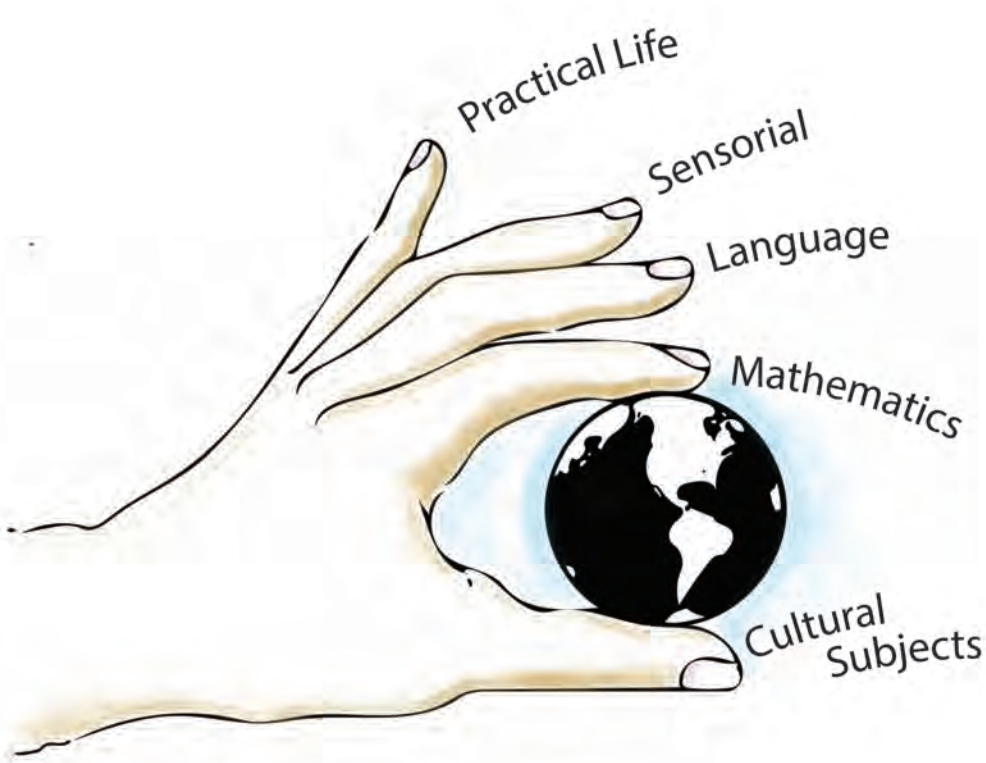
Montessori Educators International, Inc.



Biology

Early Childhood

Lesson Preparation Materials

Montessori Educators International, Inc (MEI, INC) is pleased to offer our manuals free of charge.

To obtain these resources you have submitted your email address and have hereby agreed to any and all terms laid out in our Terms of Use and Privacy Policy.

Any use of these resources is under the strict provision that the intellectual property and content contained herein are the sole property of Montessori Educators International and are in no way to be altered for resale, used for resale or any form of commercial and/or for profit use.

If you have questions about usage and permissions, please contact us for more information.

MEI, INC
2123 Stonybrook Rd
Louisville, TN 37777

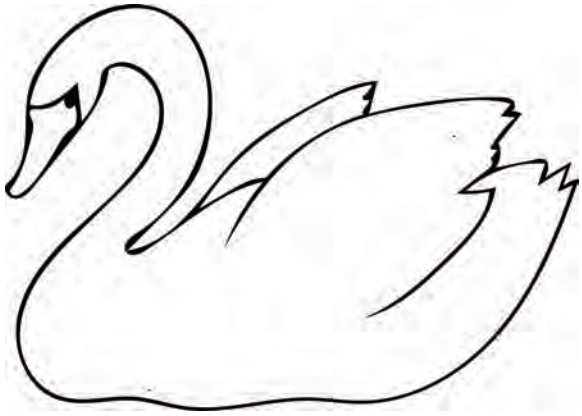
865-982-8687

aledendecker@att.net

MEI, Inc. **Biology** **Early Childhood**

Lesson Preparation Materials

Material Number of pages

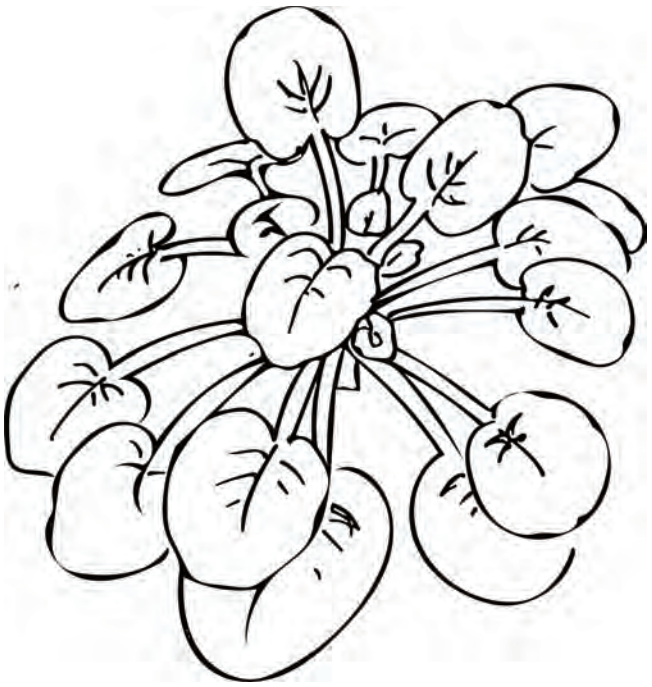


protoctista

fungi

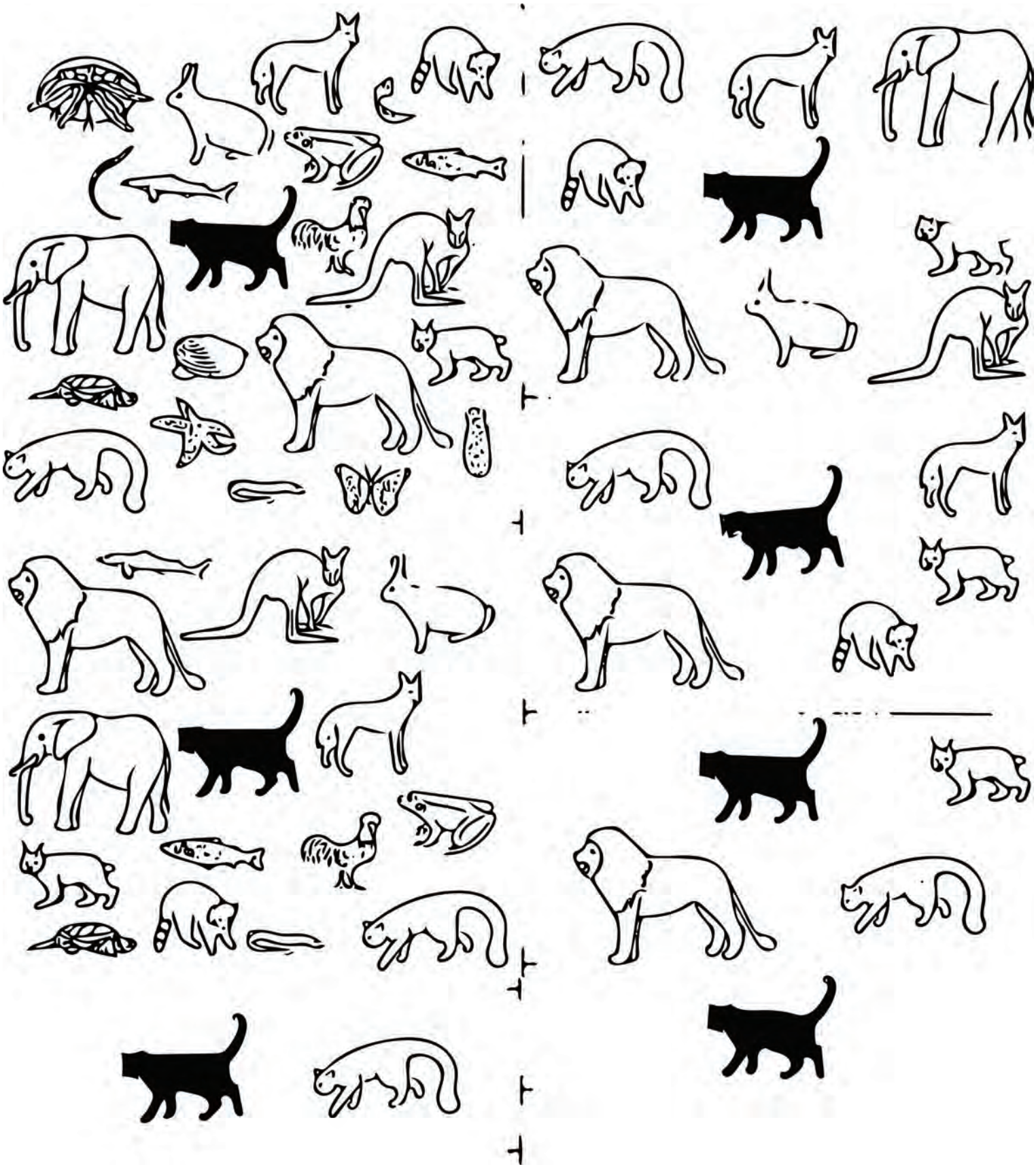
prokaryotae

animalia



plantae

Kingdom	Kingdom
Phylum	Phylum
Class	Class
Order	Order
Family	Family
Genus	Genus
Species	Species



Carolus Linnaeus

Carolus Linnaeus is the Latin name used by Carl von Linne. He was born in Sweden in 1707. Even as a child of eight he loved flowers. His studies at universities qualified him in medicine, but he became a professor of botany at University of Uppsala in Sweden.

Linnaeus kept careful notes about plants. He wrote more than one hundred eighty books in Latin from his notes.

In 1753, Linnaeus developed the scientific method for naming plants. His scientific method for naming animals was developed in 1758 and 1759.

Linnaeus created an international language for naming plants and animals. He used Latin from the Renaissance period. This allows biologists throughout the world to understand classification and to communicate.

Linnaeus developed a system of binomial nomenclature. All living things are given two names. The first name is the genus or group name. The second name is the species or kind.

For example, in classifying man, Homo sapiens is the name given to modern man. Homo means man and sapiens means wise. Homo erectus means upright man.

The books written by Linnaeus are in the library of the Linnaen Society of London, England.

Porifera
Characterized by many pores, these holes open into canals through which water flows.

Cnidaria
Primarily marine animals, they are radially symmetrical.

Platyhelminthes
The flatworms are ribbon shaped and soft bodied.

Nematqda
Roundworms move by bending or flipping.

BrachiopQda
Existing since the Paleozoic Era, the shells of these marine animals are not symetrical.

Mollusca
Living in a moist environment, these soft bodied animals have external or internal shells.

Annelida
Distinguished by ringlike segments, they live in fresh or salt water as well as on land.

Arthropoda
With the largest number of species in the animal kingdom, they have segmented bodies and appendages.

Echinodermata
These are all marine animals with tube feet used for locomotion, food handling and respiratron.

Chordata
All have a single dorsal nerve cord or notochord and gill slits in the pharynx during some stage of the life cycle

Characterized by many pores, these holes open into canals through which water flows.

Primarily marine animals, they are radially symmetrical.

The flatworms are ribbon shaped and soft bodied.

Roundworms move by bending or flipping.

Existing since the Paleozoic Era, the shells of these marine animals are not symetrical.

These are all marine animal with tube feet for locomotion, food handling and respiration.

Living in a moist environment, these soft bodied animals have external or internal shells.

All have a single dorsal nerve cord or notochord and gill slits in the pharynx during some stage of the life cycle.

Distinguished by ring-like segments, they live in fresh or salt water as well as on land.

With the largest number of species in the animal kingdom, they have segmented bodies and appendages.

Porifera

Chordata

Cnidaria

Platyhelminthes

Nematoda

Brachiopoda

Moflusca

Annelida

Arthropoda

Echinodermata

Porifera

Cnidaria

Platyhelminthes

Nematoda

Brachiopoda

Mollusca

Annelida

Arthropoda

Echinodermata

Chordata

phylum Porifera, class Demospongiae, sponge

ostia
These pores open into canals through which water passes.

spicules
A type of skeleton, the composition is siliceous or spongin.

osculum
This is the opening to the central cavity through which water is ejected.

phylum Cnidaria, class Scyphozoa, jellyfish

epidermis
The outer surface is covered by this.

exumbrella
This is the top or aboral side which is convex in shape.

subumbrella
This is the bottom or oral side which is concave in shape.

tentacles
These surround the edge where the exumbrella and subunibrella join.

tentaculocyst
The sense organ consists of an eyespot sensitive to light and a hollow statocyst for equilibrium. There are mineral particles in the tips which act as weights. Nearby are two olfactory pits for smelling.

marginal lappets
Located on either side of the tentaculocyst, they are on the edge with the tentacles.

oral lobes
Hanging from each corner of the square mouth, they contain nematocysts which paralyze prey.

mouth
Food enters through ciliated groves in the lobes. Waste products are expelled through it.

phylum Platyhelminthes, class Turbellaria, planaria

head
Triangular in shape, it contains the eyes.

eyespots
Two are located on the dorsal side of the head near the midventral line, giving the animal a cross-eyed appearance.

mouth
It is located in the center on the ventral side.

genital pore
This is located behind the mouth and is the external opening of the reproductive system.

pharynx
Also called the proboscis, it can be extended from the mouth to capture prey.

auricles
These are two lateral lobes which give the head a triangular appearance. They function as organs to detect odors.

epidermis
The animal has ciliated skin.

phylum Nematoda, class Enopla, roundworm

mouth
The beginning of the digestive system, it is located between three lips.

cuticle
This is the body covering.

genital pore
Located about one third the distance from the head end, it serves in the reproductive process.

anal pore
This ventral slit is near the posterior end. Waste Is eliminated through it.

phylum Brachiopoda, terebratulina

dorsal valve
The smaller shell is on the bottom.

ventral valve
The larger shell is on the top.

peduncle
This fleshy organ attaches the animal to the sea bottom or to some object.

lophophore
Horseshoe-shaped, it has long ciliated tentacles and a mouth in the middle.

tentacles
These ciliated appendages are used for food getting and for respiration.

mouth
Opening in the lophophore, it takes in food and leads into a gullet

phylum Mollusca, class Pelecypoda, clam

valves
The left and right sections of the shell are symmetrical.

hinge
This connects the two halves of the shell.

ligament
This part of the hinge draws the valves together.

umbra
It is the raised knob beside the hinge. Concentric lines of growth surround it.

incurrent aperture
Water and suspended food enter the body through this.

excurrent aperture
Waste and water which has been cycled through the gills are excreted through it.

foot
Being tough and muscular, it has glands which secrete mucus to assist movement Contractions allow locomotion as well as digging and anchoring into sand or mud.

mouth
This is the opening to the digestive system.

phylum Annelida, class Clitellata, earthworm

metamere
Grooves divide the body into 100 to 175 segments.

mouth
This is the beginning of the digestive system.

anus
Located in the last segment, it ends the digestive system. Waste is eliminated through it.

clitellum
This is a thickened ring behind the sex organs. It secretes mucus in Which fertilization of eggs occurs.

setae
Four pairs are located on each segment, except the first and last These bristlelike rods grip the dirt.

phylum Arthropoda, class Insecta, butterfly

head
Consisting of five or six segments fused together, it has a pair of compound eyes, a pair of antennae and oscelli.

thorax
This part has a pair of wings and three segments each having a pair of legs.

abdomen
Composed of ten or eleven segments connected by flexible membranes, it is the hindmost part of the body.

wings
These are attached to the thorax and are used for flight. There are two pairs. Overlapping scales cover them.

antennae
Attached to the head, there is a knob at the end of each. They are used as sense organs.

phylum Echinodermata, class Asteroidea, sea star

ossicles
These have projecting spines on the exterior of the body.

pedicellariae
Pincerlike spines are grouped in rosettes.

rays
Long arms allow movement and catch prey.

central disc
This is the midsection of the body where the rays are attached.

tube feet
Assisting with locomotion, these project from the rays.

madreporite
Located on the aboral surface, the opening acts as a sieve into the water-vascular system.

anus
This is the opening on the aboral surface through which wastes are excreted.

eyespots
These red spots mark the position of the ocelli which react to light but do not form images. They are located on the tips of each ray.

dermal branchiae
Skin gills function in respiration. They are between the pedicellariae.

tentacle
There is one on the tip of each ray.

phylum **chordata, class Mammalia, cat**

nape
Cats often use their mouths to carry their kittens by this part of the neck.

whiskers
Growing on the chin, on either side of the mouth and above the eyes, these are highly sensitive organs of touch.

eyes
Pupils contract into vertical slits as protection from bright light. In dim light, the pupils widen to allow better vision.

ears
Near the top of the skull, these are able to move independently. They aim in the direction of a sound to improve hearing.

dewclaw
This thumblike toe is on each forepaw.

tail
An extension of the backbone, it is a flexible appendage which helps the cat twist its body so that it lands on its feet in the event of a fall.

heels
Because of the exuaordinary length of the cat's foot, these are higher on the leg than in most mammalia.

nostrils
Located on either side of the nose, they allow the cat to smell.

mouth
This opening in the head permits catching prey and eating.

forelegs
These are located at the front end of the animal.

hind legs
These are located at the back end of the animal.

Parts of Chordates

phylum Porifera, class Demospongiae, sponge

ostia

spicules

osculum

phylum Cnidaria, class Scyphozoa, jellyfish

epidermis

exumbrella

subumbrella

tentacles

tentaculocyst

marginal lappets

oral lobes

mouth

phylum Platyhelminthes, class Turbellaria, planaria

head

eyespots

mouth

genital-pore

pharynx

auricles

epidermis

phylum Nematoda, class Enopla, roundworm

mouth

cuticle

genital pore

anal pore

phylum Brachiopoda, terebratulina

dorsal valve

ventral valve

peduncle

lophophore

tentacles

mouth

phylum Mollusca, class Pelecypoda, clam

valves

hinge

ligament

umbra

incurrent aperture

excurrent aperture

foot

mouth

phylum Annelida, class Clitellata, earthworm

metamere

mouth

anus

clitellum

setae

phylum Arthropoda, class Insecta, butterfly

head

thorax

abdomen

wings

antennae

phylum Echinodermata, class Asteroidea, sea star

ossicles

pedicellariae

rays

central disc

tube feet

madreporite

anus

eyespots

dermal branchiae

tentacle

phylum chordata,
class Mammalia, cat

nape

whiskers

eyes

ears

dewclaw

tail

heels

nostrils

mouth

forelegs

hind legs

These pores open into canals through which water passes.

This is the top or aboral side which is convex in shape.

A type of skeleton, the composition is siliceous or spongin.

This is the bottom or oral side which is concave in shape.

This is the opening to the central cavity through which water is ejected.

These surround the edge where the exumbrella and subumbrella join.

The outer surface is covered by this.

The sense organ consists of an eyespot sensitive to light and a hollow statocyst for equilibrium. There are mineral particles in the tips which act as weights. Nearby are two olfactory pits for smelling.

Located on either side of the tentaculocyst, they are on the edge with the tentacles.

Two are located on the dorsal side of the head near the midventral line, giving the animal a cross-eyed appearance.

Hanging from each corner of the square mouth, they contain nematocysts which paralyze prey.

It is located in the center on the ventral side.

Food enters through ciliated groves in the lobes. Waste products are expelled through it.

This is located behind the mouth and is the external opening of the reproductive system.

Triangular in shape, it contains the eyes.

Also called the proboscis, it can be extended from the mouth to capture prey.

These are two lateral lobes which give the head a triangular appearance. They function as organs to detect odors.

Located about one third the distance from the head end, it serves in the reproductive process.

The animal has ciliated skin.

This ventral slit is near the posterior end. Waste is eliminated through it.

The beginning of the digestive system, it is located between three lips.

The smaller shell is on the bottom.

This is the body covering.

The larger shell is on the top.

This fleshy organ attaches the animal to the sea bottom or to some object.

The left and right sections of the shell are symmetrical.

Horseshoe-shaped, it has long ciliated tentacles and a mouth in the middle.

This connects the two halves of the shell.

These ciliated appendages are used for food getting and for respiration.

This part of the hinge draws the valves together.

Opening in the lophophore, it takes in food and leads into a gullet.

It is the raised knob beside the hinge. Concentric lines of growth surround it.

Water and suspended food enter the body through this.

Grooves divide the body into 100 to 175 segments.

Waste and water which has been cycled through the gills are excreted through it.

This is the beginning of the digestive system.

Being tough and muscular, it has glands which secrete mucus to assist movement. Contractions allow locomotion as well as digging and anchoring into sand or mud.

Located in the last segment, it ends the digestive system. Waste is eliminated through it.

This is the opening to the digestive system.

This is a thickened ring behind the sex organs. It secretes mucus in which fertilization of eggs occurs.

Four pairs are located on each segment, except the first and last. These bristlelike rods grip the dirt.

These are attached to the thorax and are used for flight. There are two pairs. Overlap-ping scales cover them.

Consisting of five or six segments fused together, it has a pair of compound eyes, a pair of antennae and oscelli.

Attached to the head, there is a knob at the end of each. They are used as sense organs.

This part has a pair of wings and three segments each having a pair of legs.

These have projecting spines on the exterior of the body.

Composed of ten or eleven segments connected by flexible membranes, it is the hindmost part of the body.

Pincerlike spines are grouped in rosettes.

Long arms allow movement and catch prey.

This is the opening on the aboral surface through which wastes are excreted.

This is the midsection of the body where the rays are attached.

These red spots mark the position of the ocelli which react to light but do not form images. They are located on the tips of each ray.

Assisting with locomotion, these project from the rays.

Skin gills function in respiration. They are between the pedicellariae.

Located on the aboral surface, the opening acts as a sieve into the water-vascular system.

There is one on the tip of each ray.

Cats often use their mouths to carry their kittens by this part of the neck.

This thumblike toe is on each forepaw.

Growing on the chin, on either side of the mouth and above the eyes, these are highly sensitive organs of touch.

An extension of the backbone, it is a flexible appendage which helps the cat twist its body so that it lands on its feet in the event of a fall.

Pupils contract into vertical slits as protection from bright light. In dim light, the pupils widen to allow better vision.

Because of the extraordinary length of the cat's foot, these are higher on the leg than in most mammalia.

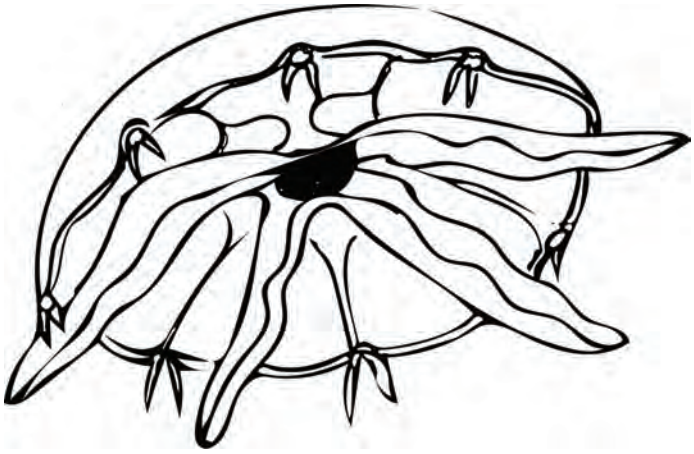
Near the top of the skull, these are able to move independently. They aim in the direction of a sound to improve hearing.

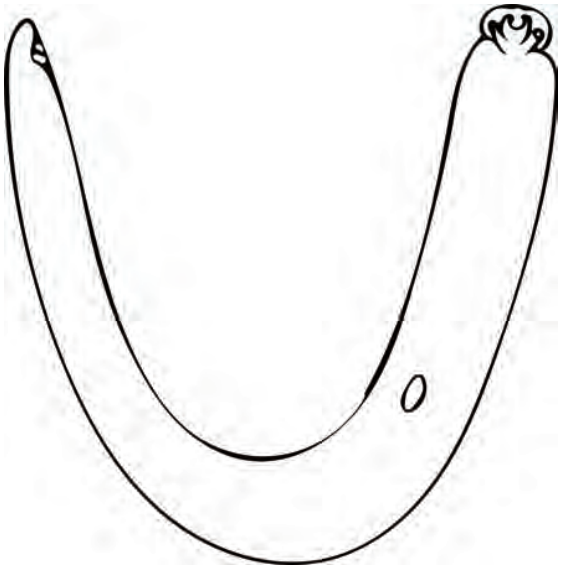
Located on either side of the nose, they allow the cat to smell.

This opening in the head permits catching prey and eating.

These are located at the front end of the animal.

These are located at the back end of the animal.



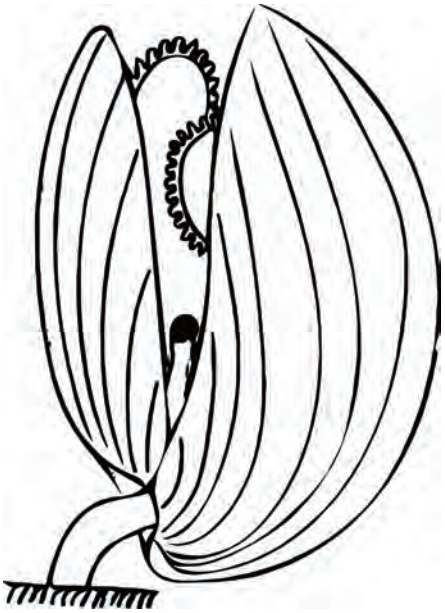


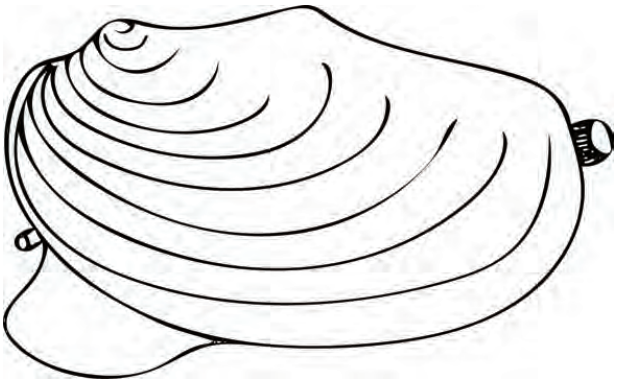
Porifera

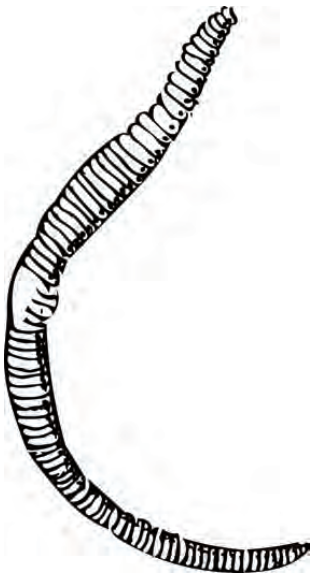
Cnidaria

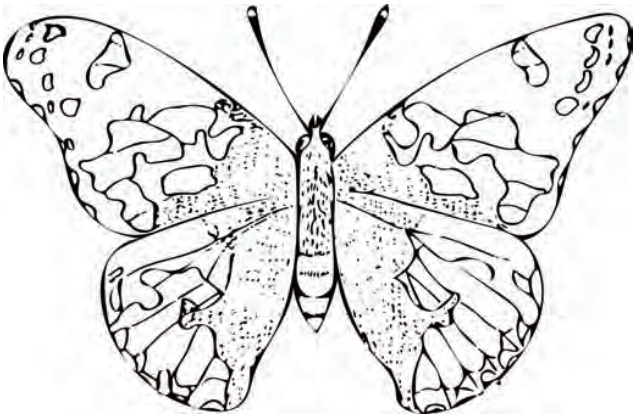
Platyhelminthes

Nematoda







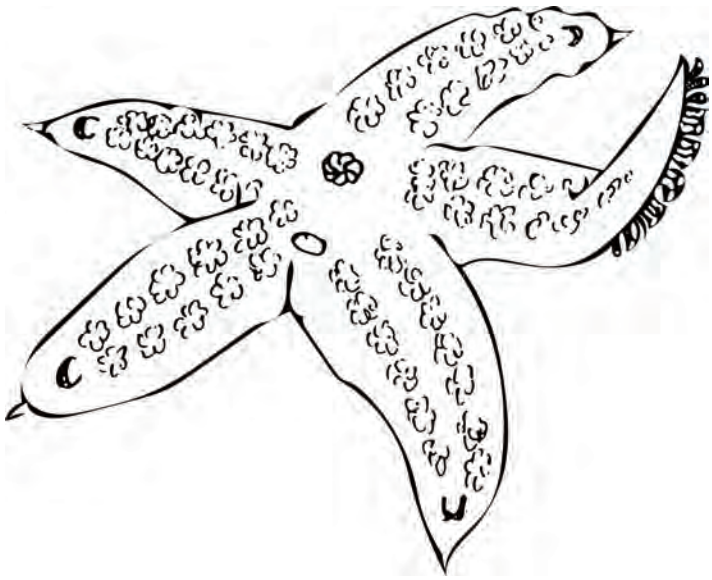


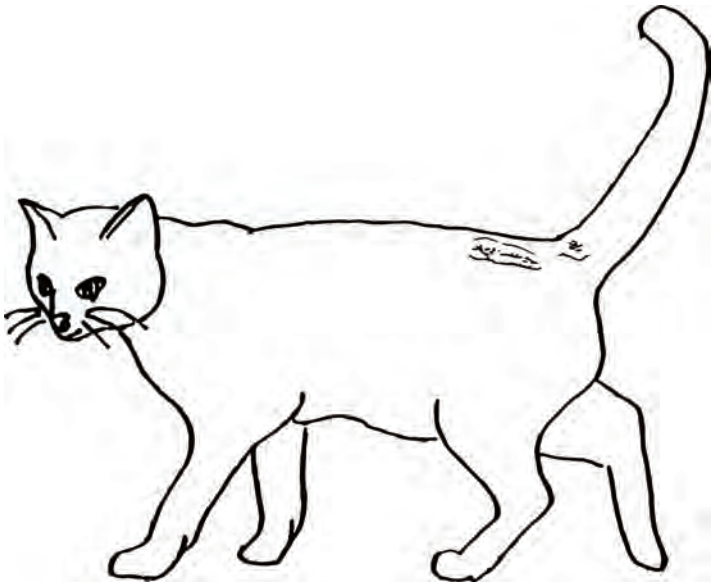
Brachiopoda

Mollusca

Annelida

Arthropoda





Echinodermata

Chordata

Life Cycle of a Sponge
White
Time Line One

Sponges may reproduce asexually by budding.

After budding, the buds break off.

The buds grow into mature sponges.

Time Line Two

Sponges may reproduce asexually by forming gemmules. The gemmules may fall off or remain attached.

Sponge cells emerge from a thin spot in the gemmule.

These cells grow by division to become adult sponges.

Sponges may reproduce sexually.

Time Line Three

Some cells enlarge with food and become female sex cells or eggs. Other cells divide to form male sex cells or sperm.

The fertilized egg divides to form a blastula which is flagellated and swims about.

After settling, the blastula attaches itself to a rock or another surface.

The larval rhagon stage develops from the blastula.

The larval rhagon develops into a mature sponge.

Life Cycle of a Jellyfish
White
In the sexual phase, eggs are shed into the gastrovascular cavity for fertilization from a male jellyfish.

Fertilized eggs or zygotes move to the oral lobes and develop into larvae.

The ciliated planula larva settles on an object such as a rock.

A scyphistoma forms to begin the asexual phase of reproduction.

The scyphistoma goes through the process of strobilation and is now a strobila.

During strobilation, buds or ephyra form. When they break loose, they turn upside down and develop into mature jellyfish.

The free-swimming medusa has an umbrella-shaped body.

Life Cycle of a Planaria
White Time Line One

In the sexual cycle, eggs are fertilized in the ovaries of an adult planaria. The fertilized eggs move down the oviducts as yolk cells are discharged.
1day
A cocoon or egg capsule forms around fewer than ten eggs and thousands of yolk cells. It passes out though the genital pore and becomes attached to an object in the water. Juvenile planaria develop inside the cocoon.
14 to 21 days
In two to three weeks, the juvenile planaria emerge from the cocoon and develop into adult planaria.

Time Line Two 2days
In asexual fission, the adult planaria constricts itself behind the pharyngeal region.
4 days
It separates into two animals.
10 days
The anterior or front part grows a new tail end. The posterior or back part grows a new head.

Life Cycle of a Roundworm
White

The adult female roundworm lays thousands of eggs each day which are passed out of the body of the host.

Eggs are enclosed in larval cysts which retain the ability to develop into adults for a period of months or years.

After being ingested, the walls of the cyst dissolve in 48 hours releasing the adult roundworm.

Life Cycle of a Brachiopod
White

Fertilization of eggs takes place in the mantle cavity. Larvae develop in the egg pouch.

Ciliated larvae are free-swimming for about twelve days.

Two segments develop.

After three segments are formed, larvae settle to the bottom.

The third or caudal segment fixes the larva to an object such as a rock and becomes the peduncle.

Permanent attachment takes place by means of the peduncle.

The second segment folds to envelop the first or head segment.

A fold is formed that divides the shell into dorsal and ventral valves.

Bristles form along with the embryonic shell.

The adult develops setae or permanent bristles.

Life Cycle of a Clam

White
Eggs pass from the oviduct of the female clam and move to the water tubes of the gills. The eggs are fertilized and are incubated in the brood chambers which develop in the gills.
90days
A larva or glochidium forms from each egg and is discharged through the excurrent aperture into the water. The larvae form cysts and live as parasites on fish for eight to twelve weeks.
162days
After developing, the young clams break out of the cysts and fall to the bottom where they grow into mature clams.

The clam lives on the bottom until maturity.

Life Cycle of a Earthworm

White
Earthworms contain both male and female sex organs within the same animal, but the eggs of one are fertilized by another earthworm. A cocoon is formed about the clitellum and eggs are passed into it.

As the cocoon slides forward over the worm's head, the eggs are fertilized by the sperm of another worm which had been stored in the seminal receptacles. The fertilized eggs divide into zygotes.

The zygotes in the cocoon develop into embryos.
14 to 21 days
Young worms leave the cocoon in two to three weeks.

Life Cycle of a Butterfly (Painted Lady)

White
This adult butterfly lays eggs on the malva plant.
3 days
After hatching, the young larva feeds almost continuously.
7 days
Each time it sheds its covering the larva is larger.
10 days
The larva attaches itself so it can hang upside down. The last time the larva molts or sheds its covering, the pupa is seen already developed beneath.
11 days
Inside the chrysalis, metamorphosis is taking place.
18 to 20days
When the pupa molts, an adult butterfly emerges.
21 days
The wings of the butterfly must become strong before it is ready to fly.

Life Cycle of a Sea Star

White
Both eggs and sperm are produced in the same sea star. These are discharged into the water for fertilization.

The fertilized egg cell divides into two equal cells which continue to divide. The process of cell
division is known as cleavage.
8 days
As the cells continue to divide, a hollow blastula forms. This is ciliated and free-swimming.
9 days
A two-layer gastrula with rudimentary arms devel-ops from the blastula.

The advanced larva attaches to a solid object
and becomes transformed into an immature sea star.

The adult sea star can move about the ocean floor.

Life Cycle of a Cat

White
18days
The embryo results from a fertilized egg.
25days
The embryo develops within the female.
63days
After 63 days, the newborn kitten emerges.
70days
The kitten's eyes open in one week.
84days
The kitten can walk in three weeks.
120days
The kitten no longer gets milk from its mother.
245days
The cat develops into a young adult.

Life Cycle of a Sponge

Life Cycle of a Cat

Life Cycle of a Jellyfish

Life Cycle of a Planaria

Life Cycle of a Roundworm

Life Cycle of a Brachiopod

Life Cycle of a Clam

Life Cycle of an Earthworm

Life Cycle of a Butterfly

Life Cycle of a Sea Star

Sponges may reproduce asexually by budding.

After budding, the buds break off.

The buds grow into mature sponges.

Sponges may reproduce asexually by forming gemmules. The gemmules may fall off or remain attached.

Sponge cells emerge from a thin spot in the gemmule.

These cells grow by division to become adult sponges.

Sponges may reproduce sexually. Some cells enlarge with food and become female sex cells or eggs. Other cells divide to form male sex cells or sperm.

The fertilized egg divides to form a blastula which is flagellated and swims about.

After settling, the blastula attaches itself to a rock or another surface.

Fertilized eggs or zygotes move to the oral lobes and develop into larvae.

The larval rhagon stage develops from the blastula.

The ciliated planula larva settles on an object such as a rock.

The larval rhagon develops into a mature sponge.

A scyphistoma forms to begin the asexual phase of reproduction.

In the sexual phase, eggs are shed into the gastrovascular cavity for fertilization from a male jellyfish.

The scyphistoma goes through the process of strobilation and is now a strobila.

During strobilation, buds or ephyra form. When they break loose, they turn upside down and develop into mature jellyfish.

A cocoon or egg capsule forms around fewer than ten eggs and thousands of yolk cells. It passes out though the genital pore and becomes attached to an object in the water. Juvenile planaria develop inside the cocoon.

The free-swimming medusa has an umbrella-shaped body.

In two to three weeks, the juvenile planaria emerge from the cocoon and develop into adult planaria.

In the sexual cycle, eggs are fertilized in the ovaries of an adult planaria. The fertilized eggs move down the oviducts as yolk cells are discharged.

In asexual fission, the adult planaria constricts itself behind the pharyngeal region.

It separates into two animals.

The anterior or front part grows a new tail end. The posterior or back part grows a new head.

Fertilization of eggs takes place in the mantle cavity. Larvae develop in the egg pouch.

The adult female roundworm lays thousands of eggs each day which are passed out of the body of the host.

Ciliated larvae are free-swimming for about twelve days.

Eggs are enclosed in larval cysts which retain the ability to develop into adults for a period of months or years.

Two segments develop.

After being ingested the walls of the cyst dissolve in 48 hours releasing the adult roundworm.

After three segments are formed, larvae settle to the bottom.

The third or caudal segment fixes the larva to an object such as a rock and becomes the peduncle.

Bristles form along with the embryonic shell.

Permanent attachment takes place by means of the peduncle.

The adult develops setae or permanent bristles.

The second segment folds to envelop the first or head segment.

Eggs pass from the oviduct of the female clam and move to the water tubes of the gills. The eggs are fertilized and are incubated in the brood chambers which develop in the gills.

A fold is formed that divides the shell into dorsal and ventral valves.

A larva or glochidium forms from each egg and is discharged through the excurrent aperture into the water. The larvae form cysts and live as parasites on fish for eight to twelve weeks.

After developing, the young clams break out of the cysts and fall to the bottom where they grow into mature clams.

The clam lives on the bottom until maturity.Earthworms contain both male and female sex organs within the same animal, but the eggs of one are fertilized by another earthworm. A cocoon is formed about the clitellum and eggs are passed into it.

As the cocoon slides forward over the worm's head, the eggs are fertilized by the sperm of another worm which had been stored in the seminal receptacles. The fertilized eggs divide into zygotes.

The zygotes in the cocoon develop into embryos.

Young worms leave the cocoon in two to three weeks.

The adult butterfly lays eggs on the malva plant.

After hatching, the young larva feeds almost continuously.

When the pupa molts, an adult butterfly emerges.

Each time it sheds its cover-ing the larva is larger.

The wings of the butterfly must become strong before it is ready to fly.

The larva attaches itself so it can hang upside down. The last time the larva molts or sheds its covering, the pupa is seen already developed beneath.

Both eggs and sperm are produced in the same sea star. These are discharged into the water for fertilization.

Inside the chrysalis, meta-morphosis is taking place.

The fertilized egg cell divides into two equal cells which continue to divide. The process of cell division is known as cleavage.

As the cells continue to divide, a hollow blastula forms. This is ciliated and free-swimming.

The embryo develops within the female.

A two-layer gastrula with rudimentary arms develops from the blastula.
The advanced larva attaches to a solid object and becomes transformed into an immature sea star.

After 63 days, the newborn kitten emerges.

The adult sea star can move about the ocean floor.

The kitten's eyes open in one week.

The embryo results from a fertilized egg.

The kitten can walk in three weeks.

The kitten no longer gets milk from its mother.

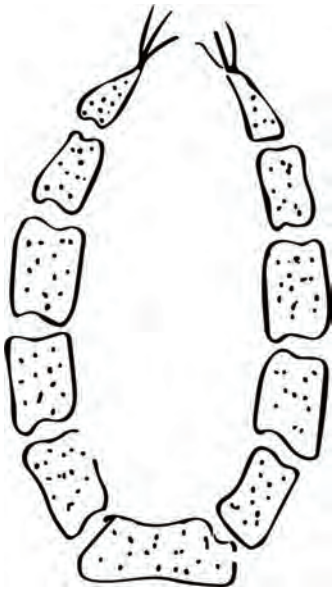
The cat develops into a young adult.

budding

detached bud

adult

gemmule

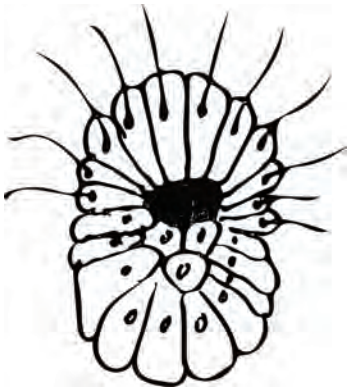


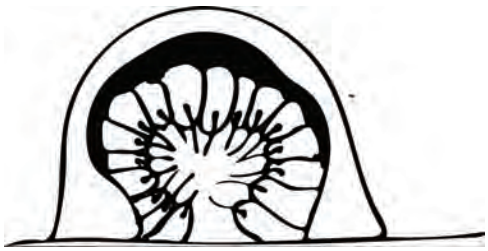
cells emerging from gemmule

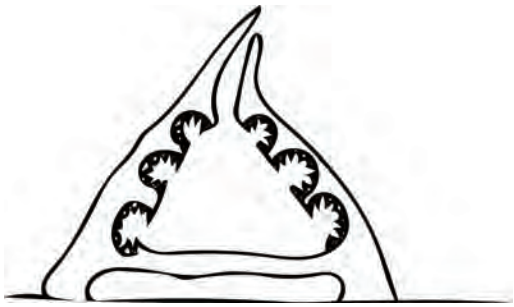
adult

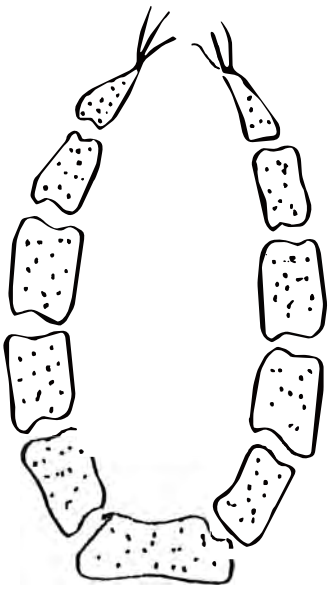
adult

sperm and egg







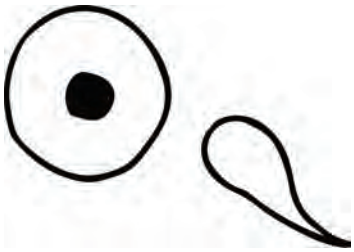


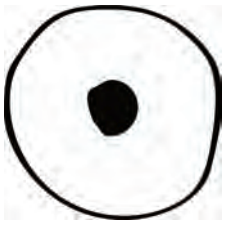
blastula

blastula after settling

larval rhagon stage

adult



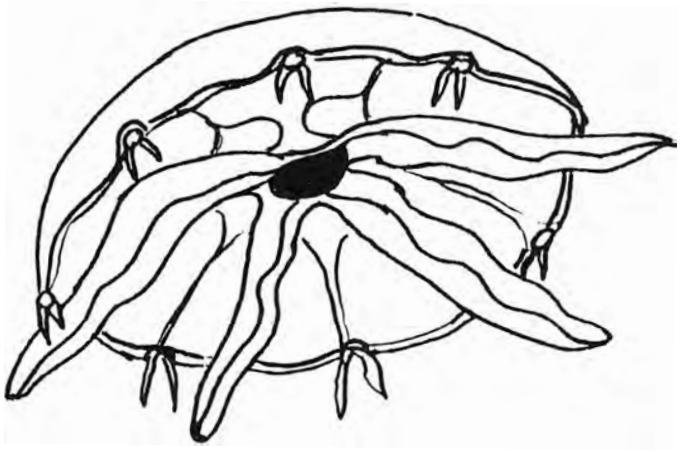


sperm and egg

zygote

ciliated planula larva

scyphistoma

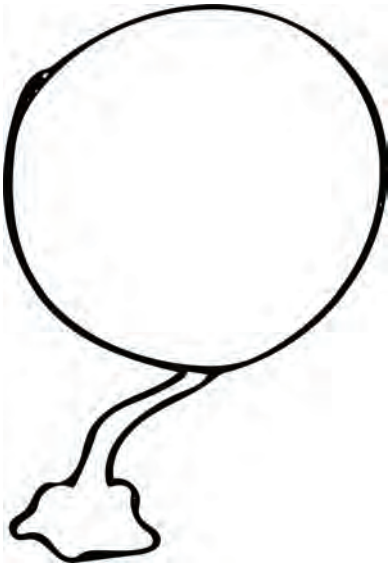


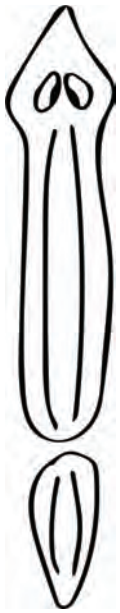
strobila

strobila with ephyra

young adult

adult



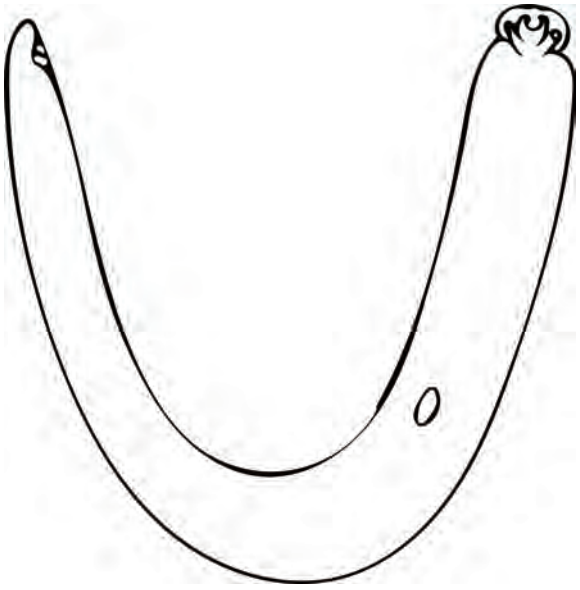


cocoon

juvenile emerging

thinning

division

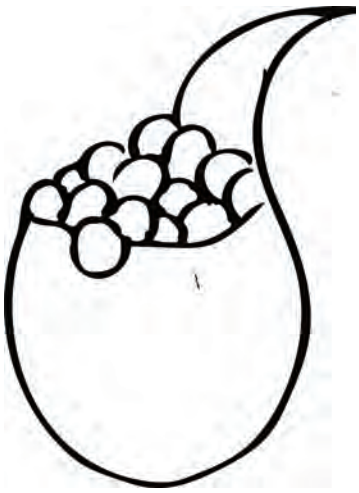


regeneration

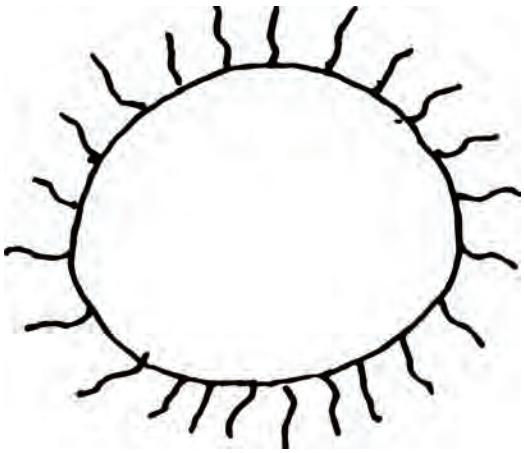
egg

larval cyst

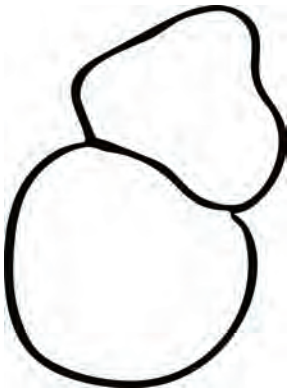
young adult



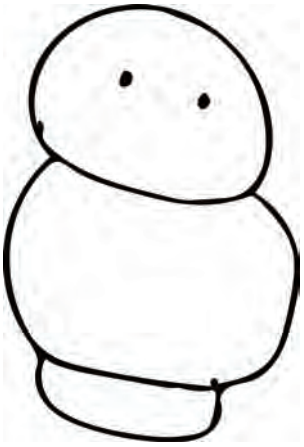
egg pouch



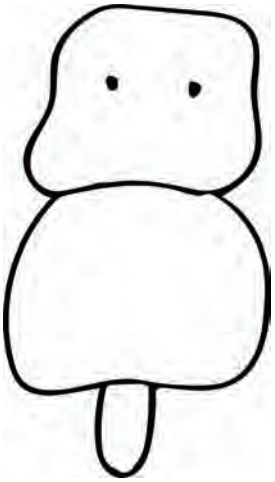
ciliated larva

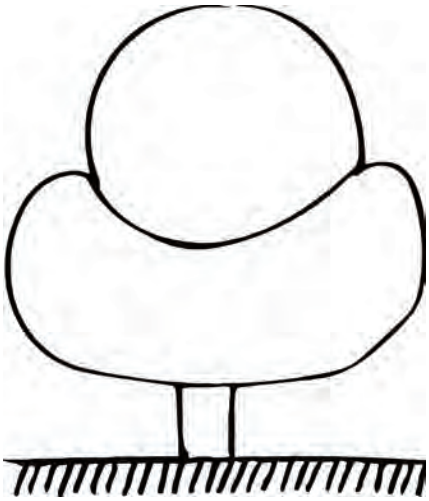


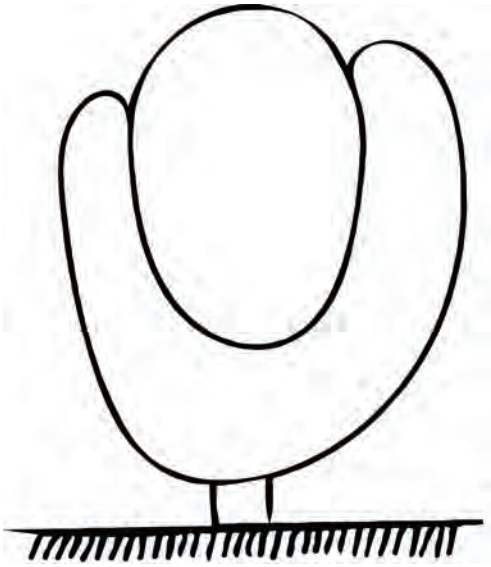
two segments

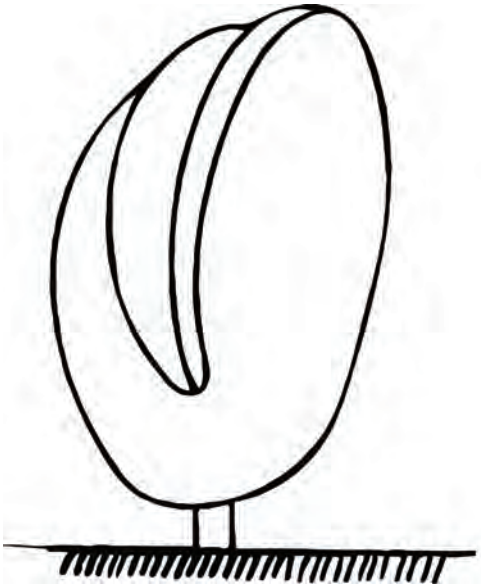


three segments







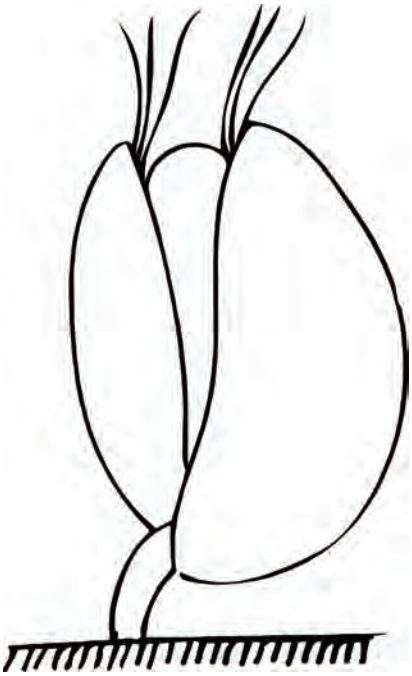


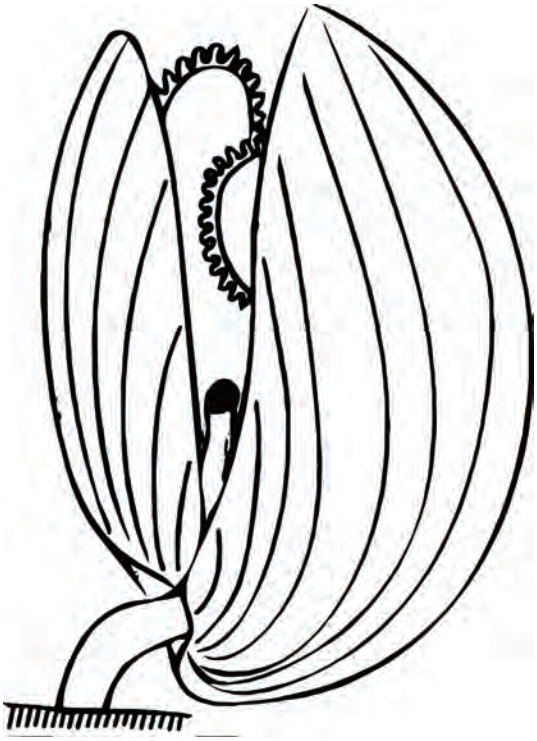
segment becomes stem

permanent attachment

early segment folding

segment folding



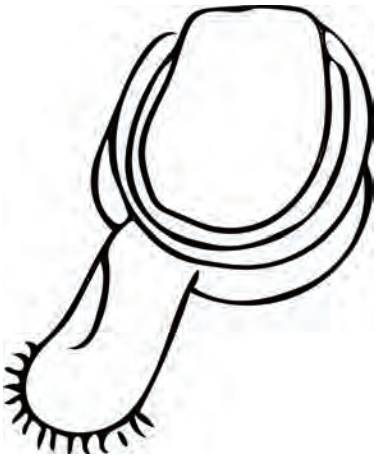


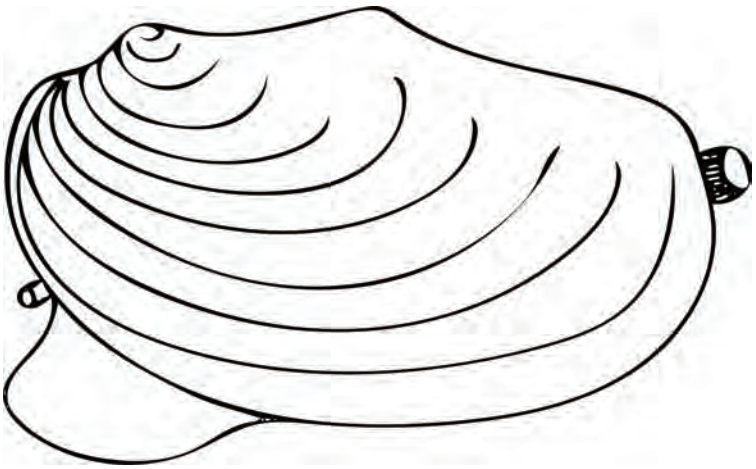
shell with bristle

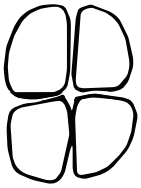
young adult

egg

glachidium





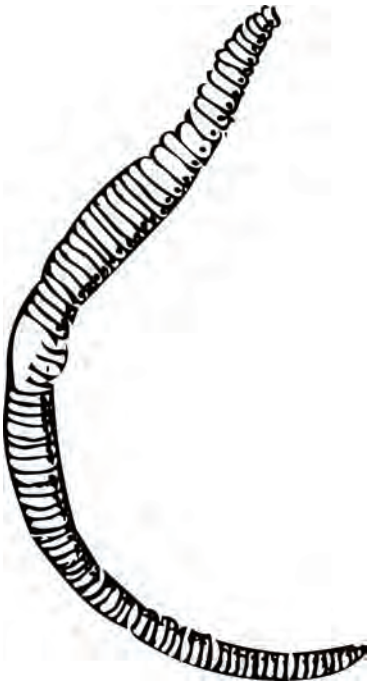


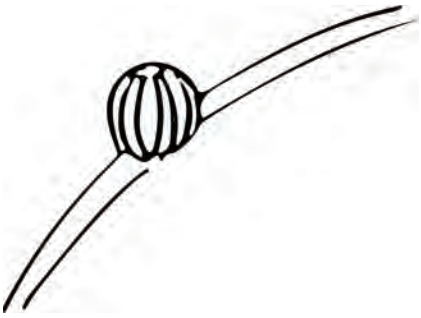
young clam

young adult

egg

zygote



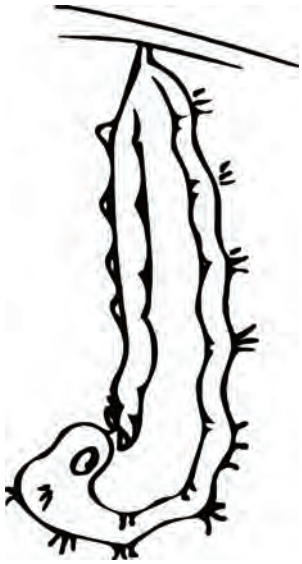


cocoon with embryo

young adult

egg

young larva

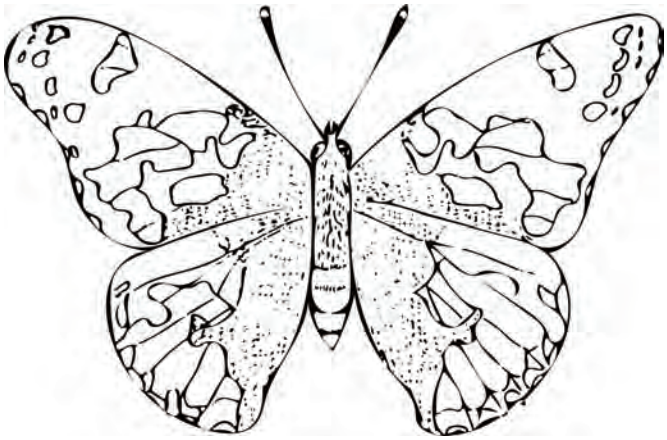


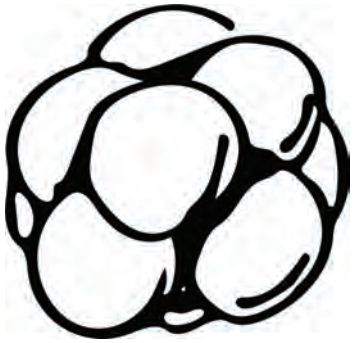
larva

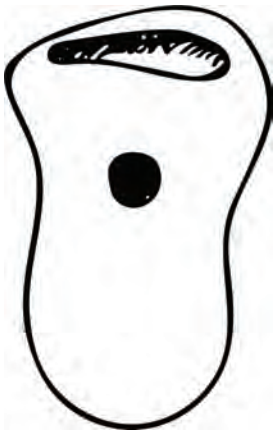
attachment

pupal stage (chrysalis)

pupa molting





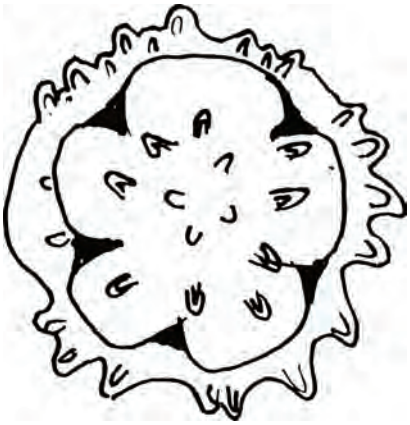


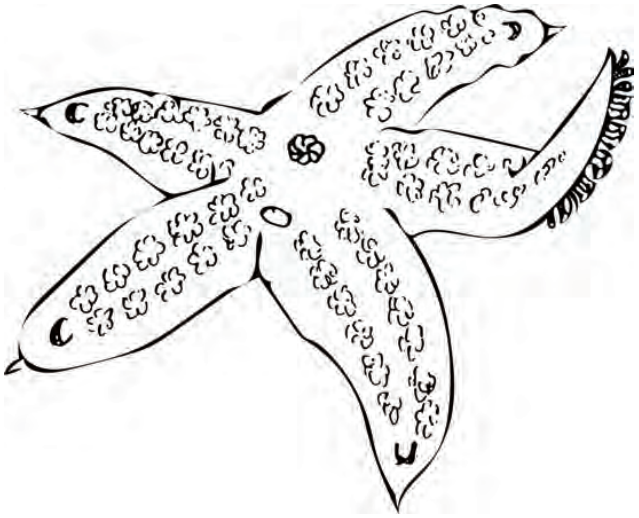
young adult

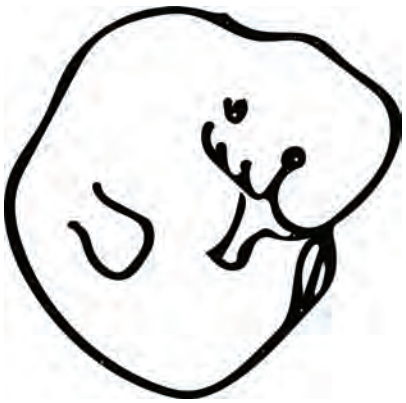
egg

cleavage

blastula





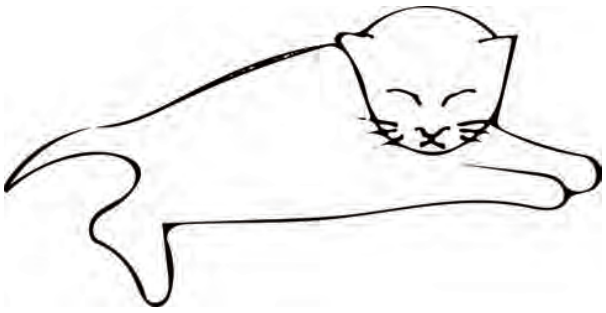


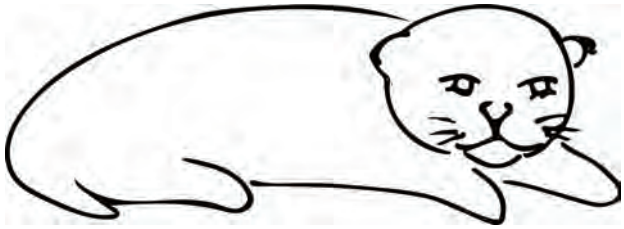
gastrula

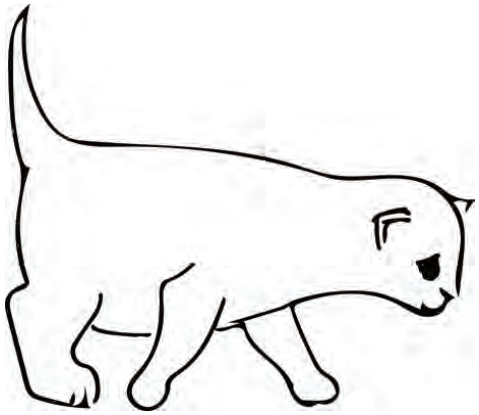
immature sea star

sea star

embryo





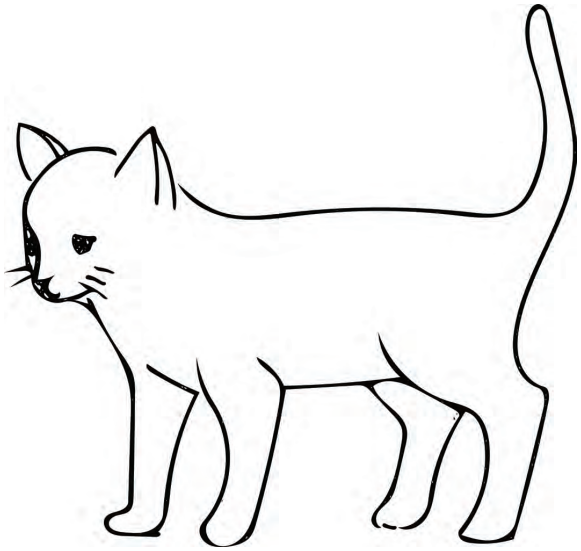


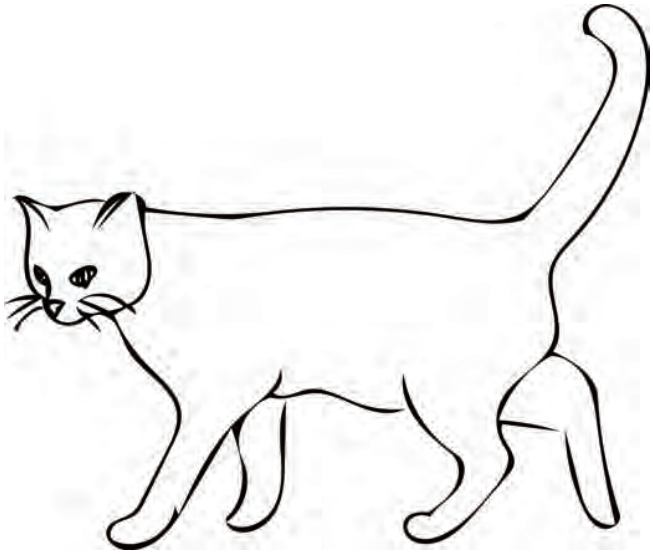
developing embryo

newborn kitten

eyes open

walking kitten





weaned kitten

young adult

Cyclostomata
jawless fish lacking scales and having round suction cup mouths, such as lampreys, slime eels

Chondrichthyes
fish which have cartilaginous skeletons, such as sharks and skates

Osteichthyes
bony fish with scales, such as perch

Amphibia
animals lacking scales which spend part of their life cycle in water, respiring through gills and respiring through skin, lungs or mouth lining on land, such as frogs, toads and salamanders

Reptilia
animals which breathe through lungs and have dry skin covered with scales, such as turtles, snakes, lizards and crocodiles

Aves
birds which have scaly skin with feathers, generally have wings for flying, and lack teeth, such as chickens, robins, and cardinals

Mammalia
animals which develop from fertilized eggs usually inside the female who secretes milk to nourish the young, which have hair-covered skin at some stage of life, and complex teeth, such as cows, humans, and dogs

Cyclostomata

Chondrichthyes

Osteichthyes

Amphibia

Reptilia

Aves

Mammalia

jawless fish lacking scales and having round suction cup mouths, such as lampreys, slime eels

animals which breathe through lungs and have dry skin covered with scales, such as turtles, snakes, lizards and crocodiles

fish which have cartilaginous skeletons, such as sharks and skates

birds which have scaly skin with feathers, generally have wings for flying, and lack teeth, such as chickens, robins, and cardinals

bony fish with scales, such as perch

animals which develop from fertilized eggs usually inside the female who secretes milk to nourish the young, which have hair-covered skin at some stage of life, and complex teeth, such as cows, humans, and dogs

animals lacking scales which spend part of their life cycle in water, respiring through gills and respiring through skin, lungs or mouth lining on land, such as frogs, toads and salamanders

Cyclostomata

Chondrichthyes

Osteichthyes

Amphibia

Reptilia

Aves

Mammalia

phylum Chordata, class Cyclostomata, lamprey

gill apertures
In the larval form, water passes through these from the mouth. In the adult form, these openings allow water to be brought into the respiratory pharynx.

buccal disc
Used in the adult stage for parasitic feeding, it contains a large number of teeth.

medial fin
It stabilizes the fish, keeping it upright. It assists with steering and fast swimming.

nostril
Located on the top of the head, it opens into the olfactory sac and allows detection of odor.

phylum Chordata, class Chondrichthyes, shark

mouth
The margin is lined with several rows of sharp teeth made of dentine built on a bone-like base.

dorsal fin
Acting as a stabilizer, it keeps the fish upright and aids in fast swimming and in steering.

lateral line
Found on both sides of the body, it can detect pressure changes caused by disturbances in the water.

pelvic fins
Located on the underside of the fish toward the tail, they aid in swimming. These correspond to hind legs of other vertebrates.

dorsal spines
These sharp, stiff projections are located in front of the dorsal fin.

pectoral fins
Located near the neck region, these correspond to forelegs of other vertebrates.

placoid scales
These cover the leathery skin.

gill slits
The respiratory current from this part is strong enough to propel the shark forward. Primarily, they absorb oxygen from water.

eyes
These allow the shark to see. They have no lids.

nostrils
They lead into a blind sac lined with olfactory receptors.

caudal fin
Found at the end of the body, it serves as a principal force of locomotion, sculling the shark forward at great speed by a side to side movement.

phylum Chordata, class Osteichthyes, perch

mouth
It contains teeth which are fused to the jaw bones.

lateral line
Small holes in a row of scales are located on both sides of the body. Pressure changes caused by disturbances in the water are detected by it.

eyes
These allow the animal to see. There are no eyelids.

dorsal fins
Used as stabilizers, these keep the fish upright and permit fast swimming and steering.

caudal fin
Found at the end of the body, it serves as a principal force for locomotion, sculling the fish rapidly forward by side to side movement.

anal fin
Located behind the anal opening, it is used as a rudder for balance and rapid movement.

scales
Formed within the dermis of the skin, these consist of an outer layer of bone and an inner layer of connective tissue. They cover the body surface and are kept slippery by mucus.

pelvic fins
Located near the bottom of the fish toward the tail, they aid in swimming.

pectoral fins
Used to control the direction of movement, they are located at the under side of the fish near the front.

operculum
This bony plate regulates the discharge of water over the gills from the pharnyx.

gill opening
Water passes through this slit and oxygen is absorbed by the gills.

nares
These are openings into the nasal pits between the mouth and the eyes. Odors are detected in the pits.

phylum Chordata, class Amphibia, frog

sacral hump
It is the rounded protrusion where the hipbones join to form the dorsal part of the pelvis.

forelegs
Although short, the feet are sometimes used to push food into the mouth. The foot has four digits. In males, the first toe has a swollen base.

hind legs
Being large, they are powered by strong muscles which enable the animal to leap. The foot has five digits with a web between the toes.

mouth
Extending from one side of the head to the other, it is the location where food enters the body.

nares
Opening into the mouth cavity, they allow breathing to occur without opening the mouth.

eyes
These are large and spherical, protruding prominently from the sides of the head. They aid in swallowing.

tympanic membranes
Located behind the eyes, these are the organs for hearing.

phylum Chordata, class Reptilia, turtle

plastron
Covering the belly, it is the ventral part of the shell.

carapace
This is the dorsal or top part of the shell.

forelegs
Used for locomotion and for digging, these front appendages are covered with scaly skin and have horny claws.

hind legs
Located at the back of the body, they are appendages for locomotion.

tail
Short and covered with thick skin, it is located at the posterior end.

head
Covered with hard scales, it can be drawn into the carapace for protection.

beak
Having no teeth, its hard, sharp edge is used to cut food.

eyes
A well-developed sense of sight is present with these organs.

nostril
This single opening makes it possible for the turtle to detect odors.

vertebral shields
These are the largest scutes which cover the top of the carapace.

marginal shields
These smaller scutes are located in a row on the rim of the carapace.

phylum Chordata class Aves, chicken

spur
Males have this bony structure on each leg.

wings
These enable chickens to fly a short distance to reach perches on which to roost or to escape enemies.

beak
Composed of upper and lower jaw bones covered by modified keratinized skin, it is used to get food since there are no teeth.

tail feathers
In most birds, these control speed and direction of flight.

toes
Used for standing, the weight of the body usually rests on the middle one.

shank
It is the lower part of the leg.

breast
The upper front part of the body, it can aid flying due to its shape which gives less resistance to the wind.

wattle
This is a fleshy appendage that hangs on the neck under the lower beak.

comb
Located on the top of the head, it is a serrated flap of flesh.

phylum Chordata, class Mammalia, cat

nape
Cats often use their mouths to carry their kittens by this part of the neck.

whiskers
Growing on the chin, on either side of the mouth and above the eyes, these are highly sensitive organs of touch.

eyes
Pupils contract into vertical slits as protection from bright light. In dim light, the pupils widen to allow better vision.

ears
Near the top of the skull, these are able to move independently. They aim in the direction of a sound to improve hearing.

dewclaw
This thumblike toe is on each forepaw.

tail
An extension of the backbone, it is a flexible appendage which helps the cat twist its body so that it lands on its feet in the event of a fall.

heels
Because of the extraordinary length of the cat's foot, these are higher on the leg than in most mammalia.

nostrils
Located on either side of the nose, they allow the cat to smell.

mouth
This opening in the head permits catching prey and eating.

forelegs
These are located at the front end of the animal.

hind legs
These are located at the back end of the animal.

phylum Chordata,
class Cyclostomata,
lamprey

gill apertures

buccal disc

medial fin

nostril

phylum Chordata,
class Chondrichthyes,
shark

mouth

dorsal fin

lateral line

pelvic fins

dorsal spines

pectoral fins

placoid scales

gill slits

eyes

nostrils

caudal fin

phylum Chordata,
class Osteichthyes,
perch

mouth	operculum
lateral line	gill opening
eyes	nares
dorsal fins	phylum Chordata, class Amphibia, frog
caudal fin	sacral hump
anal fin	forelegs
scales	hind legs
pelvic fins	mouth
pectoral fins	nares

eyes

beak

tympanic membranes

eyes

phylum Chordata,
class Reptilia,
turtle

nostril

plastron

vertebral shields

carapace

marginal shields

forelegs

phylum Chordata
class Aves, chicken

hind legs

spur

tail

wings

head

beak

tail feathers

eyes

toes

ears

shank

dewclaw

breast

tail

wattle

heels

comb

nostrils

phylum chordata,
class Mammalia, cat

mouth

nape

forelegs

whiskers

hind legs

In the larval form, water passes through these from the mouth. In the adult form, these openings allow water to be brought into the respiratory pharynx.

The margin is lined with several rows of sharp teeth made of dentine built on a bone-like base.

Used in the adult stage for parasitic feeding, it contains a large number of teeth.

Acting as a stabilizer, it keeps the fish upright and aids in fast swimming and in steering.

It stabilizes the fish, keeping it upright. It assists with steering and fast swimming.

Found on both sides of the body, it can detect pressure changes caused by disturbances in the water.

Located on the top of the head, it opens into the olfactory sac and allows detection of odor.

Located on the underside of the fish toward the tail, they aid in swimming. These correspond to hind legs of other vertebrates.

These sharp, stiff projections are located in front of the dorsal fin.

These allow the shark to see. They have no lids.

Located near the neck region, these correspond to forelegs of other vertebrates.

They lead into a blind sac lined with olfactory receptors.

These cover the leathery skin.

Found at the end of the body, it serves as a principal force of locomotion, sculling the shark forward at great speed by a side to side movement.

The respiratory current from this part is strong enough to propel the shark forward. Primarily, they absorb oxygen from water.

It contains teeth which are fused to the jaw bones.

Small holes in a row of scales are located on both sides of the body. Pressure changes caused by disturbances in the water are detected by it.

Located behind the anal opening, it is used as a rudder for balance and rapid movement.

These allow the animal to see. There are no eyelids.

Formed within the dermis of the skin, these consist of an outer layer of bone and an inner layer of connective tissue. They cover the body surface and are kept slippery by mucus.

Used as stabilizers, these keep the fish upright and permit fast swimming and steering.

Located near the bottom of the fish toward the tail, they aid in swimming.

Found at the end of the body, it serves as a principal force for locomotion, sculling the fish rapidly forward by side to side movement.

Used to control the direction of movement, they are located at the under side of the fish near the front.

This bony plate regulates the discharge of water over the gills from the pharnyx.

Although short, the feet are sometimes used to push food into the mouth. The foot has four digits. In males, the first toe has a swollen base.

Water passes through this slit and oxygen is absorbed by the gills.

Being large, they are powered by strong muscles which enable the animal to leap. The foot has five digits with a web between the toes.

These are openings into the nasal pits between the mouth and the eyes. Odors are detected in the pits.

Extending from one side of the head to the other, it is the location where food enters the body.

It is the rounded protrusion where the hipbones join to form the dorsal part of the pelvis.

Opening into the mouth cavity, they allow breathing to occur without opening the mouth.

These are large and spherical, protruding prominently from the sides of the head. They aid in swallowing.

Used for locomotion and for digging, these front appendages are covered with scaly skin and have horny claws.

Located behind the eyes, these are the organs for hearing.

Located at the back of the body, they are appendages for locomotion.

Covering the belly, it is the ven-tral part of the shell.

Short and covered with thick skin, it is located at the posterior end.

This is the dorsal or top part of the shell.

Covered with hard scales, it can be drawn into the carapace for protection.

Having no teeth, its hard, sharp edge is used to cut food.

These smaller scutes are located in a row on the rim of the carapace.

A well-developed sense of sight is present with these organs.

Males have this bony structure on each leg.

This single opening makes it possible for the turtle to detect odors.

These enable chickens to fly a short distance to reach perches on which to roost or to escape enemies.

These are the largest scutes which cover the top of the carapace.

Composed of upper and lower jaw bones covered by modified keratinized skin, it is used to get food since there are no teeth.

In most birds, these control speed and direction of flight.

This is a fleshy appendage that hangs on the neck under the lower beak.

Used for standing, the weight of the body usually rests on the middle one.

Located on the top of the head, it is a serrated flap of flesh.

It is the lower part of the leg.

Cats often use their mouths to carry their kittens by this part of the neck.

The upper front part of the body, it can aid flying due to its shape which gives less resistance to the wind.

Growing on the chin, on either side of the mouth and above the eyes, these are highly sensitive organs of touch.

Pupils contract into vertical slits as protection from bright light. In dim light, the pupils widen to allow better vision.

Because of the extraordinary length of the cat's foot, these are higher on the leg than in most mammalia.

Near the top of the skull, these are able to move independently. They aim in the direction of a sound to improve hearing.

Located on either side of the nose, they allow the cat to smell.

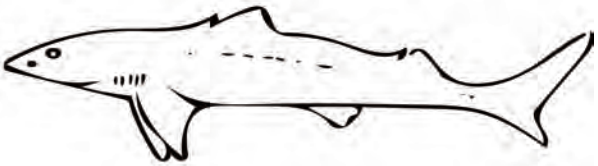
This thumblike toe is on each forepaw.

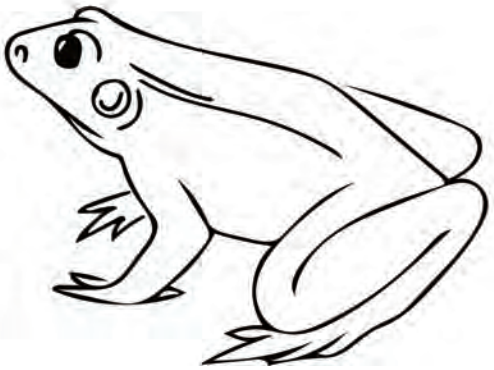
This opening in the head permits catching prey and eating.

An extension of the backbone, it is a flexible appendage which helps the cat twist its body so that it lands on its feet in the event of a fall.

These are located at the front end of the animal.

These are located at the back end of the animal.



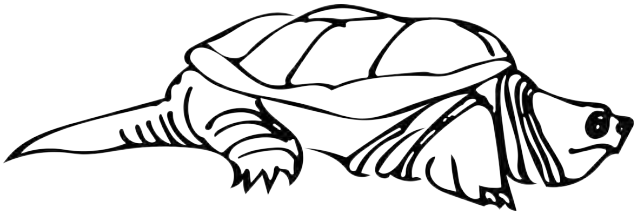


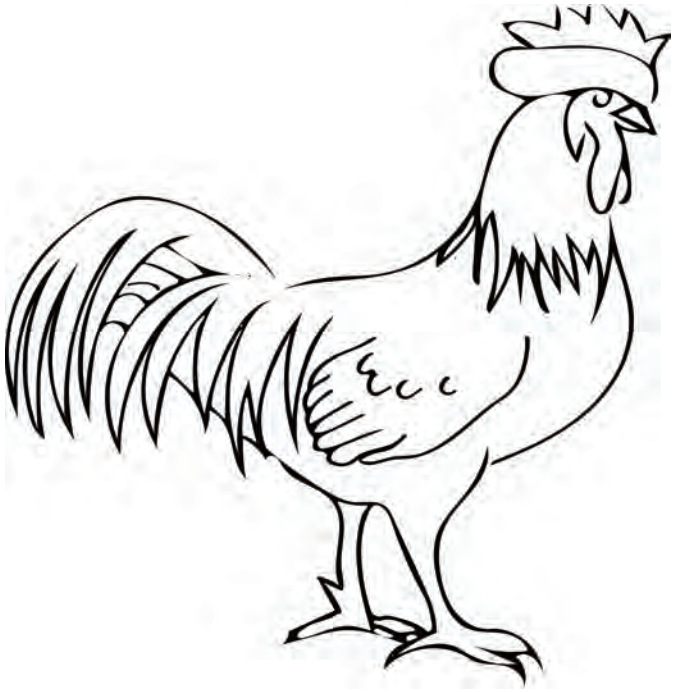
Cyclostomata

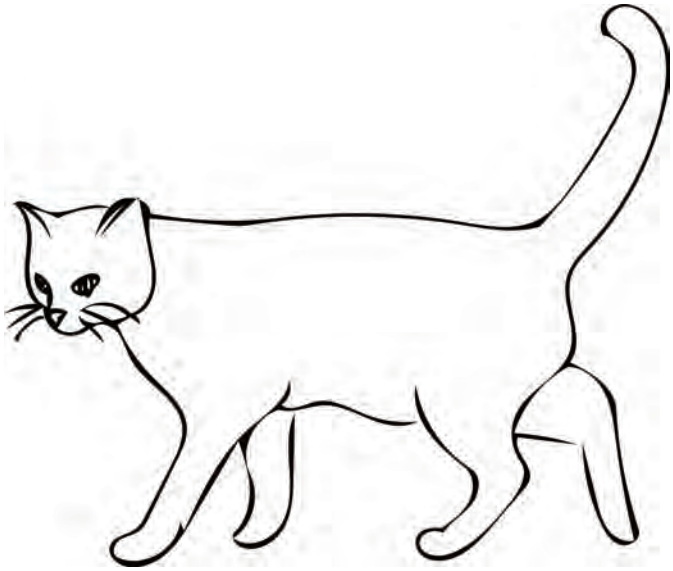
Chondrichthyes

Osteichthyes

Amphibia







Reptilia

Aves

Mammalia

Life Cycle of a Lamprey
Beige
Eggs are laid in fresh-water streams in the spring. The male makes a pit where the female lays eggs. Both adults die after spawning.
14days
In about 14 days, small larvae hatch. They stay in the nest until about one-half inch long. Then they burrow into the mud where they live from three to seven years.

In the fall, they rapidly change to adults. The adults do not eat, but live only long enough to spawn.

Life Cycle of a Shark
Beige
Although some sharks lay eggs enclosed in cases others bear live young.

The newborn shark receives food from the yoke sac.

The young shark has depleted its yolk sack.

The shark has grown to a young adult.

Life Cycle of a Perch
Beige
Eggs are usually laid and fertilized outside the body.
4days
The early embryo has clearly distinguishable eye spots.
40days
The developing embryo is nearly ready to hatch.
42days
The newly hatched fish are called fry.
252days
After 252 days, the fish develops into a young adult.

Life Cycle of a Frog
Beige
Fertilization of the eggs takes place after they have been laid in water. Each egg is enclosed in a jelly capsule.
3to 4 days
The embryo develops a head and tail.
6 to 9 days
There are external gills after the tadpole hatches in 6 to 9 days after fertilization.
18to 21days
The external gills disappear as the internal gills develop in 18 to 21 days after hatching.
60days
Hind legs grow out at the base of the tail when the tadpole is about 60 days old. The tail resorbs.
75days
Forelegs emerge behind the head at about 75 days of age.
95days
Lungs develop and the process of metamorphosis has changed the tadpole into a juvenile frog in about ninety days. The frog remains in the juvenile stage for two years.

Life Cycle of a Turtle
Beige
Eggs are fertilized internally.
30 days
The early embryo absorbs food from the yolk sac.
56days
The embryo is surrounded by a clear fluid.
84days
The embryo exchanges oxygen and carbon dioxide through the egg shell.
143days
When fully developed, the baby turtle emerges from the shell.
388days
The young adult develops in 35 weeks.

Life Cycle of a Chicken
Beige
1day
The egg cell on the egg yolk is fertilized in the oviduct. As the egg passes from the ovary through the oviduct, special glands add albumin, or egg white. Farther down the oviduct, shell membrane, shell and shell pigment are secreted around the egg before it is laid.
9days
The embryo absorbs food from the yolk . Oxygen is absorbed and carbon dioxide is excreted through the shell by means of a sac or allantois.
21days
After 21 days, the chick is ready to hatch.

The egg shell is cracked open by an egg tooth and the chick emerges, weak and wet.
22days
Shortly, the feathers dry and the chick is able to move about.
140days
The chick grows rapidly to become a young adult.

Life Cycle of a Cat
Beige
18days
The embryo results from a fertilized egg.
25days
The embryo develops within the female.
63days
After 63 days, the newborn kitten emerges.
70days
The kitten's eyes open in one week.
84days
The kitten can walk in three weeks.
120days
The kitten no longer gets milk from its mother.
245days
The cat develops into a young adult.

Life Cycle of a Lamprey

Eggs are laid in fresh-water streams in the spring. The male makes a pit where the female lays eggs. Both adults die after spawning.

Life Cycle of a Shark

Life Cycle of a Perch

Life Cycle of a Frog

In about 14 days, small larvae hatch. They stay in the nest until about one-half inch long. Then they burrow into the mud where they live from three to seven years.

Life Cycle of a Turtle

Life Cycle of a Chicken

In the fall, they rapidly change to adults. The adults do not eat, but live only long enough to spawn.

Life Cycle of a Cat

Although some sharks lay eggs enclosed in cases others bear live young.

The newborn shark receives food from the yoke sac.

The early embryo has clearly distinguishable eye spots.

The young shark has depleted its yolk sack.

The developing embryo is nearly ready to hatch.

The shark has grown to a young adult.

The newly hatched fish are called fry.

Eggs are usually laid and fertilized outside the body.

After 252 days, the fish develops into a young adult.

Fertilization of the eggs takes place after they have been laid in water. Each egg is enclosed in a jelly capsule.

Hind legs grow out at the base of the tail when the tadpole is about 60 days old. The tail resorbs.

The embryo develops a head and tail.

Forelegs emerge behind the head at about 75 days of age.

There are external gills after the tadpole hatches in 6 to 9 days after fertilization.

Lungs develop and the process of metamorphosis has changed the tadpole into a juvenile frog in about ninety days. The frog remains in the juvenile stage for two years.

The external gills disappear as the internal gills develop in 18 to 21 days after hatching.

Eggs are fertilized internally.

The early embryo absorbs food from the yolk sac.

The young adult develops in 35 weeks.

The embryo is surrounded by a clear fluid.

The egg cell on the egg yolk is fertilized in the oviduct. As the egg passes from the ovary through the oviduct, special glands add albumin, or egg white. Farther down the oviduct, shell membrane, shell and shell pigment are secreted around the egg before it is laid.

The embryo exchanges oxygen and carbon dioxide through the egg shell.

The embryo absorbs food from the yolk . Oxygen is absorbed and carbon dioxide is excreted through the shell by means of a sac or allantois.

When fully developed, the baby turtle emerges from the shell.

After 21 days, the chick is ready to hatch.

The egg shell is cracked open by an egg tooth and the chick emerges, weak and wet.

The embryo develops within the female.

Shortly, the feathers dry and the chick is able to move about.

After 63 days, the newborn kitten emerges.

The chick grows rapidly to become a young adult.

The kitten's eyes open in one week.

The embryo results from a fertilized egg.

The kitten can walk in three weeks.

The kitten no longer gets milk from its mother.

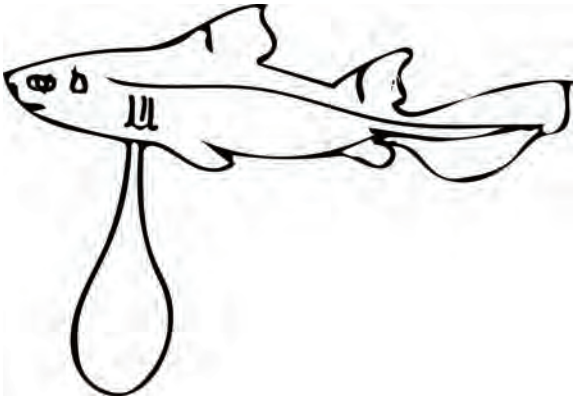
The cat develops into a young adult.

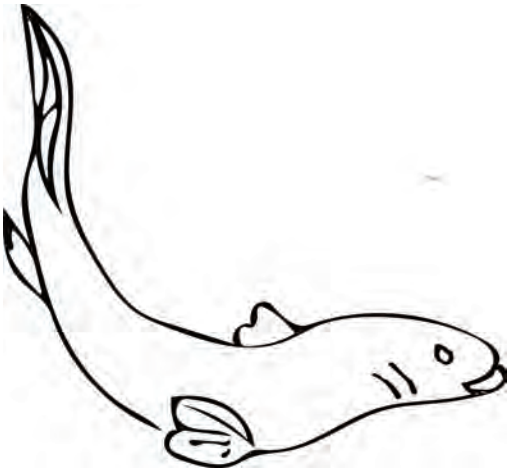
nest of eggs

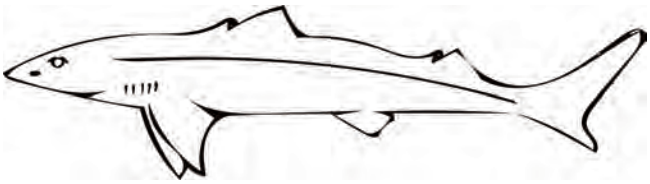
larva

adult

egg





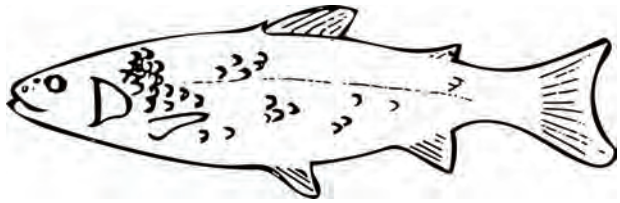


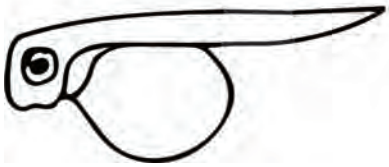
embryo with yolk sac

newborn

young adult

egg



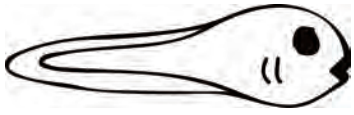


early embryo

developing embryo

fry

young adult

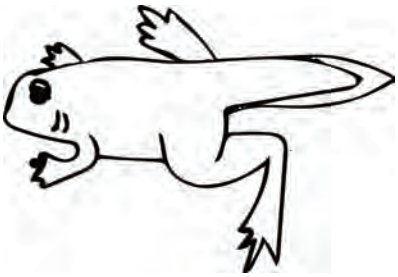


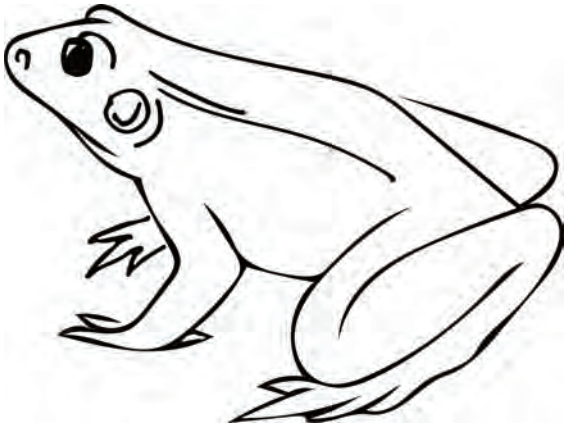
egg

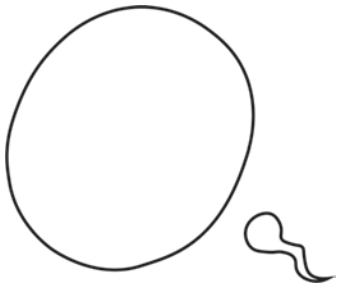
embryo

external gills

internal gills







hind legs

both sets of legs

young adult

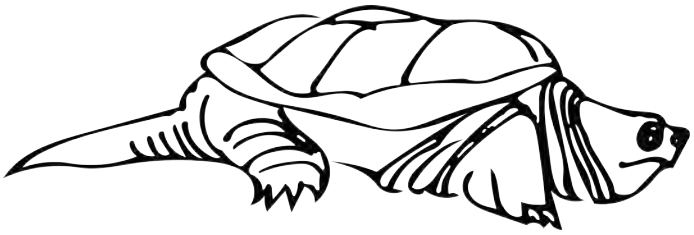
internal fertilization

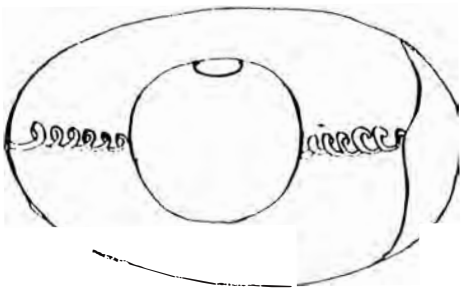
early embryo

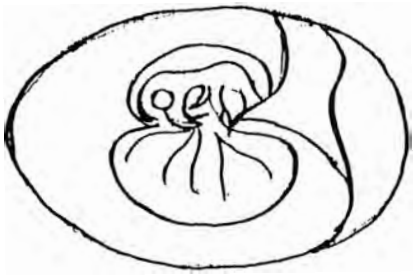
embryo

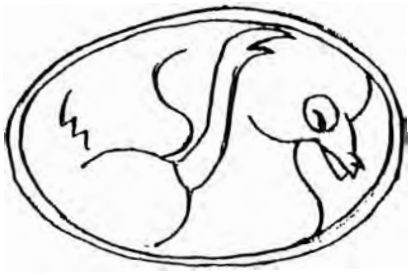
embryo with shell

ready to hatch







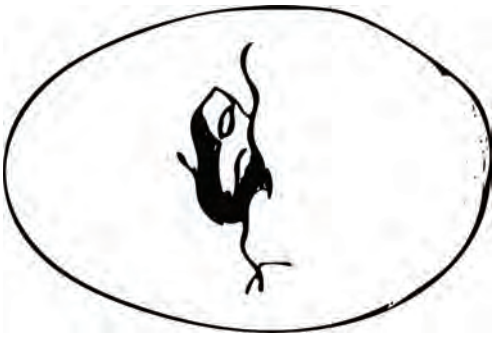


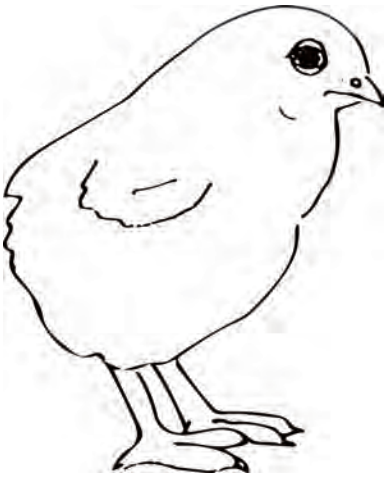
young adult

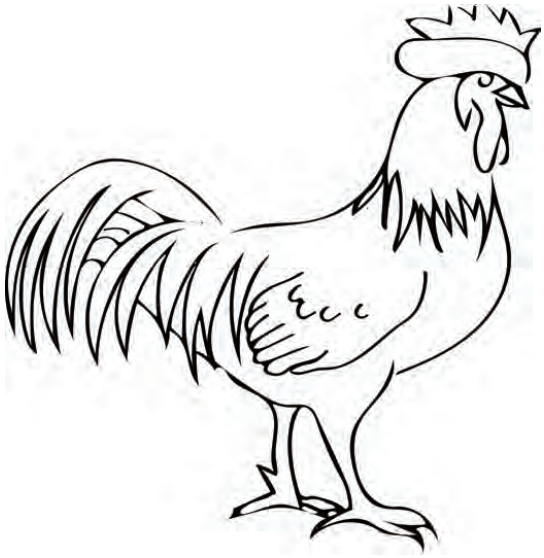
fertilized egg

developing embryo

ready to hatch



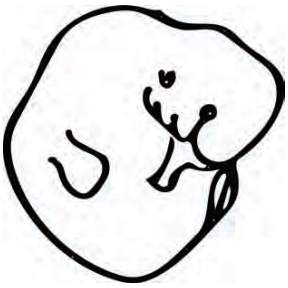


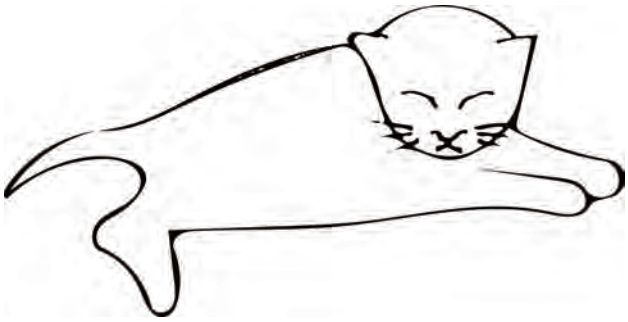


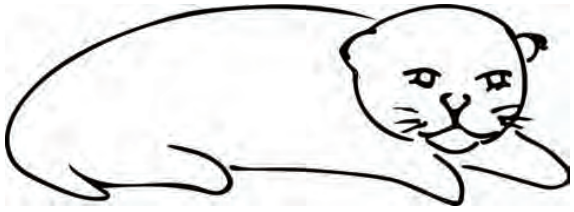
hatching

chick

young adult





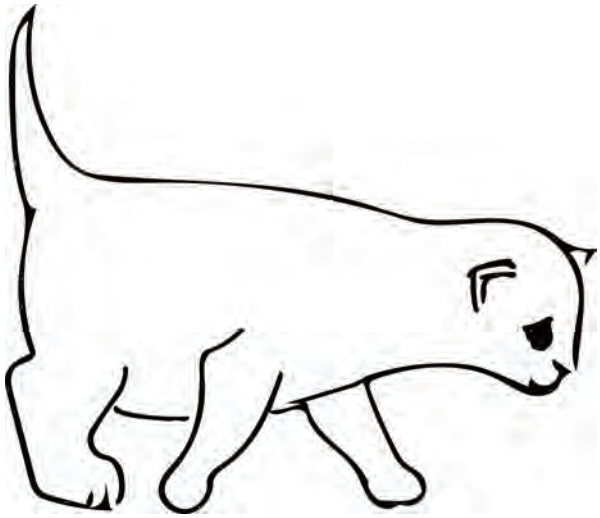


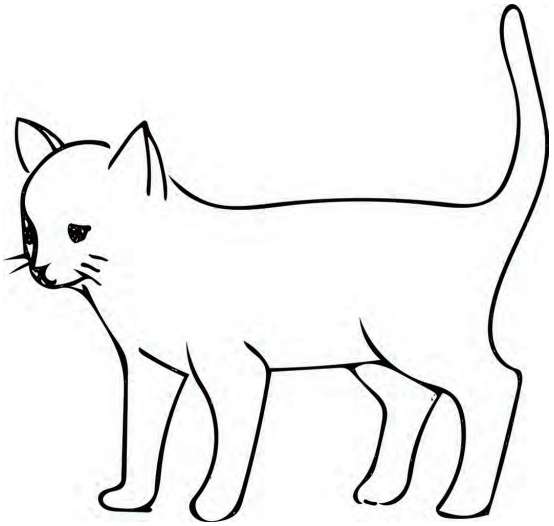
embryo

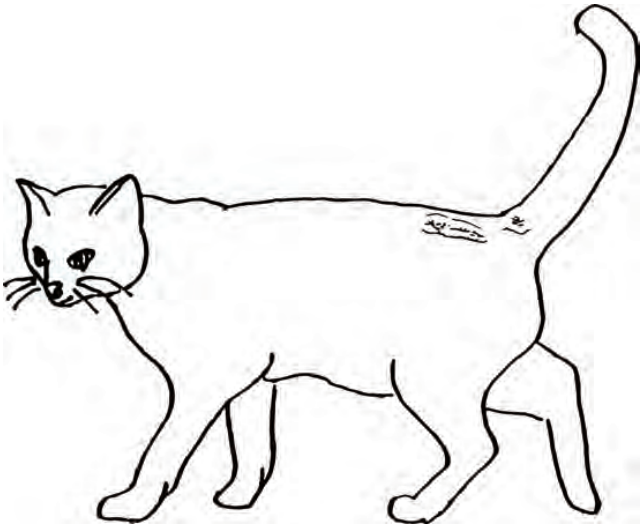
developing embryo

newborn kitten

eyes open







walking kitten

weaned kitten

young adult

parts of the
body torso
arms
legs
head

parts of the
torso chest
shoulders
waist
hips
abdomen
pelvis
buttocks
back
navel

parts of the arm
elbow
wrist
hand
forearm
upper arm

parts of the hand
palm
nails
fingers
thumbs knuckles

parts of the
foot arch
instep
sole
heel
ball
toenails
toes

parts of the leg
knee
ankle
thigh
calf
shin
foot

parts of the head
neck
chin
hair
eyes
ears
eyebrows
forehead temple
nose
jaw
mouth
cheeks

torso

arms

legs

head

chest

shoulders

waist

hips

abdomen

pelvis

buttocks

back

navel

elbow

wrist

hand

forearm

upper arm

palm

nails

fingers

thumbs

knuckles

arch

instep

sole

heel

calf

ball

shin

toenails

foot

instep

neck

toes

chin

knee

hair

ankle

eyes

thigh

ears

eyebrows

forehead

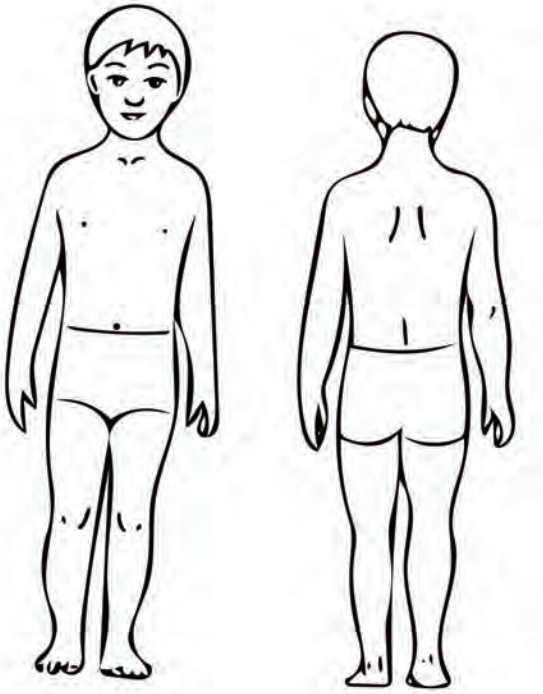
temple

nose

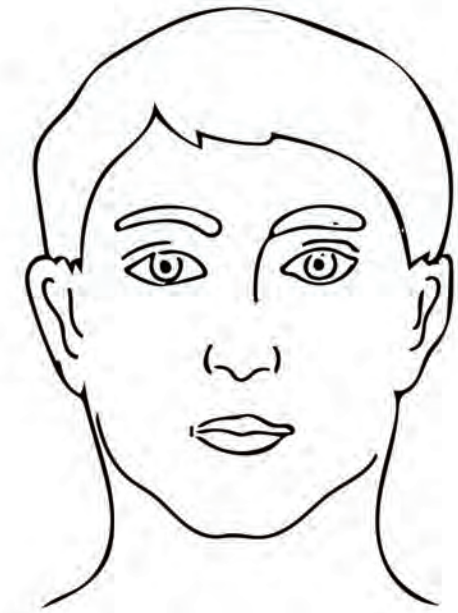
Jaw

mouth

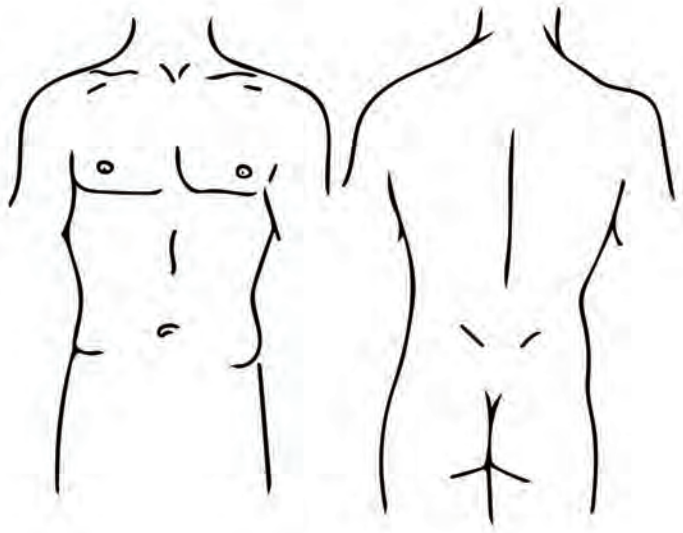
cheeks



parts of the body



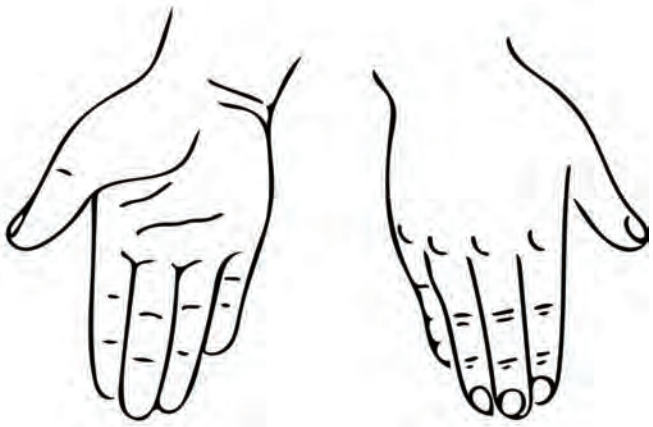
parts of the head



parts of the torso

parts of the leg

parts of the arm



parts of the hand

parts of the foot

Gnetophyta	Growing in a moist habitat, these are not adapted to life on land since sperm must swim through water to reach eggs. There are only three classes: liverworts, hornwarts and mosses.
Angiospermophyta	This bare or smooth plant has external sex organs and contains only two genus.
	Living on other plants, these do not bear seeds. They grow in moist habitats.
	Commonly called scouring rush, wedge plants have jointed and hollow stems with rough, ribbed textures and thrive on salt flats, along banks of streams and in moist low-lying wooded areas. Example: horsetail

Little wing or feather plants grow in habitats which are occasionally moist. Reproduction is by means of spores rather than seeds.

Cones of these desert plants lack resin canals and seeds are naked. They resemble flowering plants in many ways. Useful drugs are extracted from some species.

Palm plants, called gymnosperms, bear naked seeds that are not inside ovaries. The compound leaves are palmlike or fernlike.

This phylum contains nearly every familiar tree, shrub and garden plant that produce flowers and seeds.

These dioecious plants have small bilobed leaves resembling fronds of maidenhair fern.

Cone bearing plants have leaves which usually are needle-shaped. The monoecious seeds are naked. These trees are of great economic importance.

Bryophyta

Psilophyta

Lycopodophyta

Sphenophyta

Filicinophyta

Cycadophyta

Ginkgophyta

Coniferopyhta

Gnetophyta

Angiospermophyta

Parts of Bryophyta

sporophyte capsule
Asexual or haploid spores are produced within this cylindrical growth at the top of the sporophyte.

peristome
These are the rings of toothlike parts around the opening of the capsule.

sporophyte
This is the stalked diploid which supports the capsule.

gametophytes
These are leafy growths arising from the protonema.

protonema
The threadlike growth results from the germination of haploid spores.

Parts of Psilophyta

rhizome
This underground stem stores food for use of the plant.

rhizoids
These rootlike filaments attach the plant to the soil.

stem
This grows upward from the rhizome.

synangia
Spores are produced in this structure.

scalelike outgrowth
Photosynthesis is carried out in this part, producing food for the plant.

Parts of Lycopodophyta

stem
Leaves and strobili are supported by this part.

leaves
Also called microphylls, these remain green throughout the year.

strobili
Fertile microphylls group together at the tips of aerial branches to form these cones which produce spores.

Parts of Sphenophyta

stem
This is jointed and hollow with a rough texture due to silica in the outer cells.

strobilus
Located at the apex of the stem, the cone has about 50 short branches or sporangiophores.

sporangiophores
Spores are produced in this part of the plant.

leaves
These are scalelike and cover the stem.

Parts of Filicinophyta

rhizome
This rootlike stem lies on or under the ground and stores food for the plant.

Stipe
The stalk grows upward from the rhizome and supports the leaves.

blade
This is the compound leaf or frond.

pinna
One of many leaflets of the blade, it is attached to the stem

axis
This is the part of the stalk to which the leaflets are attached.

veins
The ribs of the leaflet carry products of photosynthesis.

sorus
The cluster of sporangia, where spores are produced, are found on the underside of the leaflets.

Parts of Cycadophyta

roots
These anchor the plant to the ground and transport water and minerals from the soil to other parts of the plant.

corallois roots
Also called secondary roots, they grow on or above the soil.

stem
This part extends from the roots and support the leaves.

leaf petiole
The leaf stalk attaches the leaf to the stem.

pinnules
These are parts of the pinnate leaf.

Parts of Ginkophyta

trunk
This is straight and covered with rough gray bark.

branches
These give the tree a pyramid-shaped crown.

leaves
These are fan-shaped with fine forking parallel veins and no mid-vein.

Parts of Coniferophyta

trunk
The thick bark is dark gray with brown inner layers showing between broad scaly ridges.

branches
These give the tree a broad, rounded crown.

needles
These are simple evergreen leaves which are long and narrow, arranged in bundles of three.

cones
Pollen is wind-blown from the small male reproductive structure to the larger female organ.

Parts of Gnetophyta

male strobili
These cones produce pollen.

leaves
These are very long and strap-shaped , attached to the blunt stem and spreading over the ground.

stem
This is blunt and woody, reaching only a short way above ground and tapering to a root that extends down to the water table.

Parts of Bryophyta

sporophyte capsule

peristome

sporophyte

gametophytes

protonema

Parts of Psilophyta

rhizome

rhizoids

stem

synangia

scalelike outgrowth

Parts of Lycopodophyta

stem

leaves

strobili

Parts of Sphenophyta

stem

strobilus

sporangiophores

leaves

Parts of Filicinophyta

rhizome

Stipe

blade

pinna

axis

veins

sorus

Parts of Cycadophyta

roots

corallois roots

stem

leaf petiole

pinnules

Parts of Ginkophyta

trunk

branches

leaves

Parts of Coniferophyta

trunk

branches

needles

cones

Parts of Gnetophyta

male strobiii

Asexual or haploid spores are produced within this cylindrical growth at the top of the sporophyte.

leaves

stem

These are the rings of toothlike parts around the opening of the capsule.

This is the stalked diploid which supports the capsule.

These are leafy growths arising from the protonema.

The threadlike growth results from the germination of haploid spores.

Spores are produced in this structure.

This underground stem stores food for use of the plant.

Photosynthesis is carried out in this part, producing food for the plant.

These rootlike filaments attach the plant to the soil.

Leaves and strobili are supported by this part.

This grows upward from the rhizome.

Also called microphylls, these remain green throughout the year.

Fertile microphylls group together at the tips of aerial branches to form these cones which produce spores.

These are scalelike and cover the stem.

This is jointed and hollow with a rough texture due to silica in the outer cells.

This rootlike stem lies on or under the ground and stores food for the plant.

Located at the apex of the stem, the cone has about 50 short branches or sporangiophores.

The stalk grows upward from the rhizome and supports the leaves.

Spores are produced in this part of the plant.

This is the compound leaf or frond.

One of many leaflets of the blade, it is attached to the stem .

These anchor the plant to the ground and transport water and minerals from the soil to other parts of the plant.

This is the part of the stalk to which the leaflets are attached.

Also called secondary roots, they grow on or above the soil.

The ribs of the leaflet carry products of photosynthesis.

This part extends from the roots and support the leaves.

The cluster of sporangia, where spores are produced, are found on the underside of the leaflets.

The leaf stalk attaches the leaf to the stem.

These are parts of the pinnate leaf.

The thick bark is dark gray with brown inner layers showing between broad scaly ridges.

This is straight and covered with rough gray bark.

These give the tree a broad, rounded crown.

These give the tree a pyramid-shaped crown.

These are simple evergreen leaves which are long and narrow, arranged in bundles of three.

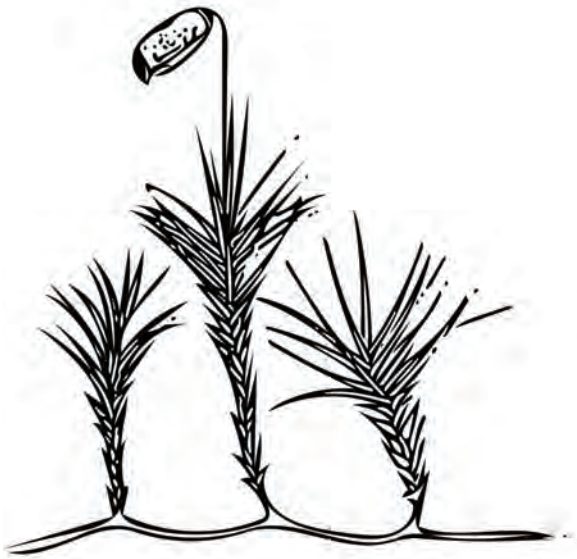
These are fan-shaped with fine forking parallel veins and no midvein.

Pollen is wind-blown from the small male reproductive structure to the larger female organ.

These cones produce pollen.

These are very long and strap-shaped , attached to the blunt stem and spreading over the ground.

This is blunt and woody, reaching only a short way above ground and tapering to a root that extends down to the water table.

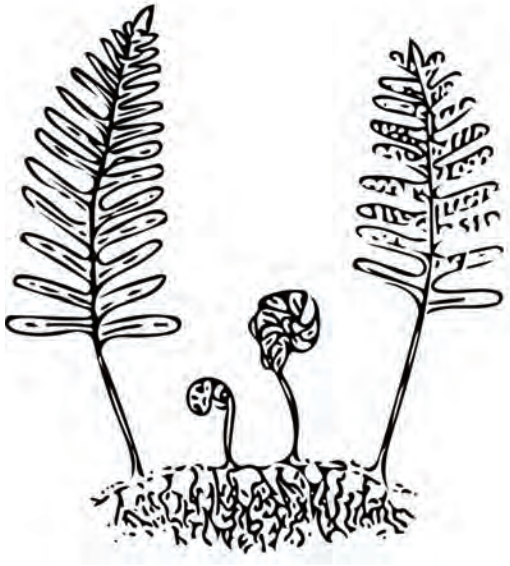


Bryophyta

Psilophyta

Lycopodophyta

Sphenophyta

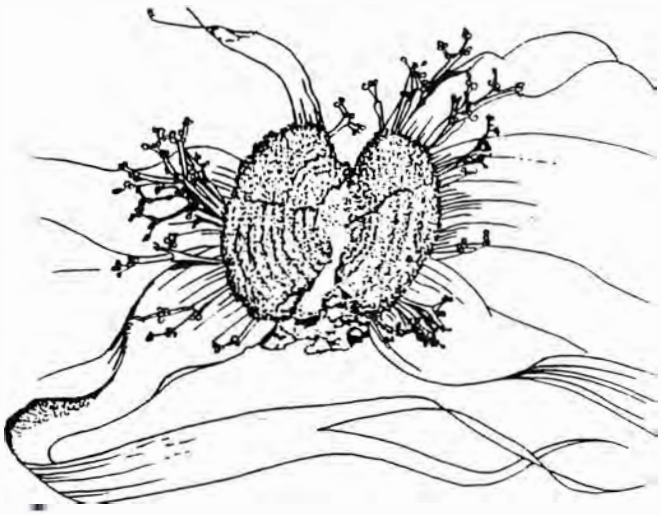


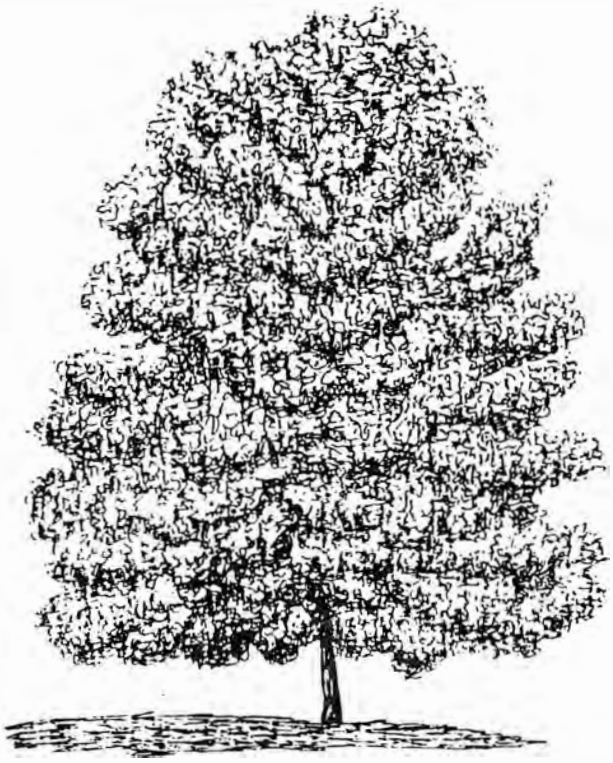
Filicinophyta

Cycadophyta

Ginkgophyta

Coniferophyta





Gnetophyta

Angiospermophyta

Life Cycle of a Bryophyte

The spore-producing plant is called a sporophyte. It grows from the top of the gametophyte. Mature spores are discharged when the cap falls off.

The spores germinate and grow protonema which are green threads of cells containing chlorophyll.

Very small buds form from the protonema. These develop into mature gametophyte plants.

At the top of the mature gametophyte are antheridia which produce sperm cells and archegonia which produce egg cells. In some mosses, both are on a single plant. In other mosses, there are separate male and female plants. The sperm fertilizes the egg.

The fertilized egg develops into an embryo which is nourished by the gametophyte. It grows a seta which is a slender stalk. At the top of the seta is a spore-producing capsule. A hood covers the capsule, under which there may be a peaked cap and a disc-like lid.

Life Cycle of a Filicinophyte

In sexual reproduction, sorus or clusters of brown sporangia form on the under side of the leaves of the mature fern.

The sorus is covered by indusium.

Each sporangium bursts when spores are mature.

The spores germinate in a moist place. The germinated spore develops rhizoids. Each of these broadens to become a young gametophyte.

The young gametophyte becomes a mature gametophyte which develops antherida with sperm cells near the rhizoids and archegonia with egg cells.

Sperm cells from one gametophyte swim in water film of dew to unite with egg cells of other gametophytes.

A fertilized egg results.

The fertilized egg develops into an embryo sporophyte which is attached to an old gametophyte. Roots form and a stem develops. The first leaf appears on the stem and the life cycle is repeated.

Life Cycle of a Conifer

The mature conifer has male and female cones.

Male cones produce pollen and female cones produce ovules.

Pollen formation takes place in the microsporophyll and the ovule develops in the megasporophyll.

Microspores develop within the microsporophyll. Each ovule forms a female gametophyte.

Microspores mature into pollen grains. Each pollen grain has wings, making it possible to be scattered by wind.

When pollen grains enter a female cone, they burst. A pollen tube grows into the ovule.

The pollen tube breaks, and sperm cells are released to fertilize the egg cells.

A young embryo sporophyte results.

The outer cover of the ovule becomes the seed coat. The rest of the ovule becomes food for the seed.

Each mature seed develops a wing, making it possible to be scattered by wind.

The seed grows into a seedling.

Life Cycle of an Angiosperm

Pollination is the means by which flowering plants reproduce.

The anther of a stamen releases pollen grains.

The pollen grain is transported to the stigma of a pistil.

Sperm cells from the pollen grain move down the pollen tube in the style to the ovary.

Fertilization occurs when the sperm cell and the egg cell unite to begin the development of a seed in the ovary.

The ovary becomes the fruit.

The seed is released from the fruit.

The seed grows into a young plant.

Life Cycle of a Bryophyte

Very small buds form from the protonema. These develop into mature gametophyte plants.

Life Cycle of a Filicinophyte

Life Cycle of a Conifer

Life Cycle of an Angiosperm

At the top of the mature gametophyte are antheridia which produce sperm cells and archegonia which produce egg cells. In some mosses, both are on a single plant. In other mosses, there are separate male and female plants. The sperm fertilizes the egg.

The spore-producing plant is called a sporophyte. It grows from the top of the gametophyte. Mature spores are discharged when the cap falls off.

The fertilized egg develops into an embryo which is nourished by the gametophyte. It grows a seta which is a slender stalk. At the top of the seta is a spore-producing capsule. A hood covers the capsule, under which there may be a peaked cap and a disc-like lid.

The spores germinate and grow protonema which are green threads of cells containing chlorophyll.

In sexual reproduction, sorus or clusters of brown sporangia form on the under side of the leaves of the mature fern.

The sorus is covered by indusium.

Sperm cells from one gametophyte swim in water film of dew to unite with egg cells of other gametophytes.

Each sporangium bursts when spores are mature.

A fertilized egg results.

The spores germinate in a moist place. The germinated spore develops rhizoids. Each of these broadens to become a young gametophyte.

The fertilized egg develops into an embryo sporophyte which is attached to an old gametophyte. Roots form and a stem develops. The first leaf appears on the stem and the life cycle is repeated.

The young gametophyte becomes a mature gametophyte which develops antherida with sperm cells near the rhizoids and archegonia with egg cells.

The mature conifer has male and female cones.

Male cones produce pollen and female cones produce ovules.

When pollen grains enter a female cone, they burst. A pollen tube grows into the ovule.

Pollen formation takes place in the microsporophyll and the ovule develops in the megasporophyll.

The pollen tube breaks, and sperm cells are released to fertilize the egg cells.

Microspores develop within the microsporophyll. Each ovule forms a female gametophyte.

A young embryo sporophyte results.

Microspores mature into pollen grains. Each pollen grain has wings, making it possible to be scattered by wind.

The outer cover of the ovule becomes the seed coat. The rest of the ovule becomes food for the seed.

Each mature seed develops a wing, making it possible to be scattered by wind.

The pollen grain is transported to the stigma of a pistil.

The seed grows into a seedling.

Sperm cells from the pollen grain move down the pollen tube in the style to the ovary.

Pollination is the means by which flowering plants reproduce.

Fertilization occurs when the sperm cell and the egg cell unite to begin the development of a seed in the ovary.

The anther of a stamen releases pollen grains.

The ovary becomes the fruit.

The seed is released from the fruit.

The seed grows into a young plant.

spores spill from capsules

green threads

male & female plants

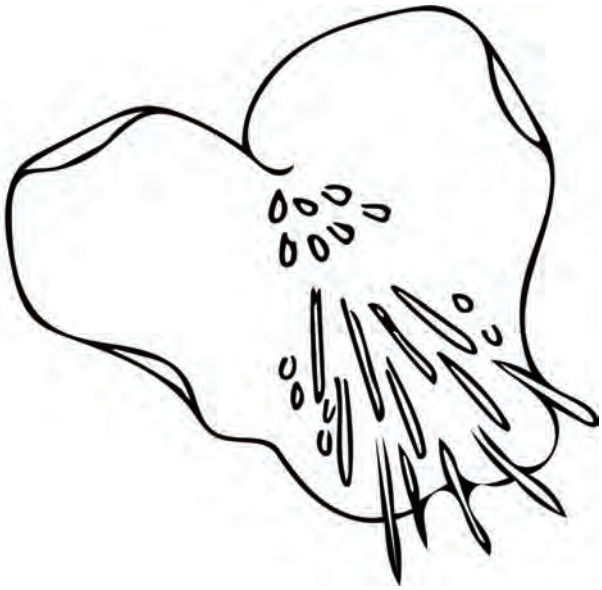
sperm from male
plant fertilizes egg

spore-producing plant grows on parent

mature fern

sporangia

sporangia spilling spores

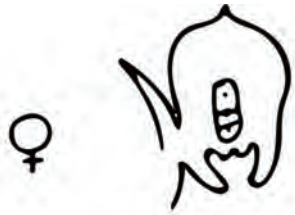


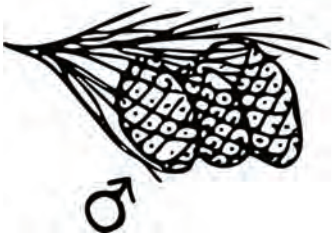
young gametophyte

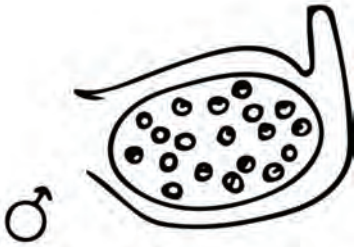
sperm from male sex organ entering female sex organ

underside of gametophyte with male & female sex organs

fertilized egg





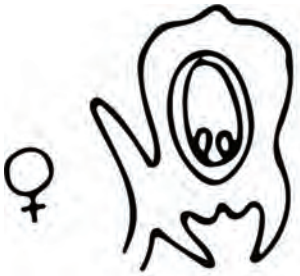


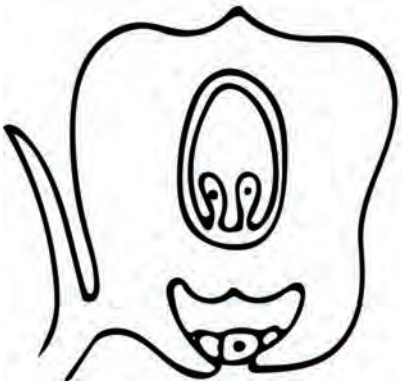
young sporophyte
on old gametophyte

mature pine

male & female cones

megaspore &
microsporaphyll



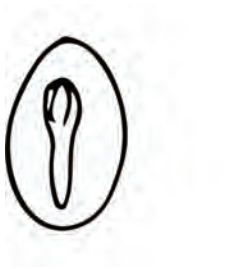


archegonia & microspore

pollen with wings

pollen grain enters gametophyte

fertilization

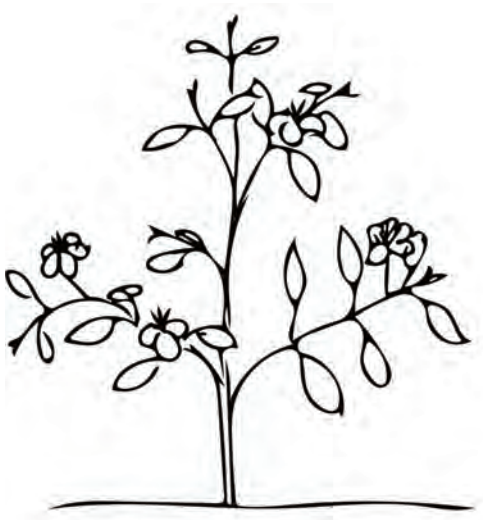


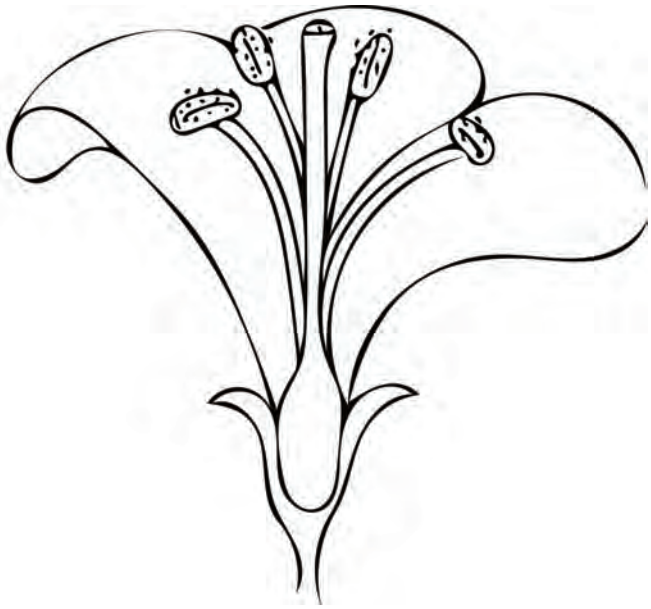
embryo

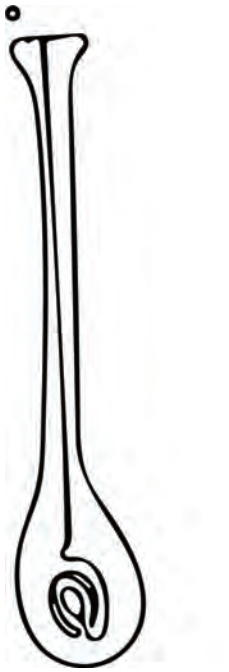
seed

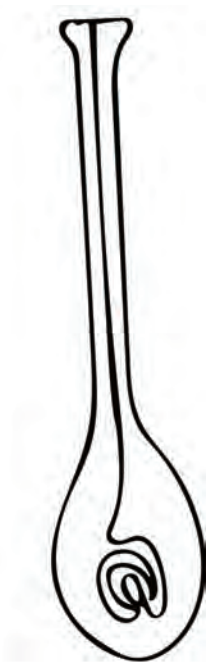
dispersed seed

seedling







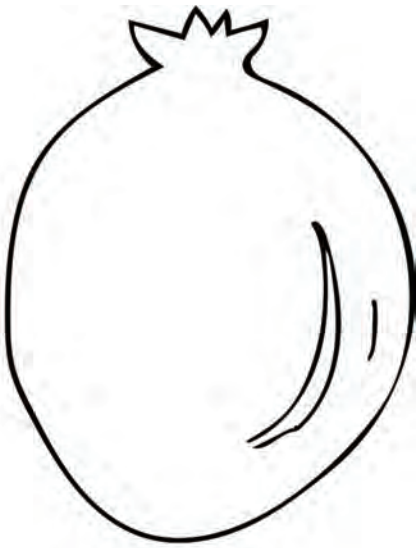


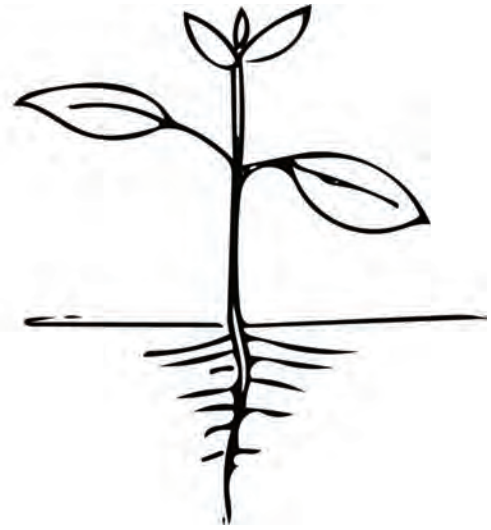
pollination

anther releases pollen

pollen travels to stigma

sperm cells in pollen tube





fertilization

ovary becomes fruit

seed

young plant

Parts of a Plant

stem: This produces and supports leaves, buds, flowers and fruit. It carries minerals and water from the roots to the leaves which are held in position to get sunlight needed to manufacture food for the plant.

leaf: This grows from the stem or twig of a plant. It produces most of the food needed by the plant to live and grow through the process of photosynthesis.

roots: These absorb minerals and water, usually underground. They anchor the plant in the soil and, in some cases, may store food for the plant to use.

flower: This develops from a bud on the stem of the plant. It contains reproductive parts.

Parts of a Perfect Flower

calyx: This is composed of sepals which usually are green and leaflike. It protects the bud of the flower.

sepals: These are small leaves located under the petals which enclose and protect the bud of the flower.

receptacle: This is part of the outer section of the flower, serving as its base.

corolla: This consists of the petals of the flower.

petals: These attract insects by color, the nectar they secrete or the odor they produce.

perianth: This is composed of petals and sepals.

pistil: This is the female reproductive organ, usually containing a stigma, style and ovary. Carpel is another name for pistil.

stamen: This is the male reproductive organ, usually consisting of an anther and a filament. It produces pollen which is contained in the anther.

Parts of a Stamen

anther: This is the enlarged tip of the stamen that grows on the end of the filament. It splits open to free pollen grains.

pollen: This is the dustlike powder produced by the stamen. It may be transferred to the stigma by wind, birds, bats and other animals or by insects such as bees, butterflies and moths.

filament: This is the long, narrow stalk of the stamen.

Parts of a Pistil

ovary: This forms the base of the pistil and contains one or more ovules. It is the location of the development of the egg and later seeds.

style: This rises from the top of the ovary as a slender tube located in the middle of the pistil.

stigma: This is the flattened structure at the top of the pistil which receives pollen from the stamen of another flower. Its rough or sticky surface ensures that the pollen will stick to it.

Parts of a Leaf

blade: This is the flat part of the leaf.

petiole: Water and food move to and from the blade by this thin, stemlike part which attaches the leaf to the stem.

base: This is the lower edge of the leaf which is attached to the petiole.

stipule: This grows on some plants where the petiole and the stem join. It looks like tiny leaves.

apex: This is the end of the leaf opposite the base.

veins: These support the leaf, holding the blade up to the sun and carrying water to the food-producing parts of the blade.

margin: This is the outer edge of the leaf.

External Parts of a Stem

terminal bud: This is located at the tip of the stem or twig and causes the plant to grow taller as the bud grows.

lateral bud: This is formed further back along the stem and can grow into branches, leaves or flowers.

node: This is the place where the lateral bud forms.

bud scales: These are small, leaflike coverings which protect the growing ends of some buds.

Parts of a Root

primary root: This develops from the radicle of the plant's seed and produces offshoots called secondary roots. In trees, it is also called the taproot.

secondary root: This is an outgrowth from the primary root and is sometimes called a lateral root.

root cap: This protects the delicate tip of the root as it pushes through the soil.

root hairs: These are many in number, about 1/2 inch long, and grow along the roots back of the root cap. These increase the root's ability to absorb minerals and water from the soil.

This produces and supports leaves, buds, flowers and fruit. It carries minerals and water from the roots to the leaves which are held in position to get sunlight needed to manufacture food for the plant.

This is composed of sepals which usually are green and leaflike. It protects the bud of the flower. These are small leaves located under the petals which enclose and protect the bud of the flower. This is part of the outer section of the flower, serving as its base.

This grows from the stem or twig of a plant. It produces most of the food needed by the plant to live and grow through the process of photosynthesis.

This consists of the petals of the flower.

These absorb minerals and water, usually underground. They anchor the plant in the soil and, in some cases, may store food for the plant to use.

These attract insects by color, the nectar they secrete or the odor they produce.

This develops from a bud on the stem of the plant. It contai·ns reproductive parts.

This is composed of petals and sepals.

This is the female reproductive organ, usually containing a stigma, style and ovary. Carpel is another name for pistil.

This is the long, narrow stalk of the stamen.

This is the male reproductive organ, usually consisting of an anther and a filament. It produces pollen which is contained in the anther.

This forms the base of the pistil and contains one or more ovules. It is the location of the development of the egg and later seeds.

This is the enlarged tip of the stamen that grows on the end of the filament. It splits open to free pollen grains.

This rises from the top of the ovary as a slender tube located in the middle of the pistil.

This is the dustlike powder produced by the stamen. It may be transferred to the stigma by wind, birds, bats and other ani-mals or by insects such as bees, butterflies and moths.

This is the flattened structure at the top of the pistil which receives pollen from the stamen of another flower. Its rough or sticky surface ensures that the pollen will stick to it.

This is the flat part of the leaf.

This is the end of the leaf opposite the base.

This carries water and food to and from the blade by this thin, stemlike part which attaches the leaf to the stem.

These support the leaf, holding the blade up to the sun and carrying water to the food-producing parts of the blade.

This is the lower edge of the leaf which is attached to the petiole.

This is the outer edge of the leaf.

This grows on some plants where the petiole and the stem join. It looks like tiny leaves.

This is located at the tip of the stem or twig and causes the plant to grow taller as the bud grows.

This is formed further back along the stem and can grow into branches, leaves or flowers.

This is an outgrowth from the primary root and is sometimes called a lateral root.

This is the place where the lateral bud forms.

This protects the delicate tip of the root as it pushes through the soil.

These are small, leaflike coverings which protect the growing ends of some buds.

These are many in number, about 1/2 inch long, and grow along the roots back of the root cap. These increase the root's ability to absorb minerals and water from the soil.

This develops from the radicle of the plant's seed and produces offshoots called secondary roots. In trees, it is also called the taproot.

Parts of a Plant

stem

leaf

roots

flower

Parts of a Perfect Flower

calyx

sepals

receptacle

corolla

petals

perianth

pistil

stamen

Parts of a Stamen

anther

pollen

filament

Parts of a Pistil

ovary

style

stigma

Parts of a Leaf

blade

petiole

base

stipule

apex

veins

margin

External Parts of a Stem

terminal bud

lateral bud

node

bud scales

Parts of a Root

primary root

secondary root

root cap

root hairs

Parts of a Plant

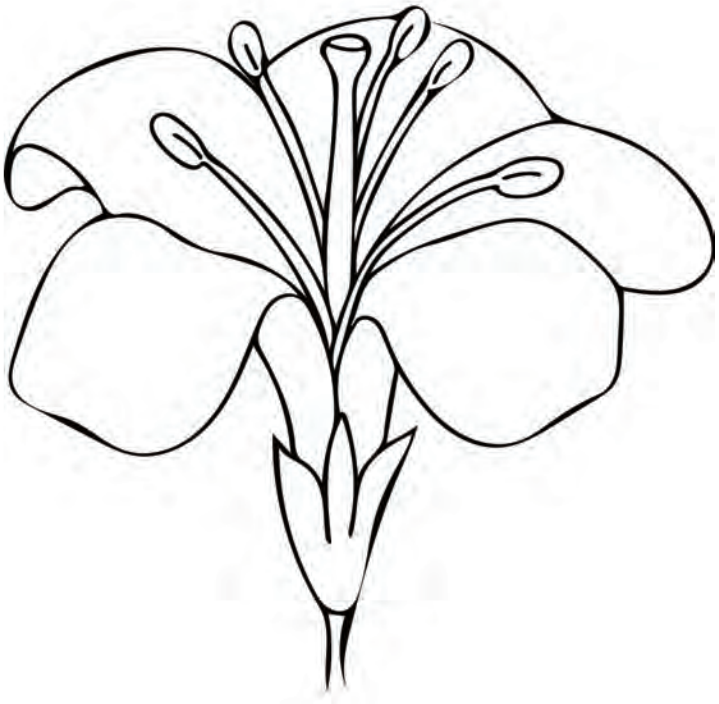
Parts of a Perfect Flower

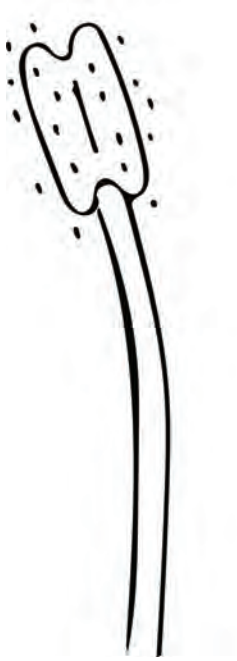
Parts of a Stamen

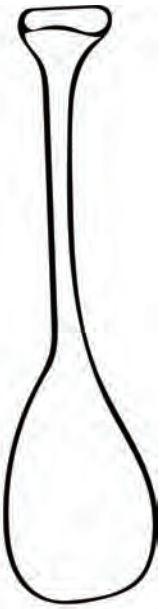
Parts of a Pistil

Parts of a Leaf

Parts of a Stem





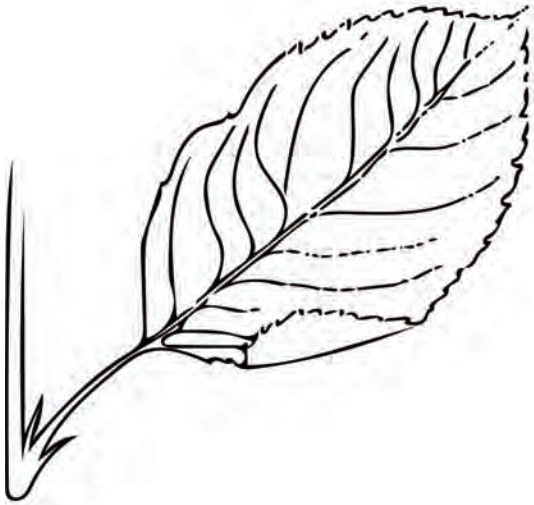


Parts of a Plant

Parts of a Perfect Flower

Parts of a Stamen

Parts of a Pistil



Parts of a Leaf

Parts of a Stem

Parts of a Root

Parts of a Tree

roots: These usually are under the ground, absorbing minerals and water from the soil and anchoring the tree into the ground.

trunk: This carries water and minerals from the roots to the branches which transport these substances to the leaves. It also supports and protects the tree.

branches: These grow out of the trunk in different arrangements, giving each kind of tree its particular shape.

leaves: These grow from the twigs attached to the branches. Usually green at some time during the year, they make food for the tree by the process of photosynthesis.

Parts of a Tree Trunk

xylem: Woody tissue that carries water and mineral ions from the roots upward through the plant. This part of the vascular system is composed of sapwood and heartwood.

phloem: This is the part of the vascular system that transports photosynthesis products from the leaves throughout the plant.

cambrium: This is the layer of soft cellular tissue from which new wood or bark originates.

annual rings: These are lines produced by the contrast between fiber produced in late summer of one year and spring of the following year.

bark: This is the protective external covering of the stem or trunk.

sapwood: This is the woody tissue of the xylem that carries water and mineral ions from the roots upward through the plant.

heartwood: This is the wood heart nearest the center of the tree. It dies as he tree ages. It helps support the tree.

These are usually under the ground, absorbing minerals and water from the soil and anchoring the tree into the ground.

This carries water and minerals from the roots to the branches which transport these substances to the leaves. It also supports and protects the tree.

These grow out of the trunk in different arrangements, giving each kind of tree its particular shape.

These grow from the twigs attached to the branches. Usually green at some time during the year, they make food for the tree by the process of photosynthesis.

Woody tissue that carries water and mineral ions from the roots upward through the plant. This part of the vascular system is composed of sapwood and heartwood.

This is the protective external covering of the stem or trunk.

This is the part of the vascular system that transports photosynthesis products from the leaves throughout the plant.

This is the woody tissue of the xylem that carries water and mineral ions from the roots upward through the plant.

This is the layer of soft cellular tissue from which new wood or bark originates.

This is the wood heart nearest the center of the tree. It dies as he tree ages. It helps support the tree.

These are lines produced by the contrast between fiber produced in late summer of one year and spring of the following year.

Parts of a Tree

roots

trunk

branches

leaves

Parts of a Tree Trunk

xylem

phloem

cambrium

annual rings

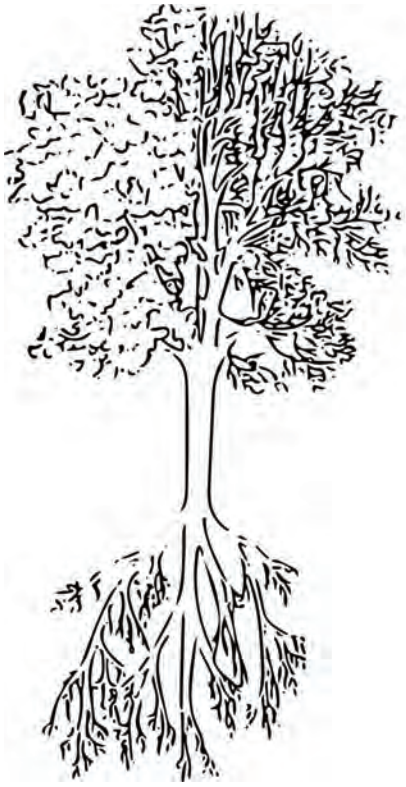
bark

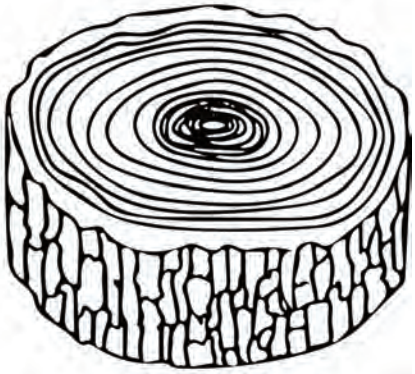
sapwood

heartwood

Parts of a Tree Trunk

Parts of a Tree





Parts of a Tree

Parts of a Tree Trunk

Definitions of Flower Forms

labiate
The term comes from the Latin word, labium, which means lip. The corolla has the appearance of lips. The upper lip consists of two fused petals. The lower lip consists of three fused petals.

personate
The term comes from the Latin word, personatus, which means masked. The corolla is labiate, giving the appearance of lips. The lower lip is pushed upward, closing the opening between the lips.

imbutiform
The term comes from the Latin word, imbutus, which means funnel. The corolla has the appearance of a funnel.

cruciform
The term comes from the Latin word, crux or crucis which means cross-shaped. The corolla has four petals, giving the appearance of a cross.

papilionaceous
The term comes from the Latin word, papilio, which means butterfly. The corolla has a large upper petal, two lateral petals and two narrow lower petals below these. This gives the appearance of a butterfly.

spurred
The term comes from the Old English word, spura, which means a sharp instrument worn on a horseman's heel. The corolla has a slender projection which give the appearance of a spur.

ligulate
lhe term comes from the Latin word, ligula, which means strap. The corolla has flattened strap-like petals.

rotate
The term comes from the Latin word, rota, which means wheel. The corolla has flat petals arranged around a center which give the appearance of a wheel.

tubular
The term comes from the Latin word, tubulus, which means tube. The corolla gives the appearance of a tube.

campanulate
The term comes from the Latin word, campanula, which means bell. The corolla gives the appearance of a bell.

urceolate
The term comes from the Latin word, urceolus, which means pitcher-shaped. The corolla give the appearance of being swelled out like a pitcher with a narrow top opening.

labiate

person ate

imbutiform

cruciform

papilionaceous

spurred

ligulate

rotate

tubutar

The term comes from the Latin word, labium, which means lip. The corolla has the appearance of lips. The upper lip consists of two fused petals. The lower lip consists of three fused petals.

campanulate

urceolate

The term comes from the Latin word, personatus, which means masked. The corolla is labiate, giving the appearance of lips. The lower lip is pushed upward, closing the opening between the lips.

The term comes from the Latin word, imbutus, which means funnel. The corolla has the appearance of a funnel.

The term comes from the Latin word, crux or crucis which means cross-shaped. The corolla has four petals, giving the appearance of a cross.

The term comes from the Latin word, papilio, which means butterfly. The corolla has a large upper petal, two lateral petals and two narrow lower petals below these. This gives the appearance of a butterfly.

The term comes from the Latin word, tubulus, which means tube. The corolla gives the appearance of a tube.

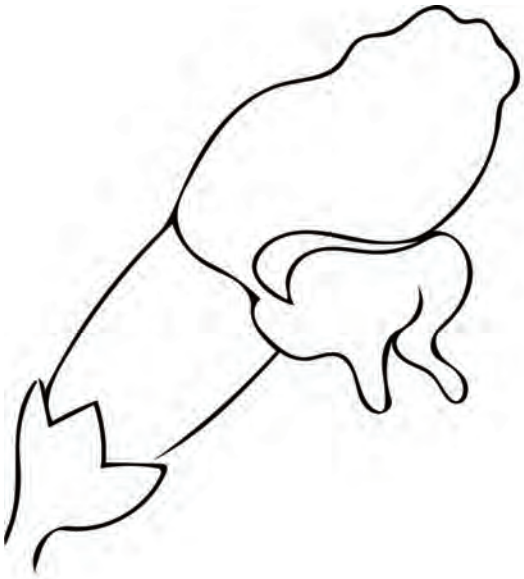
The term comes from the Old English word, spura, which means a sharp instrument worn on a horseman's heel. The corolla has a slender projection which give the appearance of a spur.

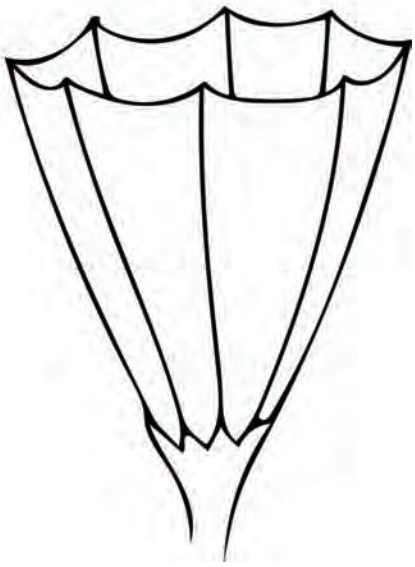
The term comes from the Latin word, campanula, which means bell. The corolla gives the appearance of a bell.

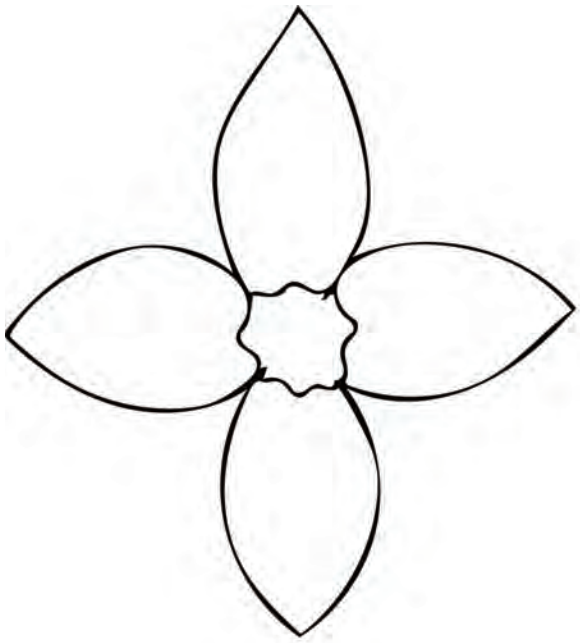
The term comes from the Latin word, ligula, which means strap. The corolla has flattened strap-like petals.

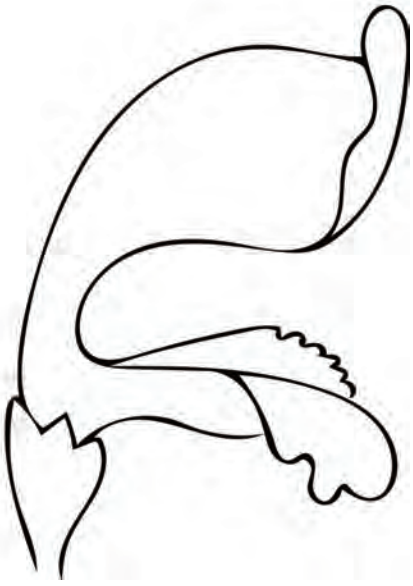
The term comes from the Latin word, urceolus, which means pitcher-shaped. The corolla give the appearance of being swelled out like a pitcher with a narrow top opening.

The term comes from the Latin word, rota, which means wheel. The corolla has flat petals arranged around a center which give the appearance of a wheel.







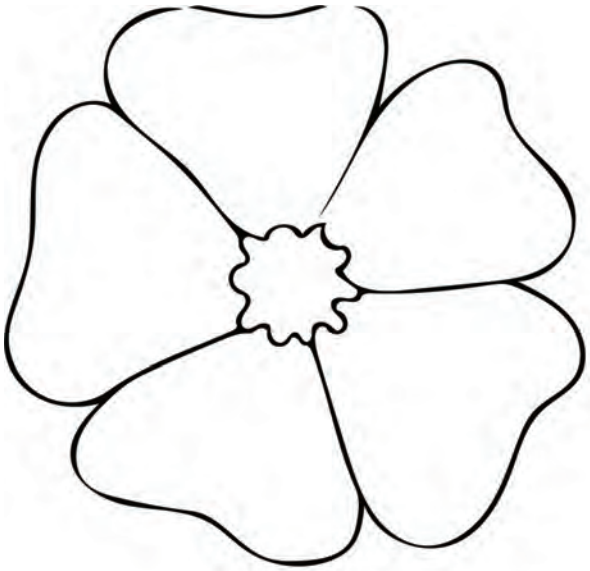


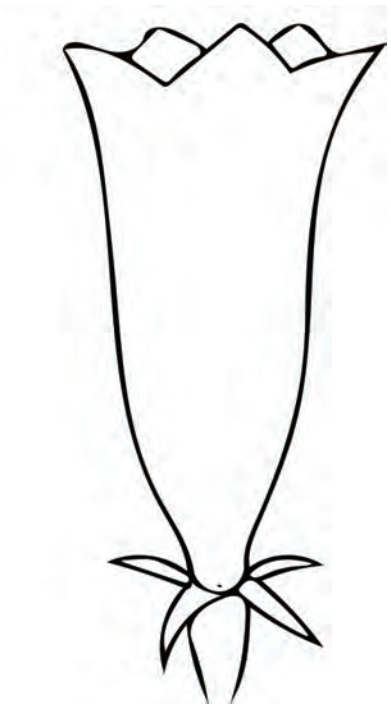
personate

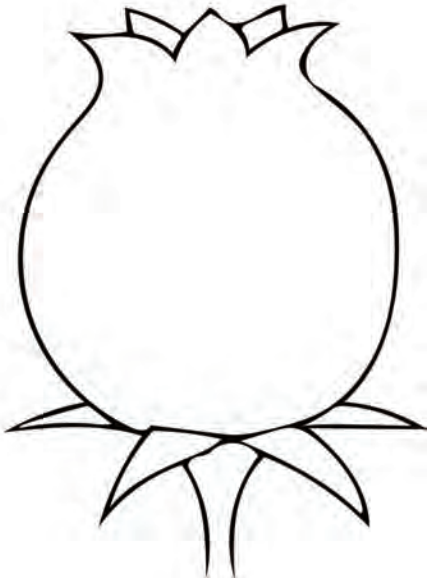
imbiliform

cruciform

labiate





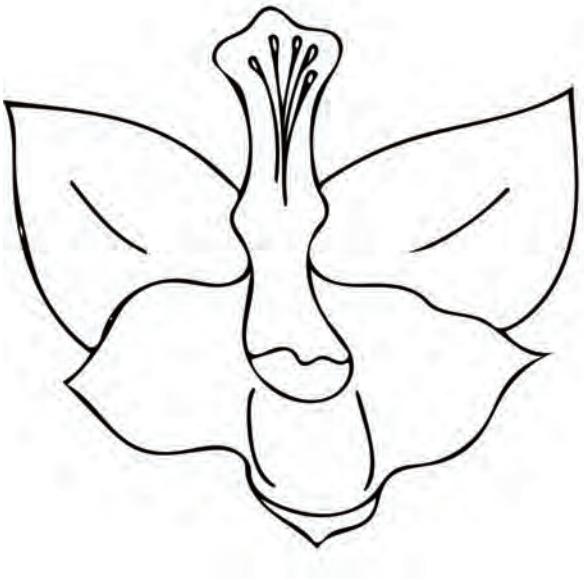


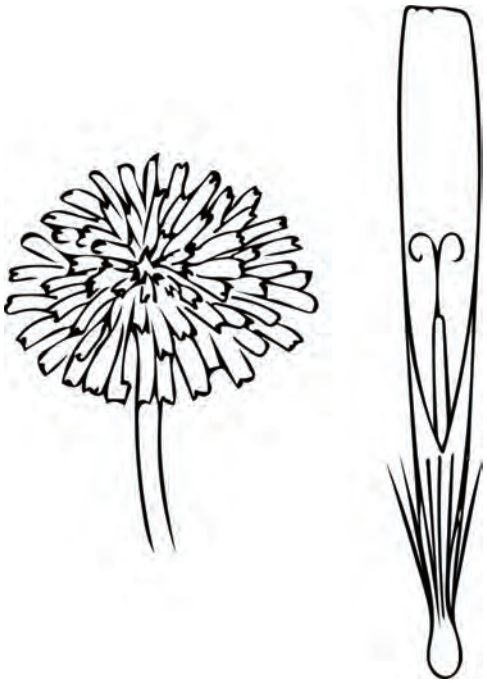
rotate

tubular

campanulate

urceolate

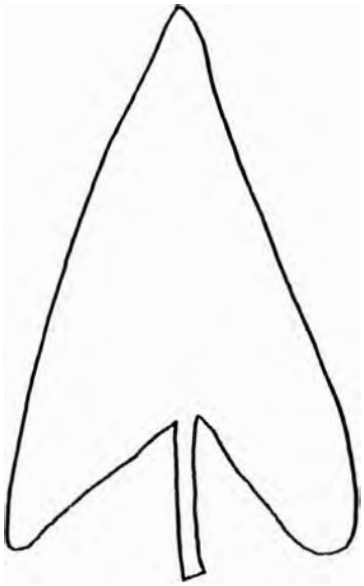


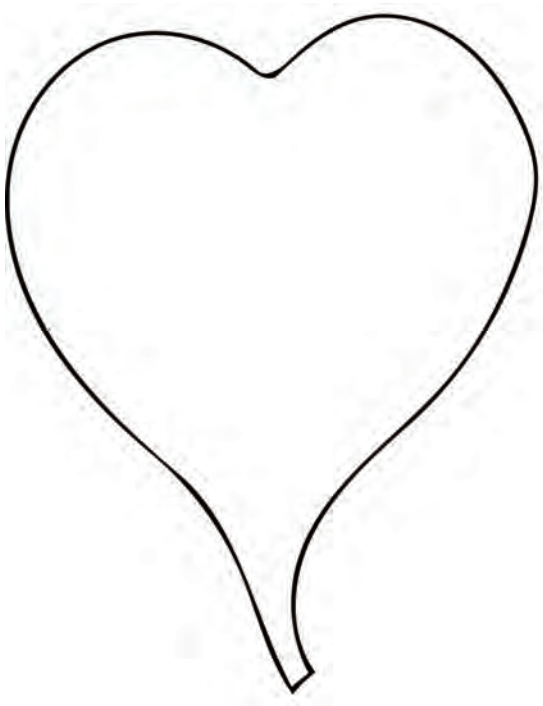


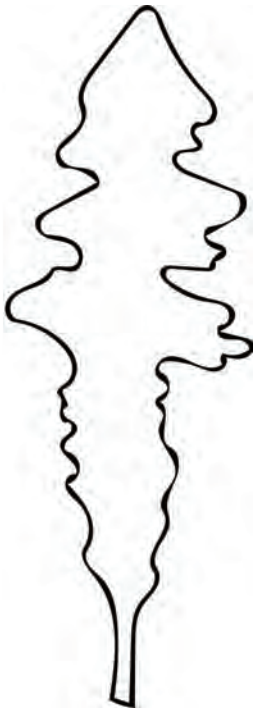
papilionaceous

spurred

ligulate





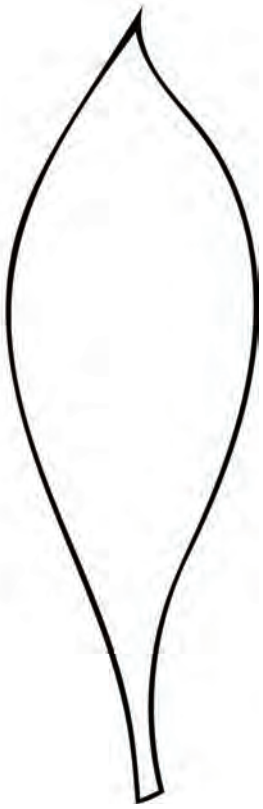


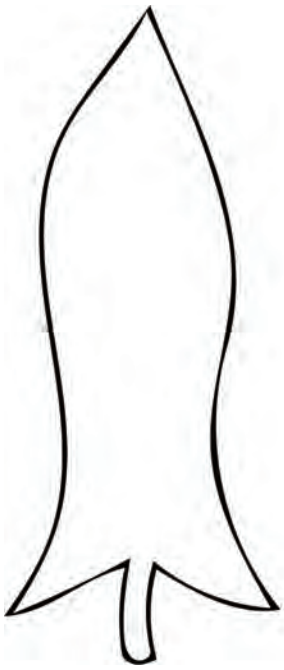
sagittate

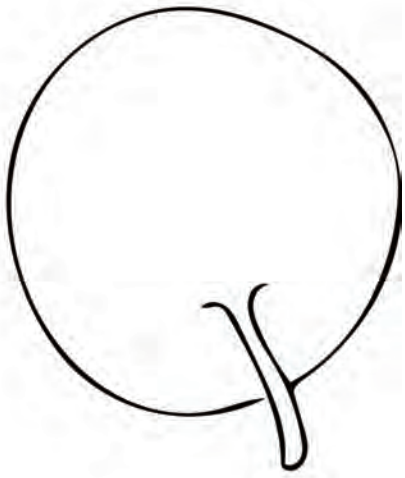
spatulate

cordate

runcinate





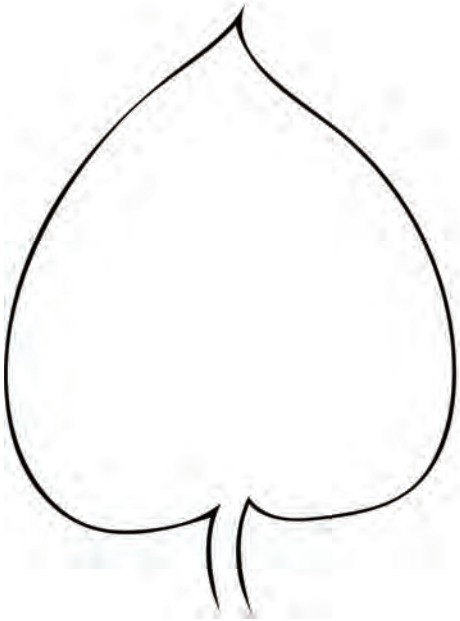


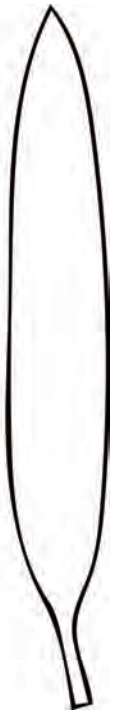
aciculate

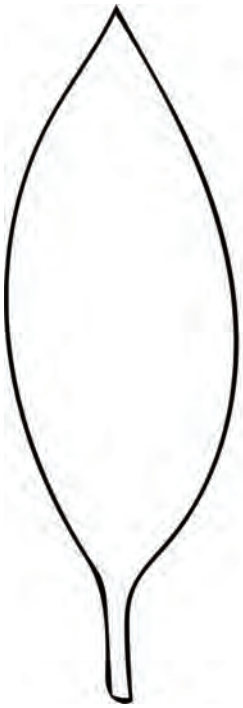
oblanceolate

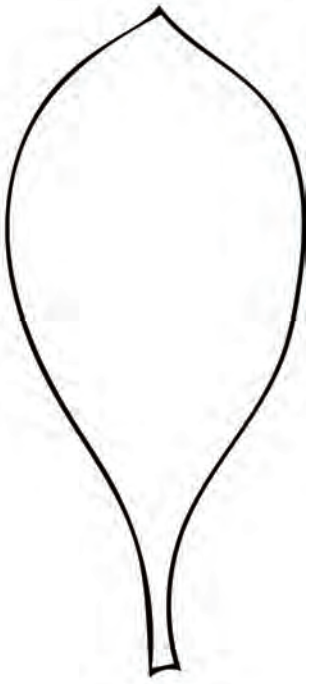
hastate

peltate







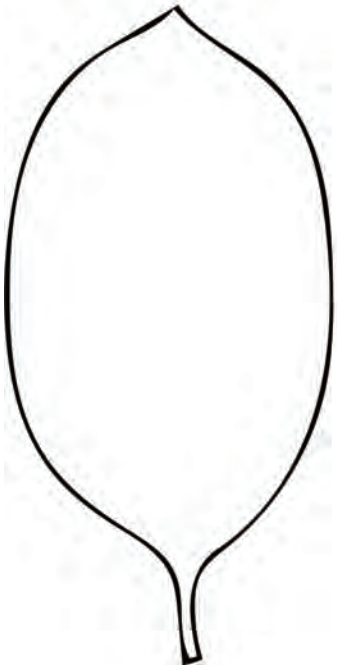


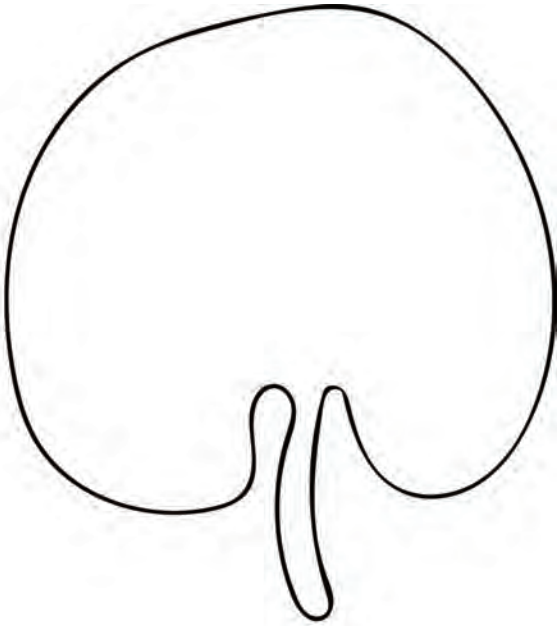
obcordate

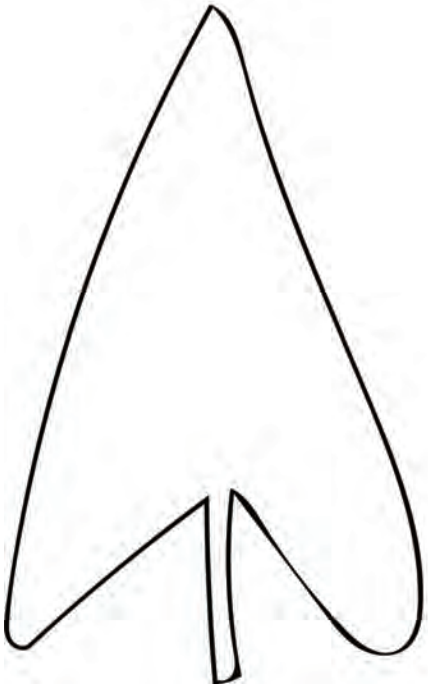
linear

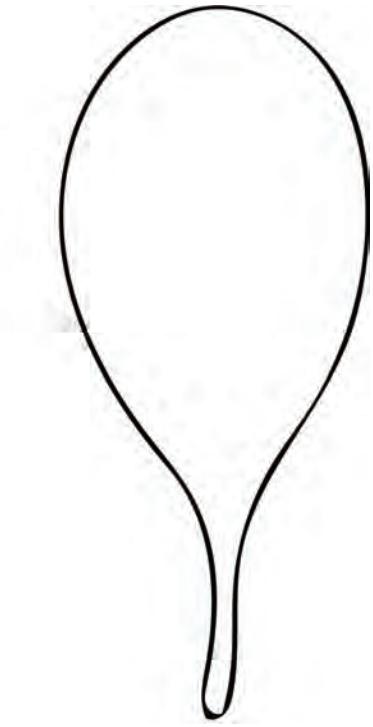
lanceolate

obovate







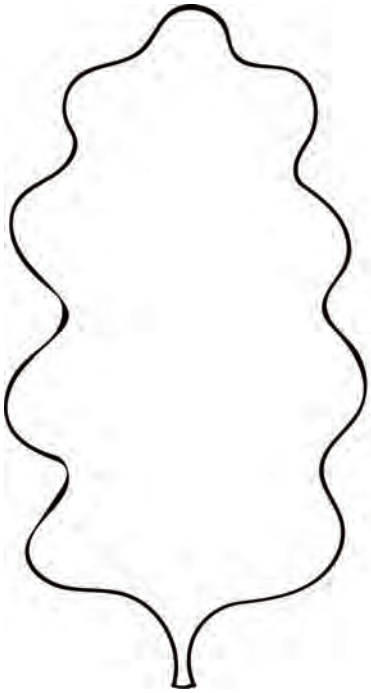


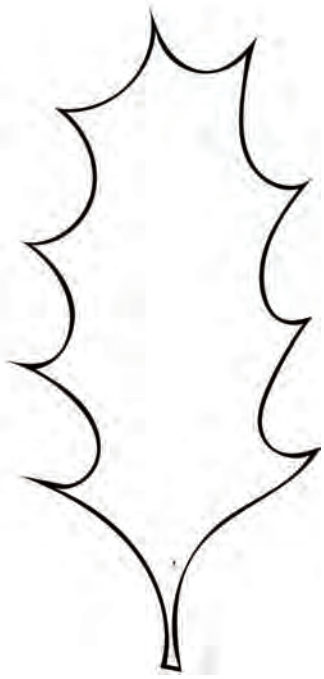
elliptical

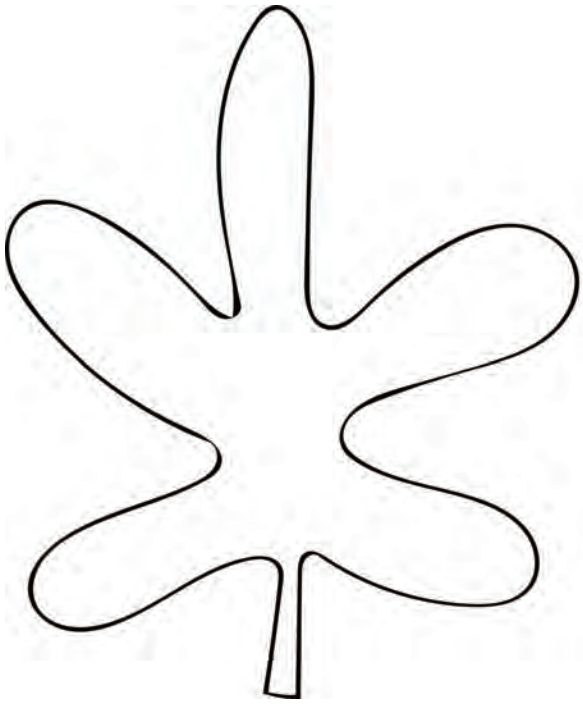
reniform

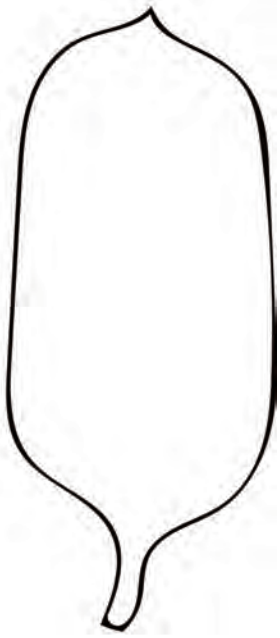
deltoid

ovate







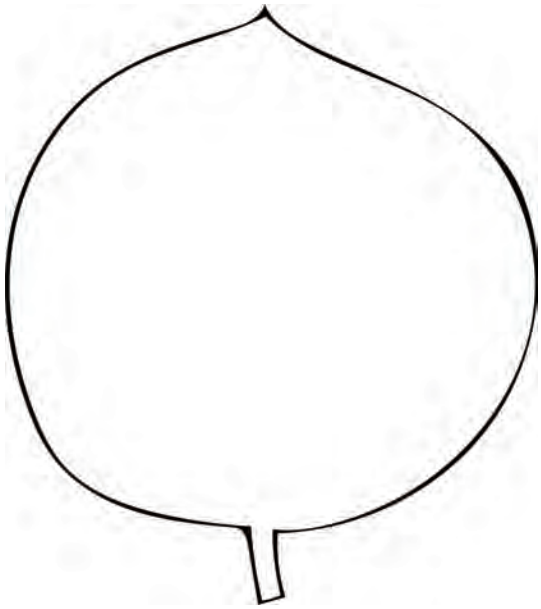


sinuate

spinose

lobed

oblong

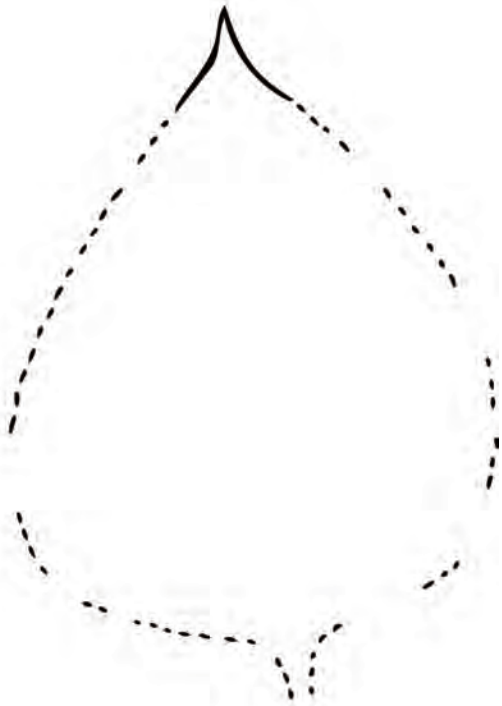


orbicular

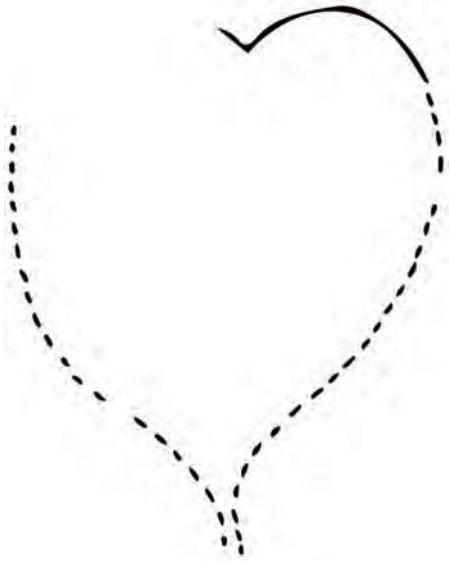
acute

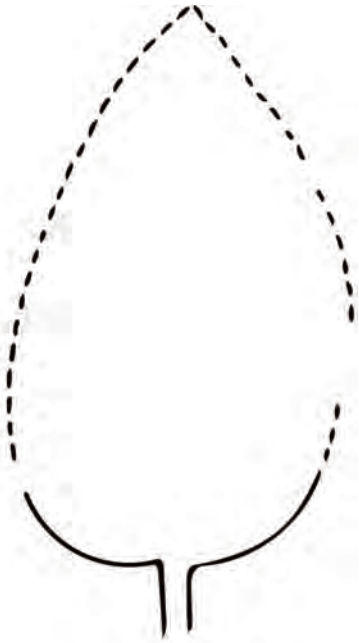
obtuse

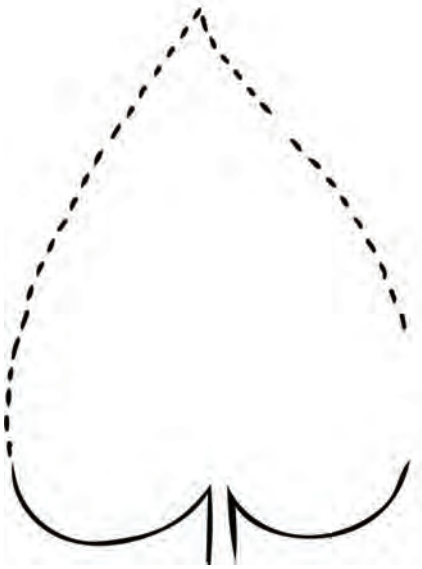
truncate



acuminate





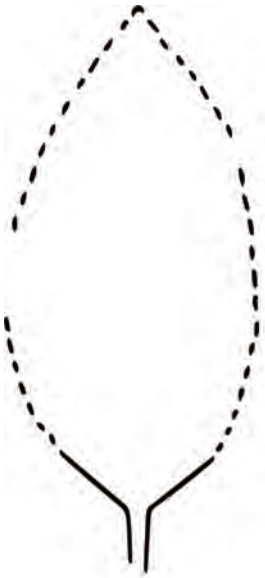


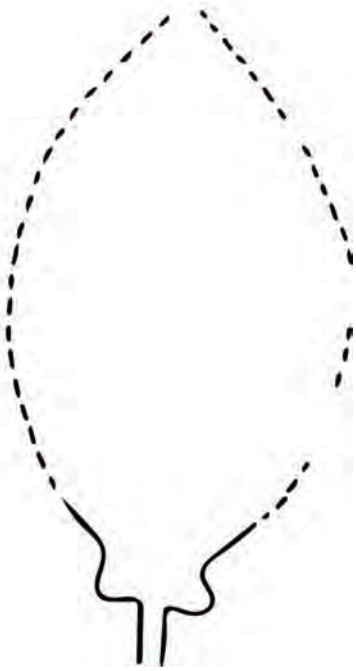
obcordate

rounded

cordate

hastate



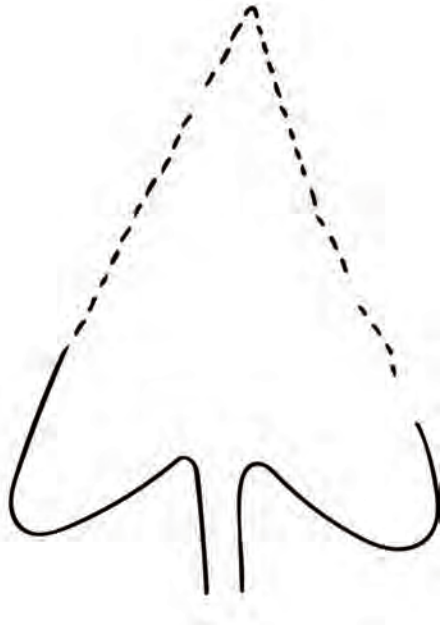


cuneate

truncate

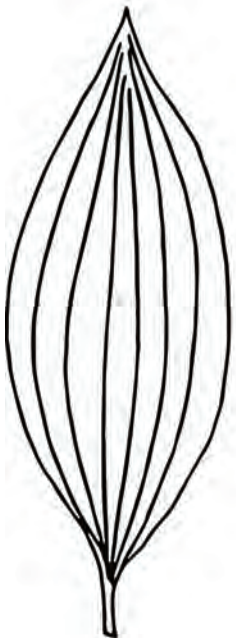
oblique

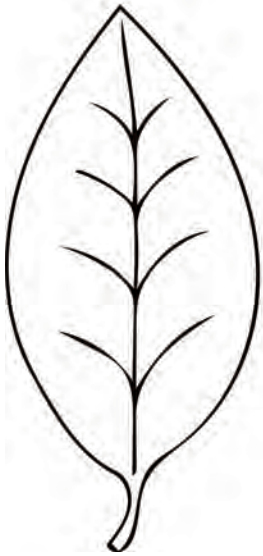
auriculate

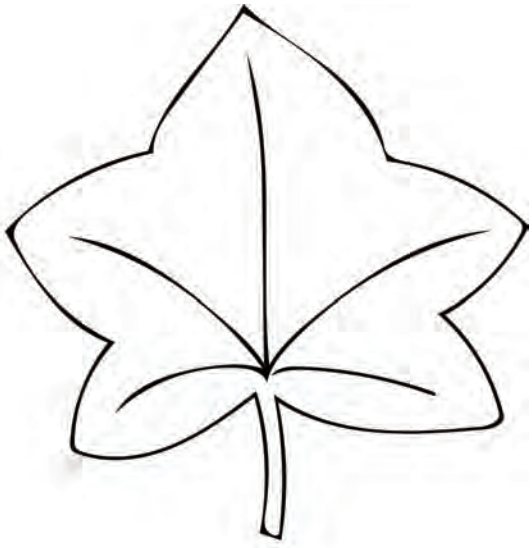


acuminate

sagittate





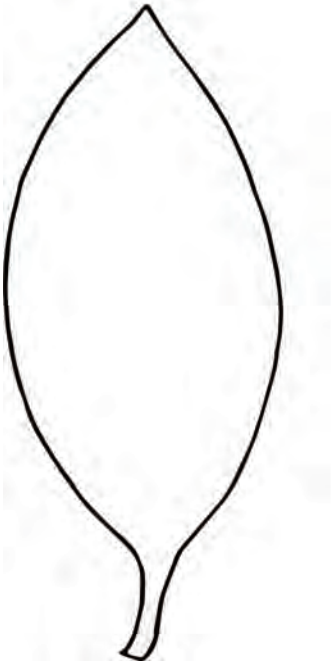


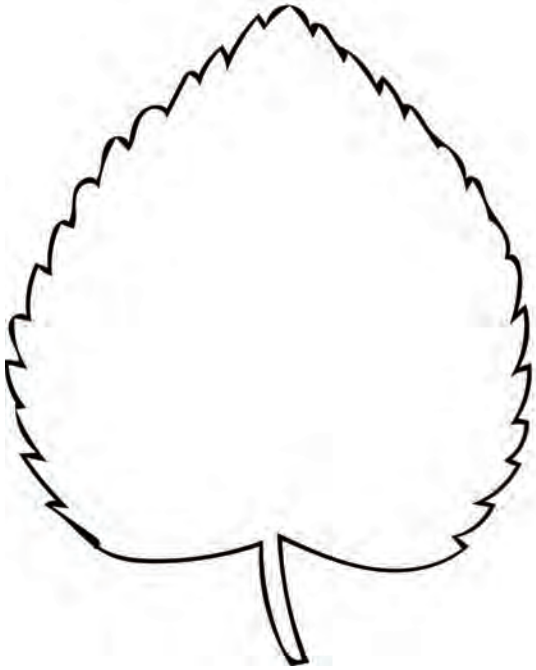
parallel

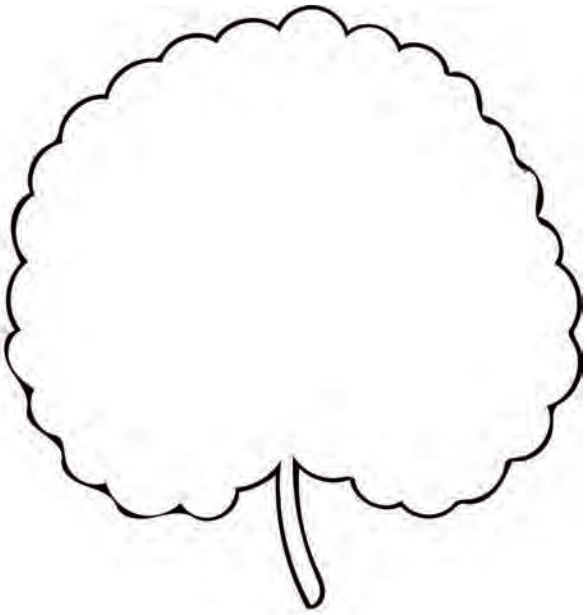
reticulate

pinnate

palmate





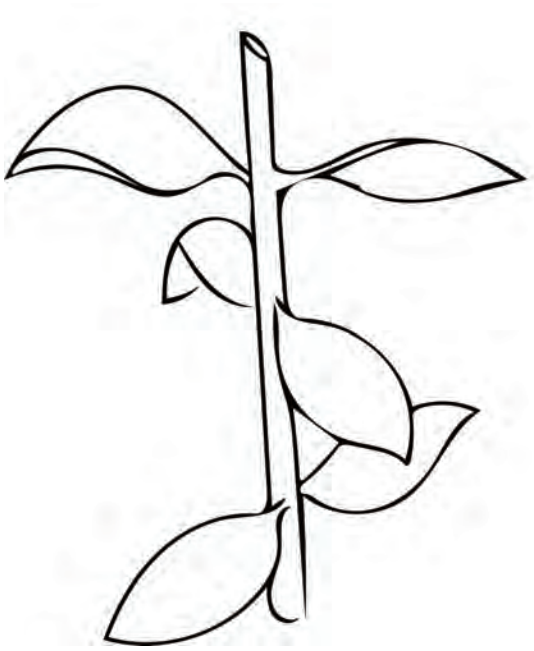


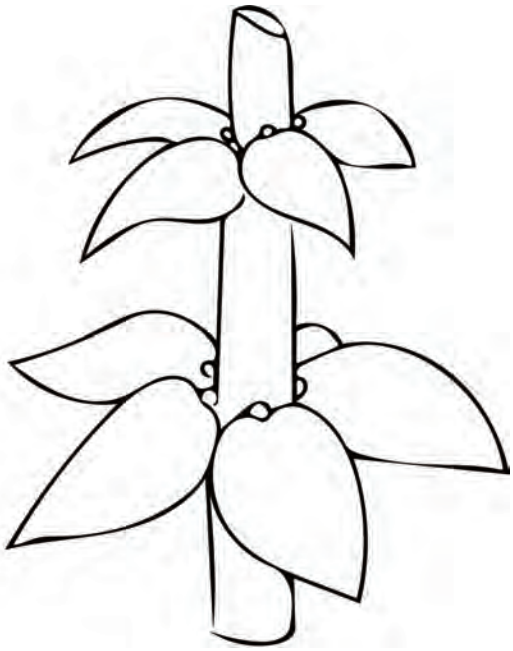
entire

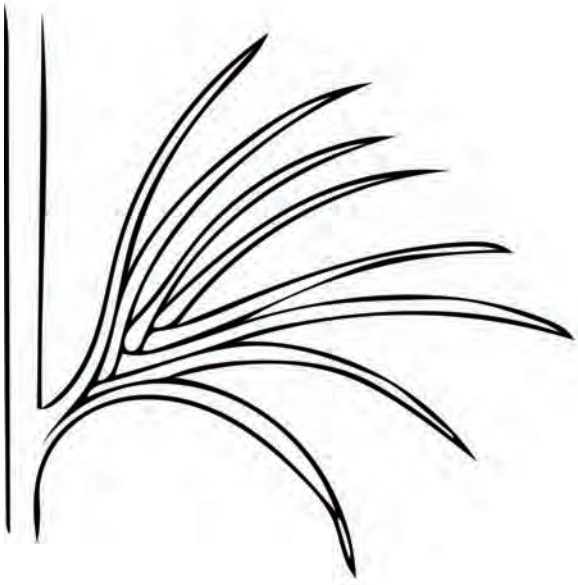
dentate

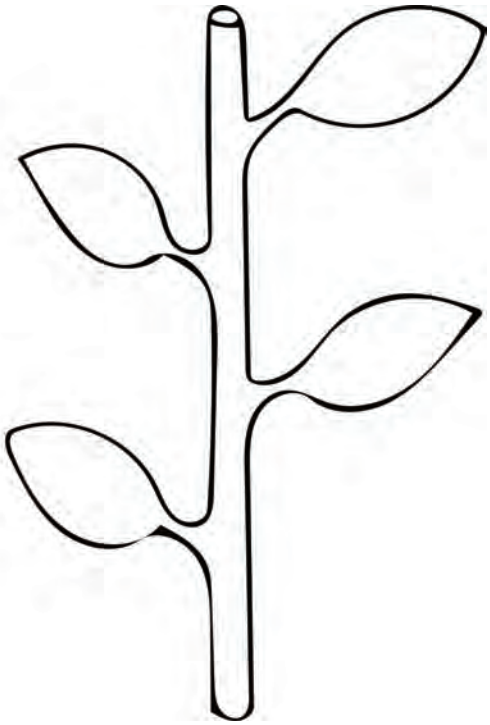
serrate

crenate







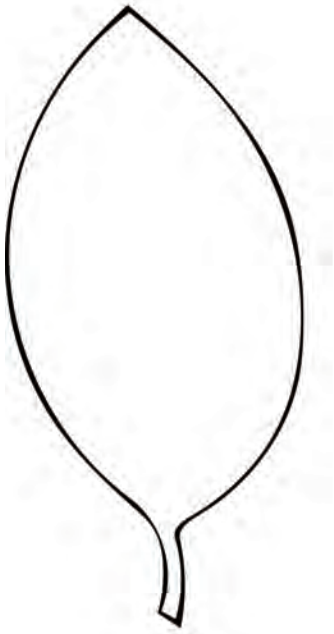


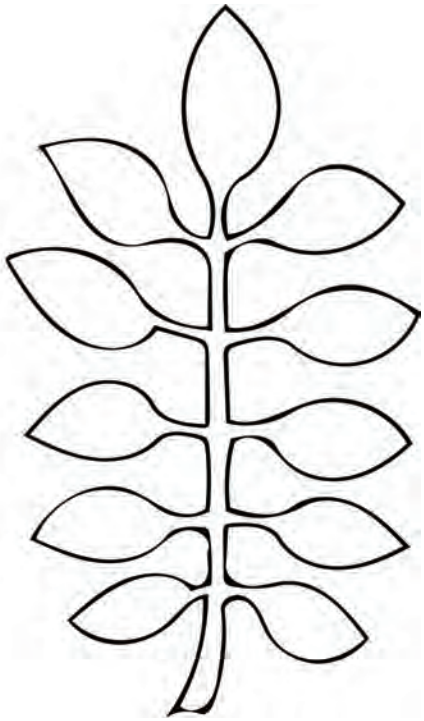
opposite

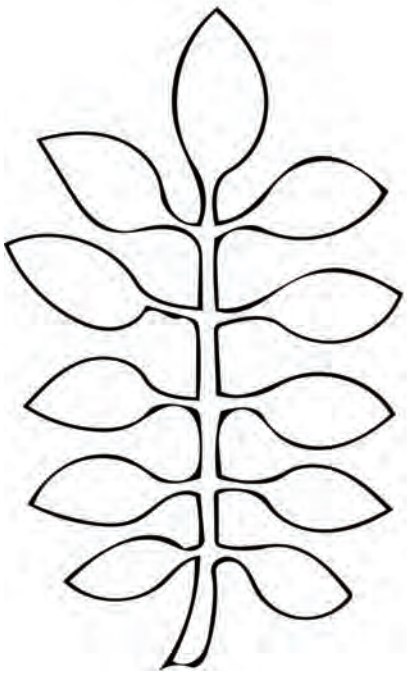
whorled

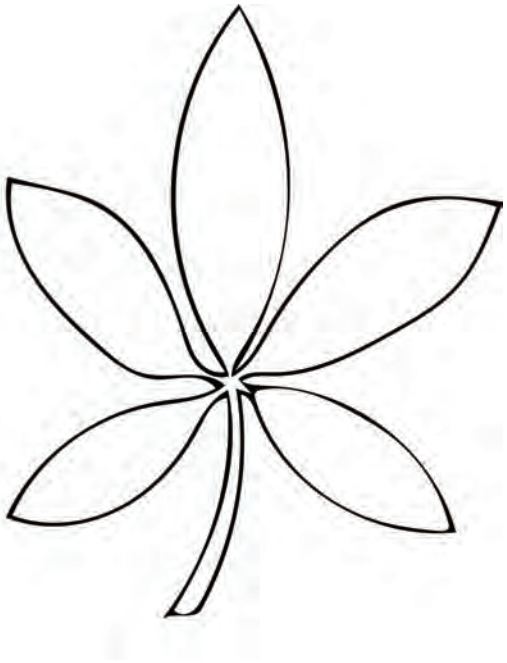
spiral

alternate







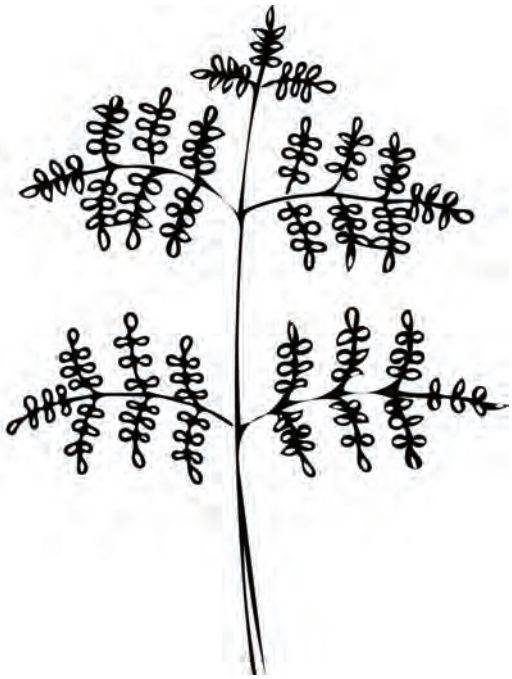


simple

compound

pinnately compound

palmately compound



bipinnately compound

pinnate-bipinnately compound

Classification of Fruit:

dry fruits: This has a dry pericarp at maturity. The ovary wall is the pod or shell. The seeds are within the ovary.

succulent fruit:: This has a fleshy pericarp at maturity. The pericarp is usually divided into three layers.

Types of Ory Fruit:

follicle: This is a fruit, such as milkweed, which contains many seeds and has only one split to release the seeds.

legume: This a fruit, such as peas, with pods which have two splits to release the seeds.

silicle/silique: These are fruits, such as mustard, which have two splits which produce two pericarpial valves that fall away leaving behind a transparent partition.

capsule: This is a type of fruit, such as lilies and poppies, which split to release the seeds from single of multiple dry receptacles.

acheme: These are single dry fruits, such as clematis, derived from a simple pistil. The seed coat is not fused to the pericarp.

samara: These are acheme with wings, such as hop tree or ash.

mericarp: These have carpels which are fused at maturity, such as hollyhocks, but separate easily.

caryopsis: These are dry fruit, such as corn and grain. They are restricted to the grass family.

nut: This is a dry fruit which has a woody pericarp.

Types of Succulent Fruit

drupes: These are fruits such as plums, cherries and olive. There is a seed surrounded by a stony layer outside of which is a layer of fleshy ovary.

pomes: These are fruits such as apples, pears and quince. Small seeds are within the ovary with the stigma and calyx opposite the stem end. The edible part is the receptacle.

berries: These are fruits such as tomatoes, grapes, oranges and watermelon. There are small seeds surrounded by the edible ovary.

multiple fruit: The ovary receptacle and parts of sepals are of one fruit. An example is the pineapple.

aggregate fruit:: The receptacle holds the edible ovaries. An example is the blackberry.

accessory fruit:: The receptacle is internal and the ovary is external. An example is the strawberry.

Parts of the Fruit

pericarp: This is the part of a fruit formed by the layers of the walls of the ovary.

exocarp: This is the outer layer of the pericarp of a fruit. It is often a skin or rind.

mesocarp: This is the middle layer of the pericarp of a fruit. It is sometimes soft and fleshy.

endocarp: This is the inner layer of the pericarp.

This has a dry pericarp at maturity. The ovary wall is the pod or shell. The seeds are within the ovary.

This has a fleshy pericarp at ma-turity. The pericarp is usually di-vided into three layers.

This is a fruit, such as milkweed, which contains many seeds and has only one split to release the seeds.

This a fruit, such as peas, with pods which have two splits to re-lease the seeds.

These are acheme with wings, such as hop tree or ash.

These are fruits, such as mustard, which have two splits which produce two pericarpial valves that fall away leaving behind a transparent partition.

These have carpels which are fused at maturity, such as holly-hocks, but separate easily.

This is a type of fruit, such as lilies and poppies, which split to re-lease the seeds from single of multiple dry receptacles.

These are dry fruit, such as corn and grain. They are restricted to the grass family.

These are single dry fruits, such as clematis, derived from a sim-ple pistil. The seed coat is not fused to the pericarp.

This is a dry fruit which has a woody pericarp.

These are fruits such as plums, cherries and olive. There is a seed surrounded by a stony layer outside of which is a layer of fleshy ovary.

The receptacle holds the edible ovaries. An example is the blackberry.

These are fruits such as apples, pears and quince. Small seeds are within the ovary with the stigma and calyx opposite the stem end. The edible part is the receptacle.

The receptacle is internal and the ovary is external. An example is the strawberry.

These are fruits such as tomatoes, grapes, oranges and watermelon. There are small seeds surrounded by the edible ovary.

This is the part of a fruit formed by the layers of the walls of the ovary.

This is the outer layer of the pericarp of a fruit. It is often a skin or rind.

The ovary receptacle and parts of sepals are of one fruit. An example is the pineapple.

This is the middle layer of the pericarp of a fruit. It is sometimes soft and fleshy.

This is the inner layer of the peri-carp.

Classification of Fruit

dry fruit

succulent fruit

Types of Dry Fruit

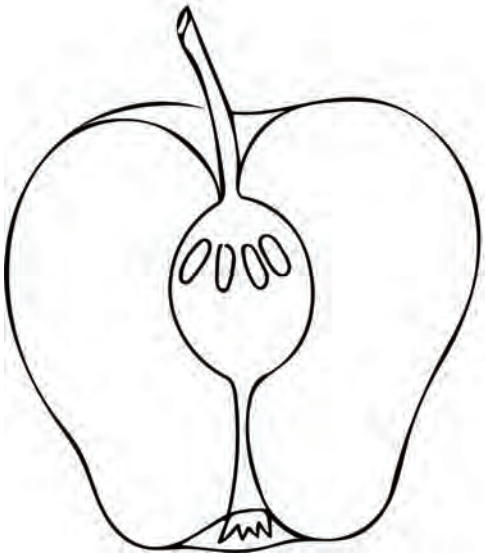
follicle

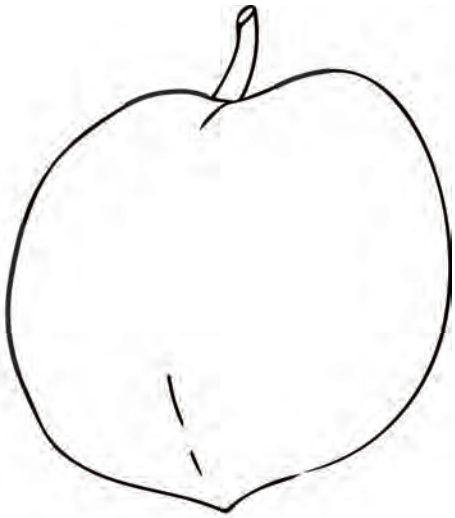
legume

silicle/silique

capsule

acheme



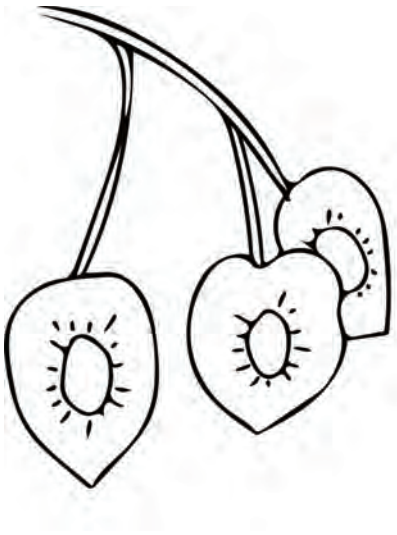


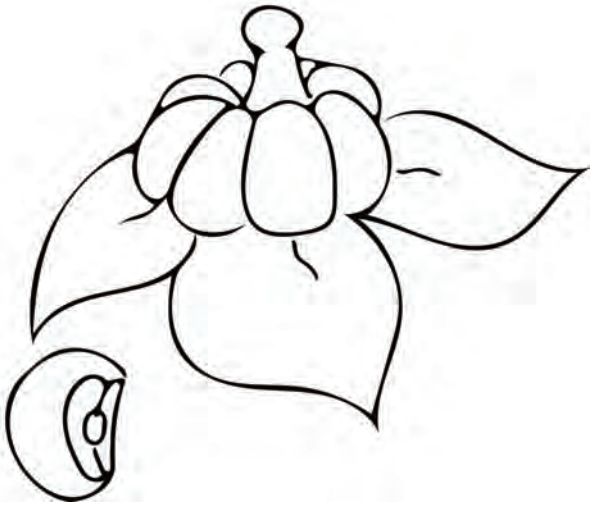
parts of the fruit

succulent fruit

dry fruit

legume



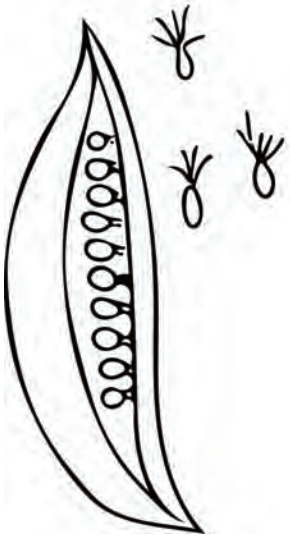


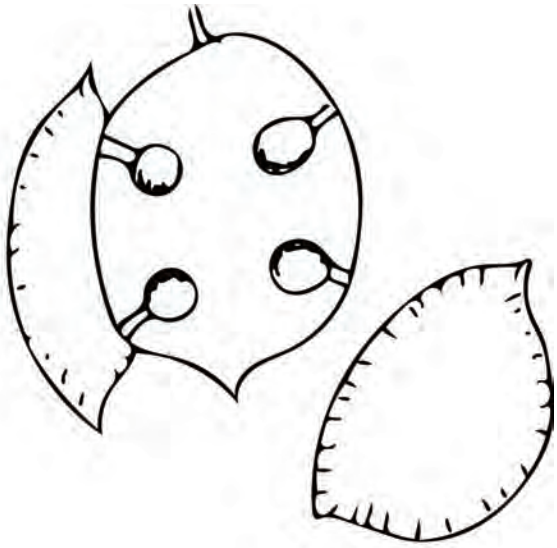
samar

mencarp

caryopsis

nut



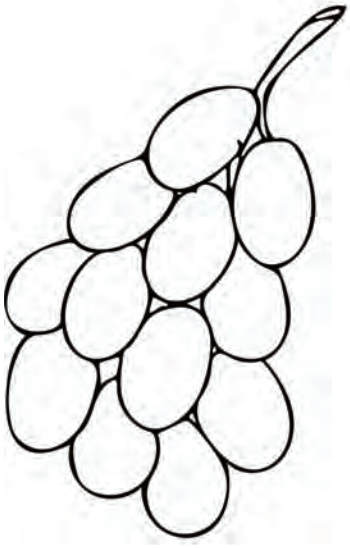


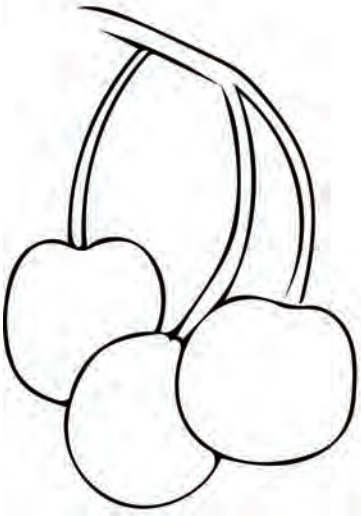
follicle

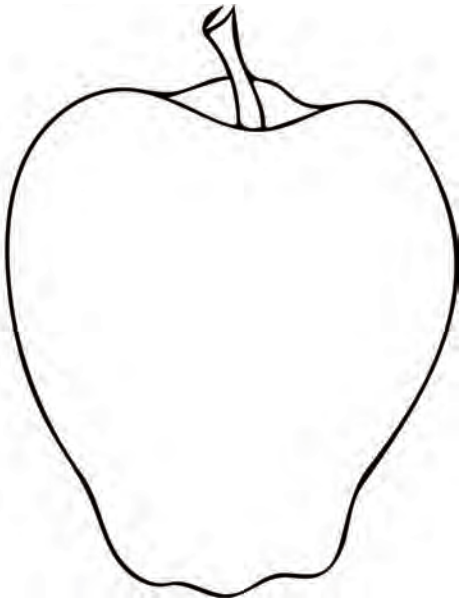
silicle

capsule

achme





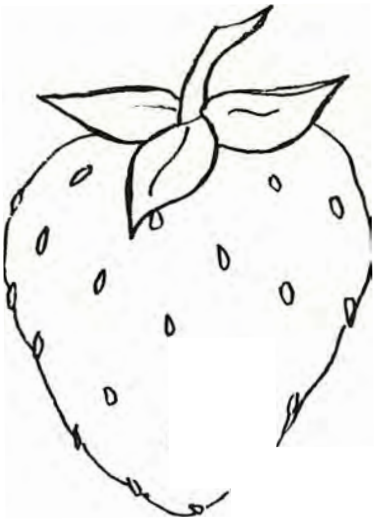


drupe

pome

berry

multiple



aggregate

accessory

Types of Seeds

monocotyledon: This has one cotyledon or seed leaf.

dicotyledon: This has two cotyledons or seed leaves.

Parts of a Seed

testa: This is the seed coat or outer skin of the seed , protecting it from insects, injury and loss of water.

tegman: This is the inner seed coat.

embryo: This is the seed and contains all parts needed to form a new plant, a radicle hypocotyl and one or more cotyledons.

cotyledon: This is the seed leaf which, in some plants, also contains food reserves for the germinating seed.

hilum: This is a scar on the surface of the seed where the funiculus or stalk of the ovule separates from it at maturity.

micropyle: This is the small pore through which the pollen tube entered the ovule prior to fertilization. Moisture enters through it to allow the seed to germinate.

hypocotyl: This is the descending axis immediately beneath the point where the cotyledons separate or diverge, continuous with the primary root or radicle.

epicotyl: This is the growing point of the stem which may have a terminal bud or plumule.

plumule: This is the terminal bud of the ascending axis immediately above the point where the cotyledons diverge.

This has one cotyledon or seed leaf.

This has two cotyledons or seed leaves.

This is the seed coat or outer skin of the seed , protecting it from insects, injury and loss of water.

This is the inner seed coat.

This is the seed and contains all parts needed to form a new plant, a radicle hypocotyl and one or more cotyledons.

This is the descending axis immediately beneath the point where the cotyledons separate or diverge, continuous with the primary root or radicle.

This is the seed leaf which, in some plants, also contains food reserves for the germinating seed.

This is the growing point of the stem which may have a terminal bud or plumule.

This is a scar on the surface of the seed where the funiculus or stalk of the ovule separates from it at maturity.

This is the terminal bud of the ascending axis immediately above the point where the cotyledons diverge.

This is the small pore through which the pollen tube entered the ovule prior to fertilization. Moisture enters through it to allow the seed to germinate.

Types of Seeds

monocotyledon

dicotyledon

Parts of a Seed

testa

tegman

embryo

cotyledon

hilum

micropyle

hypocotyl

epicotyl

plumule

Characteristics of Monocotyledons and Dicotyledons

Monocotyledons

In angiosperms, the cotyledon is the embryo leaf in a seed. This seed has one cotyledon or embryo leaf.

Plants in this classification have leaves with parallel veins.

The roots are fibrous.
Flower parts are in three's.

Stems have vascular bundles which are scattered.

Dicotyledons

This seed has two cotyledons or embryo leaves.

Plants in this classification have leaves with reticulate veins.

These plants have taproots.

Flower parts are in fours or five's.

Stems have vascular bundles in a circular arrangement.

monocotyledonous seed

flower parts in four's or five's

dicotyledonous seed

parallel leaf veins

reticulate leaf veins

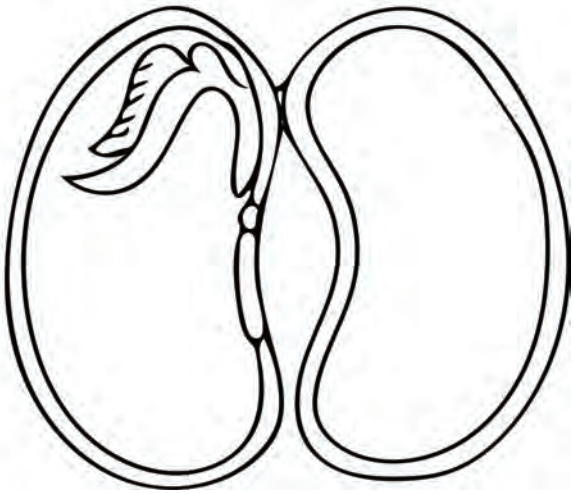
fibrous root

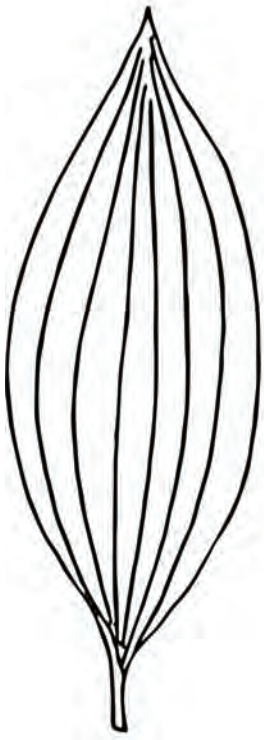
taproot

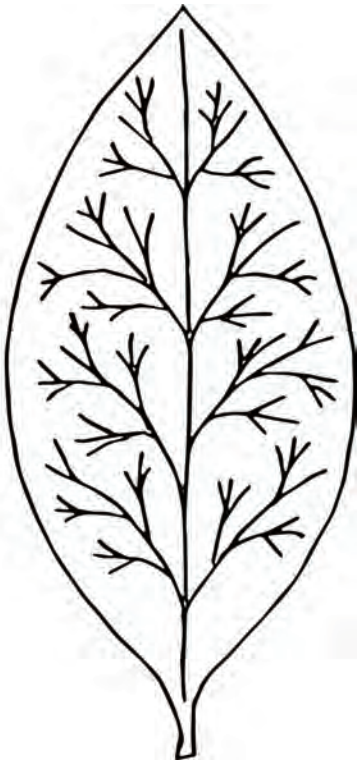
scattered vascular bundles

circular arrangement of vascular bundles

flower parts in three's





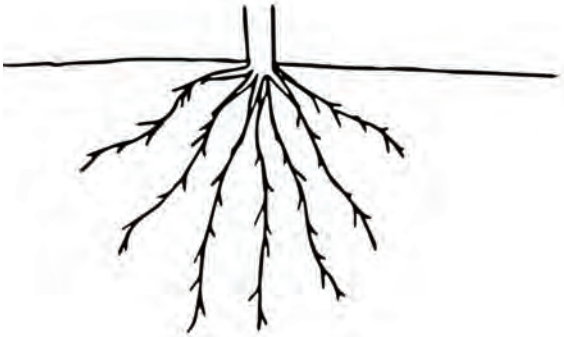


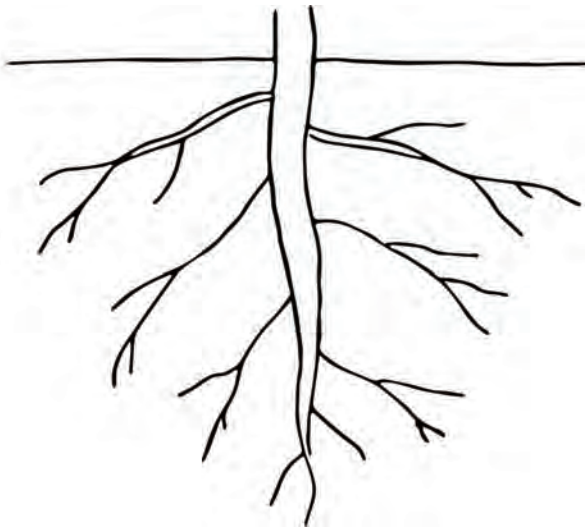
monocotyledonous seed

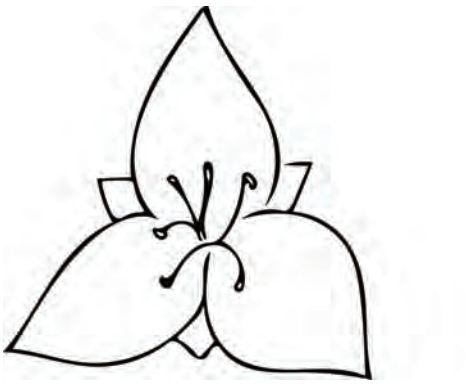
dicotyledonous seed

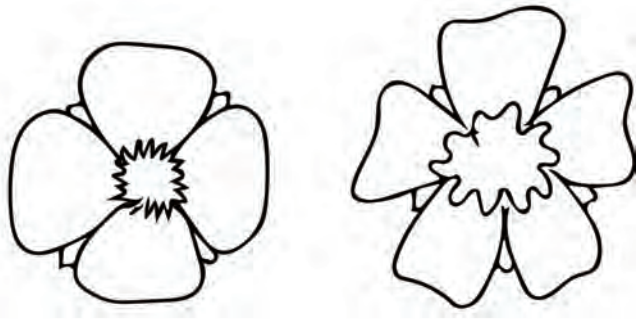
parallel

reticulate







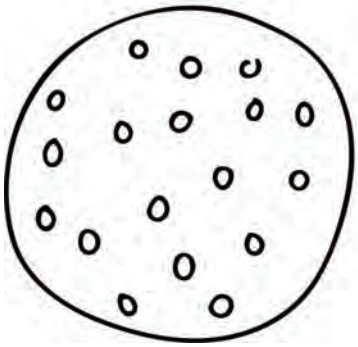


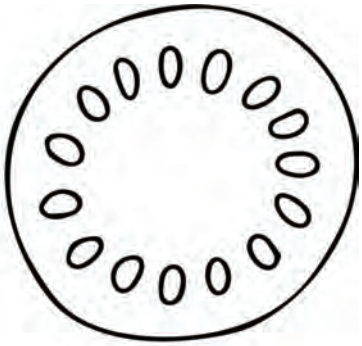
fibrous root

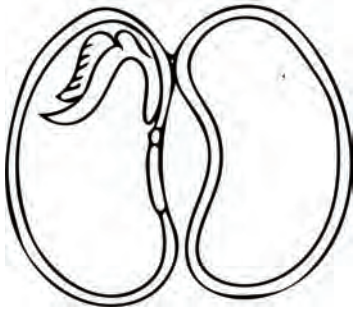
taproot

flower parts in three's

flower parts in four's or five's







scattered vascular bundles

circular arrangement of vascular bundles