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Photocopy Master Sheets

Years 7-8

Living Things

Disk filename = "07.Life"

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Topics Available

Year 7-8 General Science

Disk Filename	Topic Name
01.Energy	Energy
02.Forces	Forces
03.Matter	Solids, Liquids & Gases
04.Mixtures	Separating Mixtures
05.Elements	Elements & Compounds
06.Cells	Living Cells
07.Life	Living Things
08.LifeSystems	Plant & Animal Systems
09.Astronomy	Astronomy
10.Earth	The Earth
11.Ecosystems	Ecosystems

Year 9-10 General Science

Disk Filename	Topic Name
12.Waves	Wave Energy (inc. Light)
13.Motion	Forces & Motion
14.Electricity	Electricity
15.Atoms	Atoms & Elements
16.Reactions	Compounds & Reactions
17.DNA	Cell Division & DNA
18.Evolution	Evolution of Life
19.Health	Health & Reproduction
20.Universe	The Universe
21.EarthScience	Earth Science
22.Resources	Resources & Technology

Year 11-12 Science Courses

Biology
Preliminary Core
Local Ecosystem
Patterns in Nature
Life on Earth
Evolution Aust. Biota
HSC Core
Maintain. a Balance
Blueprint of Life
Search for Better Health
Options
Communication
Genetics:Code Broken?

Chemistry
Preliminary Core
Chemical Earth
Metals
Water
Energy
HSC Core
Production of Materials
Acidic Environment
Chem.Monit.&Mngment
Options
Shipwrecks, Corrosion...
Industrial Chemistry

Earth & Envir. Science
Preliminary Core
Planet Earth...
Local Environment
Water Issues
Dynamic Earth
HSC Core
Tectonic Impacts
Environs thru Time
Caring for the Country
Option
Introduced Species

Physics
Preliminary Core
World Communicates
Electrical Energy...
Moving About
Cosmic Engine
HSC Core
Space
Motors & Generators
Ideas to Implementation
Options
Quanta to Quarks
Astrophysics

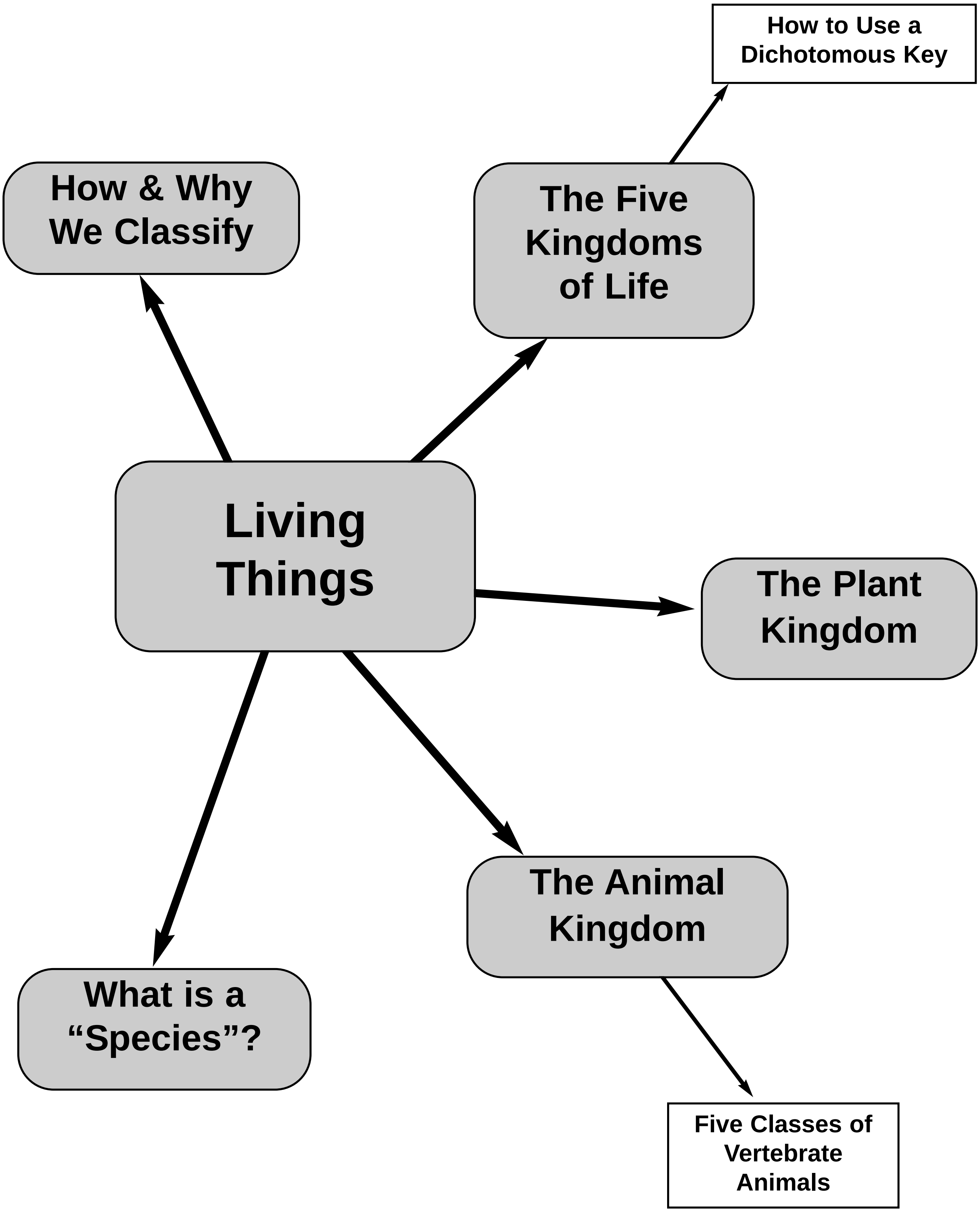
All Topics Available as PHOTOCOPY MASTERS and/or KCiC

Photocopy Masters (PDF files)
Black & White, A4 portrait-orientation for clear, economical photocopying.

KCiC = Key Concepts in Colour
Full colour, formatted for on-screen study and data projection. PDF + Powerpoint®

"Mind-Map" Outline of Topic

This topic belongs to the branch of Science called "Biology", the study of living things. Biology has many aspects, from studying the variety of life forms and how they evolved over the history of the Earth, to their body structures and functions, to how they feed, grow and reproduce.



Make your own "Mind-Map" TITLE PAGE.
Cut out the boxes. Sort them into an appropriate lay-out on a page of your workbook, then glue them down. Add connecting arrows and colour in.

Living Things

The Five Kingdoms of Life

How to Use a Dichotomous Key

Five Classes of Vertebrate Animals

How & Why We Classify

The Plant Kingdom

The Animal Kingdom

What is a "Species"?

Make your own "Mind-Map" TITLE PAGE.
Cut out the boxes. Sort them into an appropriate lay-out on a page of your workbook, then glue them down. Add connecting arrows and colour in.

Living Things

The Five Kingdoms of Life

How to Use a Dichotomous Key

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How & Why We Classify

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What is a "Species"?

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Life on Earth

How many different types of life are there?

The Variety of Living Things

No-one knows for sure how many types of living things there are on Earth.

Over a million have been named and scientifically catalogued, but new types are discovered every day.

Estimates of the total vary from 2 million, up to 30 million different types of life.

This is just the life-forms alive today. We believe that this is less than 1% of all the types that have ever lived, and are now extinct.

The Need to Classify

With such a staggering number of living things, how can scientists ever hope to understand it all?

The first step is to classify. This means to put things into groups.

Instead of trying to understand a million different creatures, we place them into just a few groups which can be more easily dealt with.

In this topic, you will survey the major groups of life-forms and get an overall impression of the variety of life.

You will also learn the basics of how things are classified.

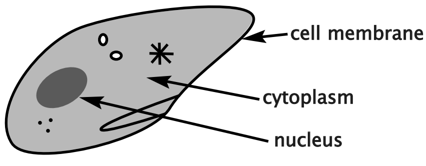
What is Life, Anyway?

The Structure of Life: CELLS

You may have already studied living cells. Cells give us a structural way to define what a living thing is.

"All living things are composed of cells, or are the product of cells"

This statement is called "The Cell Theory"



Some living things are unicellular... they are composed of one, single cell.

All the familiar plants and animals are multicellular... they are composed of many cells, usually billions.

The Functions of Life

All living things carry out certain, basic "life functions".

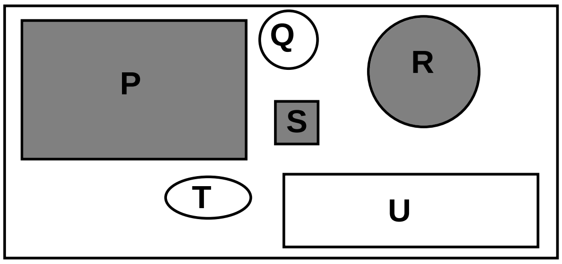
All living things:

- take in substances from their surroundings, and assimilate them.
  (Things taken in include food, water & oxygen. "Assimilation" means that the substances taken in are used to build new cells and grow body parts... they become part of the organism.)
- extract energy from their food.
- excrete their wastes.
- grow.
- reproduce their own kind.
- respond to things that happen.

Methods of Classifying

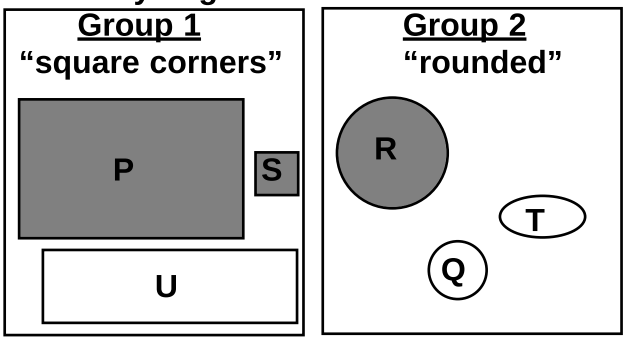
Before looking at the classification of life, let's consider the general idea of grouping or classifying things.

Imagine that you were asked to place these 6 different shapes into 2 groups.

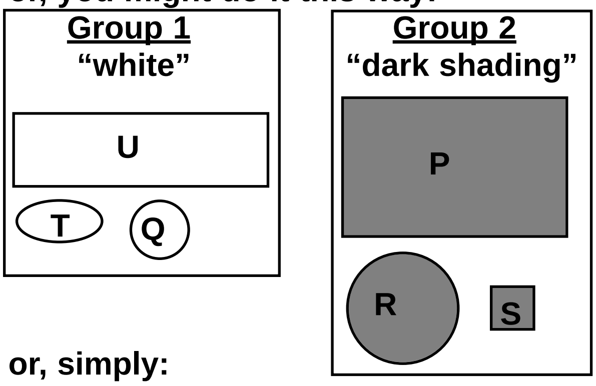


How would you do it?

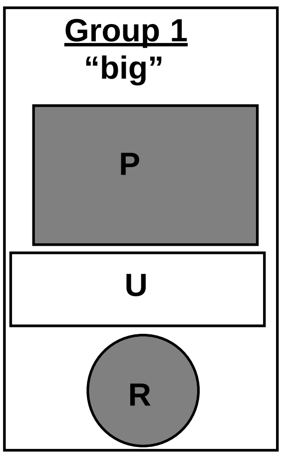
One way might be as follows:

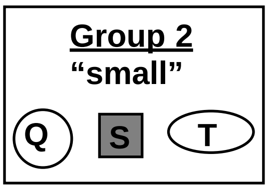


or, you might do it this way:



or, simply:





The point is, that there are many ways to classify, depending on what criteria you use. What criteria are used in Science?

Scientific Criteria for Classifying

To classify living things, we try to avoid criteria which might change during the life-time of each organism. e.g. size and colour.

We also avoid things like "lives in a tree", or "can fly", because this can create groupings that don't make sense. For example, an emu, or a penguin, would be classified separately to other birds, even though both have feathers, wings, beaks and other "bird" features.

So, we use the structures of their bodies and cells. We also use basic life functions, such as how they reproduce, or how they make, or get food and how they process it.

To start with, the key criteria are these:

Cell Structures — Organelles, or not?

Most organisms have cells which contain many small structures called "organelles". The most important is the nucleus. Some cells have one, others don't. That's a big difference!

Cellular Organisation — Uni- or Multi?

Some organisms are "unicellular"; they are made up of just 1 single living cell. Others are "multicellular"; they are composed of many cells working together. That's a big difference!

Food — Autotrophic or Heterotrophic?

(Auto = "self". Hetero = "other" trophic = "to do with feeding")

Some living things are able to make food from simple chemicals. Others must eat other living things to get food that is ready-made. That's another biggy!

Animal or Vegetable?

A Little History

Until quite recently, it seemed logical to think of all living things as being either plant or animal. Most people still think this way in everyday situations.

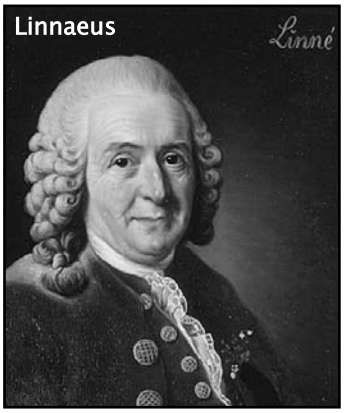
About 250 years ago, the world was being explored by Europeans as never before. They were discovering new lands, new ecosystems and many new types of living creatures.

Carl Linnaeus (Swedish, 1707-78) realised that scientists needed a formal system to name and classify all the living things that were being discovered and described. Logically, he suggested that living things should be divided into 2 great "Kingdoms": Plants and Animals.

Each kingdom could then be sub-divided into further "types" and categories and classes, until each individual "species" could be given a unique name.

Problems

The "Linnaean System" was adopted, but right from the start there were some living things that were hard to classify.



Fungi, such as mushrooms, seemed to be plants, (certainly NOT animals) but are not green, grow underground and never produce flowers or seeds.

They were classified as plants, but put in a special category for "weird" plants.

When bacteria were discovered, they also presented a problem. It was decided that they were more like plants than animals and were classified as "abnormal" plants for about 100 years.

Today, we think about these things quite differently.

Technology Changes Scientific Thinking

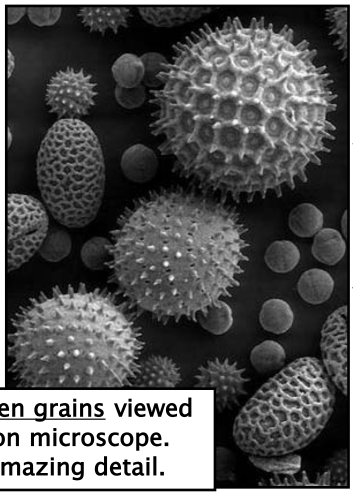
The Electron Microscope

By the mid-20th century, scientists had a new tool for studying and understanding the different types of living things.

The electron microscope uses beams of electrons to form photographic or computer images of cells.

It achieves much higher magnification than a light microscope and also shows much greater detail.

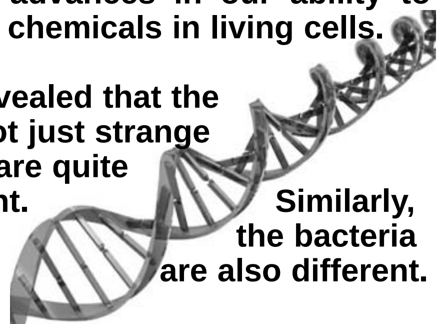
This technology has revealed that bacteria cells are completely different to either plants or animals.



These are pollen grains viewed by an electron microscope. Notice the amazing detail.

Chemical Analysis

Over the past 30-40 years there have been huge advances in our ability to analyse the chemicals in living cells.



This has revealed that the fungi are not just strange plants, but are quite different. Similarly, the bacteria are also different.

We now realise that living things are NOT just plant or animal. Our system of classifying has to be flexible and be changed to fit in with our scientific knowledge.

We now classify life forms into at least 5 different, major types.

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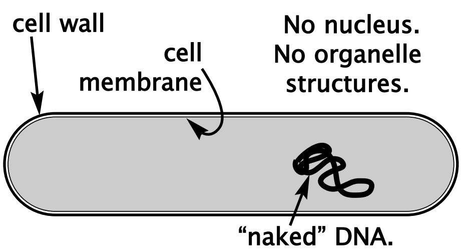
The Five Kingdoms of Life

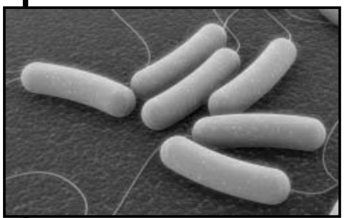
Traditionally, living things were thought of as being either plants, or animals.
Over the past 50 years this has changed.
New technologies, such as electron microscopes and DNA analysis, have revealed the fundamental differences between life forms.
All life on Earth is usually classified into 5 major groups, called “kingdoms”.

Kingdom of BACTERIA

The bacteria group are all unicellular. Their cells are very small, and do NOT have a nucleus or other “organelles”.



Some can make their own food, others eat dead matter and wastes and cause it to rot away. Some cause diseases.



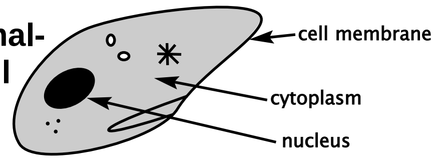
Their simplest defining feature is cells with no nucleus.

This is considered to be fundamentally different to all other life forms.

Kingdom of PROTISTS

The “Protists” are a mixed group of unicellular organisms. All have cells with a true nucleus and other organelle structures.

Some have animal-like cells (no cell wall, hetero-trophic) while others are plant-like (have a cell wall, and make food in chloroplasts).



Kingdom of FUNGI

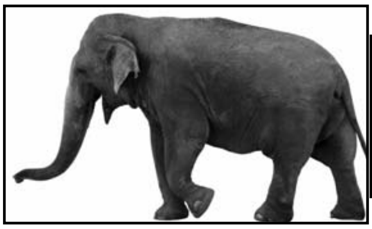
Most are multicellular such as mushrooms & toadstools. The fungi used to be thought of as weird plants, but now we recognise that they are quite different.

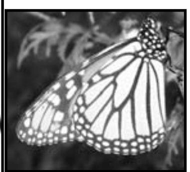
Their cells have a nucleus and organelles. They also have a cell wall, but quite different to that in a plant. They never have chloroplasts and cannot make food.

They are heterotrophic, and most eat dead plant matter, causing it to rot away.

Kingdom of ANIMALS

Animals are defined to be multicellular and heterotrophic. Their cells have no cell wall.





This group contains all the familiar animals from worms to fish to butterflies & elephants.

Protozoa?

In some texts protozoa are described as “single-celled animals”.
Here, they will be considered as “protists”, not animals.

Kingdom of PLANTS

Plants are defined as multicellular and autotrophic. Their cells always have a cell wall, and at least some of their cells have chloroplasts. They make their own food by photosynthesis.

This group contains all the familiar plants from seaweeds to ferns to grass, trees and shrubs.

A Key to the Five Kingdoms

A good way to compare the features of different groups is to construct a table.

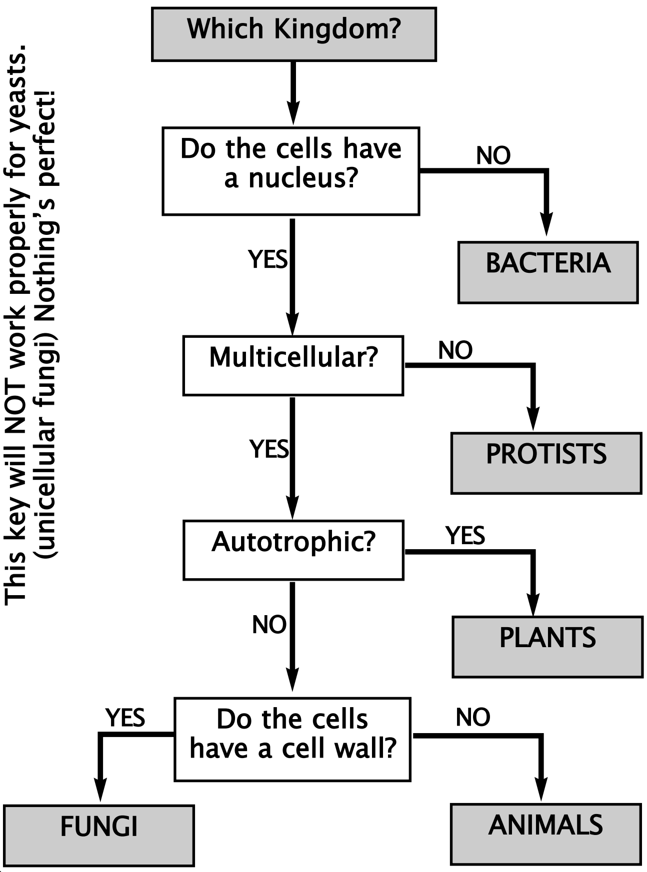
KINGDOM	Nucleus in cell?	Cell Wall?	Unicellular or Multicellular?	Autotrophic or Heterotrophic?
BACTERIA	no	yes	unicellular	some of each
PROTISTS	yes	some with. some without.	unicellular	some of each
FUNGI	yes	yes	multicellular (except yeasts - uni)	heterotrophic
PLANTS	yes	yes	multicellular	autotrophic
ANIMALS	yes	no	multicellular	heterotrophic

Viruses are not included in this classification scheme because they are not made of cells.

Once you have this information, every living thing can be classified into one of the five great "kingdoms of life".
To help with classifying into groups, we often use a "dichotomous key".
This is a key which gives you 2 choices at each step, until you reach an end point.
(Dichotomous means "to divide in two")

Dichotomous keys can be in diagram form, or have a series of paired choices.

Diagram Key



This key will NOT work properly for yeasts. (unicellular fungi) Nothing's perfect!

Paired-Choice Key

This key works in exactly the same way as the key on the left.

Which Kingdom?

Level 1
1a. Cells have a nucleus............ level 2
1b. No nucleus...................... BACTERIA

Level 2
2a. Multicellular.......................... level 3
2b. Unicellular...................... PROTISTS

Level 3
3a. Autotrophic......................... PLANTS
3b. Heterotrophic..................... level 4

Level 4
4a. Cells have cell wall.............. FUNGI
4b. No cell wall........................ ANIMALS

Worksheet 1

Defining & Classifying Life
Fill in the blanks

Student Name...

To "classify" means to place things into a)........................... with common features.

When classifying living things we use the b)............................ and functioning of their c)..................... and bodies.

At the highest level, the important criteria are:

• whether the cells have a d)................... or not.

Another important cellular feature is whether or not each cell is surrounded by a e)...................................

• if the organism is made up of 1 cell (f) ".................................." or many cells (g) "...................................")

• how the organism gets food. h) "...................................." make their own food, while i) "................................" eat food made by other organisms.

Worksheet 2

Five Kingdoms of Life

Use the Key to identify which Kingdom each organism belongs to.

Student Name...

Key to the Five Kindoms

Level 1
1a. Cells have a nucleus............ level 2
1b. No nucleus....................... BACTERIA

Level 2
2a. Multicellular........................... level 3
2b. Unicellular....................... PROTISTS

Level 3
3a. Autotrophic.......................... PLANTS
3b. Heterotrophic...................... level 4

Level 4
4a. Cells have cell wall.............. FUNGI
4b. No cell wall......................... ANIMALS

Organism A
has cells with a nucleus & cell wall. It is multicellular and autotrophic.

It must belong to the .... group.

Organism B
has cells with a nucleus, but no cell wall. It is unicellular and autotrophic.

It must belong to the .... group.

Organism C
has cells with no nucleus, but has a cell wall. It is unicellular and autotrophic.

It must belong to the .... group.

Organism D
has cells with a nucleus, but no cell wall. It is multicellular and heterotrophic.

It must belong to the .... group.

Organism E
has cells with a nucleus & cell wall. It is multicellular and heterotrophic.

It must belong to the .... group.

Organism F
is heterotrophic and multicellular. Its cells lack cell walls.

It must belong to the .... group.

The PLANT Kingdom

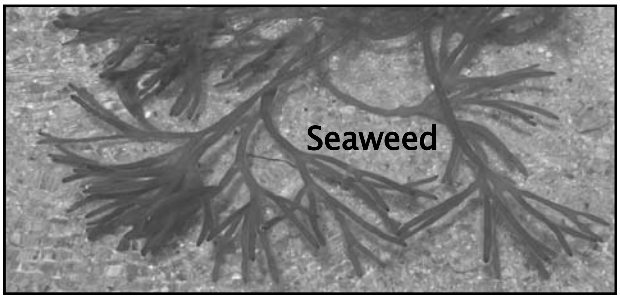
All the members of the Kingdom of Plants are <u>multicellular</u> and <u>autotrophic</u>.
The kingdom can be sub-divided into 5 major sub-groups.
We have used mostly <u>common names</u> for these groups.
Your teacher may require that you learn a more technical name.

To divide the plants into sub-groups, we use <u>structural</u> differences between them. One of the most important structures is <u>vascular tubes</u>. These are plant "veins"; tubes which carry water or food around in their bodies. Also important are <u>roots</u> and <u>leaves</u>, and the structures used to <u>reproduce</u>.

Algae

Algae are very simple plants. Most live in water, such as the "seaweeds".

They do NOT have vascular tubes, nor roots, nor proper leaves.

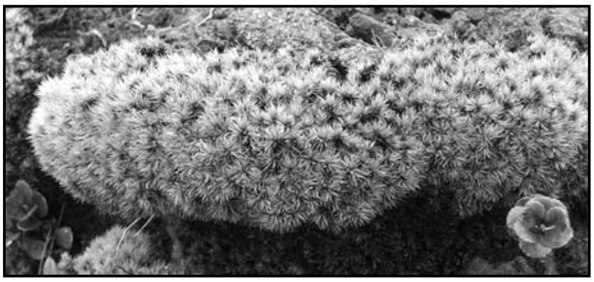


Reproduction involves releasing reproductive cells into the water environment, but they have <u>no seeds</u>.

Although they all have green chlorophyll, some have other pigments as well, and can be brown or red in colour.

Mosses

The moss group live on land, but usually in damp, shady spots.



They do NOT have vascular tubes. They do NOT have roots, but have a simple structure called a "rhizoid" to hold them in the ground.

They have leaves, but these are very simple compared to other groups.

Like the Algae, they reproduce <u>without seeds</u>.

Ferns

Ferns are <u>vascular</u>. They have "veins" to carry water from their roots, and to carry food around inside themselves.

They have true roots and leaves.

They do NOT reproduce with seeds, but use a complex, 2-stage system which requires wet conditions.

More Plants next page...

The PLANT Kingdom

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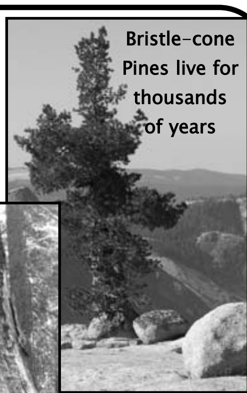
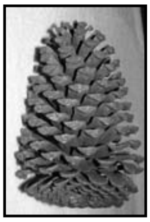
To divide the plants into sub-groups, we use structural differences between them. One of the most important structures is vascular tubes. These are plant "veins"; tubes which carry water or food around in their bodies. Also important are roots and leaves, and the structures used to reproduce.

The Conifers (Cone-bearing plants)

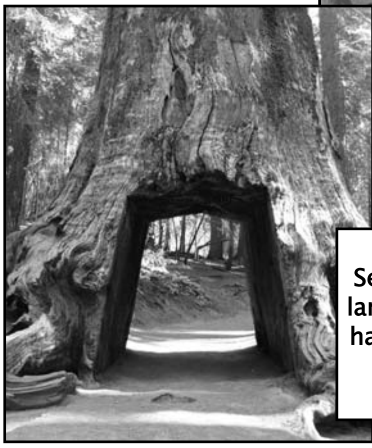


Bristle-cone Pines live for thousands of years

Most conifers grow as large trees or woody shrubs. They are vascular plants, with well-developed roots and leaves.



To reproduce they make seeds in structures called cones. This is their defining feature.



This Giant Sequoia tree is large enough to have a roadway through its trunk

Conifers include pine trees, fir trees, cedars and many others. Some are the largest living things on Earth (although most of their bulk is dead wood) and others are the longest-lived. Humans rely on conifers for much of our timber.

The Flowering Plants

This group includes all the most familiar plants including grass, gum trees, garden plants, palms, and all our cereal, fruit and vegetable crop plants.

The flowering plants are vascular, with well-developed roots and leaves. They grow in a huge variety of shapes and sizes and live in just about every possible land environment.

Their defining feature is the way they reproduce.

They produce seeds from flowers.

A seed is an embryo. It is like an unborn baby plant.

Flowering plants produce their seeds after their flowers are fertilised. This is done by pollen being carried from one plant to another by the wind, or by animals such as bees, birds or bats.

Worksheet 3

Summarising the Plant Types

Student Name..

Fill in the table to summarise the features of the types of plants.
Some items have been done for you.

Most items can be filled in with "yes" or "no"

Plant Group	Vascular Tubes?	Have Roots?	Leaves?	Seeds?	Seeds made in a...
Algae	a)	b)	c)	d)	not applicable
e)	f)	rhizoid only	simple	g)	not applicable
Ferns	h)	i)	j)	k)	not applicable
l)	m)	n)	o)	p)	cone
Flowering Plants	q)	r)	s)	t)	u)

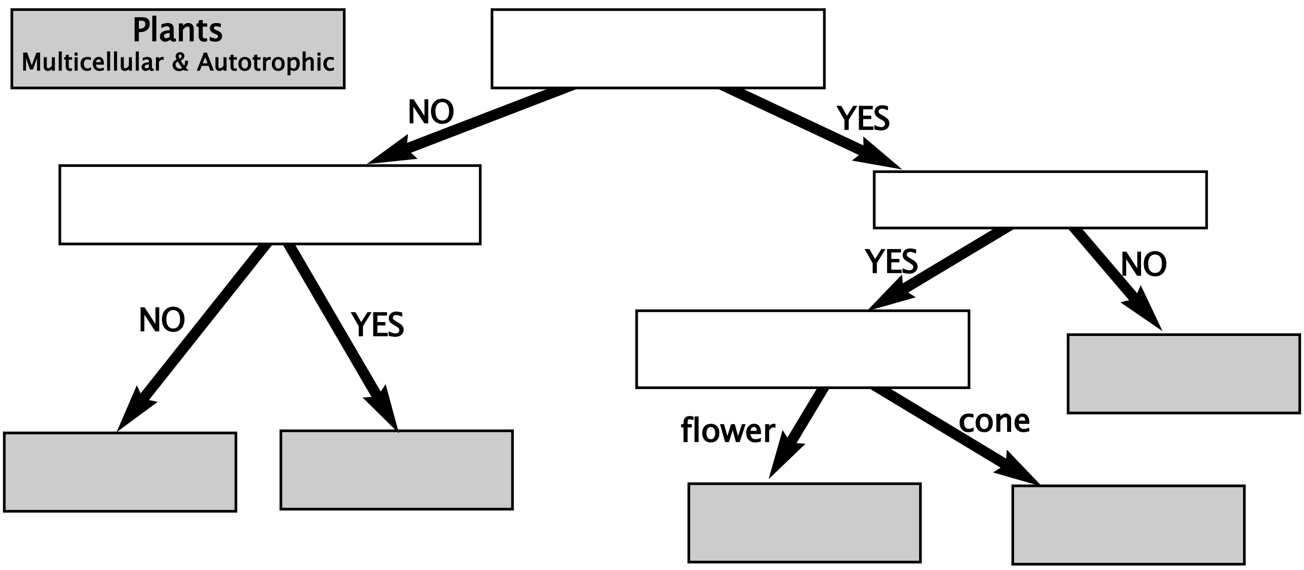
Worksheet 4

Make Your Own Dichotomous Key

Student Name..

The "Flow-Chart" is a frame-work to build a key to the Plant groups.

At the bottom are some labels which fit into the flow-chart boxes. Cut out the labels and arrange them in the flowchart. Glue when finished.



Is it Vascular?
(yes or no?)

Does it make seeds in a cone or flower?

Conifers

Ferns

Flowering Plants

Does it have rhizoid roots, and simple leaves?

Does it make seeds?

Algae

Mosses

The ANIMAL Kingdom

All the members of the Kingdom of Animals are multicellular and heterotrophic.
The cells in an animal never have a cell wall.
The kingdom can be sub-divided into many, many sub-groups.
Only the most common types are covered here.
We have used simplified or common names for some of these groups.
Your teacher may require that you learn a more technical name.

The SPONGES

A sponge animal often looks more like a plant. They grow attached to rocks in the sea and filter the water to get food. They have no "head" & "tail" ends.

Their bodies are just like a lump of cells living and growing together without much organisation.

They lack all the organs we expect an animal to have, like eyes, stomach, blood, heart, muscles, etc.

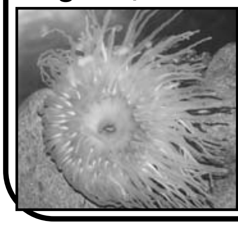
Dead Sponge.
The many holes are spaces where the cells of the sponge animal were, when alive.

Hollow-Bodied Animals The Jellyfish Group

This group includes jellyfish, sea anemones and all the coral animals which build coral reefs.

Their soft bodies are built in a circular plan, around a hollow space. They have no "head" or "tail", and no internal organs, such as heart or kidneys.

They have stinging tentacles which they use to catch their prey.



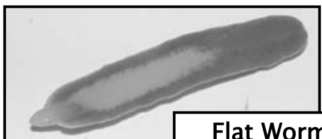
Sea Anemone

Three Kinds of Worm Animals

Although they all look "worm-like", these are really 3 quite different groups.
All have definite "head" & "tail" ends, but no skeleton, nor any legs, fins, etc.

Flat Worms

These have flattened bodies and some are leaf-shaped, called "flukes".



Flat Worm, about life size

They have hardly any internal organs (no heart or intestines) so are really very simple animals.

Round Worms

These have smooth, round, tube-shaped bodies with pointy ends. They have a gut, but no blood supply. Most live in the soil or water, but some are parasites.

Segmented Worms

This group includes earthworms, beach worms and leeches. Their tube-shaped bodies are made up of many segments.

They have many internal organs, including a heart and kidneys.

The ANIMAL Kingdom

All the members of the Kingdom of Animals are multicellular and heterotrophic.
The cells in an animal never have a cell wall.
The kingdom can be sub-divided into many, many sub-groups.
Only the most common types are covered here.
We have used simplified or common names for some of these groups.
Your teacher may require that you learn a more technical name.

Echinoderms

(Echino = "spikes", derm = "skin")

This group includes the starfish, sea urchins and other sea creatures with rough or spikey skin.

They don't have a "head" and "tail", but have "radial symmetry". This means they are built in a circular plan, usually with 5 parts.

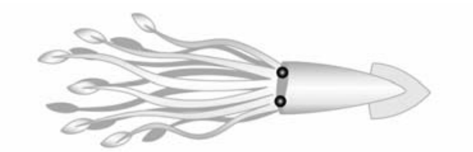
They all have hundreds of "sucker-tube feet" which allow them to cling to rocks and move around. Starfish can use their tube-feet to pull a clam or oyster open to eat it.

Molluscs. Snails & Squid

These animals are more advanced than you might think. They have well-organised bodies, with definite "head" & "tail" ends. Some are quite intelligent.

All have soft bodies, but many have a protective shell around it, The shell can be plate-like, or spiral, or a 2-part shell that opens, such as an oyster.

All have a strong "muscular foot". Snails use it to glide around, pipis use it to dig into sand. In squid and octopus the "foot" is divided into 8 or more "arms" for grasping their food.



Arthropods

(Arthro = "joints" pod = "leg")

This is the biggest animal group of all. It includes all the insects, spiders, crabs & lobsters, centipedes, and more.

Some fly, some swim, some burrow. They breathe with gills, or through simple holes in their bodies.

All have a hard "exo-skeleton" (like a suit of armour) which is jointed to allow movement. They have definite "head" & "tail" ends.

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The ANIMAL Kingdom

The final group of animals contains all the most familiar examples including fish, frogs, snakes & lizards, birds, plus all our furry friends like cats, dogs & sheep.

This is such an important group to us, that it needs to be further sub-divided.

The Chordates

In keeping with the K.I.S.S. Principle, the technical definition of this group has been simplied. Your teacher may instruct you in a more correct (but more complicated) definition.

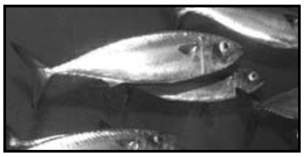
Nearly all of these animals can be described as "vertebrates"... they have an internal skeleton of bone or cartilage, with a backbone and spinal chord.

When dividing them further into "classes" we use criteria such as how they breathe, how they reproduce and what covering they have on their skin, if anything.

Another important feature is how they get their body heat. "Endotherms" make their own body heat, while "ectotherms" rely on the environment for heat. (Endo = "inside", ecto = "outside", therm = "heat")

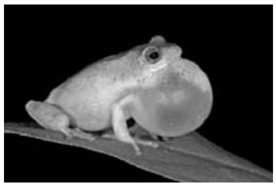
Fish

Body heat: Ectotherms
Breathing: Gills
Skin cover: Scales
Reproduction: Lay eggs



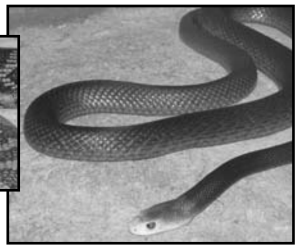
Amphibians

Body heat: Ectotherms
Breathing: Gills & Lungs
Skin cover: Moist skin
Reproduction: Lay eggs



Reptiles

Body heat: Ectotherms
Breathing: Lungs
Skin cover: Dry Scales
Reproduction: Lay eggs



Mammals

Body heat: Endotherms
Breathing: Lungs
Skin cover: Fur or hair
Reproduction: Give birth (except platypus & echidna)

Birds

Body heat: Endotherms
Breathing: Lungs
Skin cover: Feathers
Reproduction: Lay eggs

Worksheet 5

A Key to the Animal Kingdom

Student Name..

For each animal described;

a) name the group to which it belongs.
b) list the steps in the key which led you to your answer to (a).
(An example is done for you)

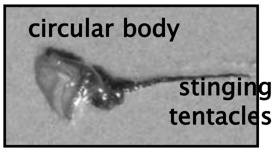
Example: Crocodile
a) CHORDATE
b) 1a, 4b, 7a
(A crocodile has a definite head and tail, it is not worm-like, and it has a bony skeleton inside its body.)

1. Garden Snail

a).............................

b)....................................

2. "Blue bottle" Jellyfish



a)............................

b).............................

3. Red-back Spider

a)................................

b)...............................

4. Sea Urchin

a)...........................

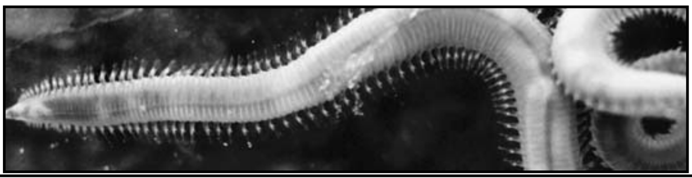
b).............................

5. Bee

a)..........................

b)............................

6. Beach Worm



a).................................
b).................................

KEY TO THE GROUPS OF ANIMALS

Level 1
1a. Definite head & tail ends....... level 4
1b. No head & tail ends.............. level 2

Level 2
2a. Circular plan body................ level 3
2b. No particular body plan.....SPONGES

Level 3
3a. Have stinging tentacles... HOLLOW-BODIED ANIMALS
3b. Have rough or spikey skin.... ECHINODERMS

Level 4
4a. Long, thin (or flat) body, with no skeleton or shell.................. level 5
4b. Body not "worm-like"........... level 7

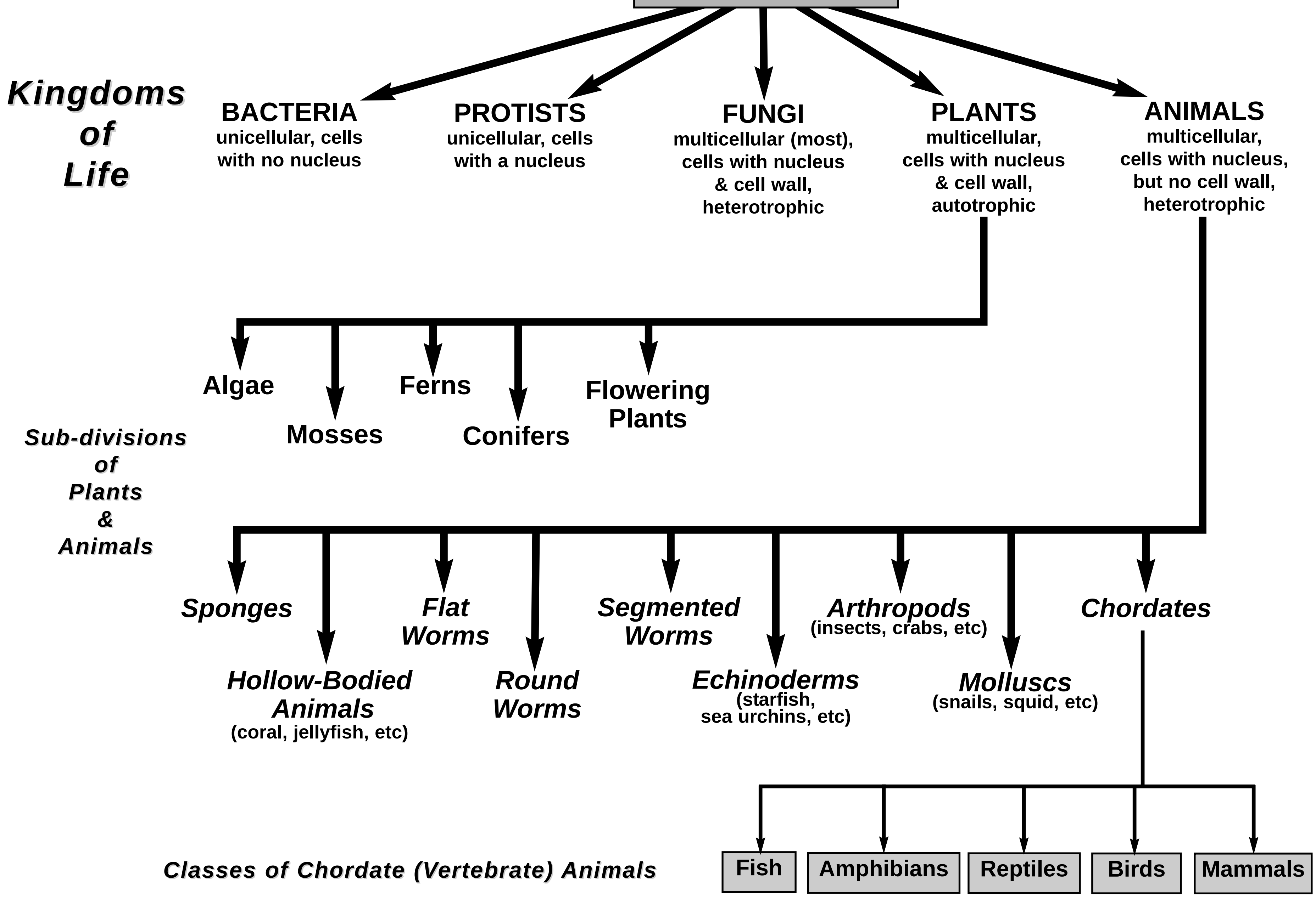
Level 5
5a. Body flattened............ FLAT WORMS
5b. Body cylindrical...................... level 6

Level 6
6a. Body made of segments................. SEGMENTED WORMS
6b. Tubular, no segments.................. ROUND WORMS

Level 7
7a. Internal skeleton of bone or cartilage ....CHORDATES
7b. No internal skeleton.............. level 8

Level 8
8a. Jointed exoskeleton.. ARTHROPODS
8b. Soft body, may have shell. Muscular "foot" for movement or "arms"..... .....MOLLUSCS

A Summary...


Living Things
Kingdoms of Life
BACTERIA
unicellular, cells with no nucleus
PROTISTS
unicellular, cells with a nucleus
FUNGI
multicellular (most), cells with nucleus & cell wall, heterotrophic
PLANTS
multicellular, cells with nucleus & cell wall, autotrophic
ANIMALS
multicellular, cells with nucleus, but no cell wall, heterotrophic
Sub-divisions of Plants & Animals
Algae
Mosses
Ferns
Conifers
Flowering Plants
Sponges
Hollow-Bodied Animals
(coral, jellyfish, etc)
Flat Worms
Round Worms
Segmented Worms
Echinoderms
(starfish, sea urchins, etc)
Arthropods
(insects, crabs, etc)
Molluscs
(snails, squid, etc)
Chordates
Classes of Chordate (Vertebrate) Animals
Fish
Amphibians
Reptiles
Birds
Mammals

Getting Specific: What is a Species?

At the top of the classification system are the "Kingdoms" of life, each containing many thousands of life forms.

At the bottom are the individual types, or species. A species refers to a single type of living thing which reproduces its own kind, over generations.

One species either cannot, or normally does not, interbreed with another species.

Lions and tigers are closely related and (in a zoo) sometimes inter-breed. Their babies are called "ligers" or "tigons".

However, in the wild these animals never meet and never inter-breed.

Therefore, they are considered separate species.

Horses and donkeys can inter-breed too. Their baby is called a "mule".

This would probably never happen in nature, but more importantly, mules are not fertile and cannot have babies. Horses and donkeys are considered separate species because they cannot inter-breed over generations.

What's in a Name?

Each species has been given a scientific name which is used by all scientists. This ensures that there is no confusion about exactly which organism is being studied or discussed, when scientists communicate.

The name of each species has 2 parts. We say it is binomial. (bi = 2, nom = name)

Example:
We might call this animal the "eastern grey kangaroo", but scientifically it is *Macropus giganteus*

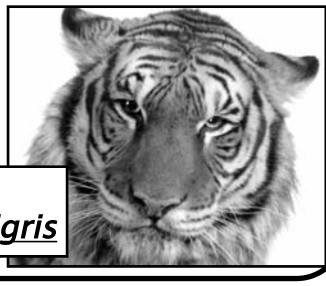
The name must always be underlined or in *italic print*.

This red kangaroo is *Macropus rufus*. Notice how the first part of the name is the same? Closely related species have the same first-name, just like human family members having the same surname.

These 3 "big cats" are all closely related and, sure enough, their scientific names all have the same "surname".

Leopard
Panthera pantheris

Lion
Panthera leo



Tiger
Panthera tigris

Topic Test - Living Things

Answer all questions in the spaces provided.

Student Name...

Score ..../ 21

1. (10 marks)

True or False? T or F

a) When classifying living things, we try to use structural features of organisms. ....

b) Bacteria are the only unicellular kingdom. ....

c) There are 2 kingdoms of life that are multicellular. ....

d) All fungi are heterotrophic. ....

e) Ferns grow from seeds. ....

f) Algae and Mosses are non-vascular plants. ....

g) Mollusc animals have an internal skeleton. ....

h) Insects & spiders belong to the Echinoderm group. ....

i) Fish are the only group with skin covered in scales. ....

j) A "species" is defined by reproduction. ....

2. (4 marks)

For each pair of items, state clearly what is the difference between them?

a) Autotrophic and Heterotrophic

b) Endothermic and Exothermic

3. (7 marks)

The Arthropod group of animals can be further sub-divided into types, mainly by how many legs they have.
Here is a simple key to the types:

1a. Have 6 legs....................... INSECTS
1b. More than 6 legs..................... level 2

2a. Have 8 legs, no claws............. level 3
2b. May have claws, or not. Have 8 or more legs........... level 4

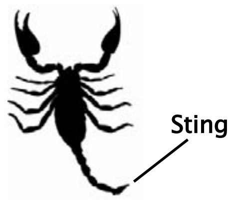
3a. Legs longer than body...... SPIDERS
3b. Legs shorter than body.... TICKS

4a. Have stinging tail......... SCORPIONS
4b. No sting................................ level 5

5a. Claws, 8 to 18 legs.. CRUSTACEANS
5b. More than 18 legs.... MYRIAPODS

Use this key to classify each animal into its group.
Sketches are NOT to the same scale.

a)...............................



b)...............................

c)...............................

d)...............................

e)...............................

f)...............................

g)...............................

Answer Section

Worksheet 1

a) groups
b) structure
c) cells
d) nucleus
e) cell wall
f) unicellular
g) multicellular
h) autotrophes
i) heterotrophes

Worksheet 2

A. PLANT
B. PROTISTS
C. BACTERIA
D. ANIMAL
E. FUNGI
F. ANIMAL

Worksheet 3

a) no b) no c) no d) no

e) Mosses f) no g) no

h) yes i) yes j) yes k) no

l) Conifers m) yes n) yes o) yes p) yes

q) yes r) yes s) yes t) yes u) flower

Worksheet 5

1. a) MOLLUSC b) 1a, 4b, 7b, 8b.
2. a) HOLLOW-BODIED b) 1b, 2a, 3a.
3. a) ARTHROPOD b) 1a, 4b, 7b, 8a.
4. a) ECHINODERM b) 1b, 2a, 3b.
5. a) ARTHROPOD b) 1a, 4b, 7b, 8a.
6. a) SEGMENTED WORM b) 1a, 4a, 5b, 6a.

Topic Test

1.
a) T
b) F
c) F
d) T
e) F
f) T
g) F
h) F
i) F
j) T

2.
a) Autotrophic refers to an organism which makes its own food. A heterotrophic organism needs to eat food made by someone else.

b) Endothermic animals make their own body heat. Exothermic animals rely on the environment for their warmth.

3.
a) Crustacean
b) Scorpion
c) Myriapod
d) Tick
e) Insect
f) Myriapod
g) Spider

Worksheet 4