

Dichotomous Keys

Dichotomous keys are used to assist in the identification and classification of specimens of living things. To use a key, start at the top. At each decision point within a key, there will be two descriptions, one after the other, on the left. Decide which best applies to your specimen, and read what is written to the right of the description. Either the classification of your specimen for that key will appear, or a number. If it's a number, look for it below in the key for the next decision point.

Note: These keys have been developed specifically with the *Essential Science TerrAqua Column* in mind so have included descriptions that incorporate material from the video, print, and Web materials. Some groups are described in ways that may leave certain important (but highly technical) features out, and numerous groups don't appear. These keys are for the more general groupings in taxonomic classification: domain, kingdom (in the eukarya), and division (in the plants) or phyla (in the animals). More specific groupings are not included: class, order, family, genus, and species.

KEY A: Key to the DOMAINS of LIVING THINGS

1. Nucleus absent; unicellular	Domain Bacteria or Domain Archaea*
Nucleus present; unicellular or multicellular	Domain Eukarya (go to KEY B)

* Individual bacteria and archaea are impossible to distinguish from one another by shape or size, even under powerful microscopes. Colonies can sometimes be distinguished on the basis of the environment in which they grow or are cultured. Species of archaea tend to grow under extreme conditions that are toxic to bacteria (e.g., extremes of temperature, pressure, or salt).

KEY B: KEY to the KINGDOMS in the DOMAIN EUKARYA

1. Unicellular	Protist Kingdom**
Multicellular	2

2.	Photosynthesize to make their own food; have cell walls made of cellulose	Plant Kingdom (go to KEY C)
	Do not photosynthesize; must obtain food	3
3.	Absorb food after digesting it externally; have cell walls made of chitin	Fungus Kingdom
	Ingest food and digest it internally; do not have cell walls	Animal Kingdom (go to KEY D)

** The Protist Kingdom *does* include some multicellular members — most of the algae, which are aquatic, and include seaweeds and kelps. They were classified as plants at one time, but because they lack the tissue differentiation and other more complex features found in the Plant Kingdom, they are typically classified as protists. There are *also* members of the Fungus Kingdom that are unicellular — most notably, the yeasts. This is thus a very general decision point that is nonetheless likely to be useful for most specimens that are encountered in K-6 settings.

KEY C: KEY to DIVISIONS in the PLANT KINGDOM

1.	Short carpet of plants with tiny leaf-like blades; stalks bearing capsules that extend above carpet are spore-producing generation; lack true roots, stems, leaves and conducting vessels; require water to unite sex cells	Division Bryophyta
	Plants do not grow as a short carpet; have true roots, stems, leaves and conducting vessels	2

<p>2. Plants grow as clumps of leafy fronds; spores produced on underside of fronds; sex cells produced by tiny, inconspicuous, heart-shaped generation; require water to unite sex cells; a few grow moderately tall</p>	<p>Division Pterophyta</p>
<p>Plants do not grow as clumps of fronds; plants produce seeds in addition to spores; do not require water to unite sex cells</p>	<p>3</p>
<p>3. Leaves are needles or scales with waxy coating; male and female cones produce spores; male spores develop as pollen grains and produce sperm; female spores develop in structures on top of the scales of the female cone and produce eggs; papery seeds develop on top of the scales after fertilization; can grow extremely tall</p>	<p>Division Coniferophyta</p>
<p>Leaves are not needles or scales; have flowers with male and female parts that produce spores; male spores develop as pollen grains and produce sperm; female spores develop in an ovary and produce eggs; seeds develop inside the ovary once fertilized; ovaries ripen into fruit</p>	<p>Division Anthophyta 4</p>

KEY D: KEY to PHYLA in the ANIMAL KINGDOM

<p>1. Body organized in a "wheel-like" way with parts radiating from a central hub (radial symmetry); tentacles with stinging cells encircling single opening to gut (mouth and anus)</p>	<p>2</p>
---	-----------------

	Body organized with two sides, a top and a bottom, and a front (head) and rear region (bilateral symmetry)	3
2.	Body soft and often jelly-like; tentacles with stinging cells arranged in a circle around a central opening that acts as a mouth and anus; tentacles can extend up or drape down; some grow in colonies of many connected individuals	Phylum Cnidaria
	Body hard or leathery with inner skeleton (endoskeleton); body parts usually in multiples of five; move with "tube feet" using internal system of pressurized water; most with mouth and anus	Phylum Echinodermata
3.	Body externally segmented	4
	Body not externally segmented	5
4.	Body soft and cylindrical; body support by pressure from internal fluid in a body cavity (hydrostatic skeleton); body a series of segments that show little differentiation; head region often without pronounced sense organs	Phylum Annelida
	Segmented bodies with hard outer skeleton (exoskeleton); segments often organized into body regions (e.g., head, thorax, abdomen); possess paired, jointed appendages (e.g., legs, pincers, antennae); many possess wings; grow by molting exoskeleton; many develop through metamorphosis	Phylum Arthropoda
5.	Body small, flattened, and composed of solid tissue; one opening to gut acts as mouth and anus	Phylum Platyhelminthes
	Body not small, flattened and solid; possess mouth and anus	6

<p>6. Body soft; organized into regions consisting of a head attached to a large muscular "foot" that most use for movement, and a mass of organs covered by a shroud of tissue (mantle); many have shells; most feed with a rasping tongue (radula)</p>	<p>Phylum Mollusca</p>
<p>Body with supporting rod-like structure along back (notochord) that develops into vertebral column in some groups; hollow nerve cord along back; gill slits in region of throat (these disappear in some groups); a tail (disappears in some groups)</p>	<p>Phylum Chordata 7</p>