# **Classification: Dichotomous Key (3 Kingdom Approach)**

## GLOSSARY OF TERMS

Appendage – an outgrowth from the body of an animal usually, but not always, used for locomotion. E.g. arm, leg

Body Segments – a structural pattern in which the body is divided into a series of more or less similar sections, the boundaries of which are usually indicated by grooves encircling the body.

Exoskeleton – a skeleton on the outer surface of an animal, enclosing the animal.

Symmetry – the body orientation or plan (shape or arrangement) of an organism.

Asymmetry – an animal that has no definable shape, that is, it varies from organism to organism.

Radial – an organism in which the parts are arranged in a circular manner around a central point or region as in a bicycle wheel. The body parts of a radially symmetrical animal are arranged around a central axis so that each part extends from the center. The animal can be cut along the axis in more than one plane to produce identical halves. Animals that exhibit radial symmetry tend to be ***sessile*** (immobile). Radial symmetry allows them to reach out in all directions. These organisms have no left or right sides, only a top and a bottom. <http://www.starfish.ch/reef/echinoderms.html>

Bilateral – the parts of an organism occur in pairs along the right and left sides of a line running from one end of the object to the other; e.g. as the body of a bus. Only one cut along the longitudinal axis will produce identical halves of a bilaterally symmetrical animal. Bilateral symmetry is best for motile animals. <http://www.tolweb.org/Bilateria/2459>

Tentacles – Slender, flexible structures that often can be lengthened or shortened, usually attached near the mouth.

**Dichotomous Key for Selected Groups of Organisms (3 Kingdom Approach)**

1a Organism single celled or microscopic; if it is multi-cellular, then it has no apparent complex internal structures; most are found living in water; some may be green (*but with no recognized roots, stems or leaves*) but many are NOT green Kingdom Protista

 (go to 3)

1b Not as above (go to 2)

2a All organism are multi-cellular; all are green (autotrophs); all are non-motile (*incapable of locomotion*); most are terrestrial; they have what appears to be leaf or leaf-like structures, root or root-like structures; stem or stem-like structures Kingdom Plants

 (go to 8)

2b Multi-cellular organisms; heterotrophic (*require complex nutrients and are non-green*); almost all members are motile (*capable of locomotion*) Kingdom Animalia

 (go to 12)

3a Obviously single celled organisms (go to 4)

3b Not single celled organisms, but rather multi-cellular/ they may appear in masses or “glob” or attached in clumps (go to 7)

4a Organisms lacking a specific shape and move by peculiar projections from their “bodies”; amoeba like organisms Phylum Sarcodina

4b Oganisms have a definite shape (go to 5)

5a Organisms have a definite shape and possess many hair-like projections (*which may or may not be apparent*) surrounding their cell; many are slipper shaped Phylum Ciliate

5b Organisms have a definite shape but lack or have NO hair-like projections (go to 6)

6a Organisms have 1 to 5 hair-like projections from their bodies Phylum Flagellata

6b Organisms have NO hair-like projections from their bodies; body shapes may be round, spiral or rod-shaped Phylum Bacteria

7a Organisms are usually green; may be found in chains or clumps; commonly found living in water Phylum Algae

7b Organisms are definitely NOT green; often found living upon dead, decaying materials; may take on a variety of colors such as white, brown, red, yellow, etc; they may have a gray, hairy mass as a body structure; not commonly found in water Phylum Fungi

8a Organisms lacking TRUE roots, stems and leaves, but have miniature structures that look like roots, stems and leaves; do not grow more than a few inches in height Phylum Brachiophyta

 (go to 9)

8b Organisms have TRUE roots, stems and leaves and grow more than a few inches in height Phylum Trachiophyta

 (go to 10)

9a Plants are NOT woody and have NO flowers, NO seeds and NO woody cones; leaves may be broad and flat with spore cases (*dark spots*) on the bottom of the leaf OR leaves may be flat, scale-like needles resembling a miniature pine tree OR leaves may be flat and scale-like arranged in whorls (*circles*) around what appears to be a square stem Class Fern, Clubmoss & Horsetail

9b Plants have a woody or herbaceous (*soft and generally green*) stem; leaves may be needle-like or flat and broad; plants possess flowers, seeds with fruit OR woody cones may be present (go to 10)

10a Plants are woody; leaves are needle-like; woody cones may be present Class Gymnosperm

10b Plants are woody or herbaceous (*soft*); leaves are typically flat and broad; flowers with seeds and fruit may be present Class Angiosperm

 (go to 11)

11a Veins in leaves are parallel; if flowers are present, their parts are typically in threes Order Monocotyledon (Monocots)

11b Veins in leaves are branched; if flowers are present, their parts are typically in fours or fives Order Dicotyledon (Dicots)

12a No apparent means of support (*skeleton*); bodies usually soft and flexible (go to 13)

12b Body with some type of skeleton OR shell OR hard covering; may have appendages (go to 17)

13a Body possesses tentacles OR is worm-like (go to 14)

13b Body perforated with holes; no obvious organs; symmetry may be radial, bilateral or assymmetric (*lack symmetry*) Phylum Porifera

14a Tentacles present; body is round and sac-like; radial symmetry Phylum Coelenterata

14b Not as above (go to 15)

15a Body worm-like; would appear ROUND in a cross section; bilateral symmetry (go to 16)

15b Body worm-like; would appear FLAT in a cross section; bilateral symmetry) Phylum Platyhelminthes

16a Body smooth and slender; body tapered to a point at both ends; no segmentation .. Phylum Nemathelminthes

16b Body divided into what appears to be obvious SEGMENTS Phylum Annelida

17a Body is soft; NO appendages although tentacles may be present; a shell is present in most Phylum Mollusca

17b Not as above (go to 18)

18a Body has FIVE radiating appendages; spiny exoskeleton; radial symmetry Phylum Echinodermata

18b Not as above (go to 19)

19a Skeleton is a HARD outer covering (exoskeleton); possesses more than TWO pair of appendages that are jointed Phylum Arthropoda

 (go to 20)

19b Skeleton is internal and usually bony; skin may be smooth or scaly OR it may be covered with feathers or hair (fur) Phylum Chordata (go to 23)

20a Organisms possess THREE or FOUR pairs of appendages (go to 21)

20b Organisms possess MORE THAN three or four pairs of appendages (go to 22)

21a THREE pair of appendages; two antennae present; wings present in most specimen; THREE basic body parts recognized (*head, abdomen, tail*) Class Insect

21b FOUR pair of appendages; body may appear hairy; no antenna present; only two distinct body parts (*head, abdomen*) Class Arachnida

22a FIVE pair of appendages with one pair of appendages usually modified into claws or pinchers; two antennae; eyes usually present on extensions called stalks; live in water and breathe by gills Class Crustacean

22b Have MANY appendages usually present on what appears to be worm-like segments; appendages usually one or two pair per segment; body segments make up a worm-like Class Myriapod

23a Skin smooth, moist or scaly (go to 24)

23b Skin covered by feathers or hair (fur) (go to 26)

24a Appendages fin-like; gills present Class Pisces

24b Not as above (go to 25)

25a Appendages present with NO claws on toes; skin smooth, moist and lacking in scales Class Amphibian

25b Two pair of appendages MAY be present but often appendages are absent; skin is dry, scaly and rough; if appendages are present toes will have claws Class Reptilia

26a Body covered with feathers; anterior appendages in the form of wings; posterior appendages are legs with scales; toes have claws; mouth is in the form of a horny beak Class Aves

26b Body covered with hair or fur; paired mammary (*milk*) glands on abdominal surface; paired appendages with feet, toes, claws or flattened nails; skin smooth Class Mammalia