

Classification

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Taxonomy is the practice and science of classification.

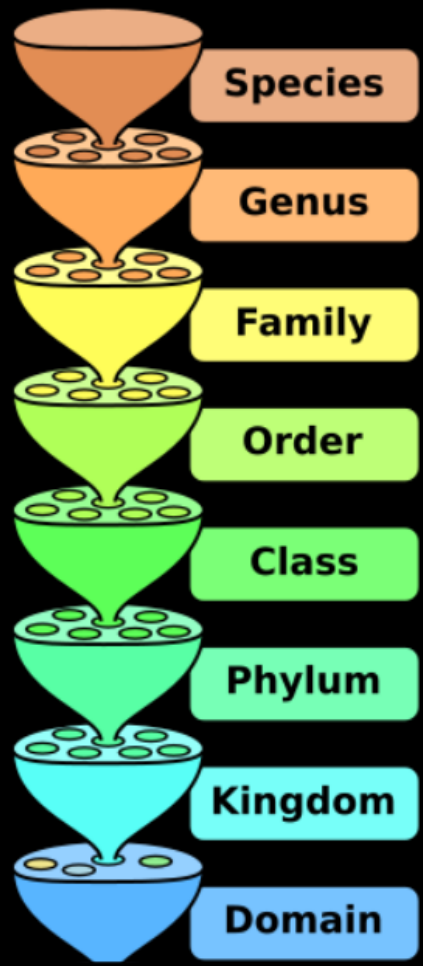
Seven levels of classification

As we move from kingdom to phylum, all the way to species, organisms share more and more characteristics.

This system allows us to group organisms whilst also assigning unique species names and is very helpful in identifying and naming new species.

smallest

largest



Species	<i>planifolia</i>	<i>ocellaris</i>
Genus	<i>Vanilla</i>	<i>Amphiprion</i>
Family	Orchidaceae	Pomacentridae
Order	Asparagales	Perciformes
Class	Liliopsida	Actinopterygii
Phylum	Magnoliophyta	Chordata
Kingdom	Plantae	Animalia
Domain		

[http://en.wikipedia.org/wiki/Kingdom_\(biology\)](http://en.wikipedia.org/wiki/Kingdom_(biology))



http://evolution.berkeley.edu/evolibrary/images/evo/3domains_200.gif



DOMAIN

Kingdom

Phylum

Class

Order

Family

Genus

Species

Subspecies

DOMAIN

Kingdom

Phylum

Class

Order

Family

Genus

Species

Subspecies

Does
Kennard
Play
Classical
Or
Folk
Guitar
Songs?

Species (more on this later)

"A group of organisms which can interbreed and produce fertile offspring"

Species are named: *Genus species*

e.g. *Heliconius charithonius*

(Zebra longwing)



The smallest taxonomic group, though many **subspecies** are recognised.



Subspecies might potentially interbreed if a barrier or other challenge was removed (such as distance)

Subspecies of White Peacock butterflies:



Anartia jatrophae semifusca

(Puerto Rico)



Anartia jatrophae jamaicensis

(Jamaica)

Images from:

<http://www.kingsnake.com/westindian/metazoa7.html>

Binomial Nomenclature

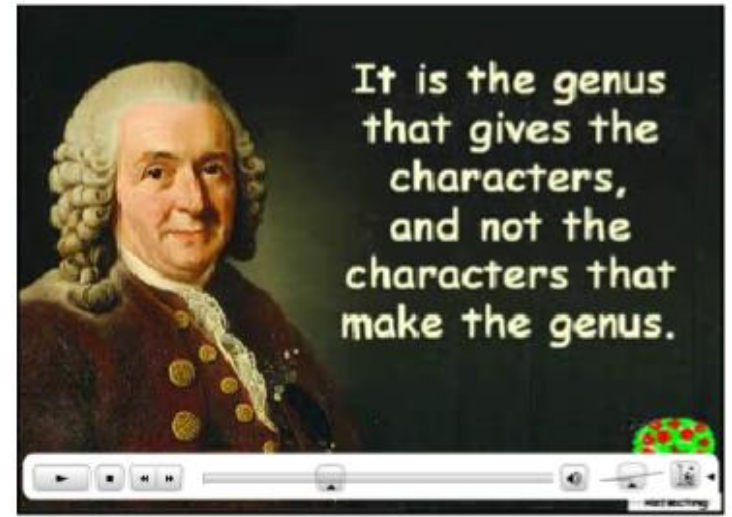
2 named naming system

capital
letter
use
italics
if typed

Homo sapiens
genus species



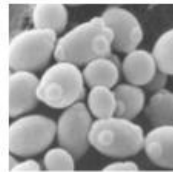
(that's us)



http://www.youtube.com/watch?v=aL7ks3AC_Yg

Escherichia coli must be underlined
if written by hand

S. cerevisiae



genus name can be abbreviated
if you have used the full name already
in your text.

The binomial system was developed by Carl Linnaeus, a Swedish botanist and taxonomist. It is still used today and is the basis for classification and naming of all new species.

It is based on physical traits of species, and most of his classified groups are still accurate.

He was way ahead of his time.

Which two species of reef sharks are most closely related?
How do you know?



Carcharhinus melanopterus
Black-tip reef shark



Triaenodon obesus
White-tip reef shark



Carcharhinus perezii
Caribbean reef shark

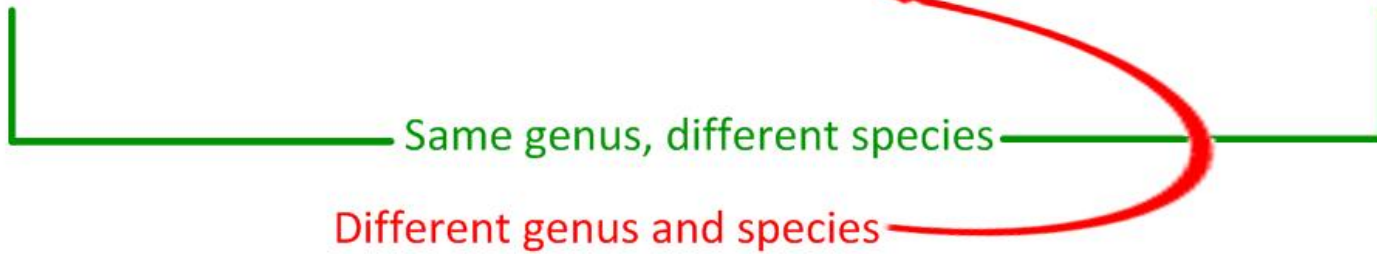
Which two species of reef sharks are most closely related?
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Carcharhinus melanopterus
Black-tip reef shark

Triaenodon obesus
White-tip reef shark

Carcharhinus perezii
Caribbean reef shark



Which two are most closely related?



Canis lupus familiaris
Domestic dog



Canis lupus laniger
Tibetan wolf



Canis rufus
Red Wolf

Which two are most closely related?



Canis lupus familiaris
Domestic dog

Canis lupus laniger
Tibetan wolf

Canis rufus
Red Wolf



Same species, different subspecies



Same genus, different species

(Homo sapiens)



Which of the following are true these elephants?



Elephas maximus



Loxodonta africana

- i. They are two species in the same genus
- ii. They are two species in different genera
- iii. They are from two genera in the same family
- iv. They are two subspecies of the same species

- A. i only
- B. ii only
- C. ii and iii only
- D. iv only



Which of the following are true these elephants?



Elephas maximus



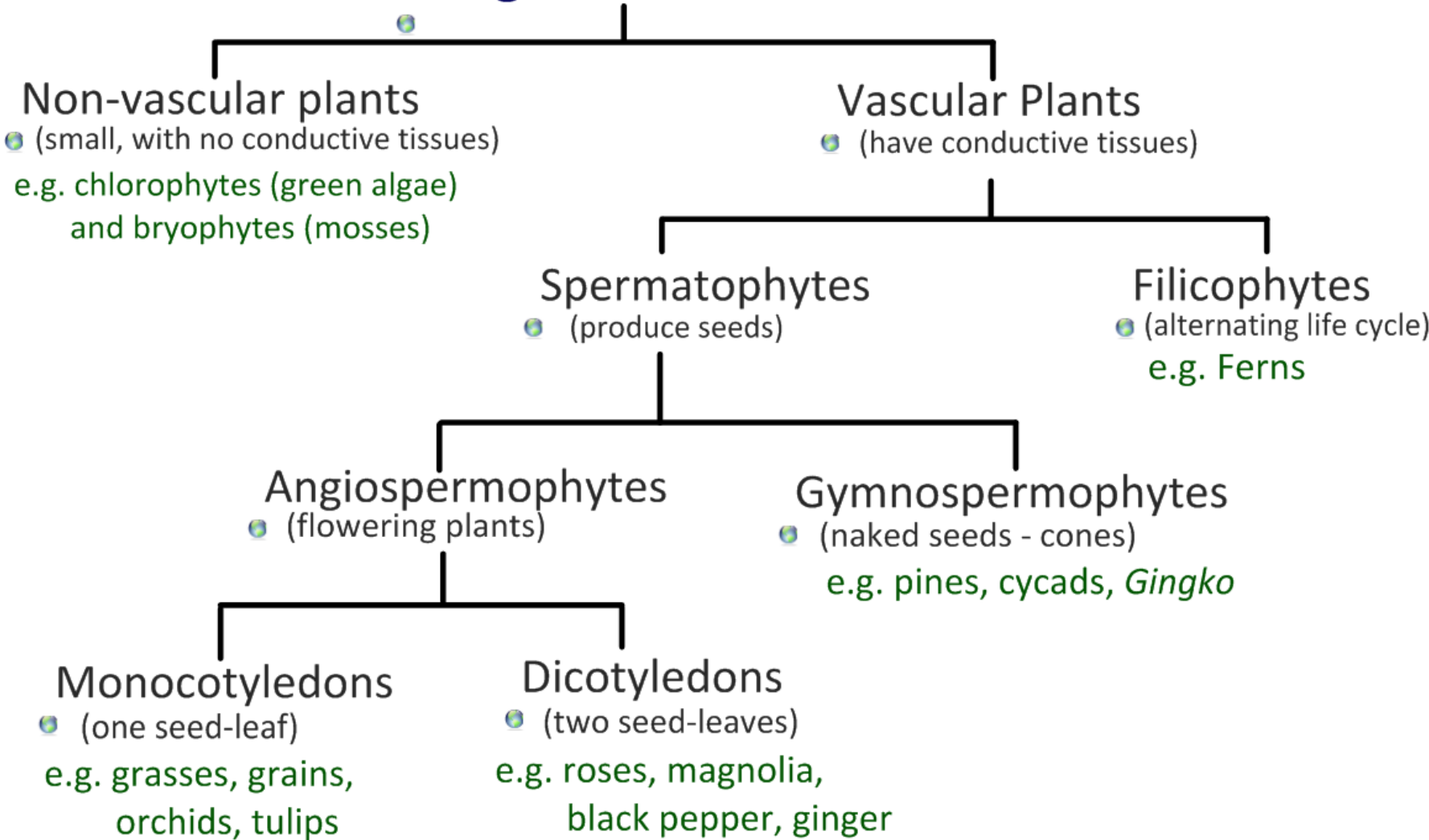
Loxodonta africana

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- A. i only
- B. ii only
- C. ii and iii only
- D. iv only



Kingdom Plantae



This phylogeny is very simplified

Kingdom Plantae

photosynthetic,
cell walls

Non-vascular plants

Vascular Plants

Chlorophyta



aquatic algae

Bryophyta



mosses

Filicophyta



ferns

Coniferophyta







pin

Angiospermophyta







flowering plants

Physical differences between the main phyla of plants:

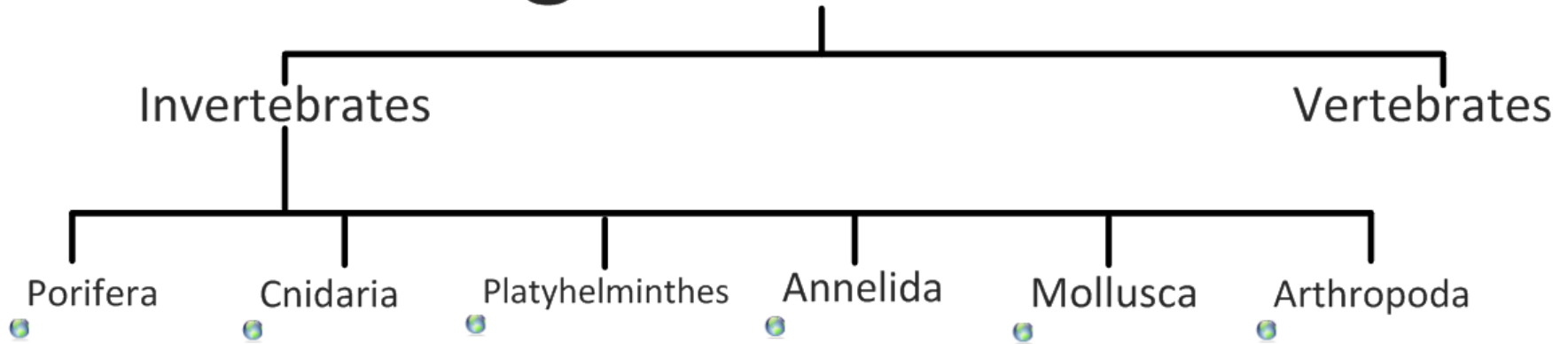
		Roots, Leaves and Stems	Max. height	Reproduction
Bryophytes e.g.				
Filicinophytes e.g.				
Coniferophytes e.g.				
Angiospermophytes e.g.				

Physical differences between the main phyla of plants:

		Roots, Leaves and Stems	Max. height	Reproduction
Bryophytes e.g.		No roots or stem, very simple, small leaves. Furry appearance.	50cm	Spores released from capsule at end of stalk (sporangium)
Filicinophytes e.g.		Roots, leaves and short stems. No lignin (no wood) Leaves are divided into sections and may be curled up	15m	Spores produced in sporangia, capsules under the leaves
Coniferophytes e.g.		Woody trees, have pine needles for leaves	100m	Seeds develop in female cones
Angiospermophytes e.g.		Roots, stems and leaves. Produce flowers.	100m	Seeds dispersed through fruits

Kingdom Animalia

heterotrophs,
animal cells



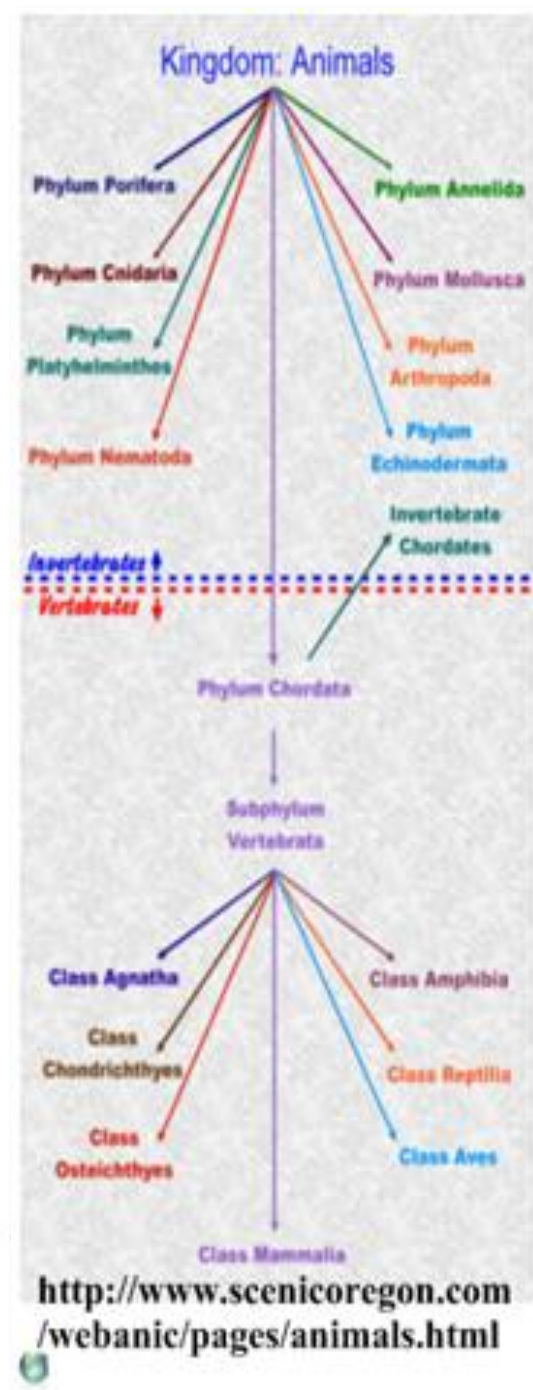
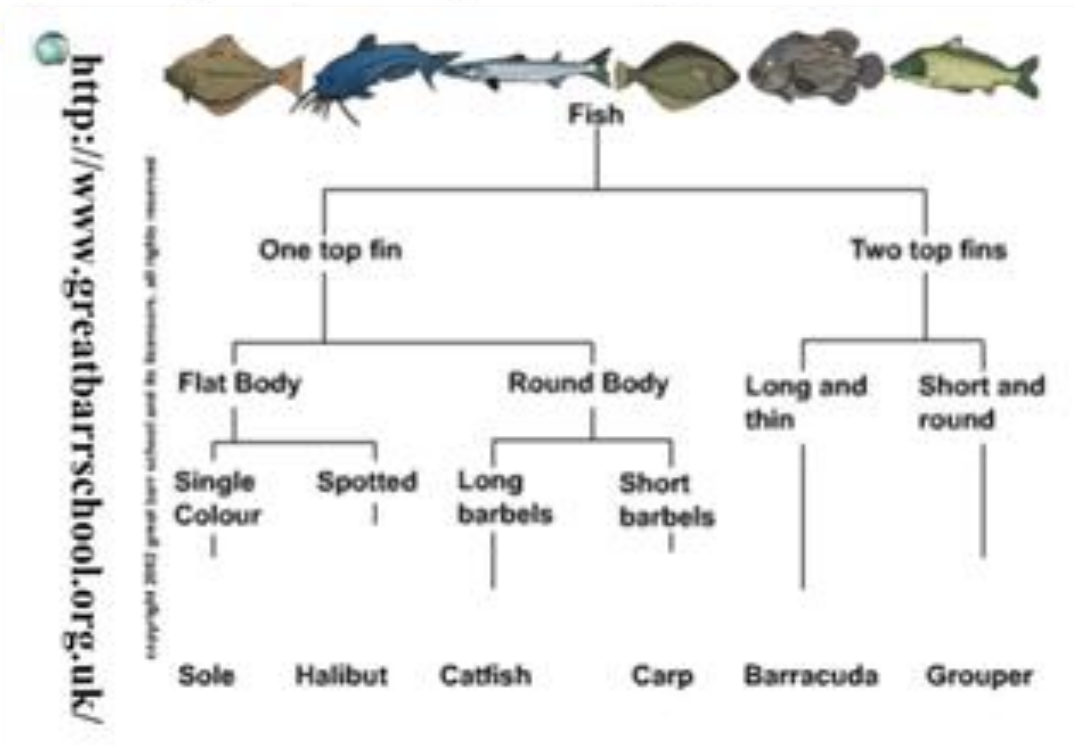
Using a dichotomous key

By a simple series of binary questions, we can identify an organism. To try it out, think of any animal and then click on this link:

<http://www.scenicoregon.com/webanic/pages/animals.html>

Now work through the questions - it will bring you to the class of animal you are imagining.

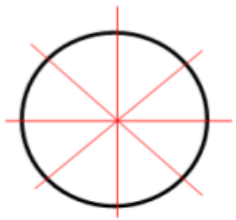
More specific keys are used to identify organisms at the species level. This key is more visual, yet still dichotomous:



Use this **dichotomous key** to identify the 6 main **phyla of invertebrates**

Give the common name and latin name of one example of each

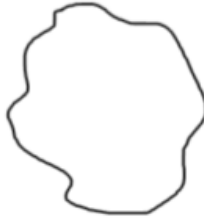
- | | | |
|-----------------------|--------------------------------|--|
| 1. Is it symmetrical? | Yes
No | go to Q2
Phylum Porifera e.g. |
| 2. Symmetry is | Radial
Bilateral | Phylum Cnidaria e.g.
go to Q3 |
| 3. Gastric tube | Mouth & anus
Mouth, no anus | go to Q4
Phylum Platyhelminthes e.g. |
| 4. Segmentation | Yes
No, or not visible | Go to Q5
Phylum Mollusca e.g. |
| 5. Exoskeleton | Yes
No | Phylum Arthropoda e.g.
Phylum Annelida e.g. |



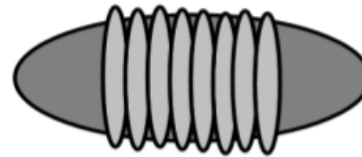
radial symmetry



bilateral symmetry



no symmetry



segmented



no segments

Drag & Drop:

Cnidaria

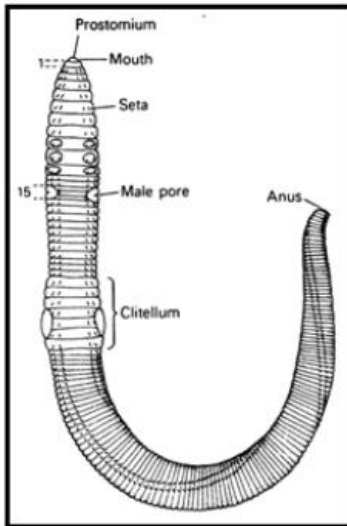
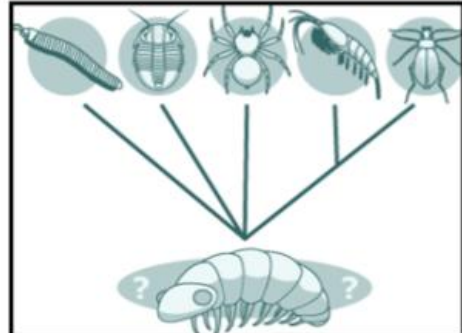
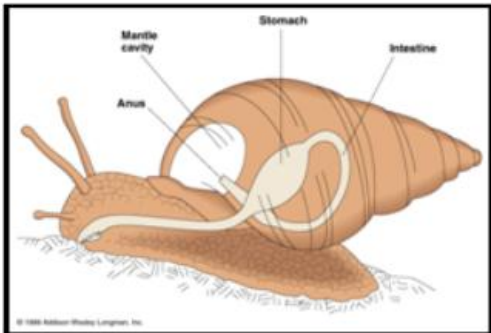
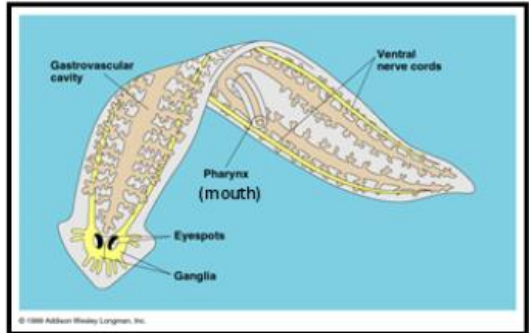
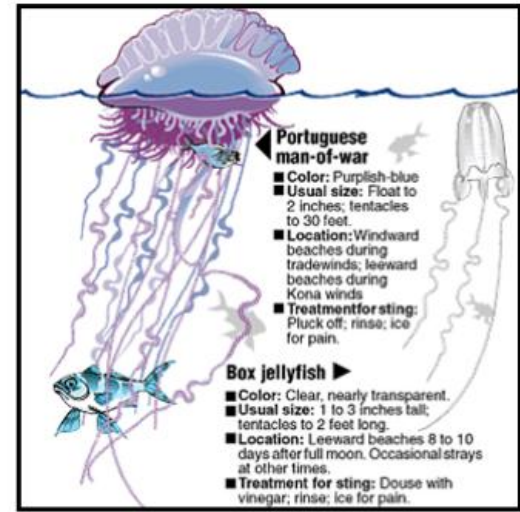
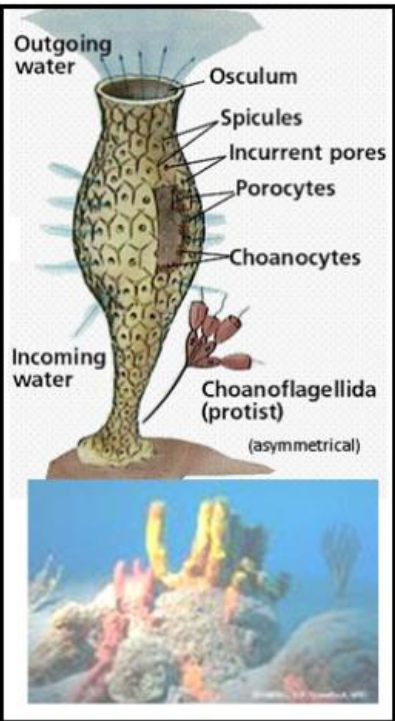
Annelida

Porifera

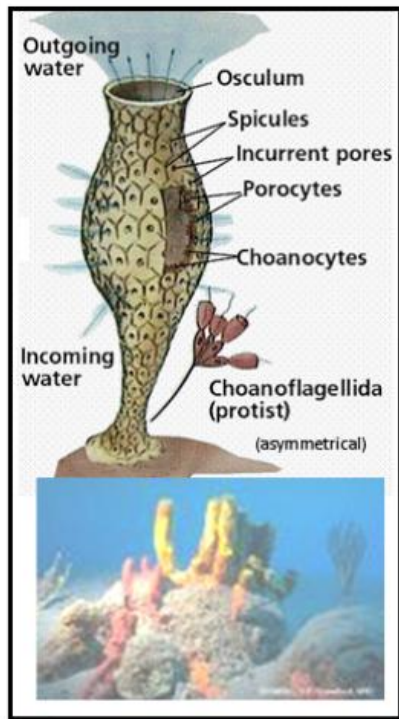
Mollusca

Arthropoda

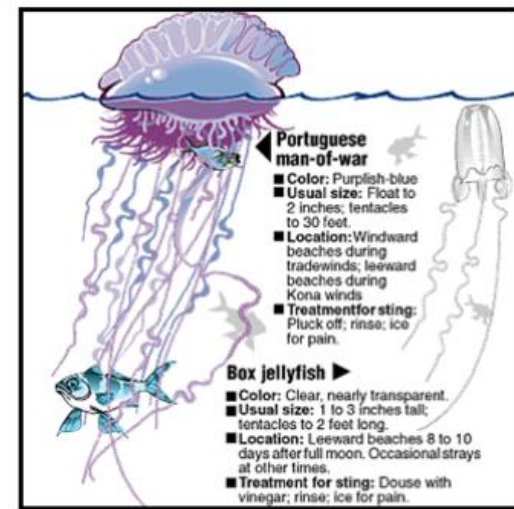
Platyhelminthes



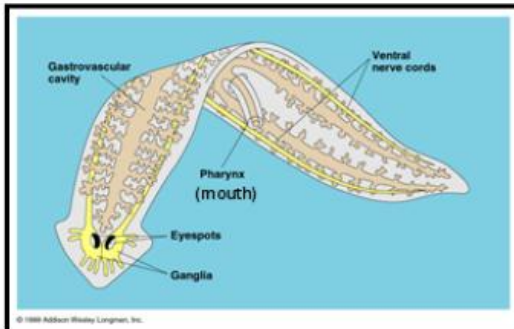
Drag & Drop:



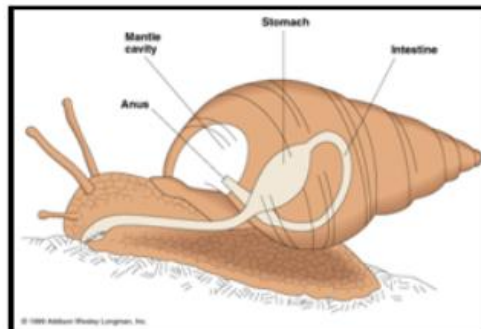
Porifera



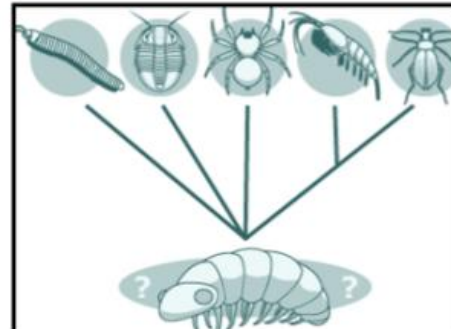
Cnidaria



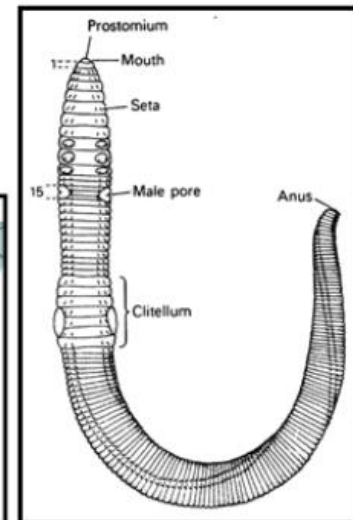
Platyhelminthes



Mollusca



Arthropoda



Annelida

Kingdom Animalia

heterotrophs,
animal cells

Invertebrates

Vertebrates

Porifera



sponges

Cnidaria



jellyfish
anemones

Platyhelminthes



flatworms

Annelida



roundworms

Mollusca



snails/slugs
octopus

Arthropoda



exoskeletons:
insects, spiders,
crustaceans,
millipedes

Physical differences between the main phyla of invertebrates:

	Symmetry	Digestive tract	Segmentation	Other features	Draw one
Porifera e.g.					
Cnidaria e.g.					
Platyhelminthes e.g.					
Annelida e.g.					
Mollusca e.g.					
Arthropoda e.g.					

Physical differences between the main phyla of invertebrates:

	Symmetry	Digestive tract	Segmentation	Other features	Draw one
Porifera e.g.	none	No mouth or anus	none	porous, attached to rocks, filter feeder	
Cnidaria e.g.	radial	Mouth, no anus	none	Tentacles around mouth, stinging cells	
Platyhelminthes e.g.	bilateral	Mouth, no anus	none	Ribbon-shaped body, commonly parasites	
Annelida e.g.	bilateral	Mouth & anus	Very segmented	May have bristles and visible blood vessels	
Mollusca e.g.	Bilateral foot, Shell not	Mouth & anus	Not visible	Many have shell, uses sharp radula for rasping on food	
Arthropoda e.g.	bilateral	Mouth & anus	Segmented, may have joints	Exoskeleton, jointed appendages	

Can you use a dichotomous key to identify these marine species?

1. Organism is motile go to Q2
Organism is sessile go to Q7
2. It is a vertebrate go to Q3
It is an invertebrate box jellyfish
3. It has dorsal fins go to Q4
It has a shell leatherback turtle
4. It has vertical stripes go to Q5
It has no vertical stripes go to Q6
5. Stripes are orange/white clownfish
Striped are yellow/black/white angelfish
6. Dorsal fin is tipped white white tip reef shark
Body is rounded with no white tip... bull shark
7. It has radial symmetry..... go to Q8
No radial symmetry..... deep sea sponge
8. Has a shell limpet
Has tentacles sea anemone

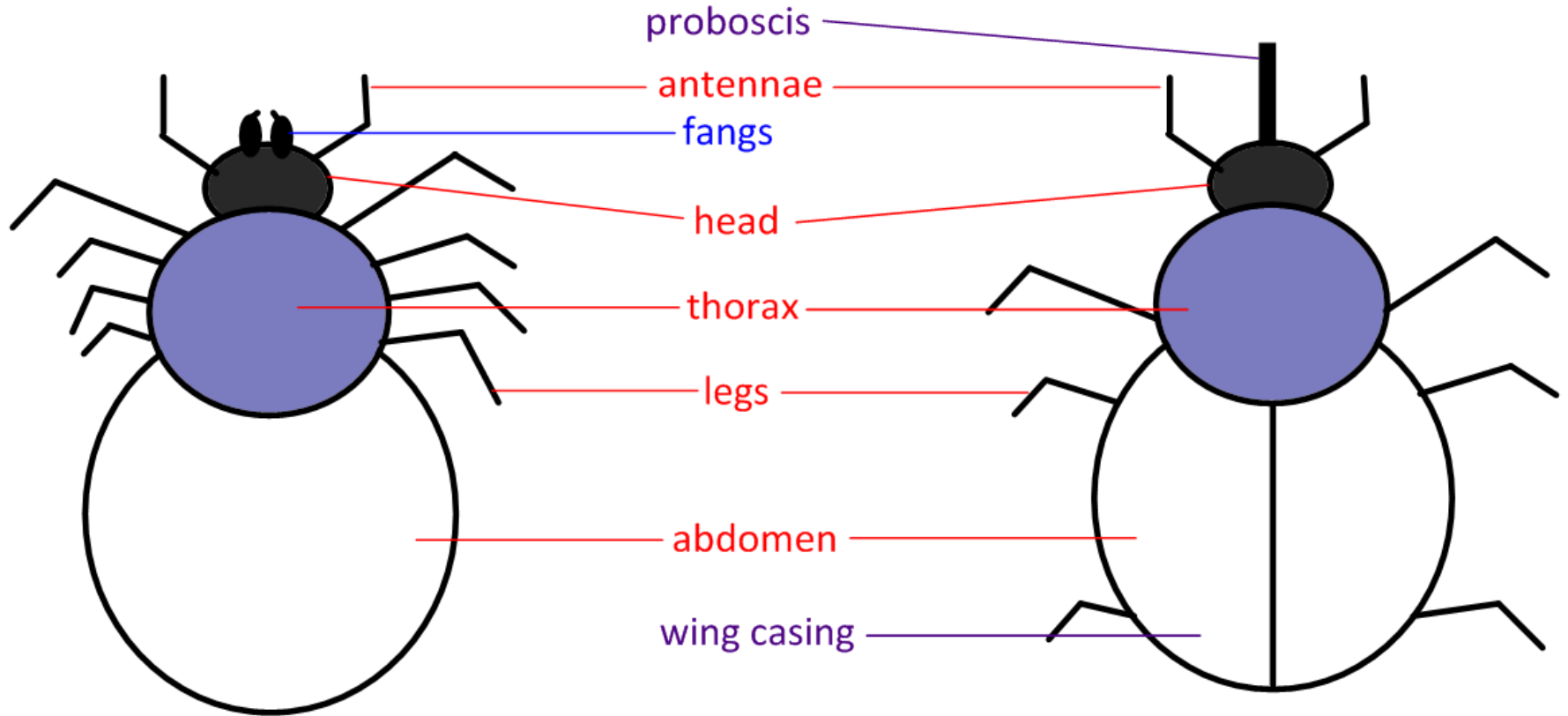


Design a dichotomous key that will allow the other group to correctly identify the species in their photos.

Order: Araneae

Order: Coleoptera

Basic body plans for your descriptions



Design a dichotomous key that will help you identify these Coleoptera (beetles)



Leptinotarsa decemlineata
Colorado beetle



Leptinotarsa juncta
False potato beetle



Anthonomus grandis
Boll weevil



Sitophilus granarius
Wheat weevil



Coccinella septempunctata
Seven-spot ladybird



Trogodendron fasciculatum
Clerid beetle



Sphaerius acaroides
Freshwater beetle



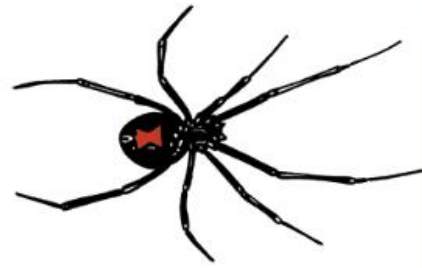
Gyrinus natator
Whirligig beetle

Design a dichotomous key that will help you identify these Araneae (spiders)



Brown recluse

Loxosceles reclusa



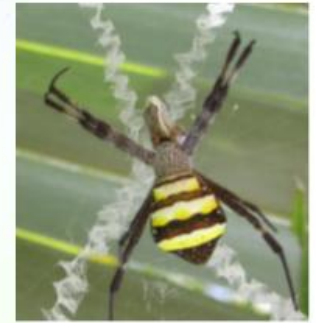
Black widow

Latrodectus tredecimguttatus



Hobo spider

Tegenaria agrestis



St. Andrew's Cross

Argiope keyserlingi



FEMALE

Mouse spider

Missulena bradleyi



MALE



Wolf spider

Hogna carolinensis



Huntsman

Heteropoda maxima

Brown recluse spider bite:

Day 0



Day 6



ouch!

See this story here:

<http://www.badspiderbites.com/brown-recluse-spider-bite/>

http://kcfac.kilgore.cc.tx.us/mobleypageap1/brown_recluse.htm

Some Videos:



<http://www.badspiderbites.com/spider-bite-video/>



<http://dsc.discovery.com/videos/i-was-bitten-brown-recluse-spider-bite.html>



Which beetle species are these?

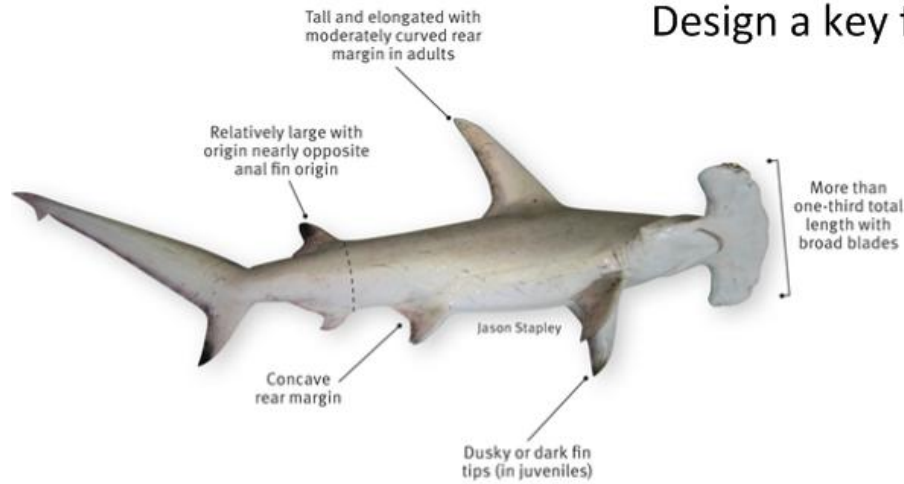


Order **Coleoptera**
 Class **Insecta**
 Phylum **Arthropoda**
 Kingdom **Animalia**

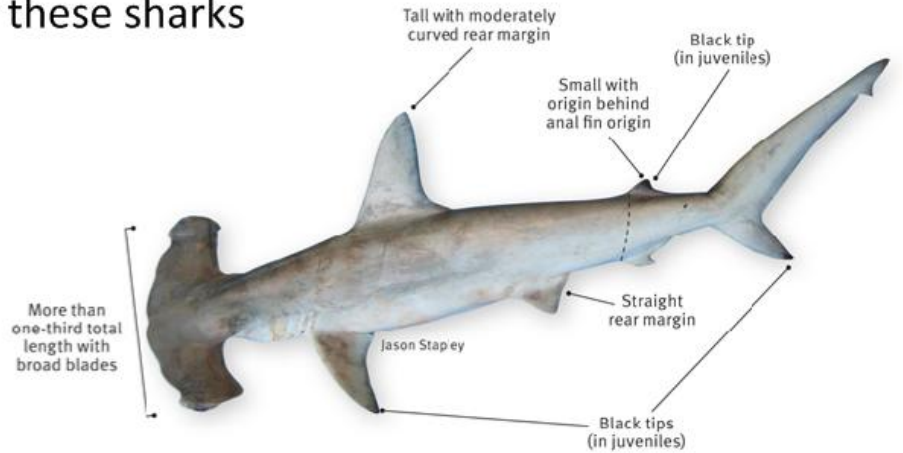


1. Has a 'snout' go to Q2
 Has no 'snout' go to Q3
2. Dark brown *Sitophilus granarius*
 Light brown....*Anthonomus grandis*
3. Has striped wing case go to Q4
 Wing casing not striped.... go to Q5
4. Alternate black/white stripes..*Leptinotarsa decemlineata*
 Black/white/brown stripes.....*Leptinotarsa juncta*
5. Wing casing is dark..... go to Q6
 Wing casing red & spotted....*Coccinella septempunctata*
6. Legs are yellow go to Q7
 Dark legs, yellow antennae.... *Trogodendron fasciculatum*
7. Legs adapted for walking.....*Sphaerius acaroides*
 Legs adapted for swimming....*Gyrinus natator*

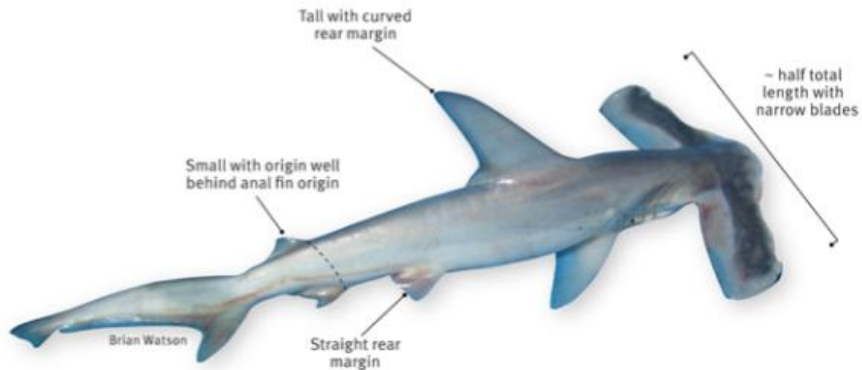
Design a key for these sharks



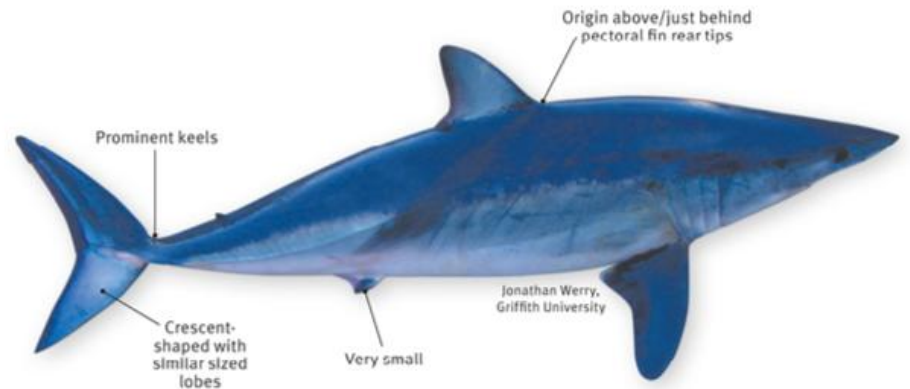
Great Hammerhead
Sphyrna mokarran



Scalloped Hammerhead
Sphyrna lewini

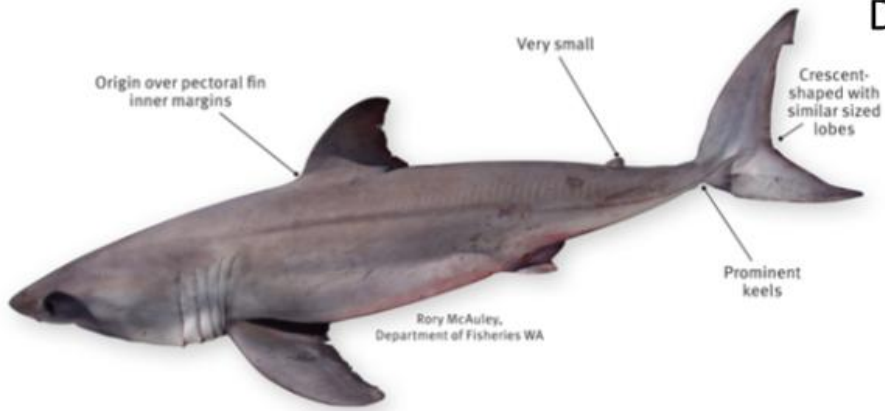


Winghead
Eusphyra blochii

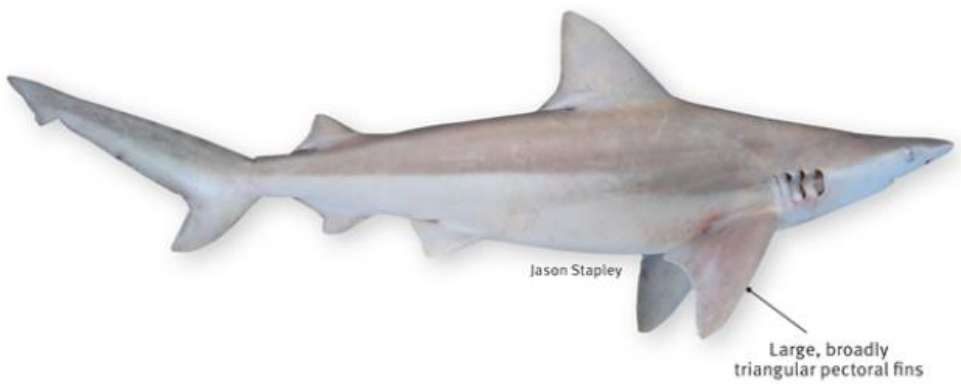


Shortfin Mako
Isurus oxyrinchus

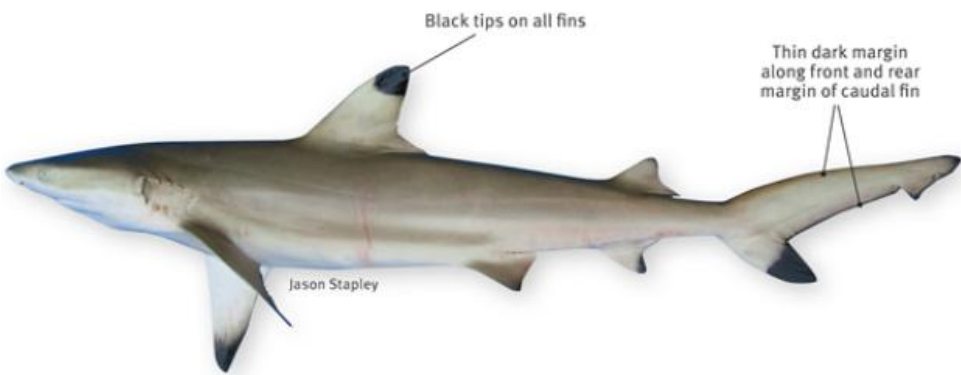
Design a key for these sharks



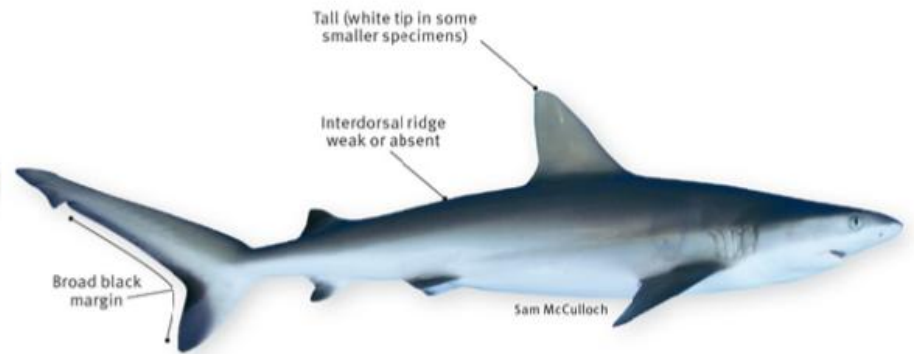
White Shark
Carcharodon carcharias



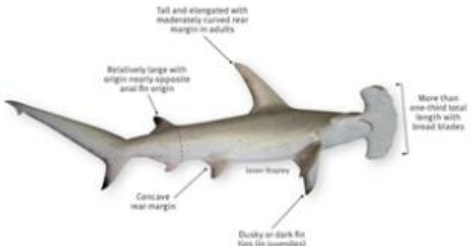
Creek Whaler
Carcharhinus fitzroyensis



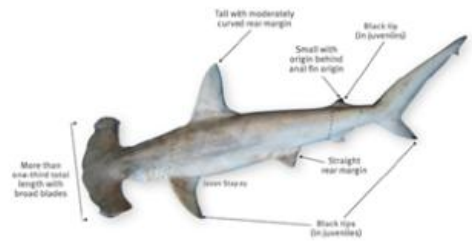
Black Tip Reef Shark
Carcharhinus melanopterus



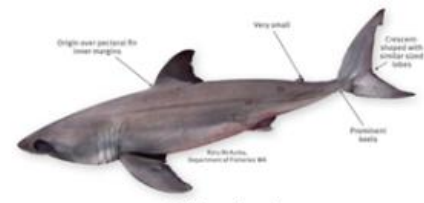
Grey Reef Shark
Carcharhinus amblyrhynchos



Great Hammerhead
Sphyrna mokarran



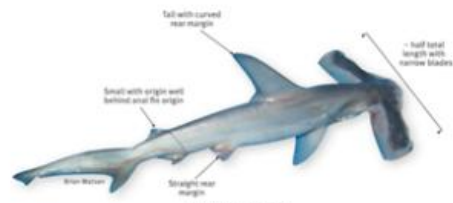
Scalloped Hammerhead
Sphyrna lewini



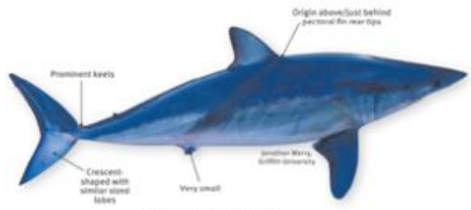
White Shark
Carcharodon carcharias



Creek Whaler
Carcharhinus fitzroyensis



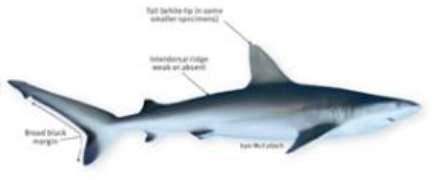
Winghead
Eusphyra blochii



Shortfin Mako
Isurus oxyrinchus



Black Tip Reef Shark
Carcharhinus melanopterus

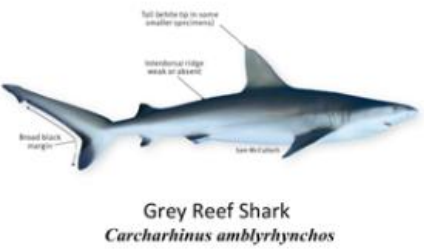
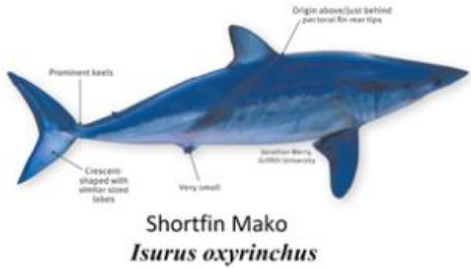
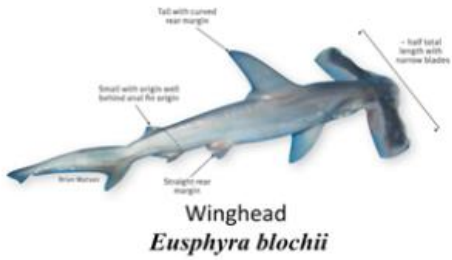
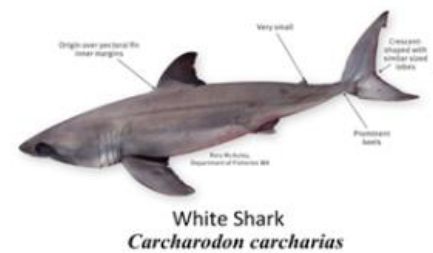
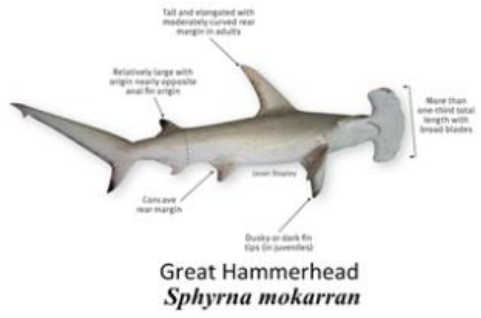


Grey Reef Shark
Carcharhinus amblyrhynchus

Queensland Government http://www.dpi.qld.gov.au/cps/rde/dpi/hs.css/28_11934_ENA_HTML.htm

1. Which of the following pairs is most closely related?

- A. Black Tip Reef Shark and White Shark
- B. Grey Reef Shark and Shortfin Mako
- C. Grey Reef Shark and Winghead
- D. Creek Whaler and Black Tip Reef Shark

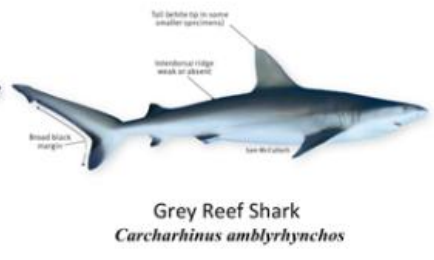
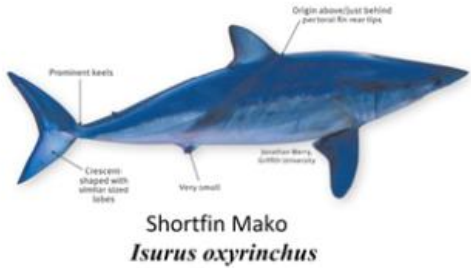
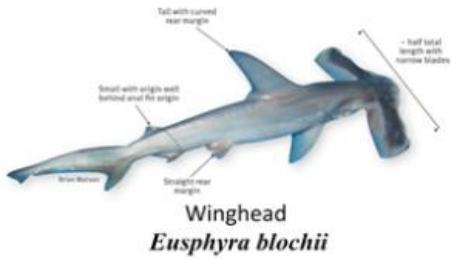
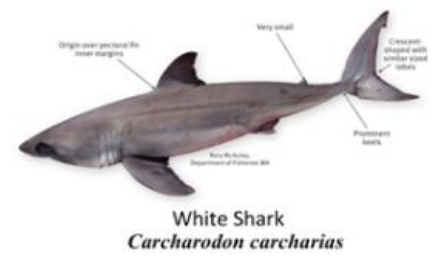
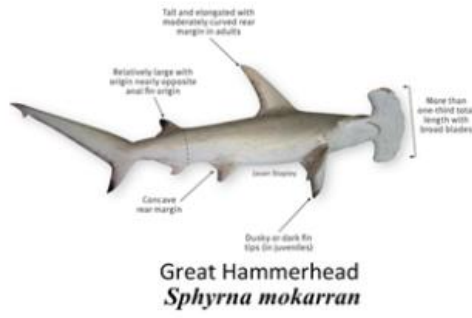


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1. Which of the following pairs is most closely related?

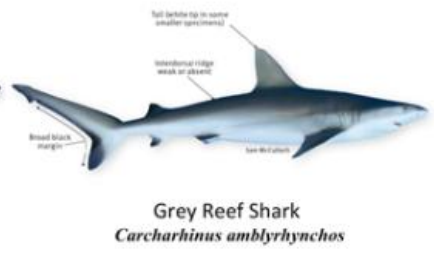
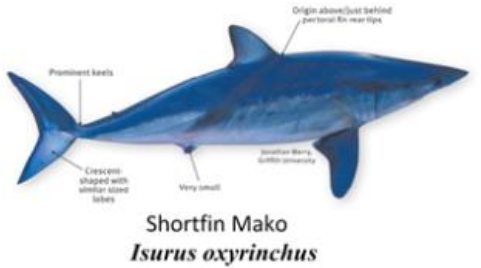
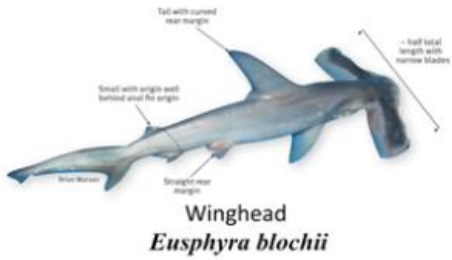
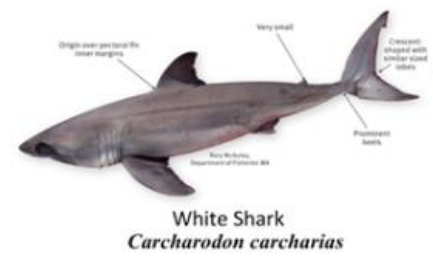
- A. Black Tip Reef Shark and White Shark
- B. Grey Reef Shark and Shortfin Mako
- C. Grey Reef Shark and Winghead
- D. Creek Whaler and Black Tip Reef Shark**

Carcharhinus genus



Queensland Government http://www.dpi.qld.gov.au/eps/rde/dpi/hs.xml/28_11934_ENA_HTML.htm

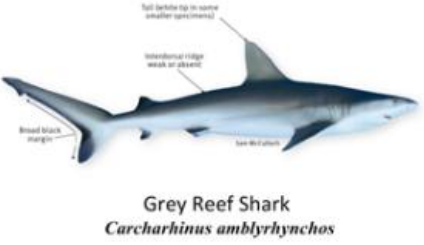
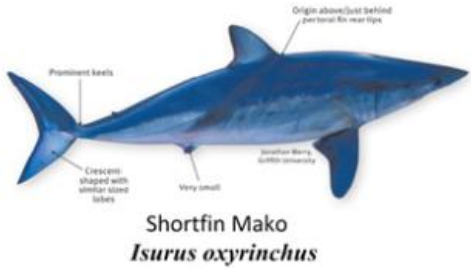
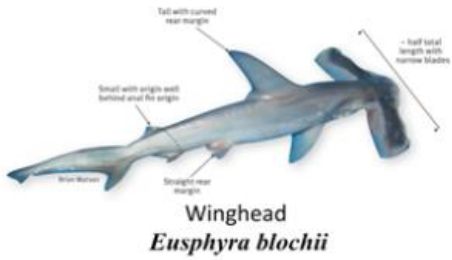
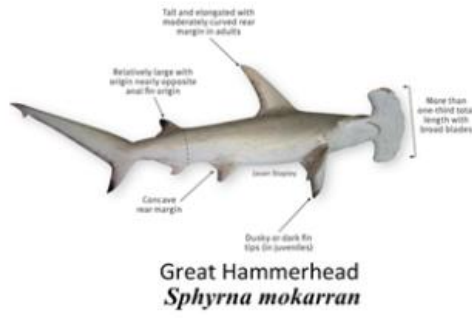
2. Which of the following is/are true for the Great Hammerhead and Scalloped Hammerhead?
- i. They are two subspecies of the same species
 - ii. They are two species in the same genus
 - iii. They are members of the same order
 - iv. They are from different phyla
- A. i only
B. i and ii
C. ii and iii
D. iv only



Queensland Government http://www.dpi.qld.gov.au/eps/rde/dpi/hs.xsl/28_11934_ENA_HTML.htm

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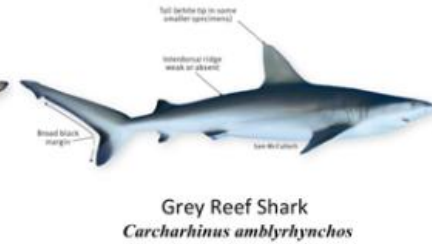
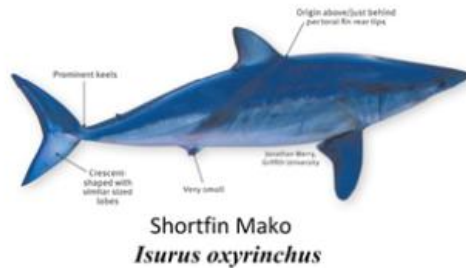
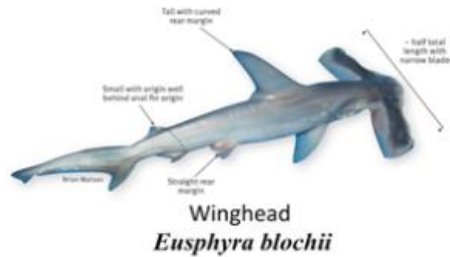
- A. i only
- B. i and ii
- C. ii and iii**
- D. iv only



3. Which of the following is/are true of **all** of the sharks in the chart?

- i. They are members of the same species
- ii. They are part of the same genus
- iii. They are part of the same class
- iv. They are part of the same kingdom

- A. i only
- B. i and ii
- C. ii and iii
- D. iii and iv



Queensland Government http://www.dpi.qld.gov.au/eps/rde/dpi/hs.xml/28_11934_ENA_HTML.htm

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 D. iii and iv

Class: Chondrichthyes



Some classification silliness:



http://ecokids.earthday.ca/pub/eco_info/topics/climate/adaptations/adaptations.swf

Hit the classification group of each animal as it drops.

You need to get 20 right to beat the computer.

Set the level and then hit Start.

Amphibian

Bird

Fish

Mammal

Reptile

Score 0

Easy

Start

<http://www.teachersdomain.org/resource/lsp07.sci.life.oate.animalclass/>

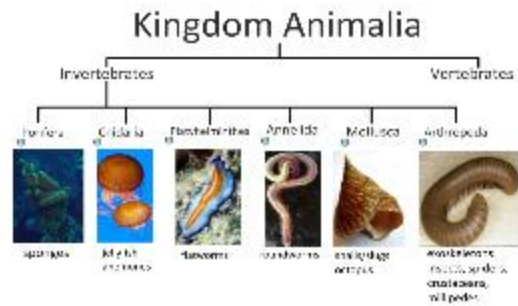
A page titled 'Animal Classification' with a yellow background. It features several illustrations of animals: a purple and pink bird, a green and yellow spotted turtle, a brown dog with its puppies, a monarch butterfly, and a bee. The text on the page explains that there is a dazzling variety of animals on Earth and that some groups share body patterns and structures. It encourages learning these patterns to place organisms in groups called classes and suggests testing knowledge with 'Classification Games'. At the bottom, there are two buttons: 'Animal Classes' and 'Games'.

Animal Classification

There is a dazzling variety of animals on Earth. Among them, there are body patterns and structures that some groups of animals share and others do not. By learning these patterns, we can place organisms in groups, called classes. Click on "Animal Classes" to learn more about some common classes of animals and then test your knowledge with the "Classification Games."

Animal Classes

Games



For more help and animations, visit:
<http://sciencevideos.wordpress.com>