HL Paper 1

A biologist exploring an uninhabited island came across an unknown plant. She made the following notes:

• grows in a damp and shady corner of the island
• has large feathery leaves with spore cases (sporangia) arranged on the underside
• young leaves are tightly rolled up
•has roots.

In what phylum should she classify this plant?

A. Angiospermophyta
B. Bryophyta
C. Coniferophyta
D. Filicinophyta

What promotes natural selection?

I. Overpopulation

II. Competition

III. Variation

A. I and II only
B. I and III only
C. II and III only
D. I, II and III

Which example provides evidence of evolution?

A. White wings of a peppered moth turn black in industrial areas.
B. Antibiotic resistant bacteria replace non-resistant bacteria over time.
C. Some Galapagos finches' beaks become smaller during dry years.
D. Polar bears are found in warmer latitudes following global warming.

What type of process causes antibiotic resistance to develop in bacteria?

A. Competition with viruses
B. Overproduction of offspring
C. Evolution due to environmental change
D. Response by bacteria to an epidemic

How can molluscs and platyhelminthes be distinguished?

A. Molluscs are unsegmented but platyhelminthes are segmented.
B. Molluscs have a mouth and an anus but platyhelminthes do not.
C. Molluscs are smooth but platyhelminthes have bristles.
D. Molluscs remain attached to rock but platyhelminthes move around in water.

Two different trees have been classified as *Pinus pinea* and *Pinus nigra*. Which of the following statements is correct?

A. Both trees belong to the same class but a different genus.
B. Both trees belong to the same family and same genus.
C. The species name of both trees is *Pinus*.
D. The family names are *pinea* and *nigra*.

A bacterial population with no resistance to an antibiotic may develop into a bacterial population with some resistance to an antibiotic. Which event could lead to this?

A. Antibiotic resistance was inherited from an ancestral population.

B. An antibiotic resistance plasmid is received from a bacterium in another population.

C. The enzyme needed for antibiotic resistance is received from a bacterium in another population.

D. The bacterial population mutated in response to antibiotics in the environment.

Which of the following is a characteristic of platyhelminthes?

A. Many pairs of legs
B. Flat body
C. Hard exoskeleton
D. Presence of cnidocytes

Based on binomial nomenclature, which two species are most closely related?

I. Common barberry (*Berberis vulgaris*)
II. Canadian bunchberry (*Cornus canadensis*)
III. Smooth blackberry (*Rubus canadensis*)
IV. Canadian barberry (*Berberis canadensis*)

A. I and IV
B. II and III
C. II and IV
D. III and IV

An animal shows radial symmetry, has only one opening leading to a digestive cavity and is soft without a skeleton. To which phylum does this animal belong?

A. Platyhelmintha

B. Annelida

C. Mollusca

D. Cnidaria

To which domain does *Carcharodon carcharias*, a shark, belong?

A. Eukaryote
B. Consumer
C. Fish
D. Chordata

What is the mechanism of natural selection?

A. Any individuals in a population can be selected entirely by chance.
B. After a change in the environment a species will evolve adaptations to the new conditions.
C. If an adaptation to the environment is useful, an individual will develop it and pass it on to its offspring.
D. Variations amongst individuals of a population are selected by a changing environment.

To which group do sponges belong?

A. Cnidaria
B. Filicinophyta
C. Porifera
D. Mollusca

What features occur in all species of Angiospermophyta and Coniferophyta?

A. Seeds
B. Bark
C. Cones
D. Flowers

Which organisms have flowers?

A. Bryophyta
B. Porifera
C. Angiospermophyta
D. Cnidaria

An animal has radial symmetry, a sac-like body with only one opening and tentacles with stinging structures. To which phylum does this animal belong?

A. Annelida
B. Cnidaria
C. Mollusca
D. Porifera

What distinguishes Annelida from Platyhelminthes?

A. Platyhelminthes have a segmented body but Annelida do not.
B. Platyhelminthes reproduce sexually but Annelida do not.
C. Platyhelminthes have radial symmetry but Annelida have bilateral symmetry.
D. Annelida have both a mouth and an anus but Platyhelminthes do not.

What is accepted by scientists as evidence for evolution?

I. Similarities in bone structure between the wings of a bat and the fins of a porpoise
II. Changes in dog breeds caused by artificial selection
III. Extinction of dinosaurs

A. I only
B. I and II only
C. I and III only
D. I, II and III

Which of the organisms A–D, identified by the key below, represents an Annelid?

1.	Shows bilateral symmetry	go to 2
	Does not show bilateral symmetry	Cnidaria
2.	Has a segmented body	go to 3
	Does not have a segmented body	go to 4
3.	Has jointed legs	A
	Does not have jointed legs	B
4.	Has a shell	C
	Does not have a shell	D

How can species of bacteria evolve to be resistant to antibiotics?

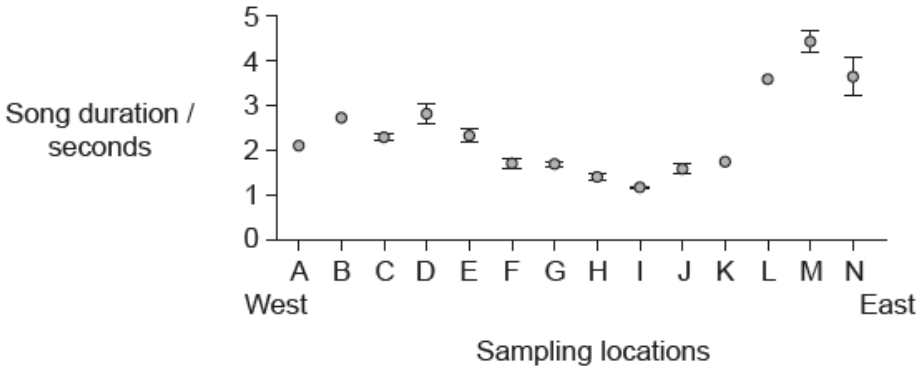
I. A variation within one bacterium's genome confers resistance.
II. Antibiotics enable genes to become adapted through transcription and translation.
III. An incomplete dose of antibiotics allows bacteria with a high resistance to survive and reproduce.

A. I only
B. I and II only
C. I and III only
D. III only

Ranunculus repens and *Hypericum repens* both have yellow flowers. Which statement is true?

A. They are angiospermophytes.
B. They are coniferophytes.
C. They are members of the same species.
D. They are members of the same genus.

The graph shows the song duration of birds from the genus *Phylloscopus* sampled from west to east throughout Northern Europe and Northern Asia.



[Source: adapted from D E Irwin, (2000), *Evolution*, **54** (3), Wiley, page 1006]

What concept do these data illustrate?

A. Gradual divergence

B. Adaptive radiation

C. Interbreeding populations

D. Punctuated equilibrium

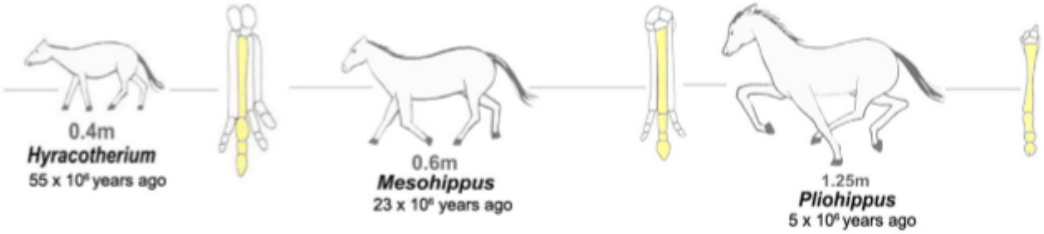
The scientific name of the great egret has recently been changed from *Casmerodius albus* to *Ardea alba*.

[Source: http://images.freeimages.com/images/previews/218/ardea-alba-2-1250856.jpg, by sxc]

What is a possible reason for the reclassification of egrets?

A. Allopatric speciation
B. Discovery of different ancestry
C. A change in the mating behaviours
D. Change in habitat and geographic range

The following diagrams (not to scale) represent the fossilized forelimbs of three horses living at different times, none of which are alive today.



Images by Alex Brollo

The diagrams provide evidence for which of the following?

A. Pentadactyl limb
B. Domestication of animals
C. Homologous structures
D. Change in the characteristics of species

The image shows an *Acacia tortilis* tree which is one of 13 species of Acacia. All such flowering trees are examples of Fabaceae.

[Source: adapted from www.elicriso.it]

What is the highest level of taxa for *Acacia tortilis*?

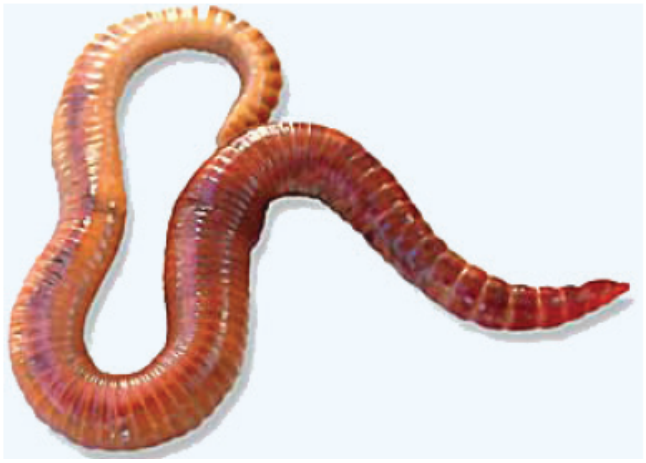
A. *Acacia*

B. *Tortilis*

C. Fabaceae

D. Angiospermophyta

The photograph shows an animal of the species *Eisenia fetida*.



[Source: “Redwiggler1” by Mihai Duguleana; - Transferred from en.wikipedia to Commons. Licensed under Public Domain via Wikimedia Commons - https://commons.wikimedia.org/wiki/File:Redwiggler1.jpg#/media/File:Redwiggler1.jpg]

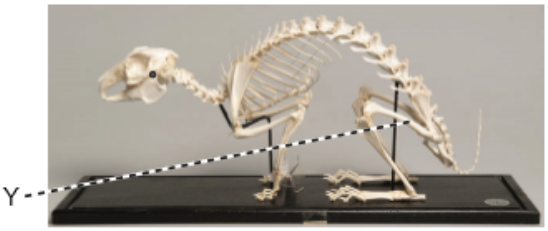
Which phylum does it belong to?
A. Cnidaria
B. Platyhelminthes
C. Annelida
D. Arthropoda

The pictures show skeletons of a frog (*Conraua goliath*) and of a domestic rabbit (*Oryctolagus cuniculus*).

Frog

[Source: © Bone Clones, www.boneclones.com]

Rabbit



[Source: © CSG CIC Glasgow Museums and Libraries Collections]

What is the evolutionary relationship between X and Y?

A. They are analogous.
B. X is analogous and Y is homologous.
C. They are homologous.
D. They are neither homologous nor analogous.

The photograph shows vegetation in a rocky area.

[Source: © International Baccalaureate Organization 2017]

Which characteristic of the plants indicates that the area in which they are growing is probably dry?

A. Relatively small size

B. Small flowers

C. Narrow leaf surface

D. Small root system