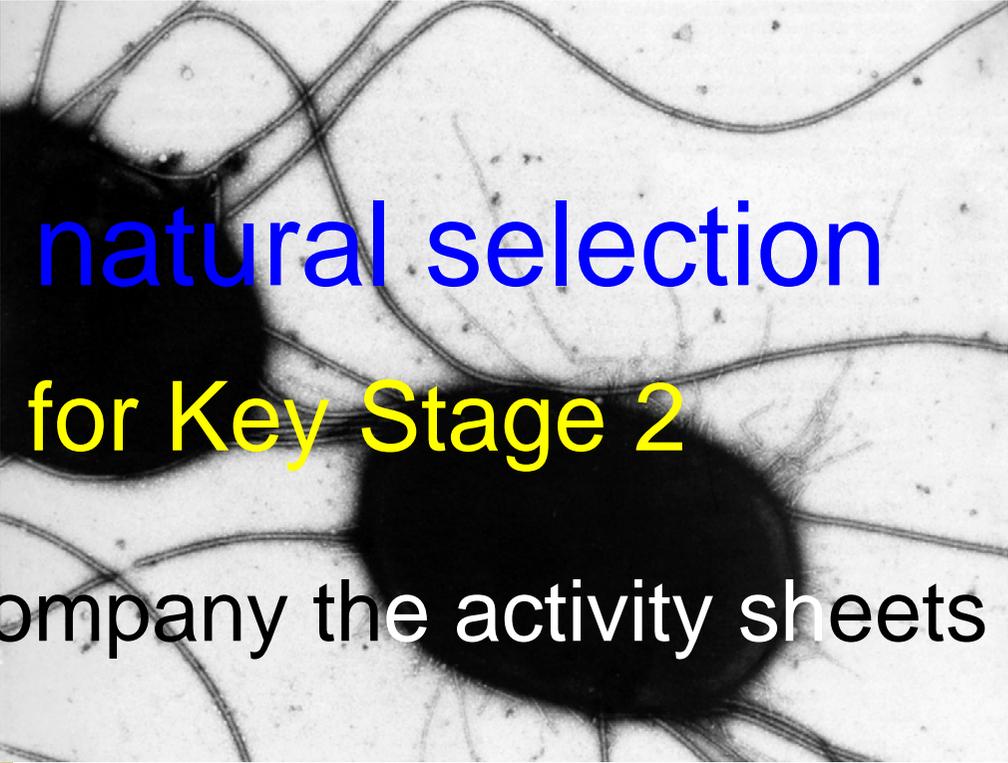




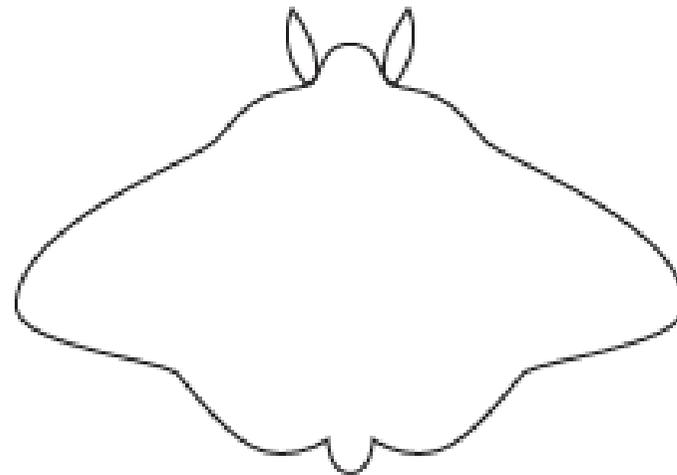
Darwin 2009:  
Hands-on activities

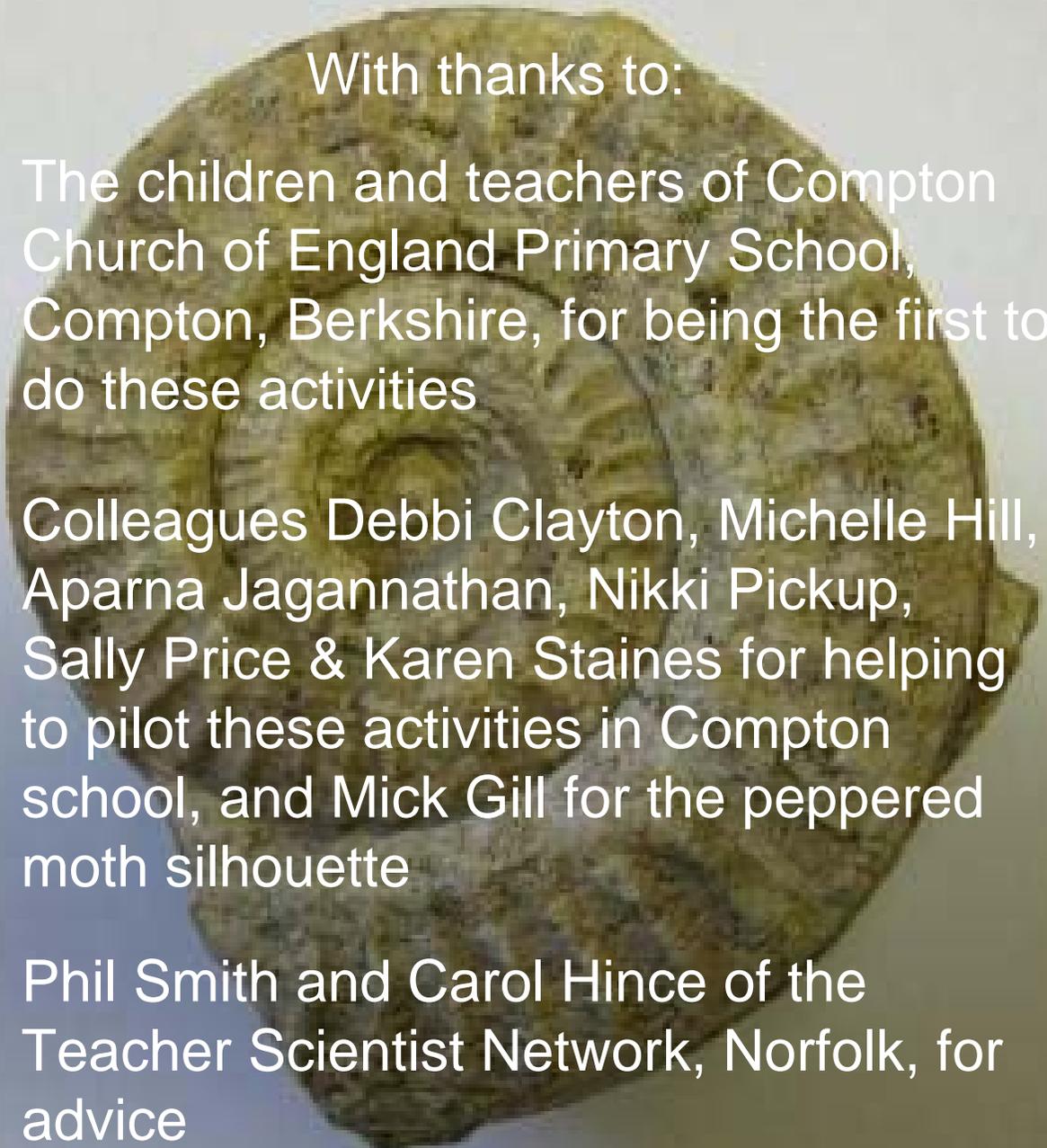
Notes & pictures to accompany the activity sheets

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natural selection  
for Key Stage 2





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# Charles Darwin

- Born 12 February 1809, Shropshire
- Set sail on HMS Beagle, December 1831, as a scientist, for a 5-year around the globe voyage
- He described many amazing new animals and plants around the world

# Charles Darwin

- He spent many years thinking about what he had seen
- Why were there so many different types of animals and plants?
- Why were there similar – but not identical – creatures/plants in different places?
- Why had some creatures become extinct (he had observed some fossils)?

# Charles Darwin

He concluded that:

- all animals and plants changed, by chance
- some variants were better fitted for their environment than others; they survived better
- they passed their characteristics to their offspring
- over a very long time many changes resulted in new species

Continued...

# Charles Darwin

- sometimes a species became extinct, when it could not survive in a changed environment e.g. hotter, colder, wetter, drier
- he called this process “Natural Selection”
- it explained how living things evolved – changed – over time

# Genes, mutation & natural selection

- Briefly talk about how scientists now know how natural selection and evolution occur; Darwin did not know this (next slide)
- The children will have come across mutants in films e.g. The X-Men and Jurassic Park. Ask about them first
- Ask questions whenever possible
- Use a black/white board

Topic continues.....

# Genes, mutation & natural selection

- We now know that it is our GENES, in our cells, that determine how we, and all creatures and plants, look.
- Genes are made of DNA.
- When cells divide the DNA is COPIED, so that each new cell has all its genes.
- MISTAKES occur RANDOMLY, BY CHANCE, during the DNA copying process.
- These mistakes are called MUTATIONS, producing MUTANT genes (changed genes), producing MUTANT creatures and plants.
- Most mutations do not result in any change to the body of an animal or plant.
- A few mutations do result in a change in the body.

Topic continues.....

# Genes, mutation & natural selection

Natural selection is possible because of mutant genes AND because the ENVIRONMENT CHANGES. (Ask what 'environment' means. Lots of answers are correct, including that our bodies are the environment for bacteria inside us.)

If a mutant gene (or a combination of mutant genes) produces an animal or plant with a changed body that enables it to grow/reproduce better than its relatives in the changed environment, then it will be more likely to survive than its relatives. It will be SELECTED by the ENVIRONMENT, NATURALLY.

In time, with increasing generations, the population of the organism changes; the mutants become the majority. The least successful relatives might die out

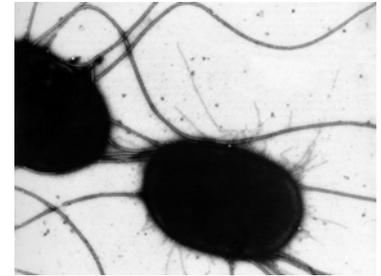
Topic continues.....

# Genes, mutation & natural selection

- With more generations, more mutations, more ENVIRONMENTAL CHANGE, the organism changes further.
- Eventually, after a very long time (millions of years), it has changed so much that it becomes a new SPECIES.
- We call this process of the development of new species EVOLUTION, a consequence of RANDOM MUTATION and NATURAL SELECTION by the environment.
- Mutants + changes in environment > natural selection of some mutants >>>>> new species.

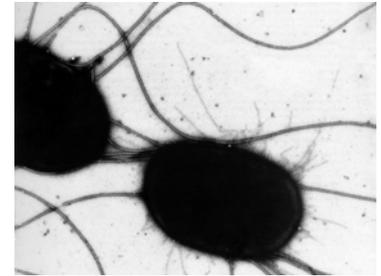
# Activity 1

## Very quick natural selection: development of antibiotic resistance



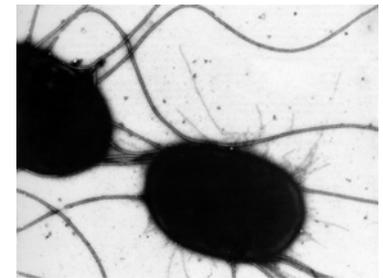
# Activity 1

## Very quick natural selection: development of antibiotic resistance



# Activity 1

## Very quick natural selection: development of antibiotic resistance



## Activity 2

### Natural selection because of different colour: camouflage

**The peppered moth.** The change in the ratio of pale:dark forms of the peppered moth since the mid-19th century is a well studied case of industrial melanism; first, natural selection of dark (melanic) forms of an insect as the environment got dirtier during coal-burning industrial expansion and domestic use.

Continued....

## Activity 2

### Natural selection because of different colour: camouflage

The situation has reversed since the Clean Air Act of the 1950s.

A good account is given by Dr Jim Mallett, University College London. Search on the internet for “Jim Mallett peppered moth” to get his article *The peppered moth: a black and white story after all*

November 2003 (updated January 2004)

Continued....

## Activity 2

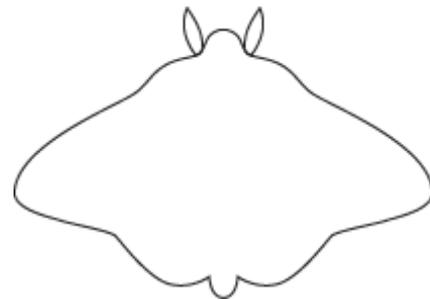
### Natural selection because of different colour: camouflage

The case for the peppered moth changing in the 19th and 20th centuries, and for environmental change being a selection mechanism (specifically a darkening of some vegetation) is overwhelming. Recent experiments confirm the earlier view that camouflage/predation is at least a part of the explanation.

Continued....

## Activity 2: peppered moth outline

To use as a template for cutting the shape



# Activity 2

## Natural selection because of different colour: camouflage



# Activity 3

## How we know what the dinosaurs looked like. How fossils were formed



# Activity 3

## How we know what the dinosaurs looked like. How fossils were formed



# Activity 3

## How we know what the dinosaurs looked like looked like. How fossils were formed



# Activity 4

## Handling fossils



# Activity 4

## Handling fossils



# Activity 4

## Handling fossils

