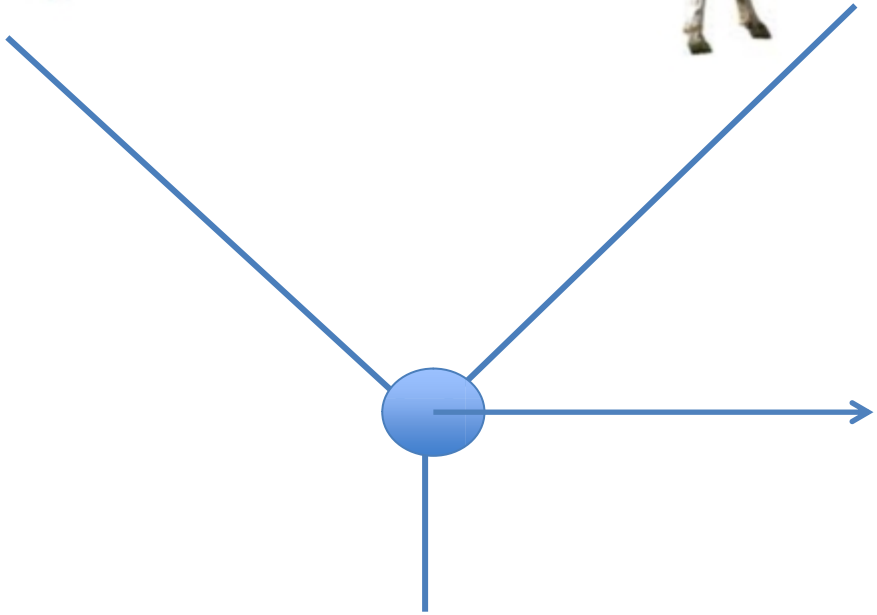
Topic	Evolution: decent with modification	**Level**	For students aged 14-16
Outcomes	• To understand the concept of a common ancestor • To use data to consider the evidence for evolution – decent from a common ancestor with modification • To use evidence (data) to support a claim		

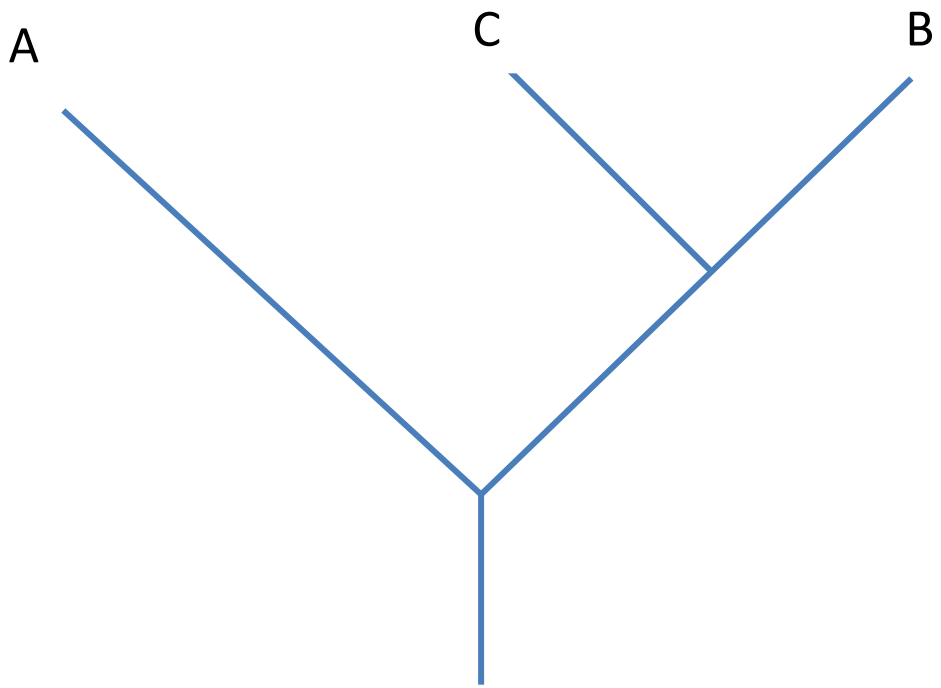
For this lesson you will need to print out slides 7-11 for the group discussion. More information on argumentation is available here: http://thescienceteacher.co.uk/argumentation-in-science/

What do you think the common ancestor looked like?

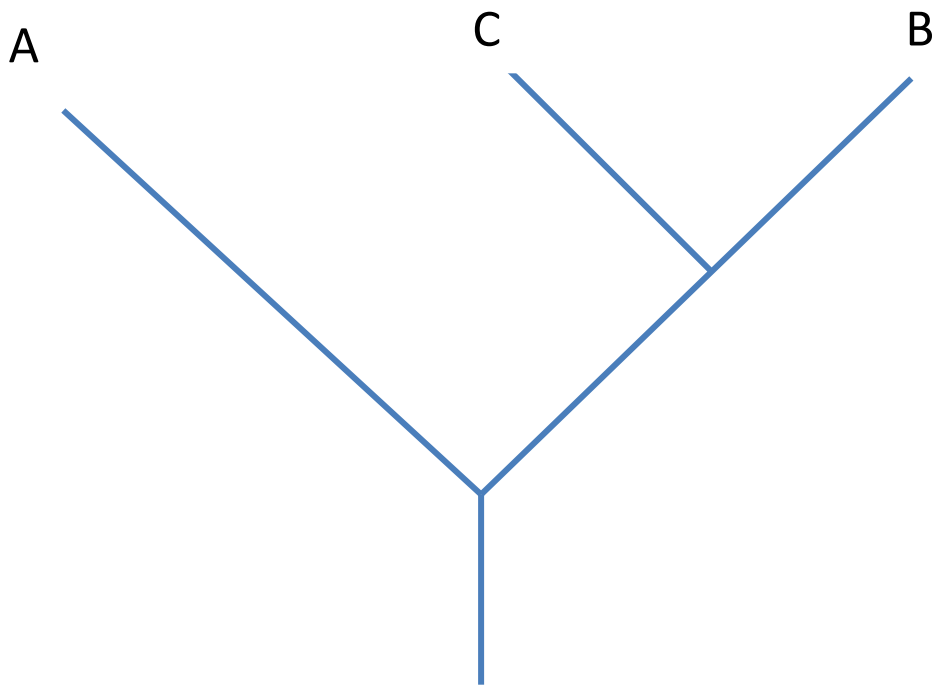


Draw what you think the common ancestor could have looked like?!

Who is more closely related to C? A or B?



Who is more closely related to A? C or B?



Argumentation in science

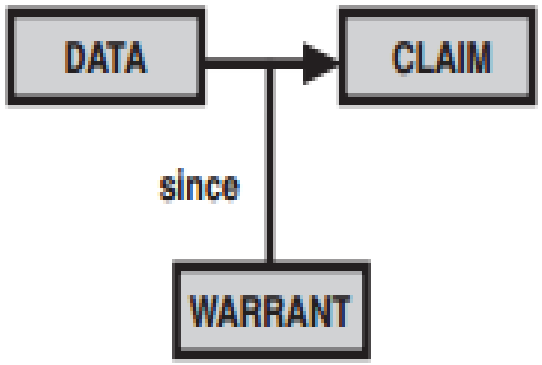
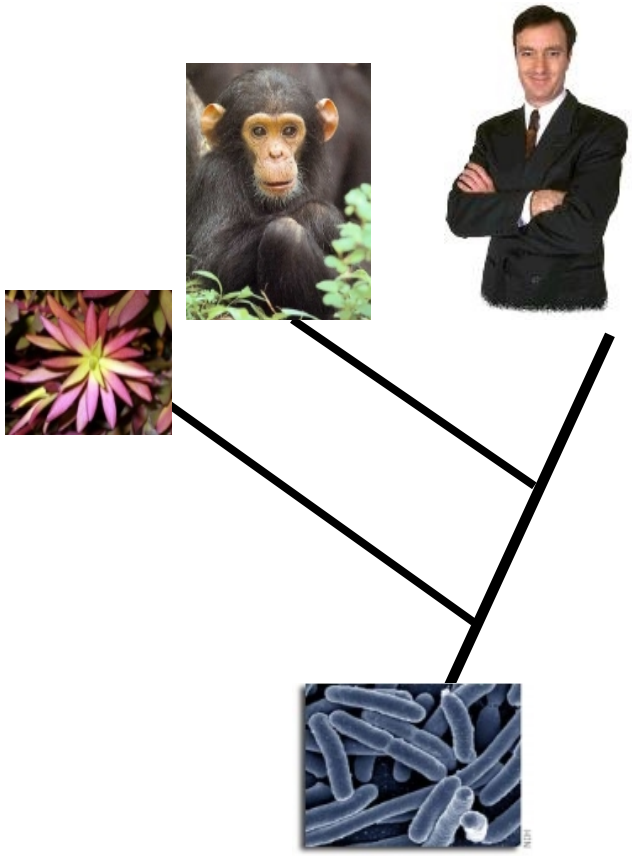


Figure 1 A simplified version of Toulmin's (1958) 'Framework for argumentation'.

To make an argument **claims** are justified by relating them to the **data** on which they are based.

Evidence for any claim consists of at least two components – data and warrants. **Warrants** are essentially the means by which the data are related to claims providing the justification for belief.

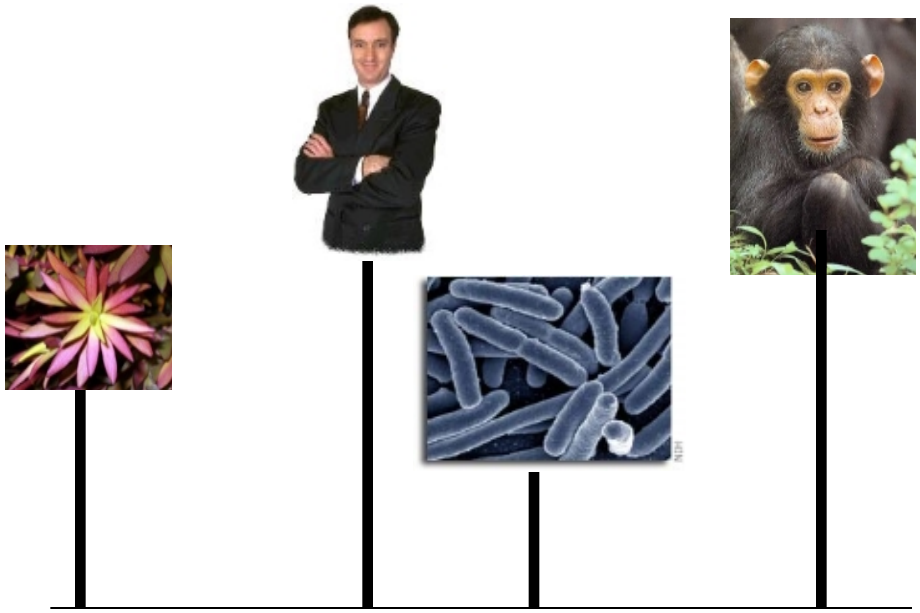
Theory 1



All life shares common ancestry - all life is related

Life evolved once only

Theory 2



Each organism is unrelated and is created independently

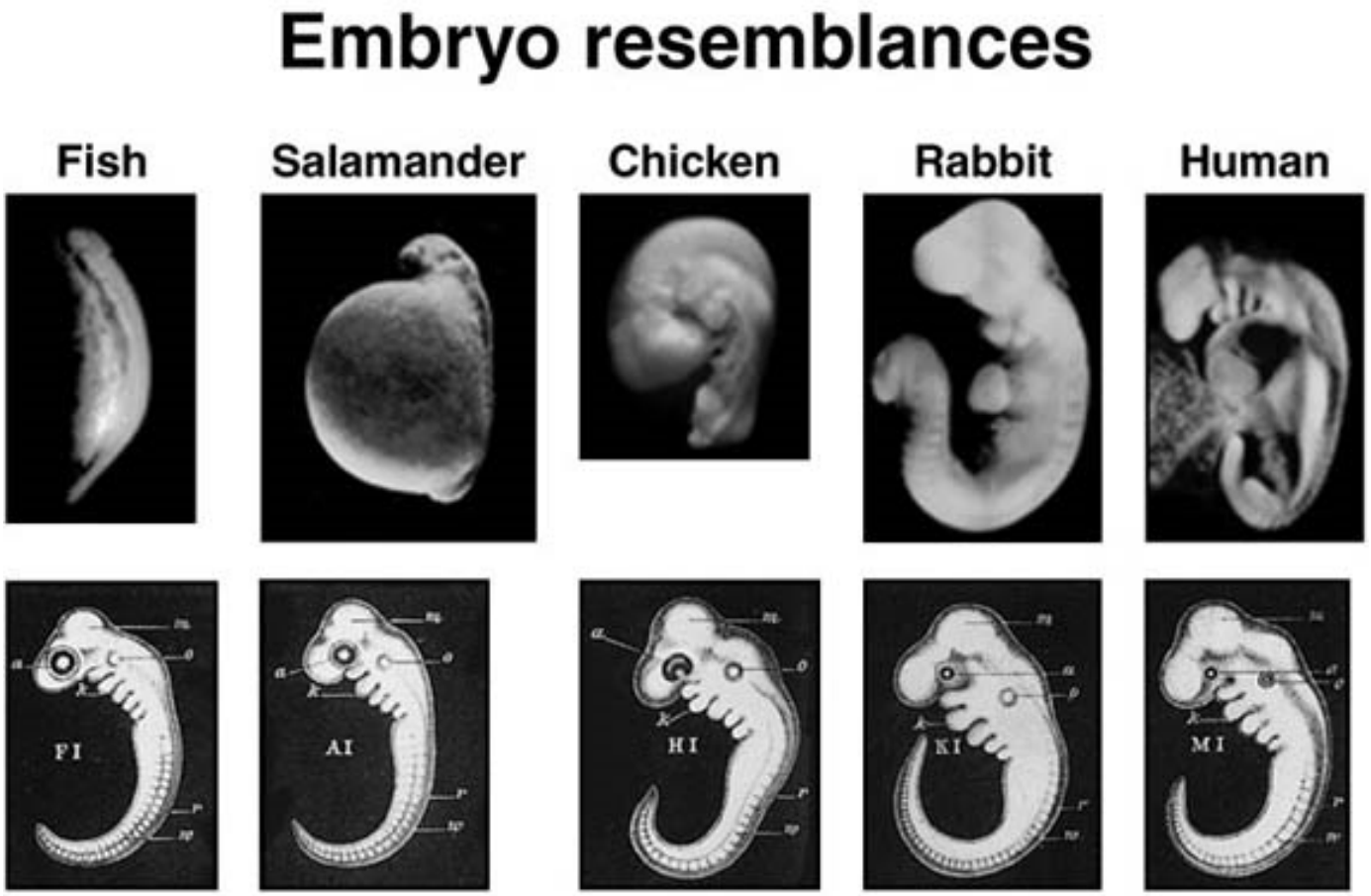
Life evolved many times

- Theory 1: All living organisms evolved from a single common ancestor.

- Theory 2: Life evolved many times independently.

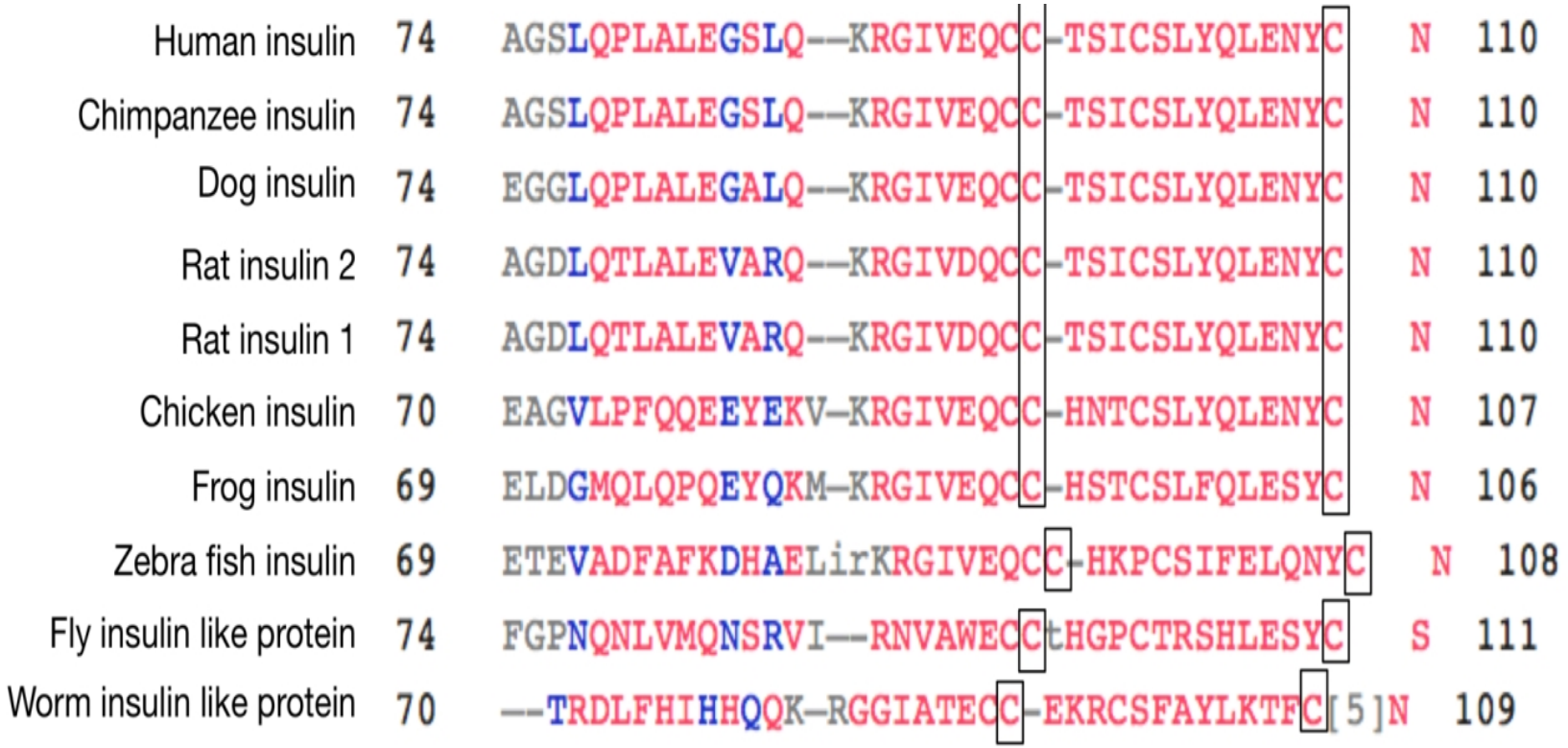
Discuss whether the pieces of evidence (data) in front of you support Theory 1, Theory 2, both or neither.

Comparison of embryos



Data 1

Comparison of protein sequences

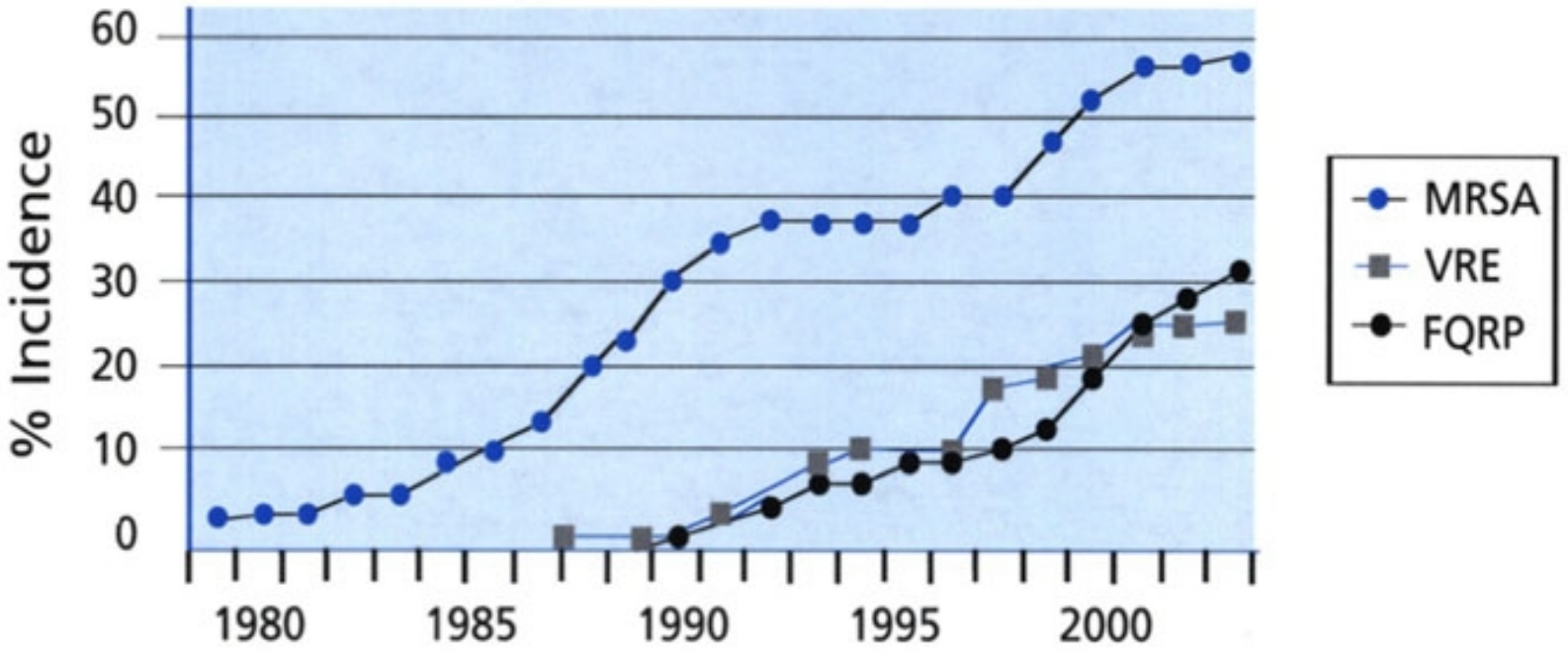


Data 2

The horseshoe crab – a present day example and a fossil from 500 million years ago

Data 3

An increase in antibiotic resistant bacteria



MRSA = methicillin-resistant *Staphylococcus aureus*; VRE = Vancomycin-resistant *enteroccoci*
FQRP = Fluoroquinolone-resistant *Pseudomonas aeruginosa*

Data 4

The diversity of life

Data 5

My Argument

My idea is that ...

My reasons are that ...

Arguments against my idea might be that ...

I would convince somebody that does not believe me by ...

The evidence I would use to convince them is that ...

Theory 1: All living organisms evolved from a single common ancestor.

Theory 2: Life evolved many times independently.

(writing frame taken from:
Osborne, J., Erduran, S., and Simon, S. "Enhancing the quality of argumentation in school science." Journal of research in science teaching 41.10 (2004): 994-1020.)