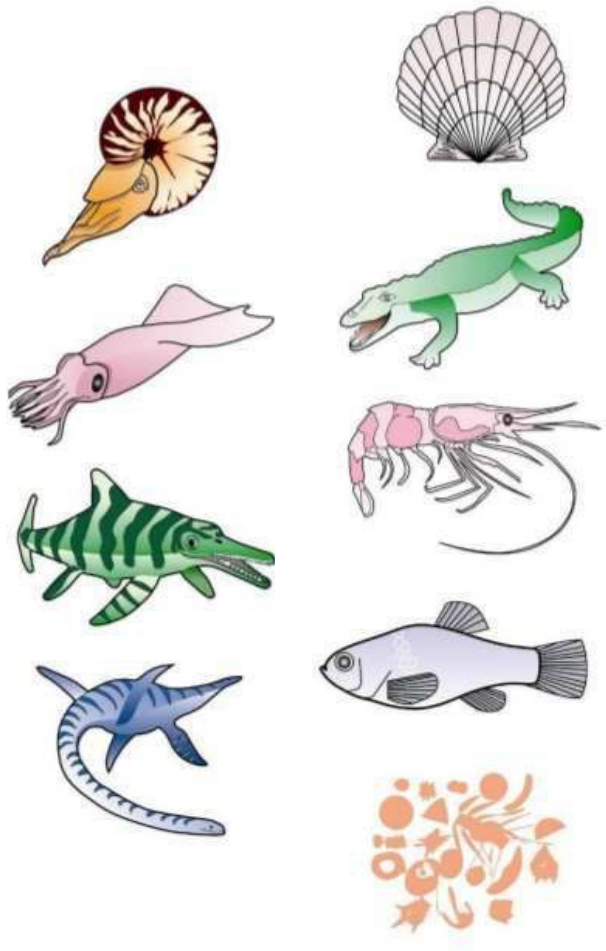
Who ate the ammonite?
A Jurassic food web - from fossil evidence

Pupils may well have studied the carnivore/herbivore relationships between animals and plants that exist today but can they apply this understanding to work out the relationships between animals and plants that lived millions of years ago?

Fossil sheet A (page 3) shows some fossils which were found in rocks of Jurassic age, about 180 million years old. The reconstructions (A-H) on sheet B (page 4) show what these animals may have looked like when they were alive. The reconstructions are based on the structure of the fossils and on comparison with similar, present-day animals.

Ask the pupils to:
- compare the fossils shown on sheet A with the reconstructions of the animals shown on sheet B.
- use the feeding information on sheet B, to fill in the names of the organisms on the food web shown on sheet C (page 5). The direction of the arrow points from the organism being eaten to the eater (in the direction of flow of food/energy).
- build up a picture of where in the sea they think the organisms might have lived - use sheet D (page 7) to place drawings or cut-outs of the pictures of the organisms in the most likely places.
- use the information on sheet C, to draw arrows on sheet D to show the food web for the Jurassic sea.
- explain how they think a food web for the seas of today would differ from the Jurassic food web.
- suggest which animals in the sea today are the top consumers.



Reconstructions of the fossils

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The back up:

Title: Who ate the ammonite?

Subtitle: A Jurassic food web - from fossil evidence

Topic: This activity could be included in any lesson which involves discussion about carnivore/herbivore, predator/prey relationships, building food chains/webs, producers/consumers and trophic levels.

Age range of pupils: 8 - 16 years

Time needed to complete activity: 20 minutes

Pupil learning outcomes: Pupils can:
- relate images of fossils to images of the reconstructed animals;
- build up the food web in trophic levels (the level that the organisms occupy within the food web), from producers to consumers (through primary and secondary to top consumers);
- realise that food flow/energy moves up the trophic levels from producer to top consumer.
- use fossil evidence to build food webs for ancient seas;
- realise that the trophic level of organisms does not equate with where in the environment the organisms live/lived (i.e. the organism at the bottom of the sea is not necessarily the producer; the highest - nearest the ocean surface in this case - is not necessarily the top consumer).

Context:
The completed food web is shown on sheet C on page 6. Pupils may need to be told to start with plankton as the producer on the lowest trophic level. They will see that one of the primary consumers is also a secondary consumer.
The food web for the Jurassic seas does not differ a great deal from any modern food web except that some of the animals are now extinct.
The top consumers today are sharks and some whales.

Note: The fossils in this activity will not necessarily have been preserved in different layers of rock. When organisms living in the ocean waters died and sank to the bottom, they will have been mixed up with the remains of organisms which lived on the sea bed. Palaeontologists use evidence from the fossils and from the rocks which contain them, to work out where in the environment each particular organism would have lived.

Often there is confusion between a food chain and a food web: a food chain is a single sequence within a food web.

Following up the activity:
Pupils could find out which of the animals on sheet A are still alive today. What happened to the others? They could research different organisms that live in the sea today, discover what they eat and draw a food web linking the organisms. Then they could compare this modern web with the Jurassic food web. Also, they could look at fossils from other geological time periods and try to construct food webs for them, e.g. Silurian seas, Carboniferous seas, Cretaceous land.

Underlying principles:
- Food webs can be constructed using fossil evidence.
- Trophic levels in ancient food webs are similar to those of today.
- Although producers are always the lowest trophic level, these plants or animals may or may not occupy the lowest physical position in the environment.
- The food flow, i.e. energy, increases upwards through the trophic levels.

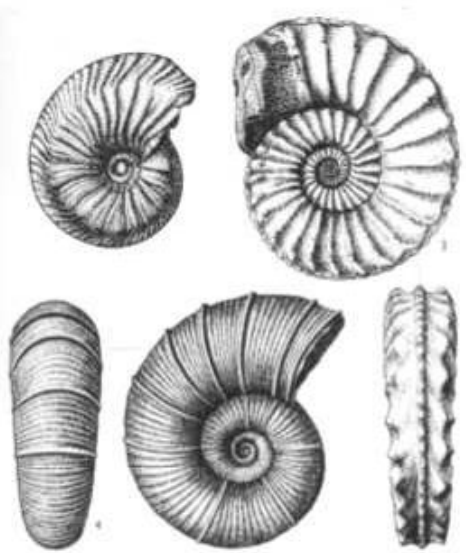
Thinking skill development:
Completing the food web from lowest trophic level to highest trophic level involves construction. Cognitive conflict occurs when it is realised that the plankton in the lowest trophic level live at the top of their environment. Applying modern food webs to ancient seas is a bridging thinking skill.

Resource list:
- print-outs of fossil sheets A, B, C and D
- scissors and glue or coloured pencils

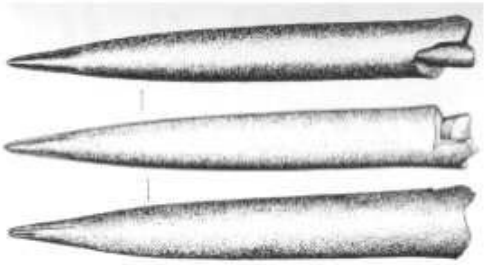
Useful links: Putting ‘food web’ into a search engine like Google will give many results.

Source: Adapted by Elizabeth Devon from an activity in the Earth Science Education Unit’s ‘Life on Earth’, Teaching KS3 Biology.
http://www.earthscienceeducation.com

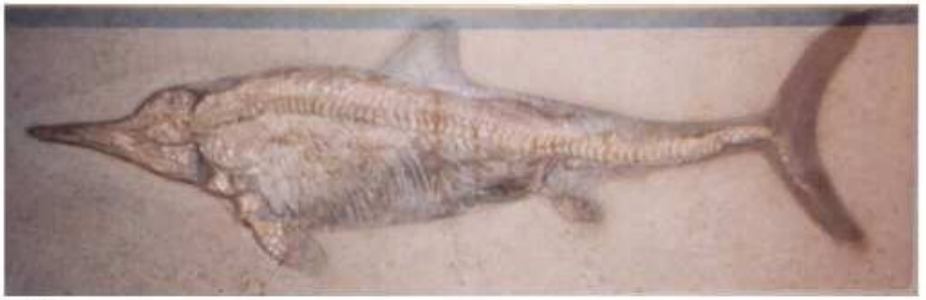
Fossil sheet A



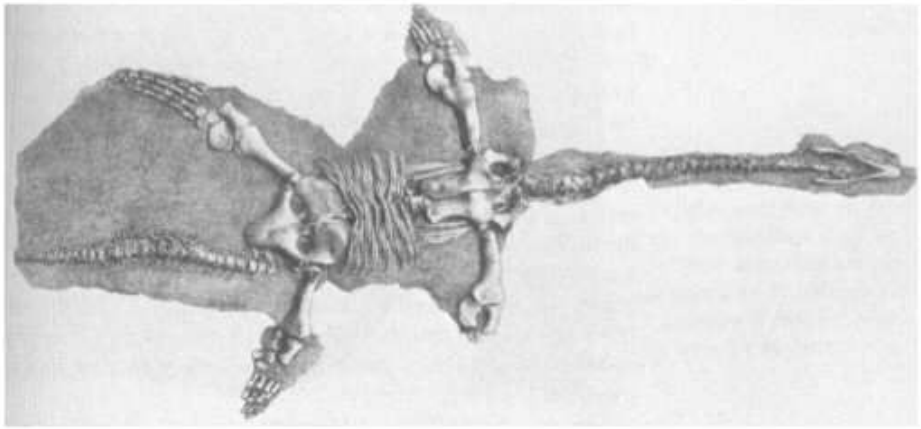
A Ammonites
(extinct squid-like animals)



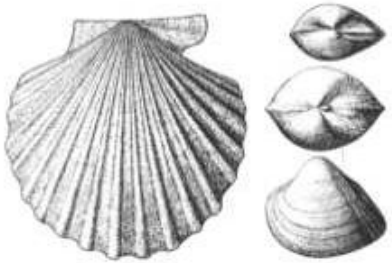
B Belemnites
(extinct squid-like animals)



C Ichthyosaur (extinct marine reptile)



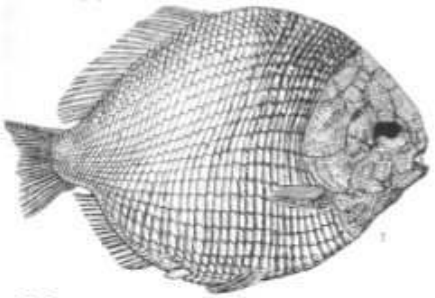
D Plesiosaur (extinct marine reptile)



E bivalve molluscs (shelly animals such as clams and scallops)

F crocodile tooth

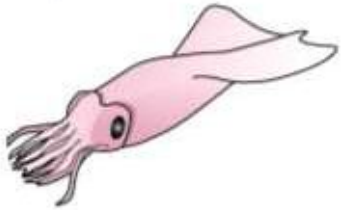
G shrimp



H fish

Reconstruction sheet B

A
Ammonite - ate crustaceans such as shrimp



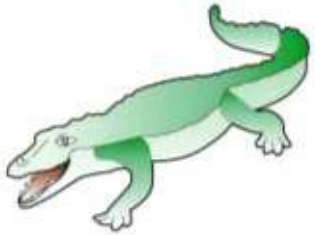
B
Belemnite - ate crustaceans such as shrimp

C
Ichthyosaur - has preserved stomach contents of squid-like animals

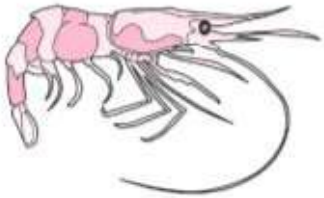
D
Plesiosaur - ate fish

Reconstructions are not to scale!

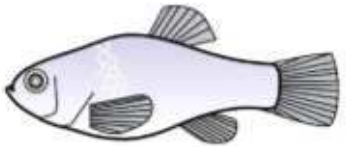
E
Bivalve - ate plankton



F
Crocodile - ate fish



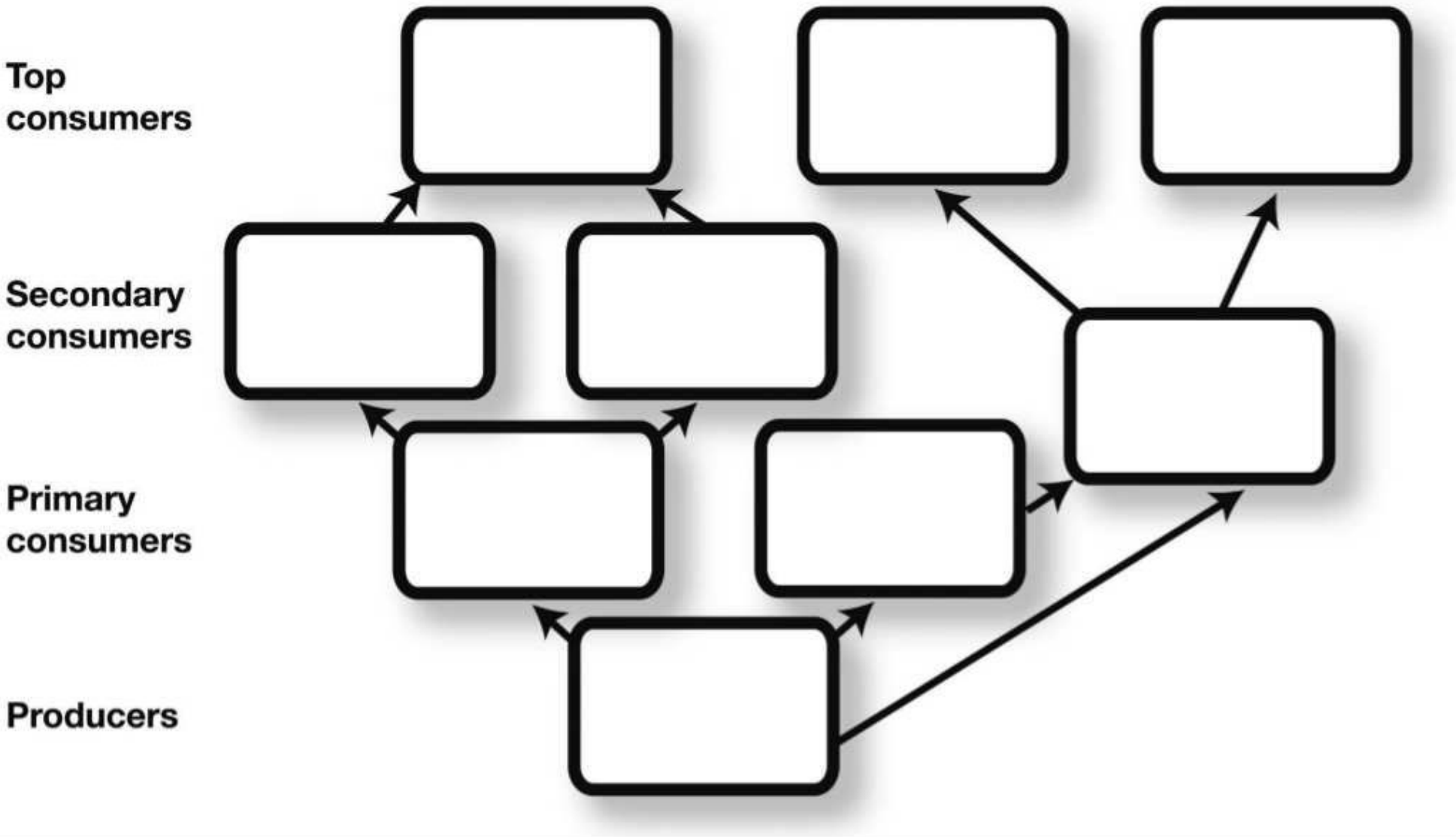
G
Shrimp - ate plankton



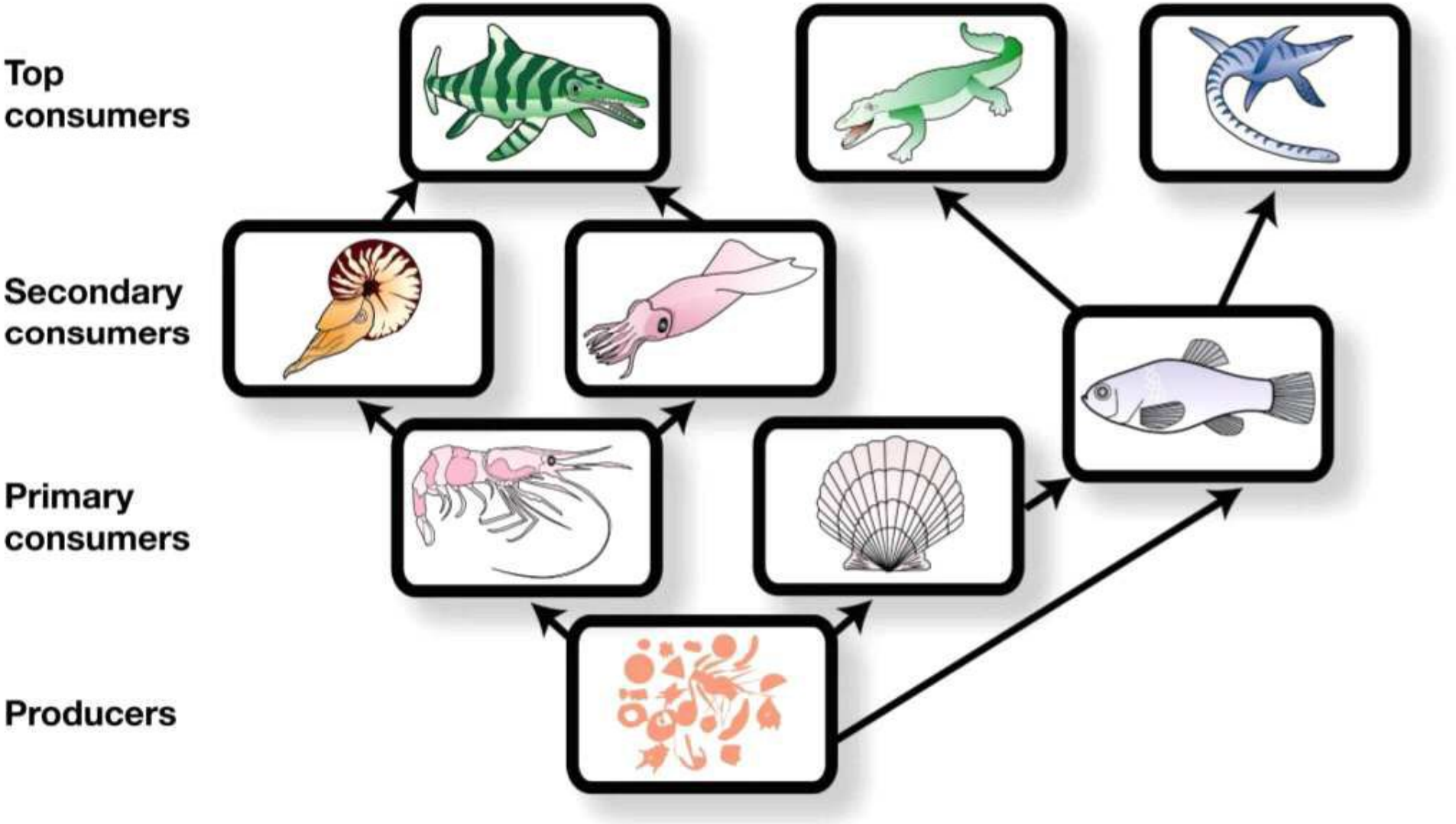
H
Fish - ate plankton and bivalves

I
Plankton - phytoplankton photosynthesises

Fossil web sheet C



Fossil web sheet C with answers



Jurassic sea sheet D