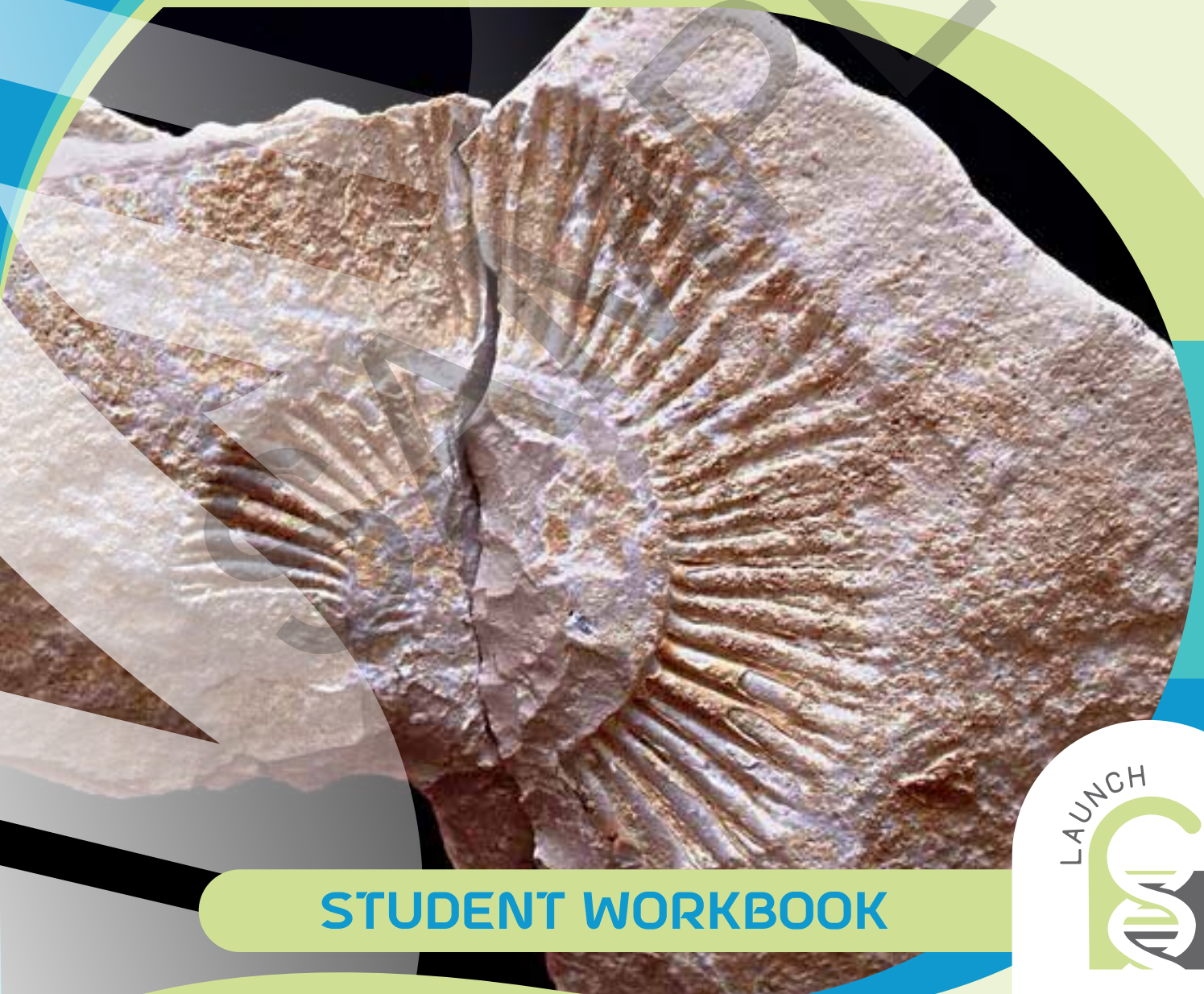
ANCIENT ORGANISMS



STUDENT WORKBOOK

LAUNCH

6. Based on your study of the samples, develop at least two testable criteria for defining or differentiating a fossil. Criteria is the plural form of criterion. A **criterion** is a set of traits or characteristics that a sample is judged by.

7. Write your criteria in the left column. Add rows to the chart below if you come up with more criteria and need more space.

8. Using your criteria, test each object. Decide which are fossils and which are non-fossils. Put "Yes" in the boxes for a sample that meets the criterion for being a fossil and "No" for those that don't.

9. After completing the test of your two criteria, move on to the "Lick Test" and "Burn Test."

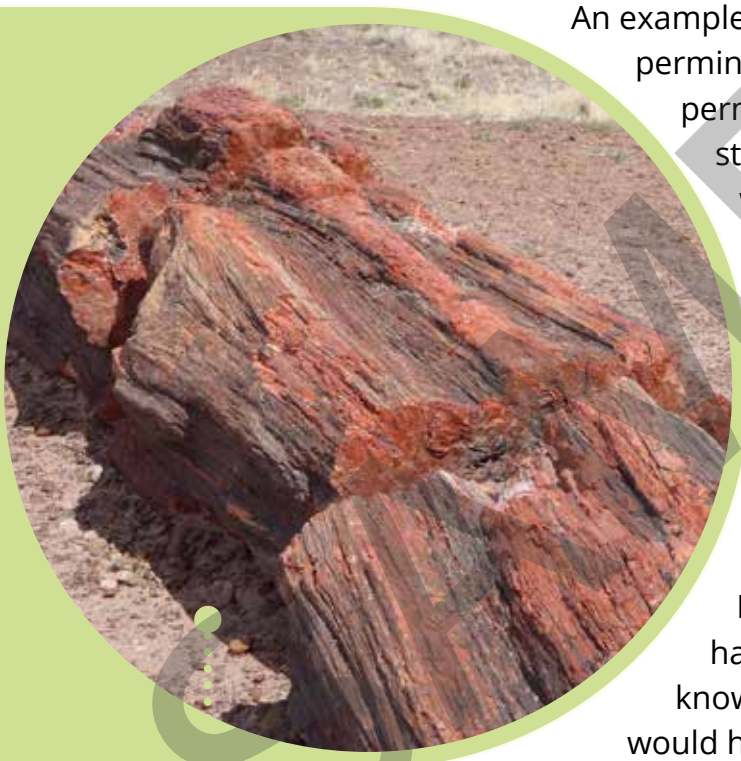
Object:	1	2	3	4	5	6
Criteria 1: _____						
Criteria 2: _____						
"Lick Test"						
"Burn Test"						

THE LICK TEST

In these next steps you'll have the option of using your tongue or your finger to perform a test of one criterion above, called "The Lick Test". The samples, while not hazardous, may be dirty and they definitely won't taste very good. Instructions for both approaches are provided below.

Before permineralization, the soft tissues of an organism are either eaten by bacteria or animals, or decay within the sediment. During permineralization, the hard parts of an organism, such as the bones, remain and become buried by sediment over time. Water with mineralized crystals leeches on and into the bones and slowly encases them to form sedimentary rock.

The water works its way down into the bones of the ancient animal because of the porous structure of the tissues. Even as permineralization changes those tissues into rock, the porous structures still exist in true form fossils. Therefore, fossilized bone can still be spongy because the porous internal structures are remnants of the original tissues, like those found in animal bones today. If it were to rain or other moisture were to touch the fossil, the fossil will pull the water in through capillary action. Capillary action is a liquid's ability to flow into a small space regardless of gravity or other forces. This can make highly porous materials, like fossilized bone, stick to moist surfaces (like your tongue or wet finger).



Petrified wood

An example of a fossil that has gone through permineralization is petrified wood. Through permineralization, the once-living tissues and structures of the wood are slowly replaced with crystalized minerals from water, like silica. As a result, when you find petrified wood it seems to be more like a rock than a tree. In the same way, as a tooth is fossilized, the organic structures in the tooth are slowly replaced with rock through permineralization.

Now, consider this: Have you ever smelled organic material burning? Perhaps you've accidently burned some hairs on your arm or head. If you have, you know it has a distinct smell! The same thing would happen if you burned organic tissues in an animal tooth. But wait! A fossilized tooth has been mineralized, meaning all those organic tissues are gone and all that remails is mineral, or rock. That means if the object is a real fossil that has been mineralized, there should be no smell.

MISTAKES HAPPEN

It is important that we understand what fossils are and how they are made so that we identify them correctly. In the past and even today, scientists make mistakes when it comes to ancient life.

In the late 1800s, two paleontologists, O.C. Marsh and Edward Drinker Cope, were racing to publish more new dinosaur names than the other. In 1877, O.C. Marsh discovered a skeleton of an ancient organism he called *Apatosaurus*. However, the skeleton was missing a head. In order to complete the skeleton, Marsh used the head of a *Camarasaurus* to make a complete skeleton. While this was an intentional error, Marsh made a bigger mistake that is still confusing people today – the *Brontosaurus.*

In 1879, another skeleton was discovered and named by Marsh *Brontosaurus*[1], however, in 1903 it was discovered that the *Brontosaurus* he discovered was actually a smaller *Apatosaurus*[1]. Marsh's mistakes caused misunderstandings about dinosaurs for over 100 years, with the idea that the "thunder lizard" called the *Brontosaurus* existed[2]. It's a debate that continues today, with new research suggesting Marsh might have been right after all (albeit possibly unintentionally).

Complete Apatosaurus Skeleton

Research another example of an error a scientist has made about ancient organisms. You can start with "Piltdown Chicken" or "scientist mistakes." Write a short summary (approximately 5 sentences) about it below including a description of the error and the reason it was made.

LAUNCH

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