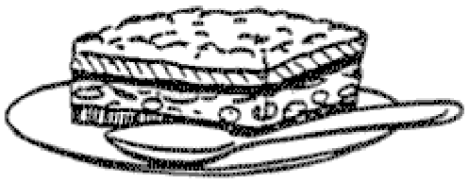
Return To Middle School Lesson Plans

Title: Edible Rock Layers
Level: Middle School
Time: 60 minutes
KERA Goals: 2.3; 2.35



Background Information:

If you had a few million years, you*might* be able to catch a glimpse of what happens to beds of rock (called Strata)when they are folded and faulted. Unfortunately, we're not around that long. But, the good news is we can build an experiment that simulates the movement and folding and faulting of rock strata like sandstonęsiltstone, limestone, and shale. Even better news is this: once you have built the experiment and have demonstrated how it works, you can eat it!! Yes, eat it!

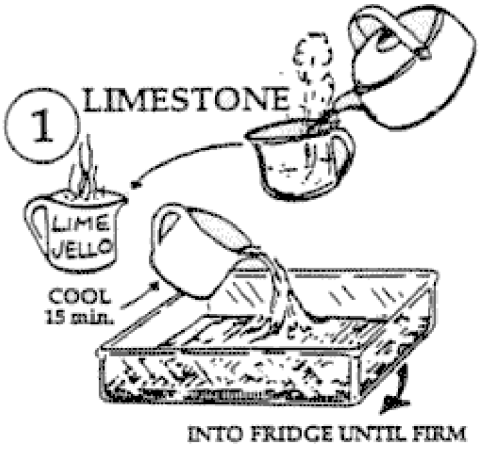
Materials:

three flavors of gelatin-maybe raspberry, lime, and lemon
graham crackers
whipped cream
banana or canned fruit cocktail, drained

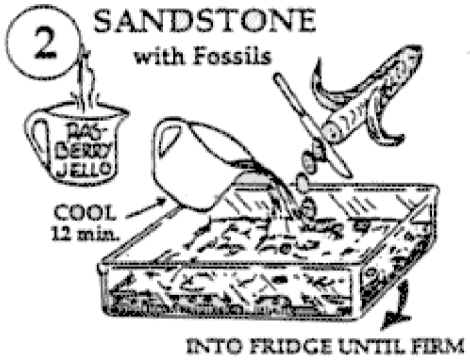
drained
clear Pyrex or glass pan, 8 inches by 12 inches and at least 2 inches deep
measuring cup

Activity:

1. Mix up a batch of limestone, using lime gelatin. We'll say that this bed (stratum) formed when the area was under the ocean. To create the limestone, put the gelatin in a measuring cup, add boiling water, and stir. Add a little less water than called for in the directions on the box. Let your limestone cool in the mixing cup for about 15 minutes, then pour it into the pan. Place the pan so it is level in the refrigerator and leave it until the gelatin is completely set.



2. Make a stratum of sandstone, the kind that forms from sand deposited by a river. Fossils are often found in this kind of stratum, so we'll need some fossils too. In this case, the



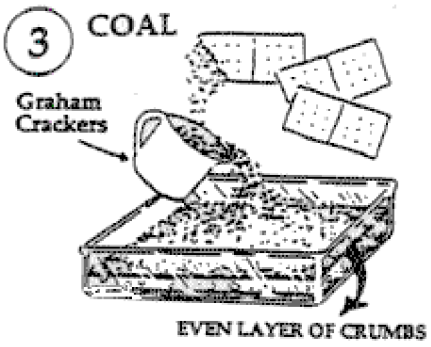
sandstone will be raspberry gelatin and the fossils will be pieces of banana or a well-dried can of fruit cocktail.

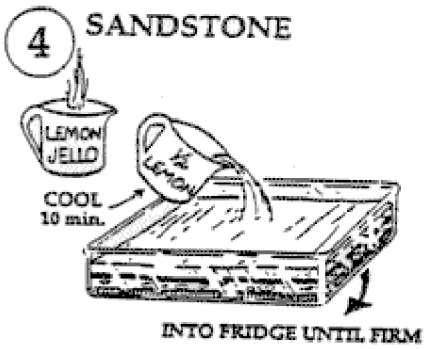
3. Cut the banana into small chunks. Mix the gelatin in the measuring cup as you did before and let it cool for about 12 minutes. Mix in the banana or well-drained fruit cocktail. Pour this mixture into the pan on top of the limestone. Make sure the limestone is completely firm, so the two layers don't mix together. Place the pan back in the refrigerator until it is cold and firm.

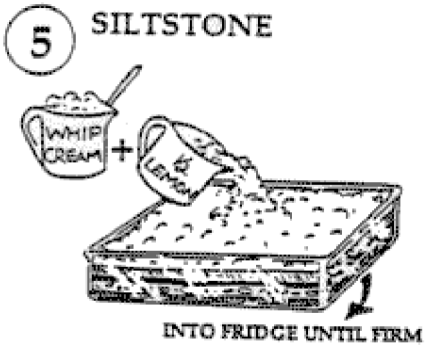
4. Our third stratum will be a thin layer of coal formed when the area was part of a huge swamp. Crushed graham crackers will be our coal. Crumble up five or six graham crackers and sprinkle them on top of the sandstone.

5. Mix up half a box of the lemon gelatin. This will be another layer of sandstone. Cool the lemon gelatin for 10 minutes then pour over graham crackers and return your growing formation to the refrigerator for more cooling.

6. For our final layer we need a siltstone. Make the rest of the lemon gelatin and let it cool in the measuring cup. Then stir in about ½ cup of whipped cream or topping. Pour this mixture evenly over the top of your formation. Put the whole thing back into the refrigerator.





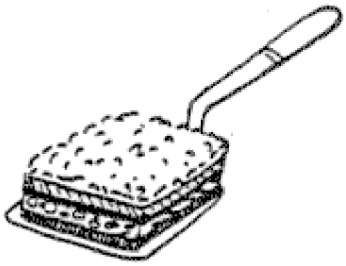


Once your formation has set, take a look through the side of the dish. You've created in an afternoon a series of strata that would take millions of years to form in nature.

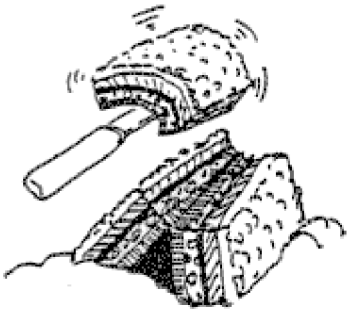
Where are the oldest gelatin strata? Right. On the bottom. And the youngest? On top.

One thing you'll notice is that the banana or fruit cocktail "fossils" are hidden away under a number of other layers. How will they ever be found? Fortunately, things don't get as soft as gelatin, but they do stretch and bend and even break just like the gelatin layers when they are subjected to the heat and pressure generated by the earth.

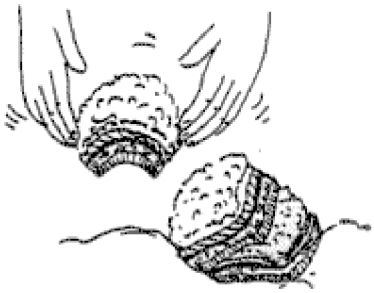
There are a number of different ways that our fossils can work their way to the top of the pile. Cut a 4-inch by 4 inch square of the formation, and you'll see how this might happen.



Uplifting. First, there are tremendous pressures building up inside the earth. These pressures form mountain ranges, and at the same time they twist flat strata into all sorts of bizarre shapes. Slide a knife under the center of your gelatin square and lift. The strata will bend so far and finally break. Once the pieces are standing on end, you'll see something interesting - one edge of the sandstone with the fossils is now on the surface. If a couple of miniature paleontologists happened to wander across this area right now, they'd probably discover some really tasty fossils!

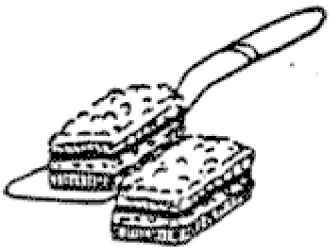


Overthrust There's another way that strata can get mixed up. Cut another square of gelatin. Gently and evenly push in from opposite sides of the square so that the center rises up and one half flops over on the other half. When this happens in the earth, geologists call it an overthrust.



One interesting thing. Notice that the older strata are no longer under younger ones. In fact, half of the youngest stratum is on the very bottom. Geologists must study rock strata very carefully to determine their relative

ages.

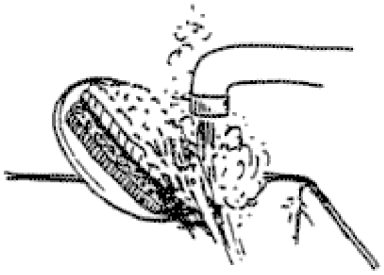


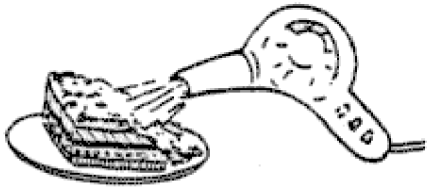
Faulting. The surface of the earth is full of big cracks called faults. Sometimes the land on one side of the fault will be uplifted, or raised, above the land on the other side. This is one way that fossils can work their way to the surface.

You can demonstrate the effects of faulting with another square of gelatin. Slice the square into two parts with a spatula. Then use the spatula to lift up one half. If it is raised high enough, the layer containing your fossil bananas will be exposed.

Erosion. Fortunately for paleontologists (geologists who study fossils), sedimentary rocks are constantly being worn away (eroded) from above by wind and rain, so fossils are constantly being uncovered, We can demonstrate with a cup of warm water and another square of stratified gelatin.

Place the gelatin on the paper towel on the plate. Tilt the plate over a sink or bowl, which will catch the water, and slowly pour a stream of warm water on one edge. Gradually, the top layers will melt away, exposing the fossil layer.





The wind also erodes sediments. To show this, take a blow dryer, turn it to warm, and aim it at a square of gelatin. In a few minutes the top layers will begin to dissolve. Soon fossils will be uncovered. (Of course, in nature the rocks don't melt. They're just slowly broken down and carried away).

Notice how small pieces of fruit flow out with the melting gelatin. This happens with real fossils too. When paleontologists find a few small bone or shell fragments lying on the ground (which they call float), they often find the rest of the fossil by looking in the rocks directly above it.

Marker beds: Coal beds like the one formed by your graham crackers are very important to paleontologists because they can be seen very easily. A gelatin geologist looking at your formation, for example, could always be sure that wherever she spotted *graham* crackers she would also be likely to find bananas or fruit cocktail in the next layer. Real fossil hunters often use the dark black coal beds as"markers" because they are easy to spot among all the light gray and brown layers. By knowing where the fossil-rich strata are in relation to the coal, they can zero in on the areas where they are most likely to find fossils. Coal beds are also great places to find fossils because coal formed from decaying plants in swampy areas. Huge fossilized tree trunks have been found in association with coal beds.

Well now, in an hour's time and in the space of a glass pan, you have witnessed a simulation of what happens when sedimentaryrocks are formed, and what happens to them when they are acted upon by the forces of nature. These forces have included uplifting, faulting, and erosion. You have been able to make observations that are similar to what geologists and paleontologists see when they work in the field.

When you have completed all demonstrations and experiments on your "gelatin layer cake," cut the remaining gelatin into sections and serve to the class.

HAPPY EATING!!

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