Where does clay come from?
Guided drawing

30 minutes

National Curriculum:
Science: *compare and group together different kinds of rocks on the basis of their appearance and simple physical properties; explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including the action of acid*
Geography*: develop contextual knowledge of globally significant places–including their defining physical and human characteristics and how these provide a geographical context for understanding the actions of processes; use basic geographical vocabulary to refer to key physical features; describe and understand key aspects of physical geography*

Materials needed: Paper (or sketchbook page) for each student, large sheet of craft paper or a whiteboard. A raw piece of clay (optional).

Optional:
Project Pottery's detailed chemical explanation:
https://www.youtube.com/watch?v=6O2R_LqDljI

Follow the process in North Carolina:
Real Dirt About Clay | NC Science Now | UNC-TV https://www.youtube.com/watch?v=6h12dvkruHQ

Key Questions: What is clay and where does it come from? How does the origin of clay give it its unique properties?

Learning Objectives: Students will draw the physical geological and geographic process of the formation of clay. Students will be able to identify three different kinds of clay and where they might be found.

Activity:

1) Begin by trying to write a definition of clay as a class. Typically, students will be able to identify clay as a kind of mud or dirt. If not, guide students to this by sharing or asking about their experience of playing in the mud. See how many types of 'dirt' or descriptions the students can think of. (sand, garden soil, dust, etc) If you have a raw piece of clay, hand it around and discuss what makes clay different from these other types of dirt (i.e. It is slippery and sticks together when wet, it dries hard, it can be rolled into worms, flattened into pancakes etc.) Tell the students that clay has these special properties because of how it is made and where it comes from.
2) Each student should create their own drawing along with you as you narrate the story of clay. Make sure to tell them that they will get time to add all the details they want to their drawing at the end. Monitor the pace to allow students to finish each section before moving on.
3) Sequence of the drawing. Items in brackets indicate a more advanced explanation.
    a. Draw several mountains in one corner. This is where the story of clay begins, as a volcanic rock called granite, high up in the mountains.
    a. Draw snowflakes and streaks of wind above the mountains. Freezing and other physical processes help to break the rocks apart. [This is called mechanical weathering] If you've ever looked at a granite countertop or sculpture, you know it's made up of lots of small crystal grains. The larger white chunks are a mineral called feldspar, which goes on to become clay.
    b. [Draw several dots on your mountains. The presence of water and other chemical reactions in the environment also helps to make the tiny, tiny flakes of eroded rock that make up clay. This is called chemical weathering and is an important part of the process on a microscopic level.]
    c. Draw a large circle at the base of the mountains. The erosion of the rocks keeps happening until it builds up a

deposit of pure, *primary clay* that is very light in colour and hardens at very high temperatures. One of the most famous places where this happened is in Cornwall near St. Austell and it is where we get our or porcelain clay from.

d. Draw a river flowing down from the mountain. This is how the clay gets out of the mountains.
e. Draw a second circle below and along the river. The tiny flakes of weathered rock are washed out of the mountains and settle into deposits of *secondary clay* downriver.
f. Draw a few arrows that flow down the river through the first circle deposit and into the second. As it flows, along with the clay the river picks up other minerals like sand and iron and mixes them together with the clay. This creates stoneware clay. Stoneware is usually tan coloured, and fires at medium temperatures. The stoneware used at the Leach pottery is mined near St. Agnes in Cornwall.
g. At the end of the river, draw several streams branching out. In the wetlands, the clay mixes with organic material and even more minerals, and is exposed to water. [And further chemical reactions] This turns it into *tertiary clay*, or earthenware. This is usually a very dark red or brown colour because of all of the different minerals [oxides] and can be fired at relatively low temperatures, even without a kiln. When Leach and Hamada first started the pottery, they were getting earthenware clay from St. Erth in Cornwall.
h. Before the clay is used for pottery, it is often mixed with other ingredients (feldspar, ball clay, bentonite, grog etc.) depending on how the potter wants to use it. This turns the clay into what we call a *clay body*.

Extension: Find the locations of the clay sources for the pottery on a topographic or geologic map. What do they notice about the geology of Cornwall? Where else might they expect to find clay? The geological process that makes clay takes a very long time, and sometimes clay deposits can help geologists to understand how the earth has changed. In fact, looking at the differences in clay mineral content of buried clay soils helps geologists to understand ancient climates!

Research some of the other important clay deposits in England and around the world, particularly near Stoke-on-Trent and Jingdezhen, China.

S.J. Howe's article 'Geology of the Lizard' explores more about the clay found in that part of Cornwall. It can be found in the Leach library, in issue 76 of *Ceramic Review* from 1982.

You can also visit the Wheal Martyn China Clay Museum near St. Austell to learn more about the industrial mining of primary clay.
https://www.wheal-martyn.com

Edited by Jillian Echlin, October 2017