



THE LIFE OF A ROCK

THE REAL LIFE STORY OF YOSEMITE GRANITE



How did this...



Part 1:

It's not easy being a baby rock!

I'm Granite. Nice to meet you. I live in Yosemite National Park. I'm an igneous rock! I formed underneath a volcano but I was never shot out one. Not all igneous rocks have to come out of a volcano, you see. Some of us cool underneath the ground, like me. Before I was even a rock, I existed as hot molten magma deep below the ground. In Yosemite, around 200 million years ago, large volcanoes started to erupt! I was in a gigantic magma chamber waiting to be erupted, but my chance never came. I slowly cooled into solid rock ten miles below the ground.

Investigate: What would you like to find out about the weathering of this granite rock?





This is a photo of the Washington Column lit up with the beautiful orange light of sunset. It reminds me of when I was a magma!

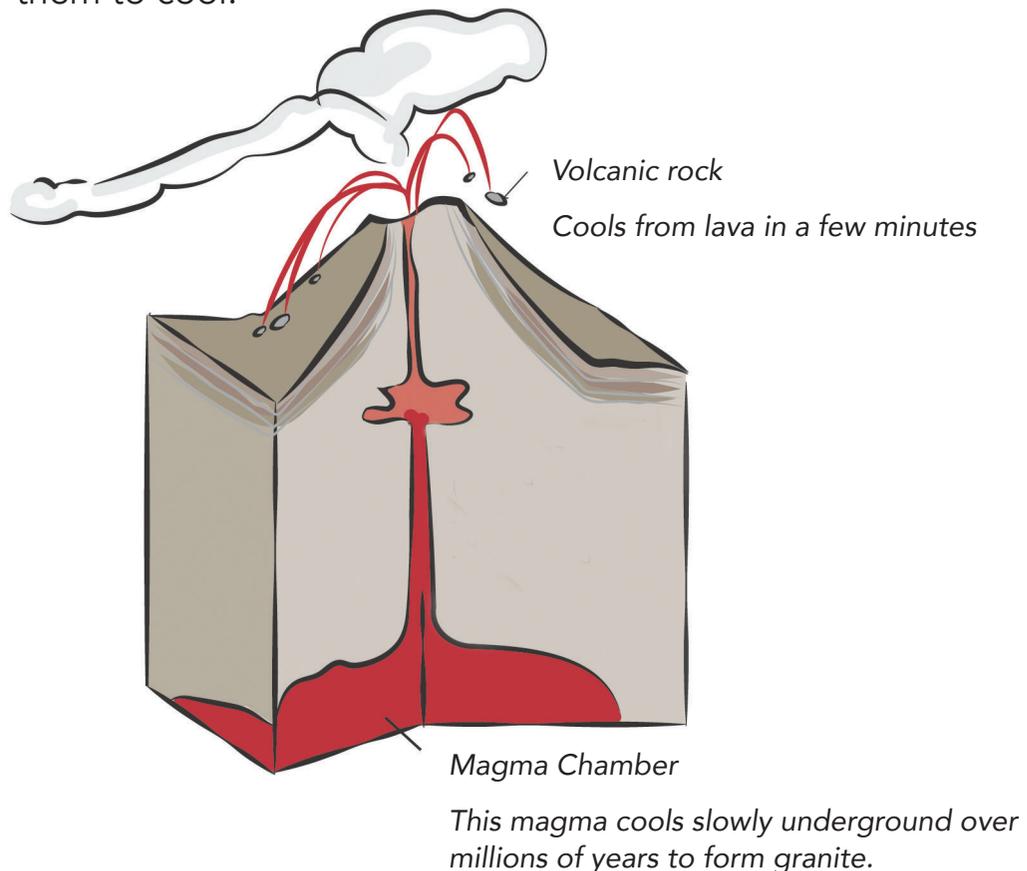


Part 2

A rocky beginning

So, the day I cooled into a rock, 70 million years ago, I guess you could say that was my birthday. I was a baby rock! Becoming a rock was really, really intense! I don't know what was worse, being cooked at 1200°F (700°C), or taking a hundred million years to cool off and solidify into a rock! As I slowly cooled, my minerals started to crystallize and grow larger and larger. I am made of many different minerals—light, dark, hard and soft minerals.

I would have been very different if I had come out of a volcano. Volcanic rocks cool quickly and so their minerals don't have time to form large crystals. Both volcanic rocks and granite can come from the same magma, but they will look very different because of how long it took for them to cool.





Hi, I'm a volcanic rock. I cooled quickly from lava erupted by a volcano.



These volcanic rocks are found just outside Yosemite! They are from ancient lava flows.



Part 3

Out with the old and in with the new

You might be wondering, if I started life 10 miles under the ground, how did I get up to the surface? Well, the short answer is, a lot can happen in 70 million years! Let me explain.



After all those volcanoes stopped erupting, some of them were very, very tall. The tallest were around 20,000 feet. That's a lot taller than the tallest mountain in California today. Those ancient volcanoes were worn down by the forces of erosion. Nothing is left of those volcanoes today. They have completely disappeared! Crazy, huh! We know that they existed because we can see all their erosional sediments that washed into the central valley farmland of California.



This volcanic rock cooled into the shape of a teardrop as it was shot out of a volcano. It cooled before it hit the ground.

How do we know that giant volcanoes once existed in the Yosemite area long ago?





This is the famous Half Dome as viewed from the valley floor. Isn't it magnificent?



Part 4

I was on top of the world!

Erosion stripped away all the volcanic rocks above me and I, Granite, was pushed to the surface by tectonic forces. I could finally see the light of day! I felt like I was on top of the world. But then I realized how difficult and uncomfortable it was to be exposed at the surface during an ice age. The last ice age was about 20 million years ago and it was freezing cold!

I was covered with glacial ice for a few million years. Heavy ice carried gigantic rocks and boulders that scraped deep into the granite. When the ice finally melted a magnificent sight was revealed. Yosemite was now a place filled with deep U-shaped valleys, granite spires and waterfalls!

How steep does the terrain appear to you?
How would the steepness affect erosion?



What evidence do you see in this landscape to help you know if it was eroded by water or ice?



Imagine these U-shaped valleys full to the top with flowing ice! The ice scraped and removed millions of tons of solid granite rock!



Part 5

How much rock was removed?

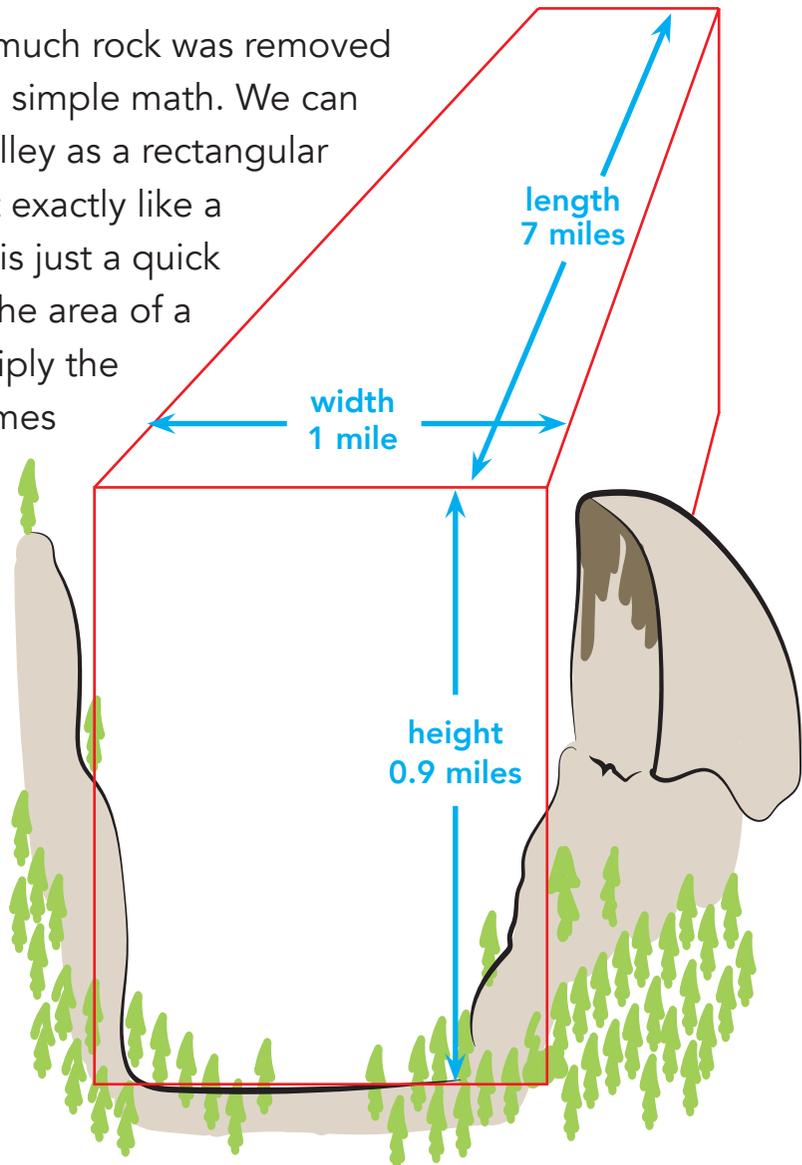
Now, I am just a little rock at the bottom of the Yosemite valley. Looking up at the mountainsides and at the towering cliffs is impressive, but sometimes I think about all that rock that was removed! Just look at that deep valley. There is a lot of rock that is gone!

How could we estimate how much rock was removed from Yosemite valley?



You could estimate how much rock was removed from Yosemite with some simple math. We can imagine the U-shaped valley as a rectangular box... well, I know it's not exactly like a rectangular box, but this is just a quick estimation. To calculate the area of a rectangular box, we multiply the length times the width times the height.

How much rock was removed from this valley?





Look at all that rock
that has been removed
from the valley!



Part 6

See, I told you that I'd been through a lot!

So, there I was—a little rock peacefully sitting on the valley floor. Then it started to rain and soon I heard something that sounded like a raging river. I looked up and saw a flash flood coming my way. The next thing I remember was tumbling and crashing into other rocks as the water carried me down the river bed. The fast flowing water had a lot of energy! With all that bumping and tumbling around, some of my favorite minerals were knocked right off my surface.

Over the years, I was swept miles downstream. The farther I traveled the smaller I got. Finally, all that bumping around turned me into sand! I was really worried that no one would appreciate my magnificent self anymore. Then one day a group of kids scooped me up and brought me to your wonderful classroom. I love being under the microscope! And thanks to you, I feel appreciated again!

Would the size of a rock effect how far the river takes it? What sizes of sediments would you find farthest away from the mountains?





This is El Capitan, the tallest wall in the Yosemite Valley! It is over 3,000 ft of solid granite rock!

