The Outside Story

Just a Random Rock

By: Dave Mance III

Act One opens in a forest on the western slopes of the Taconic Mountains in southwestern Vermont. A man in his forties is walking with his former high-school geology teacher – a man now in his seventies. Amid the towering trees, they come across a VW bus-sized boulder, sitting alone and somewhat out of place on the forest floor. The rock is covered in moss and lichen and walking fern, and it glows green against the dirty white, late-winter landscape; it's obviously been there for a very long time. The two men begin to speak.

What is it?

[Uncomfortable pause] It's a rock.

Yes, I know. But what kind?

I'm 90 percent sure it's blue marble, which is the dominant rock type in this area. There's a small chance it's dolomite. If I had some muriatic acid, I could tell for sure – the marble would fizz.

How did the rock come to be?

About 550 million years ago, there was a great sea – what geologists call the Iapetus Ocean. You see the layers in this stone? Those were layers of limy mud that were deposited in the shallow ocean water on the continental shelf. Millions of years of compression turned the sediment into limestone.

Are there fossils in it?

Potentially, but not likely. The sediment contained corals and algae and sponges and bivalves and trilobites, but fossils are rarely well preserved when limestone changes to marble.

Coral sounds tropical. This was a warm sea?

Yes. Back then, proto–North America was in the southern hemisphere.

This was back in the dinosaur age?

No. This was about 300 million years before the big charismatic dinosaurs. The only life on earth was in the ocean, and even then, it was modest life. Animals were just forming shells and exoskeletons.

So how did a chunk of sea floor get pushed up on land?

Around 500 million years ago, the plate under proto–North America moved east, and the crust under the ocean was subducted under the adjacent plate. The resulting volcanic activity produced a chain of islands, which ran from what is today Alabama all the way up to Newfoundland. Then, proto–North America smashed into the arc and fused with it, which formed much taller mountains. Geologists call this the Taconic orogeny – it's how the Taconic Mountains were born.

The way you described that makes it seem like the East Coast should be just east of the Taconics. Where did eastern New England come from?

There was a chunk of continent that had broken off of proto–Africa and was drifting around in the

Iapetus Ocean. Geologists call it Avalonia. After the Taconic orogeny, Avalonia collided and then fused with the island arc, creating the White Mountains in New Hampshire. Some of the land to the east of the Whites is sediment that was pushed up during the collision. Some of coastal New England is actually part of Avalonia.

So this was before the supercontinent Pangaea?

Well before. It took another 100 million years of continental drift before proto–Africa and proto–Europe collided with proto–North America to form Pangaea. At that point, the Iapetus Ocean disappeared. When Pangaea broke apart, parts of Avalonia drifted away with Europe.

Wild. But getting back to this rock – how did it get here, to this exact spot, laying randomly on the forest floor with no other big rocks around it?

The rock was originally part of the bedrock, but the Laurentide Ice Sheet moved it and deposited it where it sits. For about 70,000 years – and as recently as 15,000 years ago – this area was covered in a blanket of ice up to two miles thick. The ice moved from north to south, grinding the landscape in the process. This stone might have moved feet, or miles, or hundreds of miles.

Can you tell how far it moved?

Not exactly, but it likely wasn't far. For one, it matches the bedrock in the region. Also, it's not scoured and rounded. The glacier was something of a big rock tumbler, so when stones moved a long way, they have smooth edges to reflect it.

[End of Scene]

Thanks to Ken Carlson for the walk and the refresher course. And thanks to Peter J. Thompson, co-editor of the Vermont State Bedrock Map, for filling in some additional details.

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