

The New York Times

EDITORS' NOTE: THIS SECTION SHOULD NOT BE READ BY GROWN-UPS

YOUR

BEST YEAR

EVER

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Science

HOW I BECAME A
SUBMARINE
PILOT



BY ERIKA BERGMAN

I GREW UP moving from farm to farm, and there were always tractors to fix and places to explore. When it came time to apply to college, I remembered that I had once seen a University of Washington ship with students on board wearing life jackets and hard hats. It looked fun, so I applied there.

In college I studied oceanography, in which you learn about the geology of the ocean, the chemicals and animals in it and the physics of the waves. A week before graduation, I walked into the basement of the oceanography building and saw a yellow submarine big enough to fit five people inside. The heavens opened up, the sun shone down and I knew I wanted to be a submarine pilot.

It was owned by a company that operates submarines for scientists and explorers doing research. I told them I'd do anything to work for them — even take out the garbage. I became a pilot in training, and for six months, I used reference books to disassemble the submarine, learn every system and put it back together. Then I was allowed to put it in the water. The hardest part about learning to pilot is also the most fun: the beautiful ballet of adapting to changing currents and light.

It took me two years to get to my final exam. The first time, I forgot to turn on the oxygen for a few minutes, and I failed. But the second time, I passed. Now I'm a pilot for hire, taking scientists, filmmakers and tourists on dives around the world. The majority of my job is maintaining the submarine and planning. Only a tiny fraction is taking passengers down into the ocean. But my favorite part is taking someone down for the first time. Somewhere in the middle, they relax, and we're 1,000 feet underwater, just looking out the window in silence and in awe.

So many of us dream of becoming astronauts and going to space. But we have a huge water planet that needs aquanauts. And there's room for so many people to join us. *Interview by Elise Craig*

A DINOSAUR'S GUIDE TO SURVIVING COLD

BY GALADRIEL WATSON • ILLUSTRATION BY ANDREW RAE



When you imagine the world of dinosaurs, you probably picture something like "Jurassic Park": a warm, tropical forest with predators lurking in the fog. But in recent years, paleontologists (people who study fossils) have found evidence that dinosaurs also lived near the coldest parts of the earth. In 2020 and 2021, scientists announced that they had uncovered several types of baby dinosaurs in the Arctic. A new species of giant sauropod was also found in Australia, which used to be farther south and partly within the Antarctic Circle. Back then, the Antarctic and Arctic Circles weren't quite

as cold as they are now (scientists think temperatures were similar to the northern United States), but "polar dinosaurs" still had to live with bitter temperatures and periods of snow. Let's find out how.

THEY WORE 'COATS'

Most polar dinosaurs probably had feathers, which kept them warm by locking in heat, says Holly Woodward, who studies dinosaurs at Oklahoma State University. For a long time, scientists thought dinosaurs were coldblooded reptiles who couldn't produce body heat and would have had to live in warmer environments. But paleontologists are discovering that many could produce some heat, which feathers helped to hold in.

THEY WERE SMALLER

Animals need food to grow, but finding a meal in winter can be tricky. That's why, Woodward says, "dinosaurs in polar regions definitely stopped growing" when temperatures cooled. By looking at their bones, scientists have found that polar dinosaurs like hypsilophodontids didn't grow when food was scarce. It takes a lot of food to keep a giant dinosaur energized, so some, like the polar tyrannosaur Nanuqsaurus, adapted to be only half the size of its southern relatives.

THEY USED THEIR STRENGTHS

Not all dinosaurs suffered in the winter — some were at their best. Troodons had huge eyes that helped them snatch

prey even in the dark. "They were more efficient hunters because of that sight," says Anthony Fiorillo, a paleontologist at Southern Methodist University. This skill allowed northern Troodons to grow to about twice the size of those farther south, and have larger populations.

THEY HID AND HUDDLED

Hypsilophodontids burrowed underground to stay warm, and dinosaurs like hadrosaurs "might have coped with the cold just by huddling," Woodward says. Fiorillo hopes that future discoveries will teach us even more about how dinosaurs lived in polar areas. "We don't have all the answers," he says, "and that's why we keep going back." ♦

A FREEDOM FLOWCHART

BY CHELSEA LEU

IF YOU GOT your second Covid shot more than two weeks ago, you're now considered fully vaccinated — hooray! "The vaccine gives you a very strong force field of protection, so you're a lot safer doing many of the activities you normally do," says Kawsar Talaat, a vaccine expert at the Johns Hopkins Bloomberg School of Public Health. Still, it can be tricky to figure out where you can go, masked or unmasked. This flow chart can guide you through some common scenarios. Of course, you should always consider what kind of space the activity is taking place in, how many infections are in your area and whether you're going to be in contact with vulnerable people like grandparents or babies. And any adults you go places with should also be fully vaccinated and boosted. "There's no right answer for everybody," Talaat says. If you haven't gotten vaccinated yet, you should — so you can do all these things safely.

