

# THE FIRST FOSSIL OF A MARINE TURTLE HAS BEEN FOUND IN COLOMBIA: AND THE TURTLE WAS PREGNANT!

The discovery of a 125 million years-old fossil not only makes it possible to understand the evolution and reproductive aspects of these ancient reptiles, but it also throws light on their current descendants. The findings of the research enable us to understand the history of biodiversity and thus heighten awareness of the need to conserve fauna, particularly marine turtles which are severely endangered by the contamination of oceans, indiscriminate hunting and the effect of climate change. The study was led by Professor Edwin Alberto Cadena, of the Faculty of Natural Sciences and Mathematics.

By: Inés Elvira Ospina  
Photos: Leonardo Parra, Edwin Cadena

**E**dwin Alberto Cadena was born and raised in Zapatoca, Santander, one of the few places in the world where you find an intact fossil beach that is 135 million years-old. That is why collecting marine fossils became a passion of his when he was a boy. He remembers that, when he was six, his collection of stones drove his mother “a little crazy.” “She was always asking me what I was going to do with it and what use it would be in my life,” says this researcher from the Faculty of Natural Sciences and Mathematics of the Universidad del Rosario.

Years later, his passion for fossils led Cadena to become the researcher of one of the most important scientific and paleontological discoveries, both in Colombia and the world: The remains of an animal which lived 125 million years ago and turned out to be the first marine turtle bearing eggs.

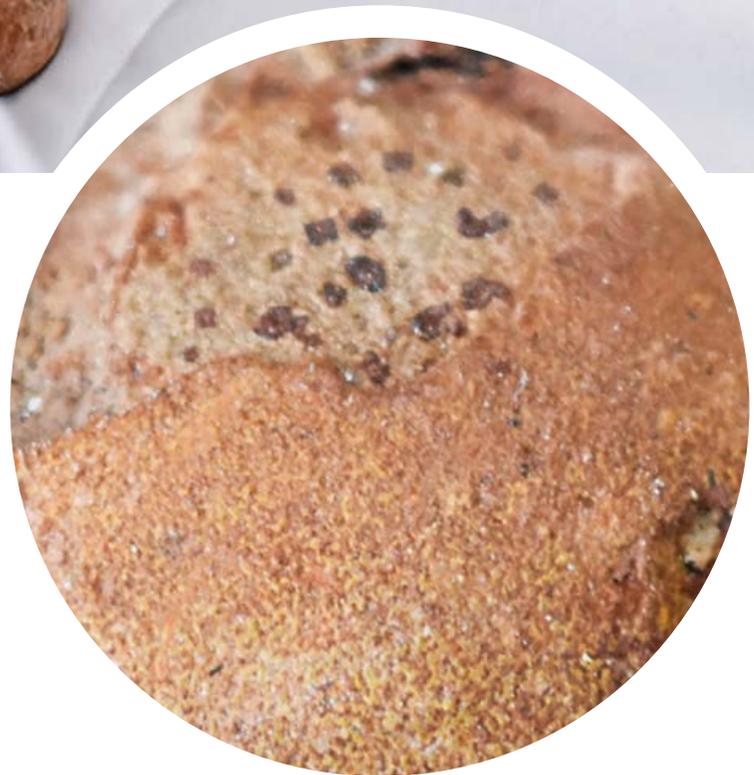
“Colombia is a mega-diverse country but we know little about why and how it became one. This is precisely one of the

most interesting things about this discovery: It helps us to retrace that history and make it known. To teach children that we have fascinating species in Colombia, like *Desmatocheilus padillai* (the world’s oldest marine turtle) or *Titanoboa cerrejonensis* (the biggest snake which has ever existed),” he stresses.

In the opinion of Professor Cadena, learning about such fossils and studying their history is important, even for the conservation of our current biodiversity, because many of those species are relatives of animals which are alive today. “Understanding where and how a species has lived, or if it no longer exists and why, is important for conserving living ones. It enables us to make history accessible to people and for example, when they are eating a turtle during Easter Week, tell them that that species has lived for two million or more years and their consumption of the turtle will make the species extinct in only a few years,” he explains.

Another benefit of this study is the protection of our patrimony. Cadena believes that





a recent measure, the Decree-Law no. 1353, which regulates the country's paleontological and geological patrimony, is a sound way to advance the study of paleontology in the country, a field which is highly important for science and scientific research.

### **The paths which led him to Villa de Leyva**

125 million years ago, the town of Villa de Leyva in Boyacá lay under a shallow sea. That is why it has turned out to be an ideal place for the discovery and study of fossils. Edwin Cadena became acquainted with it when he was studying geology at the Universidad Industrial de Santander (UIS –Industrial University of Santander), the subject he chose when he finished high school.

Once he obtained his undergraduate degree, he traveled to the Panama Canal to do a two-year internship with the Smithsonian Institution and he then went to the University of Florida for his Masters. He obtained his doc-

torate in North Carolina and traveled to Germany on an Alexander Von Humboldt Fellowship for his postdoctoral studies between 2012 and 2015.

“After I returned, being in Zapatoca, I discovered something which led me to follow the path of the vertebrate animals, especially turtles. I refer to the oldest little turtle which we have in the north of South America and with that, I had the opportunity to go to the American Museum of Natural History in New York and work with one of the best experts in the field,” recalls this co-director of the new program on “Earth System Sciences” at the Universidad del Rosario. It was during that period that he noticed that there was a big gap in the documentation of the turtles of northern South America and thus got interested in that subject.

Cadena then went to the Department of Boyacá and joined the recently-opened *Centro de Investigaciones Paleontológicas* (CIP-Center for Paleontological Investigations). The Center had been set into motion by the Padilla brothers, both of whom are passionate about paleontology and invested their own resources in it. Along with Mary Luz and Juan de Dios Parra, a local family who had studied the terrain for years, they built a good infrastructure to undertake their investigations there.

“They had the infrastructure and the fossils, but they lacked the scientific personnel who were needed to study and work with them. That is how I have had the opportunity to work with all of that material which they had already collected,” explains Professor Cadena, who has collaborated with the CIP for the past eight years. Due to that work jointly done with Santiago Padilla and the Parra brothers, they are now the co-authors of Cadena’s articles. “We have already published about three or four articles in international journals, not only on the subject of turtles, but also dinosaurs, fishes and other marine reptiles which were found in the place,” he explains.

### Novel methods enabled the researchers to see the 51 eggs between the carapace and the bottom half of the shell

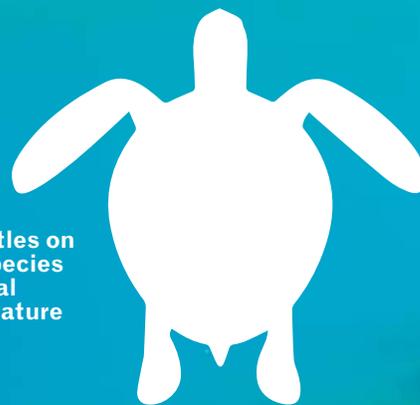
During those years, Cadena studied a fossil which was guarded on the shelves of the CIP. It had been discovered by Juan de Dios ten years before, on the desiccated slopes of the mountains between Villa de Leyva and the town of Sutamarchán, and Mary Luz had prepared it for study. During this investigation, they found that the animal was two meters long and was part of a super-family of marine turtles known as the Cheloniidae, of which there are still seven living species which live in the oceans and undertake long migrations, like the green turtle (*Chelonia mydas*) and the *hawksbill* sea turtle (*Eretmochelys imbricata*), known as the *tortuga Carey* in Spanish.

## WHY WE COLOMBIANS SHOULD CARE ABOUT THIS DISCOVERY?

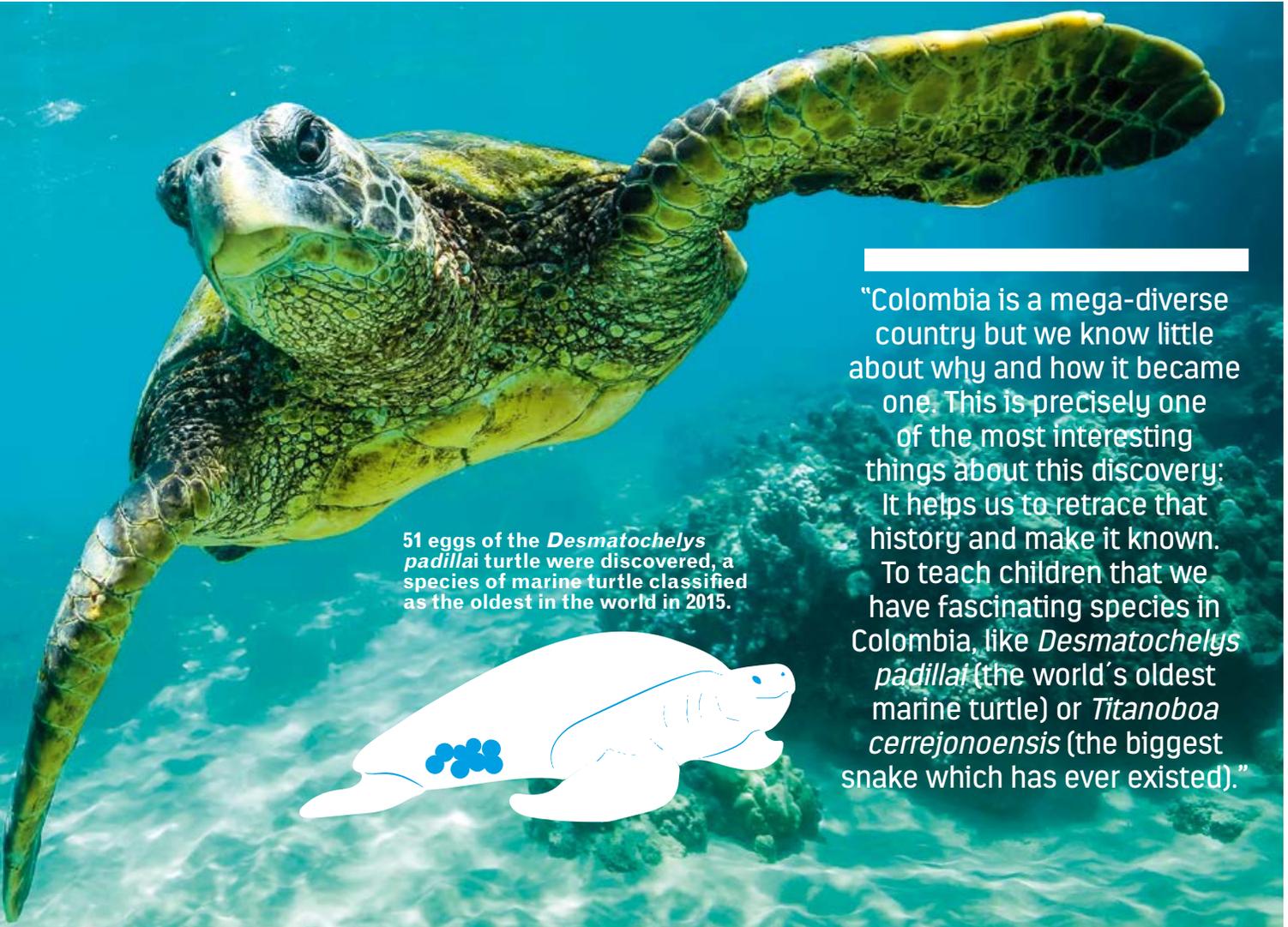
Our country has the second-highest diversity of marine life in America.

Five of the seven marine turtles on the red list of endangered species compiled by the International Union for Conservation of Nature (IUCN) live in our seas.

Colombia is in seventh place in the world in the number of continental, terrestrial or sweet water species of turtles and the second after Brazil in South America; but of the 27 species which live in the country and are found in its 32 Departments, 11 are in danger of extinction.



← The most important feature of the discovery is that there were still 51 eggs of the *Desmatochelys padillai* turtle between a large fragment of its shell or carapace and its plastron (the bottom half of the shell), which has enabled us to enrich our understanding of the evolution of marine turtles,” Edwin Cadena explains.



51 eggs of the *Desmatochelys padillai* turtle were discovered, a species of marine turtle classified as the oldest in the world in 2015.

“Colombia is a mega-diverse country but we know little about why and how it became one. This is precisely one of the most interesting things about this discovery: It helps us to retrace that history and make it known. To teach children that we have fascinating species in Colombia, like *Desmatochelys padillai* (the world’s oldest marine turtle) or *Titanoboa cerrejonensis* (the biggest snake which has ever existed).”

The most important feature of the discovery is that there were still 51 eggs of the *Desmatochelys padillai* turtle between a large fragment of its shell or carapace and its plastron (the bottom half of the shell). In 2015, that species of marine turtle was first identified as the oldest in the world. “What most interested us was that we would be able to enrich our understanding of the evolution of marine turtles,” Cadena explains.

During the investigation, they employed some conventional scientific methods like computerized tomography, which revealed that the diameter of the nearly spherical eggs varied between 32 and 43 millimeters. They also used a scanning electron microscope, a novel way to analyze the specimen without covering it with gold or carbon, which enabled them to analyze the mineral structure of the eggs and discover that they had a rigid shell, like the one of land turtles, and not a soft and flexible one, like the marine turtles of today.

The adjustments done with the electron microscopy analysis enabled the researchers to avoid contaminating the specimen and thus be absolutely certain that they were in fact eggs, and they potentially preserved remnants of their original compounds. This discovery, which is very important for the world, has opened up new paths for scientific research. In

collaboration with Colombian and foreign institutions, the Universidad del Rosario is now sponsoring several projects in those fields. One, a joint effort with the Smithsonian, is studying fossils in places very close to Bogotá and seeks to understand how the tropical forest and everything which now surrounds it arose.

Another project is being carried out in the desert of the Tatacoa, and also focuses on a species of turtle, one that is likewise of a large size, but “younger”, since it is barely some 13 or 14 million years-old.

“There is a lot to do in Colombia and this should help to encourage those youngsters who, at times, do not want to risk studying something outside of the traditional subjects. If they do things with passion, and enjoy them and are talented and persist, they will surely achieve their dreams and broaden the spectrum of science, which is something our country strongly needs,” concludes Cadena. ■