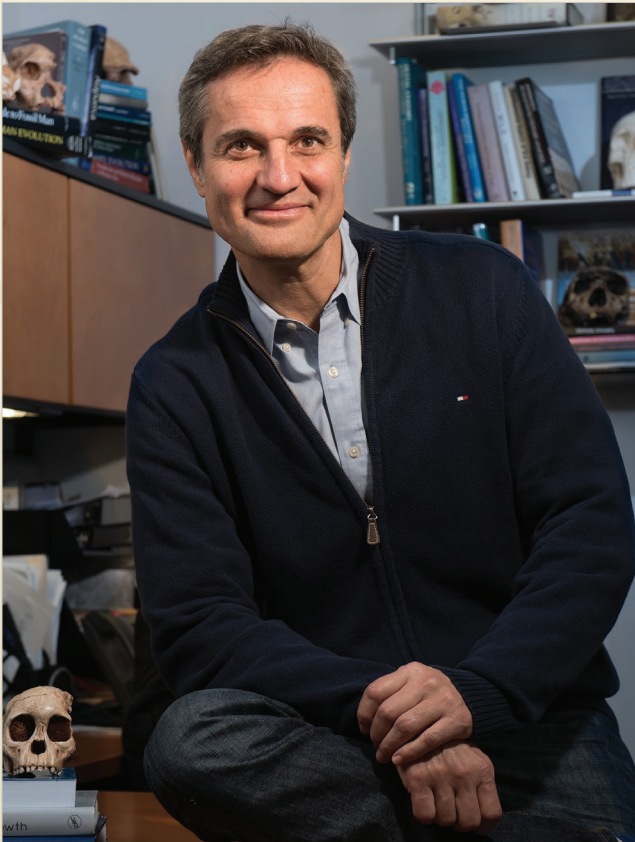


Rodrigo S. Lacruz, MSc, PhD: International Man of Science



DR. RODRIGO S. LACRUZ, assistant professor of basic science and craniofacial biology, lives for the journey of discovery. As a boy growing up on Tenerife in the archipelago of Spain's Canary Islands, he longed to experience life on a broader scale.

"On a small island like Tenerife, people are never in a hurry to go anywhere. They visit the same places, see the same people, and follow the same routine again and again," he says. "I always knew I wanted more." This early wanderlust prompted Dr. Lacruz to embark on a 25-year odyssey that eventually led him to NYU College of Dentistry.

Upon completing his undergraduate studies at the University of La Laguna in Tenerife in 1988, Dr. Lacruz packed his bags and headed to Meacham Field, Texas — his first trip to the US — to earn a commercial pilot's license. In Texas, he met people from many countries, including a Kenyan man whose goal was to become an agricultural pilot in Africa and who encouraged Dr. Lacruz also to travel to Africa. "As a youngster I had always wanted to go to Africa," he says. "Although the Canary Islands and Africa are very close geographically, it seemed like another world to me, and I was hesitant to travel there because people said it was too dangerous. Perhaps it was fear of the unknown."

Dr. Lacruz was able to set aside his reservations, and armed with his pilot's license, he traveled to Kenya, where he would spend the next five years, initially flying tourists to Africa's many game reserves. When the first Gulf War broke out and the Kenyan piloting business plummeted, he pursued a career as a safari guide in Kenya and Tanzania and worked with his friend Tony Fitzjohn, a leader in wildlife conservation in Tanzania. "We did a lot of camping out in tents in the middle of the bush," says Dr. Lacruz, "often chasing hyenas away from our food trunks at night. I loved it! These experiences fueled my desire to learn more about animal behavior and wildlife conservation."

It was in Kenya that Dr. Lacruz discovered a love of paleoanthropology. While preparing to lead a tour group through the National Museum in Nairobi, Dr. Lacruz came across an exhibit on the chronology of human evolution. He recalls the experience as transformative: “Being there, looking at a 3.2-million-year-old replica of the famous fossil known as Lucy and at the skull and skeleton of a young *Homo erectus*, and seeing how we changed from one shape to another to become humans, was the most enthralling thing I had ever experienced. I thought, ‘this is a part of our evolution, a part of our history that I don’t know much about, and I don’t know how, but I would like to pursue a career in it.’”

Before he went down that path, however, Dr. Lacruz took a two-year detour to work as a traveling musician in London and returned to Africa in 1997 as a manager at the legendary tented safari camp, Jack’s

Camp, located in the remote Makgadikgadi Pans in Botswana. “The nearest town, Maun, was a three-hour drive away, along sandy roads. This was in the days before cell phones, so from the camp we communicated only via HF radios powered by solar panels. Daytime temperatures in the summer reached 115°F. We did not have electricity or running water, so we used bucket showers, and to read at night, we had paraffin lanterns. It was bliss,” says Dr. Lacruz.

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Dr. Lacruz tending to an orphaned zebra near San Camp in the Makgadikgadi Pans of Botswana, circa 1988.



Dr. Lee Berger, a professor of human evolution at the University of the Witwatersrand in Johannesburg, South Africa, came across Dr. Lacruz one day while searching for fossils in the area. He told Dr. Lacruz of his interest in expanding fossil surveys in Botswana. Dr. Lacruz, in turn, expressed his desire to study the history of human evolution, and before long, the two had struck a deal.

Together they developed the project requirements for a master's degree in paleoanthropology, with topics of study ranging from cave geology to paleontology, including the fossils of saber-toothed cats. After completing his master's degree, Dr. Lacruz went on to pursue a

PhD in paleoanthropology, also at the University of the Witwatersrand.

"I spent many nights sleeping in my office because I couldn't afford a house with my salary as a PhD candidate, but none of that mattered to me. It was all about the new path I was on, and I was determined to get my PhD," says Dr. Lacruz, whose thesis focused on the origins of dental development using growth tracks found in the enamel of human fossils.

In late 2006, Dr. Lacruz received an invitation to conduct postdoctoral research at the Center for Craniofacial Molecular Biology at the University of Southern California (USC) School of Dentistry. That environment enabled him to study tooth enamel — its genetic make-up and how it relates to human health and disease. Dr. Lacruz's research at USC over the next several years led him to discover genes that play a role in enamel maturation and mineralization.

These genes are at the core of his research at NYU Dentistry today. Dr. Lacruz came to the College in 2013 with a K99/R00 NIH/NIDCR career development grant, which enabled him to investigate the role of calcium release-activated calcium (CRAC) channels in enamel production. It is his hypothesis that understanding CRAC channels will benefit those who suffer from enamel-formation disorders due to mutations in the genes that control the activity of these channels.

With multiple job offers at the time, Dr. Lacruz considered NYU Dentistry's resources, reputation, and, most importantly, the caliber of its researchers as determining factors in making his decision. "I realized that NYU was the place I needed to be," says Dr. Lacruz. "It had a network of really good people, knowledgeable people of high standards that the other institutions couldn't quite match. I saw this as the perfect location for collaboration." It was also key that his PhD advisor, Dr. Timothy Bromage, professor of biomaterials, was at the College.

At NYU Dentistry, Dr. Lacruz was introduced to Dr. Stefan Feske, an internationally prominent researcher in the area of calcium signaling and a pioneer in discovering CRAC channels, by his department

Dr. Lacruz near Jack's Camp in the Makgadikgadi Pans of northern Botswana in 1998



Dr. Lacruz during excavations in 2001 at the Motsetse cave, near Johannesburg, South Africa, which recovered fossil deposits dating back at least one million years, including the most complete dentition of the saber-toothed-like cat called *Dinofelis*



chair, Dr. Nicola C. Partridge, who also introduced him to Dr. William A. Coetzee. Both Drs. Feske and Coetzee, who are on the faculty at the NYU School of Medicine, played pivotal roles in helping Dr. Lacruz initiate his research, including allowing him to use their lab equipment and facilities until the College acquired the same instrumentation in 2015.

Today, Dr. Lacruz is setting new standards in calcium transport research. In October 2015, he and his team published the first-ever paper describing and demonstrating the mechanism of calcium transport essential in the formation of dental enamel. Despite calcium's central role in the development of enamel, it was not previously understood how it was transported from the bloodstream to the zone where enamel crystals grow. The paper, "Dental Enamel Cells Express Functional SOCE Channels," appeared in *Scientific Reports*, introducing innovative methodologies into the complex field of enamel biology. (See related story on p. 7.) Dr. Lacruz recently received funding from the NIDCR for a proposal to advance his research in the field of calcium control in dental enamel.

Paleoanthropology remains part of his research focus as well. This past year, he and Dr. Bromage and Dr.

Johanna Warshaw, clinical assistant professor of basic science and craniofacial biology, set out to understand the morphological processes that distinguish Neanderthal facial growth patterns from those of modern humans. The team used an electron microscope and portable confocal microscope developed by Dr. Bromage to map, for the first time, the bone-cell growth processes (deposition and resorption) that occurred in the outer layer of the facial skeletons of young Neanderthals. Their findings were published in *Nature Communications* in an article entitled "Ontogeny of the Maxilla in Neanderthals and their Ancestors." (See related story on p. 6.)

Dr. Lacruz is convinced that success as a scientist requires an ability to view things from multiple perspectives. As he explains, "When they're in the lab, a lot of scientists tend to think only about conducting an experiment and calculating the results, but for me it's also about the journey of discovery, learning new things and seeing things for the first time, reminding myself of what it means in terms of the big picture. The thrill of the journey gives me the energy and enthusiasm I need to follow through in everything I do, in science and beyond." ■