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Dr. Eric Angel Ramos – a shooting star that inspired marine mammalogists and beyond (1987 – 2024)

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On the morning of 6 December 2024, marine biologist Dr. Eric A. Ramos passed away at his home in Sarasota, Florida. He is survived by his girlfriend Ayshah, aunts Rafaela and Nelly, uncles Jose and Victor, brothers Damien and Dorien, several cousins including Noemi and Jose, close friends Alton and Kristi, among many others, and his beloved dog, Bella. Eric obtained a Bachelor of Arts in Psychology and Italian from the University of Arizona (2005 - 2009), a Master's in Animal Behavior and Conservation (2010 - 2013), and a PhD in Animal Behavior and Comparative Psychology from the City University of New York (2013 - 2021), both under the supervision of Dr. Diana Reiss. Upon the completion of his PhD, he worked as a Postdoctoral Associate under Dr. Marcelo Magnasco at Rockefeller University (2021 - 2022) studying octopus sleep patterns. He then started another Postdoctoral Fellowship at the University of Vermont (2022 - 2023) under Dr. Laura J. May-Collado at the ONDAS Lab studying habitat use of Greater Caribbean manatees (*Trichechus manatus manatus*) of Placencia, Belize. More recently, in June 2024, he became a Postdoctoral Research Fellow at the Mote Marine Laboratory in Sarasota, Florida. He was leading projects on manatee ecology and conservation in Florida and in marine mammal acoustics and ecology in the Mexican Caribbean, with the collaboration of Drs Beth Brady (Save the Manatee Club) and Nataly Castelblanco-Martínez (El Colegio de la Frontera Sur, Mexico), and with Drs Jeremy Kiszka and May-Collado in Costa Rica.

Eric was born on 23 September 1987, in Brooklyn, New York. His grandparents, Antonia Rivera and Lino Ramos, were from Puerto Rico. His grandad would often take him on fishing trips and his mom, Noemi Ramos, wanted to be a marine biologist. As a result, both passed that love for animals and the ocean to Eric. Little did they know that they had ignited a spark that would turn Eric into one of the most successful marine mammalogists of his generation. Noemi would take him to visit aquariums and museums, in Eric's own words *"she taught me about animals and science, and a bigger world worth seeing and living in."* Sadly, Noemi was diagnosed in 2017 with interstitial pulmonary fibrosis, and, during her hospitalization, Eric was by her side every day. When days were harder, he would turn to science. During this difficult

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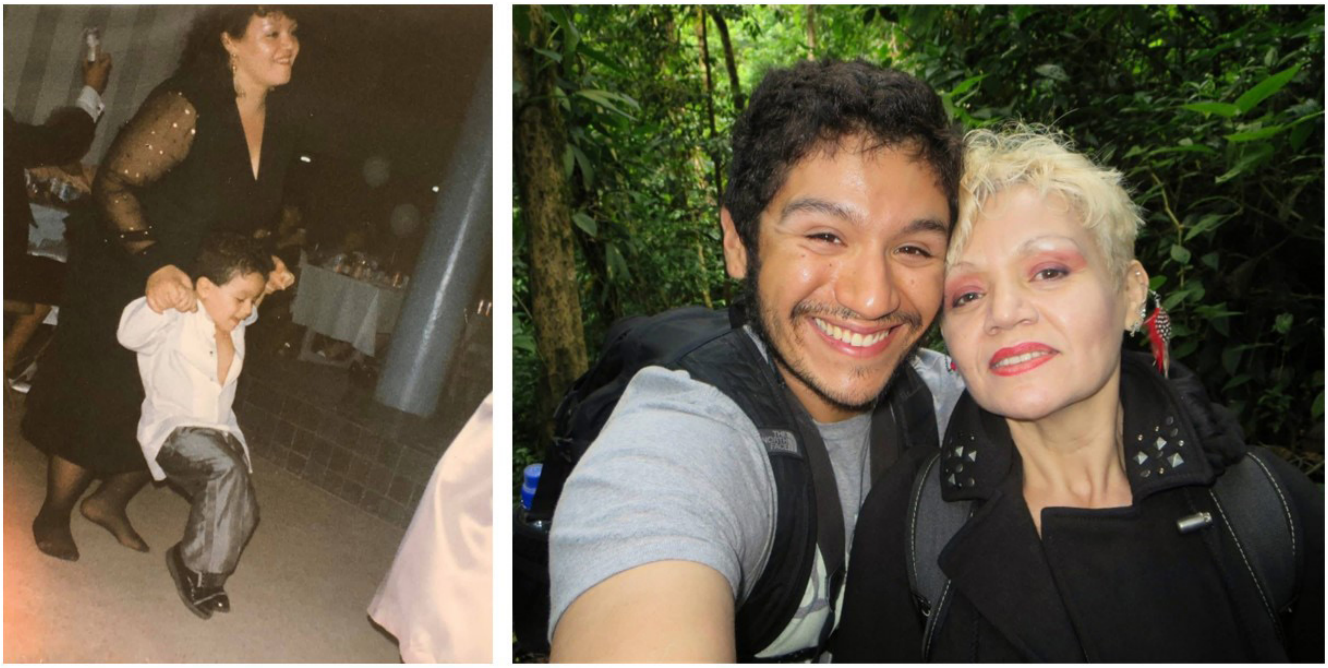

Figure 1. Eric A. Ramos as a child with his mom, Noemi Ramos, in Brooklyn, NY (left), and during a trip to Costa Rica in 2014 (right) (Photos Eric A. Ramos archive).

time, he discovered that common bottlenose dolphins (*Tursiops truncatus*) used "mud-ring feeding" as a foraging tactic in coastal lagoons in Belize and Mexico. He spent hours searching for mud rings using high-resolution images in Google Earth and reading fragments of the manuscript to his beloved mother (Ramos et al., 2022). Eric would later write: "*as parts of me unseen withered rapidly, I grasped onto my science for dear life. I spent the last two months of my mother's life by her side excitedly finding mud rings… we traced little lines together and the beauty of discovering something new gave me a little life left to bring her happiness, it kept my smile afloat amidst tsunamis of pain… I owe everything to her, but especially this one. Thanks mama*". After the passing of his mom in 2019, Eric faced many obstacles including economic uncertainty and mental health challenges.

During his undergraduate studies, Eric developed an interest in linguistics and animal communication. Eric began his research at Turneffe Atoll, Belize, working with the Oceanic Society as a field researcher and naturalist tour leader (2010 - 2015). Over the years there, while working on his Master's and PhD, he grew to know every single dolphin at Turneffe by sight, sound, and personality. For his Master's, he studied the acoustic behavior of common bottlenose dolphins while based at the Oceanic Society field station at Blackbird Caye. He discovered that during foraging, dolphins would produce low frequency calls, that he termed "thrums," when engaging in bottom foraging in seagrass beds and when manipulating their prey (Ramos, 2014). After concluding his Master's degree in 2014, the age of commercially available Unmanned Aerial Vehicles (UAVs, commonly named drones) had begun. Eric quickly saw the potential to use this technology to investigate the behavior of dolphins and manatees for his PhD. However, as he was concerned about marine mammal welfare, he naturally investigated how this new tool could negatively affect their behavior (Ramos et al., 2018). Discovering that bottlenose dolphins in Belize were not significantly affected by the use of UAVs, he effectively employed them to quantify their activity budgets and fine-scale habitat use (Ramos, 2022).

In early 2021, while finalizing the writing of his dissertation, Eric joined Dr. Magnasco's lab at Rockefeller University as a technician in charge of octopus husbandry, and after his PhD defense on 4 November 2021, he became a Postdoctoral Associate to study octopus cognition. In March 2022, something strange happened. Eric went into the lab and noted the water in one of the tanks was turbid. The tank's inhabitant, a Brazil reef octopus (*Octopus insularis*) named *Costello*, was in a very atypical position. He asked Magnasco if something had happened, to which the reply was "check the tape". Minutes later, Eric called Magnasco: "*you gotta see this*". This was the infamous "octopus nightmare" video, where *Costello*, still asleep, seemed to violently fight an unseen enemy, eventually inking the tank. As the ink had cleared away, he saw *Costello* wrapped around a PVC pipe, and then immortalized in the reflection on the glass we can see Eric arriving and doing a sudden double take, mouthing some words of disbelief, and taking his phone out to grab a video. This episode turned out to be itself a nightmare, as the scientific community quickly became divided between those believing it was a seizure or other abnormal neurological activity, and those thinking it could indeed be an indication that David Scheele's hypothesis of octopuses having dreams with episodic recall may yet be correct. Many months of scrutinizing every hour of every day in the 24/7 records of *Costello's* life in the lab followed, culminating in the pre-print release on *bioRxiv* that drew as much attention as flak (Ramos et al., 2023). After Eric's departure from the lab, another octopus, *Caia*, exhibited similar behaviors. Eric and Magnasco subsequently decided to rework the manuscript and incorporate their new observations.

Despite many challenges, at only 37, Eric was already a well-established marine mammalogist with at least 46 peer reviewed publications, and many more in various stages of development or in review. He was the lead author of at least half of these contributions. Outside the peer-reviewed literature, Eric contributed to multiple book chapters, reports, and meeting documents. He participated in numerous international conferences, workshops and meetings. One of his most impactful oral presentations was at the SOLAMAC (*Sociedad Latinoamericana de Especialistas en Mamíferos Acuáticos*) meeting in Cartagena, Colombia, in 2014, where he received the best student presentation award for his work on bottlenose dolphin acoustics and his discovery of "thrums." Later, Eric gave two other inspiring talks as an invited speaker at the SOLAMAC meeting in Praia do Forte (2022), and at the Psychobiology Conference in Natal (2023), both in Brazil, about drones and his work on marine mammal acoustics in the Caribbean and beyond. During his time at Mote, Eric led innovative studies using drones to assess the body condition of manatees in Florida. Hosted by Dr. Renata Sousa-Lima during his visit to Brazil in 2023, Eric helped the team at the Laboratory of Bioacoustics at Federal University of Rio Grande do Norte to test the feasibility of drone surveys in Pipa Beach. This year, right before his passing, he coordinated a project with Dr. Sousa-Lima, and many other colleagues, on the use of passive acoustics to investigate marine mammal occurrence across multiple sites in Brazil. Eric also organized workshops, including at the Biennial Conference on the Biology of Marine Mammals and at SOLAMAC, primarily on the application of small UAVs to study the behavior and ecology of marine mammals.

Eric was also involved in conservation organizations, professional societies, and various regional and global initiatives. Eric was a member of the Sirenian Specialist Group (IUCN Species Survival Commission) and provided expertise on manatees through the working group on Sirenians in Mesoamerica. Eric was an outstanding writer and storyteller. Despite his young age, he actively served our scientific community as a member of the Editorial Board of the *Latin American Journal of Aquatic Mammals*, and on multiple occasions as a guest editor for *Marine Mammal Science*. More recently, he was actively involved in the submission of multiple proposals to identify Important Marine Mammal Areas (IMMAs), particularly in the southeastern United States (Florida and the Gulf of Mexico), Belize, Costa Rica, and Mexico. In May 2024, he participated in the 11th Regional IMMA workshop in Playa del Carmen, Mexico, where 46 of these IMMAs were proposed and submitted to the Secretariat of the IUCN Marine Mammal Protected Areas Task Force. He also co-founded the *Fundación Internacional para la Naturaleza y la Sustentabilidad* (FINS), an organization interested in aquatic megafauna research and conservation mainly in Latin American countries. As part of FINS, since its foundation (2012), Eric was a key advisor for several students conducting their theses in Mexico, mainly training them in the use of cutting-edge technologies applied to study Caribbean marine fauna, such as drones, bioacoustics, spatial occupancy models, and photo-identification techniques. As a science communicator, he also designed and managed the FINS website (https://finsconservation.org/), and beautifully enriched it with many of his amazing marine wildlife pictures.

Eric was a prolific and creative scientific writer, a skill that was visible on his social media posts from time to time. Over his exceptionally productive 17-year career, Eric had built a network of collaborators that brought together scientists and laymen alike from all continents. For example, together with Dr. Daniel Gonzalez-Socoloske (Andrews University, Michigan), Eric worked with non-profit organizations, local photographers, and fishers to document the marine mammals of Honduras. These data form part of a much larger collaboration with other mammal scientists

Figure 2. Eric A. Ramos deploying UAVs in Bocas del Toro, Panama (top left), in June 2023; at Turneffe atoll, Belize, in December 2015 (lower left); in Sian Ka'an, Mexico, in October 2019 (center); and in Pipa Beach, Brazil, in November 2023 (left) (Photos: Maia Austin, Eric A. Ramos, Lizbeth Lara, and Renata Sousa-Lima).

Figure 3. Eric A. Ramos doing a CT scan of minke whale nasal plugs with Dr. Joy S. Reidenberg in 2019.

which resulted in a monograph that is currently accepted with revisions and will be the most comprehensive assessment of mammals available for this poorly known region of Central America (Turcios-Casco et al., in press). Eric's collaborations were naturally inclusive, perhaps aided in part due to his Latino heritage and his ability to speak multiple languages (English, Spanish, Italian, and some Belizean Creole). Eric's zest for bringing so many people together to do collaborative science was a rare gift. He easily connected with people, but he also enabled many of us to connect with each other. Today, many of us are colleagues and friends thanks to him.

Eric was the nucleus of so many projects that expanded into a large network of collaborating marine mammal colleagues. One such collaboration involved working with Dr. Joy Reidenberg to study marine mammal anatomy. In 2019, Eric helped excise the blowhole regions from two stranded whales, and then spent hours in Joy's lab dissecting humpback (*Megaptera novaeangliae*) and minke whale (*Balaenoptera acutorostrata*) nasal plugs and documenting their anatomy digitally through scanning with CT and MRI. Eric's new knowledge of whale nasal anatomy and his interest in UAVs were then combined to begin a project on how to remotely assess whale health. To this end, Eric fostered yet another collaboration – this time with members of Ocean Alliance that were using drones to thermally image whale blowholes to collect body temperature data. This work blossomed into additional exciting hypotheses presented at conferences on how nasal plug geometry determines the unique blow shapes of different whale species, and whether water trapped in the nasal cavity on diving is expelled during submergence or upon resurfacing.

Eric loved combining multiple tools to answer a question, while contributing to the design of new methods to study marine mammals, particularly using UAVs (*e.g.*, Landeo-Yauri et al., 2021). For example, he led a study combining multiple observation methods, including surface observations, UAV footages, and high-resolution satellite imagery to demonstrate that common bottlenose dolphins use "mud-ring feeding" as a foraging tactic in Belize, which was only previously documented in southern Florida (Ramos et al., 2022). He also used drones and acoustics to investigate manatee vocal and behavioral response to playback of conspecifics. Eric's curiosity was limitless and, as a result, he published a long list of naturalist notes on the occurrence of marine mammals in unknown areas of the Caribbean region or along the Pacific coast of Central America (*e.g.*, Ramos et al., 2020, De Weerdt et al., 2021). Along with his colleagues, he also documented atypical or undocumented behaviors. He discovered that rough-toothed dolphins (*Steno bredanensis*) could collectively handle and share prey off the Pacific coast of Mexico (Ramos et al., 2021), and documented the presence of an unreported octopus, *Octopus insularis*, in Florida (Maloney et al. 2023). Earlier in 2024, he published multiple reports of aggressive and fatal interaction initiated by common bottlenose dolphins towards manatee calves in Belize (Ramos et al., 2024). Eric was also a major contributor to a recently NSF-funded project on the ecology and evolution of toothed whale vocal repertoires, led by Dr. May-Collado. He was instrumental in the preparation of multiple manuscripts, including a methodological study on the use of machine learning tools to quantify odontocete vocal repertoires. He also co-authored three other studies implementing these methods to assess the geographical variation of the vocal repertoires of false killer whales (*Pseudorca crassidens*), Guiana dolphins (*Sotalia guianensis*), and common bottlenose dolphins.

Eric's other contributions were in teaching and mentoring. As an undergraduate student he led summer science courses with students for RISE (Research Training Initiative for Student Engagement) in New York and mentored undergraduate students applying to PhD programs for the City University of New York Pipeline Program. His way was all heart as well as head, and authentically so. More recently, Eric guided international expeditions to Indonesia and Mexico for Oceanic Society, where he energized guests with his love of the ocean. Eric was legendary among the hundreds of visiting students and ecotourists, as a naturalist tour leader, for his gift as an inspirational storyteller as he shared his research on dolphins, manatees, and sea turtles with all.

Eric also served on the board of the Society for Marine Mammalogy (SMM, 2019 - 2022) as Student Member-at-Large, where he participated and developed activities to make the Society and Biennial Conferences more inclusive and equitable. He was also one of the founders of the SMM Northeast Student Chapter. The purpose was to expand the marine mammal stranding network response in New York and assist with the necropsies and recovering of mammal specimens for research. Eric was often invited as a guest speaker at various academic institutions and organizations. His seminars and lectures were always dynamic and inspiring. One student from the University of Vermont recalls "*Eric's lecture was a highlight during my time as undergraduate. He was so inspiring to us as young scientists trying to figure out our place in the world*". Throughout his career he also mentored students and young scientists around the world by providing training in bioacoustics, drones, sharing his data, providing equipment, and involving them in the preparation of research proposals and peer-reviewed articles. Clinton Factheu, a graduate student from the University of Yaounde, Cameroon, with whom Eric and others conducted acoustic studies to improve monitoring of African manatees (*Trichechus senegalensis*), beautifully describes Eric's readiness to help others in the field, but especially those from countries where mentorship is limited "*you guided me throughout my first steps in bioacoustics and introduced me to the Society for Marine Mammalogy board by nominating me as a Student Member-at-Large… you always*

Figure 4. Eric's beloved animals, his dog Bella (left), manatees (center) and Eric recording the moment he first saw Costello the octopus having nightmares (right) (Photos: Eric A. Ramos).

reassured me and helped when I needed you". Maybe something quite unique about Eric, despite his relative "juniority", is that he offered advice to senior scientists. He also bluntly asked how supportive they were with their students and how.

Eric's radiant smile left an impression on everyone who met him, even if only briefly. He was very generous with his time, shared his talents, and was deeply compassionate – always willing to help. He was truly a shooting star, inspiring marine mammalogists, both juniors and seniors, and others far beyond the field. We, Eric's academic family, pledge to honor his memory by completing his unfinished work and by continuing his legacy of creating space and opportunities for others.

Eric, your influence is why many of us know each other and collaborate today. Science was your calling, a calling to uncover the beauty that lies hidden in the remarkable biology of marine organisms. "*Fair winds and following seas, shipmate. We have the watch*." Rest in peace, dear friend.

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