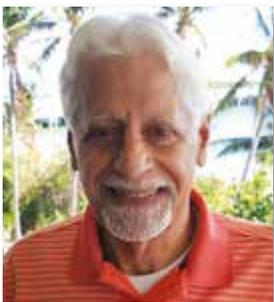


The Adventures of Meg A. Mole, Future Chemist



Dr. Frank J. Millero
Ocean Chemistry Researcher

In honor of this year's Chemists Celebrate Earth Week theme, "Dive into Marine Chemistry," I traveled all the way to Miami, Florida to meet with Dr. Frank J. Millero, Professor Emeritus in the Department of Ocean Sciences at the University of Miami, Rosenstiel School of Marine and Atmospheric Science.

Dr. Millero explained to me that he "studies the physical properties of the world's oceans and other natural waters." Most of his team's studies, he told me, involve learning about the impact of carbon dioxide in the world's oceans. I was not quite sure why they study this, so I asked him to tell me more.

"We are interested in how CO₂, a product from burning fossil fuels, ends up in the oceans," he said. "This addition of CO₂ causes the surface waters to have a lower pH, a problem known as ocean acidification. My research group has been taking measurements aboard research cruises for many years." The team adds the data they and other researchers collect into a database that allows them to track the effects over time. Their results and those of other workers are published in scientific journals.

I was very interested in how they do their work, and what tools they use. He told me, "Most of the equipment that we use, we have developed ourselves." I know safety is a very important aspect of all scientific work, so I wanted to know more about the personal protective equipment they used. "We normally do not need to wear safety glasses on cruises; however, in the lab when working with acids we would use them," he said.

Dr. Millero told me he was interested in chemistry at an early age. "I sold seeds to buy my first chemistry set in grade school.



Personal Profile

- Favorite food – Italian
- Favorite color – Blue, like the ocean
- Favorite pastime/hobby – Reading books by Robert Ludlum and watching sports
- Accomplishment you are proud of – His high school, undergraduate, and graduate students who have published papers from their labs studies with him
- About your family – Wife Judith, two sons, one daughter, and two granddaughters
- Fun fact – For years, he ran every day, and participated in 10 marathons and a half-marathon in Rome, Italy. Now, he enjoys swimming for 30 minutes every evening in his pool at home.

I used the set to study the properties of natural systems (local waters and salts) ... and had only one explosion! In junior high and high school, I enjoyed studying chemistry, math, and Edgar Allen Poe's poetry."

His interest in the sciences continued on after high school. After graduation, he went to a small college (Thiel College) to work on his bachelor's degree. "I had a math teacher who used calculus to study the Sputnik space flights," he recalled. "After injuring my knee playing football, I transferred to Ohio State, where I took every chemistry course that was available, which included all the laboratory courses in physical chemistry and calculus. Before going to graduate school, I worked a summer at the National Bureau of Science under the direction of Roger Bates, a solution chemist. I made thermodynamic measurements on solutions and decided I wanted to get my Ph.D. in physical chemistry, so I got my Ph.D. at Carnegie Mellon."

After graduating from Carnegie Mellon, Dr. Millero took a job with ExxonMobil working on automobile air pollution. "Later, I saw an ad for a position at the University of Miami," he explained, "and I have been studying the chemistry of ocean waters ever since." He has enjoyed teaching marine chemistry to undergraduate students and marine physical chemistry to graduate students, and many of his students have gone on to careers in chemistry and published papers on the field.

"I retired from teaching at the end of 2015," he told me, "but I still have ongoing research projects and am active in studies of ocean chemistry. I have also enjoyed helping my granddaughters with their many projects in chemistry."