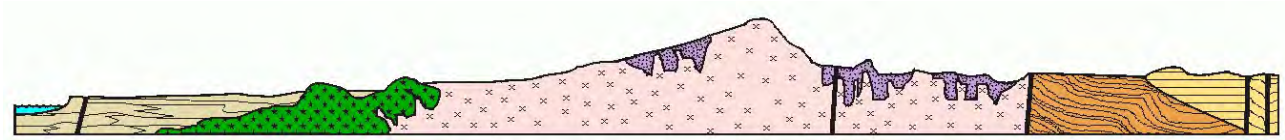

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SDAG MEETING ANNOUNCEMENT
Wednesday, January 17, 2024

Where: **GEOCON Corporate Office**
6960 Flanders Dr. San Diego 92121

When: 6:00 pm - Social Hour
7:00 pm - Dinner
8:00 pm - Program

Dinner: **Mediterranean Kabob Buffet**

Cost: $50 Member; Non-Member $55; Students $25

Reservations: Make & Pay your reservation **online** through the SDAG website, before Noon Monday, January 15. (*Please note beginning January 2024 all meeting reservations require on-line pre-payment.*)

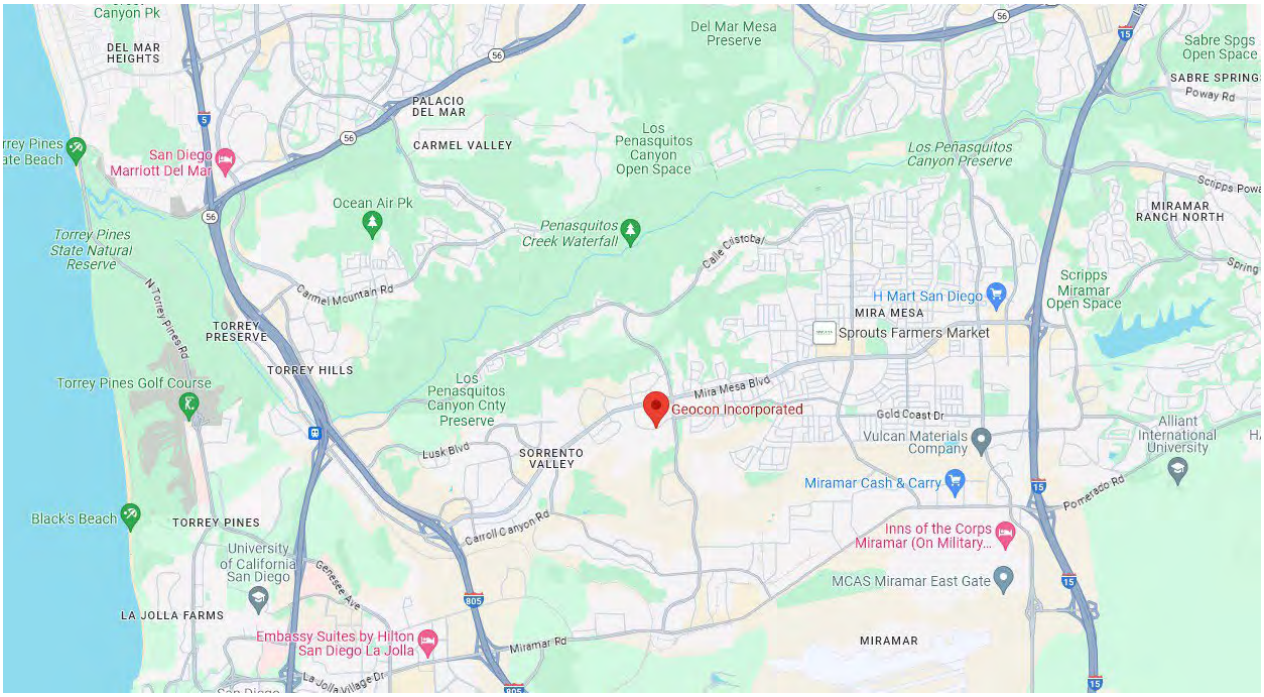
Speaker: **Dr. Eleanora (Norrie) Robbins, Ph.D.**
USGS Retired 2001 SDSU Retired 2015

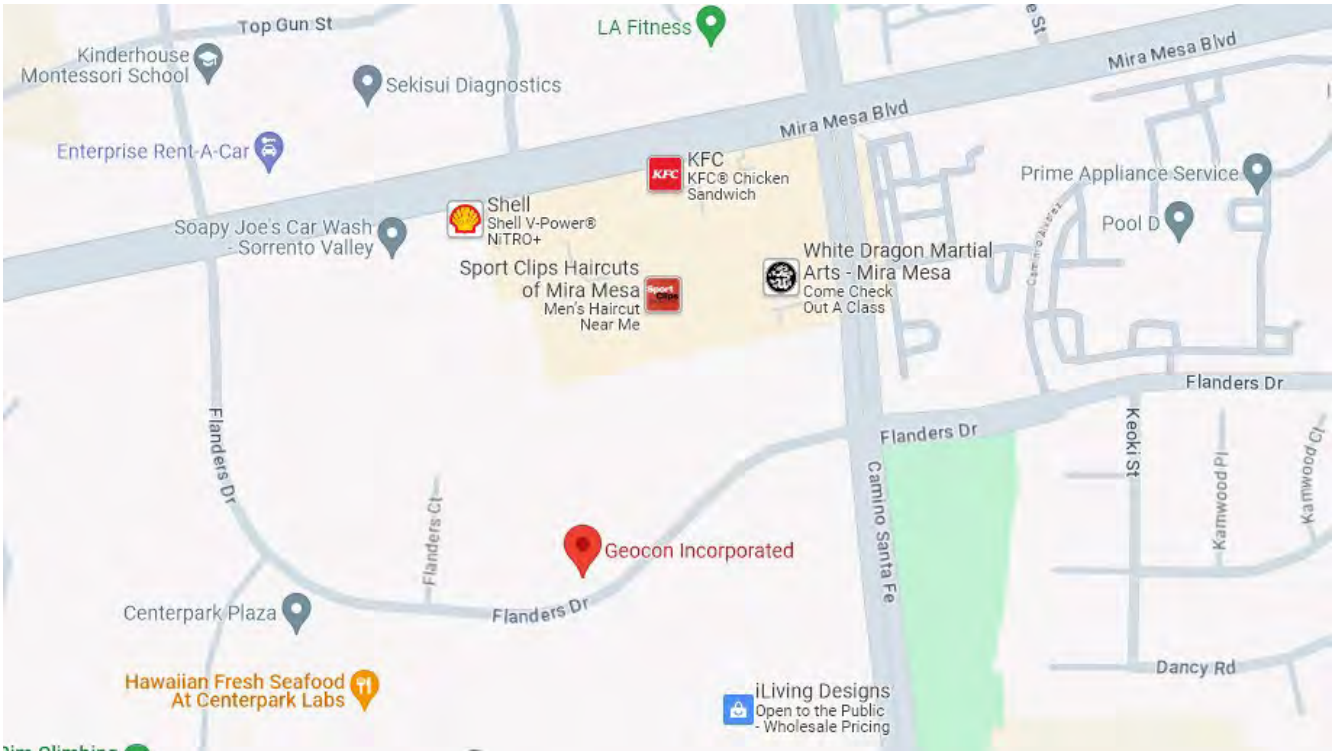
Presentation Title: **Food, Shelter, Water: The Microbiology of Mineralogy**

HAPPY NEW YEAR!

For our first meeting of 2024, GEOCON is graciously providing their 2nd floor game room and kegerator for Norrie Robbins' presentation. We look forward to seeing you all there as we bring in the new year!

Meeting Location Map:





Directions:

FROM INTERSTATE 805:
Take Mira Mesa Blvd exit. Travel east on Mira Mesa Blvd, turn right on Flanders Drive, go to 6960 Flanders Drive, parking lot on side & behind building. Meeting room on 2nd floor.

FROM INTERSTATE 15:
Take Mira Mesa Blvd exit. Travel west on Mira Mesa Blvd to Camino Santa Fe and turn left.

Turn right on Flanders Drive, go to 6960 Flanders Drive, parking lot on side & behind building. Meeting room on 2nd floor

Dr. Eleanora (Norrie) Robbins is a geologist who started her geology career with the Tanganyika Geological Survey as a Peace Corps Volunteer in Dodoma. She then worked for the US Geological Survey as an economic geologist and palynologist (fossil pollen grains) for 34 years in Washington, DC, Denver, CO, and Reston, VA. Retired from the Federal Government, she became adjunct faculty at SDSU, a 15-year-long activity that involved mostly mentoring students while she did her own research on geomicrobiology.

Speaker Dr. Eleanora Robbins, PhD

ABSTRACT Food, Shelter, Water: The Microbiology of Mineralogy

Bacteria operate at the level of electrons and catalyze many reactions that occur at the surface and in the subsurface of the Earth. This means that they have the potential to catalyze the formation of minerals.

Chemists say that real catalysts don't get incorporated into the reactions that they speed up or slow down. But bacteria that catalyze the formation of some minerals do get incorporated right into the minerals. These minerals begin as nanocrystals attached to the bacteria. Nanocrystals continue to grow until the bacteria become entombed. Really good examples of this are those that precipitate gold, pyrite, chert, hematite, and the manganese-bearing minerals romanechite and birnessite.

An interesting place to watch active biological reactions is at redox boundaries where some atoms are oxidized and others reduced. These are the places where electrons from the available atoms get exchanged by the bacteria. The redox boundaries between oxygen on top (oxidized) and no oxygen on bottom (reduced) exist in the water, in the sediments, and even inside our stinky sinks in San Diego.

The sulfur cycle begins with the anaerobic bacteria that live in the sediment or water where oxygen is lacking and a source of sulfur is available from rocks weathering in the watershed. The bacteria give off hydrogen sulfide gas (H_2S, the rotten egg smell). Other bacteria living in this zone are, at the same time, interacting with iron and other cations. At first, minerals undersaturated with sulfide called monosulfides form around certain bacteria. If the sulfate reducing bacteria continue to give off the gas, then fully-stable sulfide minerals form around the cation-precipitating bacteria. This pathway takes us from iron monosulfide (mackinawite, greigite) to pyrite.

The path to oxygen-bearing minerals is equally fascinating, but not tested yet, so these are my ideas. When the bacteria are alive and catalyzing reactions, water attaches to the nanocrystals that they form. With time, the water dehydrates to hydroxide minerals. With more time and probably also burial heat, the water and hydroxide get removed and fully formed stable oxide minerals are created. This pathway takes us from ferrihydrite to goethite to hematite.

I haven't figured out a fully coherent pathway to silicate minerals yet. I know that certain bacteria get entombed in silica. Maybe they concentrate the silica so that when heat arrives, silica is available to dissolve, lose its bound water, and reprecipitate chemically into stable silicates. Maybe some bacteria in the silica get caught up and become part of fluid inclusions.

Currently working on malachite dissolution, I see organic tissues that resemble the cyanobacterium *Nostoc*. Now I am searching for the modern analog. Such a place would be in water having high sulfate and calcium, along with the presence of copper in the watershed.

As a microscopist, I find it quite extraordinary to watch these processes unfold. A test of my

hypothesis that "bacteria get caught up in the minerals they initiate" would be to analyze minerals for their organic carbon content. Analyzing non-carbonate carbon (C-14) might be useful also.

One Stop Wonder February 10

Rob Hawk has planned a OSW to the traditional La Jolla Shores during super low tide occurrence the afternoon of Saturday, February 10, 2024. We plan to meet 2:30pm at the beach access at the Marine Room - 2000 Spindrift Dr, La Jolla, CA 92037

Make your plans, more details to follow!

UPCOMING 2024 SDAG MEETINGS

January 17, 2024	Norrie Robbins: "Food, Shelter, and Water--The Microbiology of Mineralogy"
February 21, 2024	Ryley Hill on Salton Sea filling effect on San Andreas earthquakes.
March 20, 2024	Bruce Luyendyk & Dave Kimbrough on Antarctica Geotours
April 17, 2024	Student research presentations by student scholarship winners
May 15, 2024	Don Barrie & William Buckley present some Icelandic Adventures
June 3 *or* 19, 2024	SDAG / SCGS joint meeting: Susan Hough on 1994 Northridge Earthquake
July 17, 2024	TBA
August 21, 2024	TBA
September 18, 2024	TBA
October	Annual SDAG 2024 Field Trip
November 20, 2024	TBA
December 11 *or* 18, 2024	TBA

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2023 Holiday Celebration Photos

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On-line Payment ($25 Member; $5 Student):

https://www.sandiegogeologists.org/MemberForm.html

Mail in or Bring FORM to Meeting: **https://www.sandiegogeologists.org/MemberForm.pdf**

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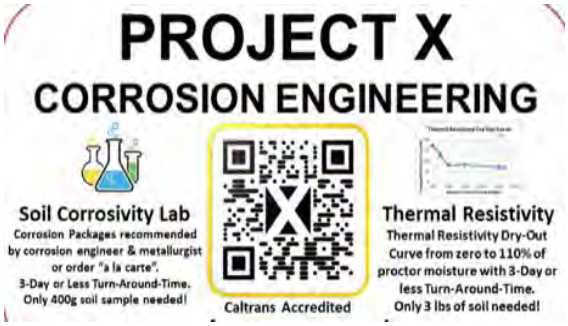

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Photos from the APRG October Annular Eclipse Field Trip, near Canyon de Chelly, Arizona: