

## Biological Soil Crusts of JTNP

### Information

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Date/ Time: Saturday, November 14, 9 am – 5 pm  
Sunday, November 15, 9 am – 4 pm

Meet at: [Oasis Visitor Center](#) (click on link for a map of the meeting site)  
74485 National Park Dr., Twentynine Palms, CA 92277

Instructor: Nuttapon (Nat) Pombubpa (lead instructor), Ph.D. candidate, UC Riverside  
Tania Kurbessoian, Ph.D. candidate, UC Riverside  
Julia Adams, Ph.D. candidate, UC Riverside

### Overview

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The desert floor may look like dirt and sand but it is full of living small and microscopic organisms vital to the park's ecosystem. Many of these organisms live in biological highly active soil crusts that cover the first inch of the desert soil surface. In this field class Nat, Julia, and Tania will introduce crypto-biotic soil crusts with an emphasis on fungi, soil algae, and lichens. Participants will study the secret life of these microscopic organisms as they demystify this thin layer of soil. This class will discuss the components of crusts such as cyanobacteria (one of the oldest known life forms on earth), green algae, diatoms, bacteria, fungi, and lichens. During the lab session, participants will see the biodiversity of the park's crusts up close through two different types of microscopes. On the second day, the class will go into the field to identify and assess the condition of several types of algal and lichen soil crust communities found in JTNP.

### Itinerary

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Saturday, November 14, 9 am – 5 pm

*Oasis Visitor Center*

- Lecture
- Lunch Break, **bring your own food**
- Lab Session with microscopes

Sunday, November 15, 9 am – 4 pm

*Oasis Visitor Center*

- Field session – exploring the Wonderland of Rocks and Skull Rock
- Snack break, **bring your own food**
- Field session continued – exploring Wonderland of Rocks

## What to Bring to the Course

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### **Optional Equipment**

- Hiking Poles

### **The 10 Essentials: Every day in the Desert**

- Day pack
- 4 quarts of water
- Hiking boots with traction soles
- Lunch and snacks
- Clothing layers
- Hat
- Sun glasses
- Sunscreen
- Notebook and pencil/pen
- Whistle

## Fitness Requirements

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Participants must be in good physical condition for courses/activities in a desert that may be hot, dry, windy, and sometimes surprisingly cold.

## Hike Level

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Easy to Moderate

## Guidelines

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- You are responsible for your safety.
- Park your car in designated areas only. Parking along the side of the road is dangerous to you and the environment.
- Rattlesnakes are present in the park. Avoid contact with wildlife. Put your hands and feet only where you can see.
- Stay with the group. If you get lost, stay put.
- Drink plenty of water. If you run out, notify the instructor or the Desert Institute Representative.
- Before leaving the class, check out with the Desert Institute Representative.

## College Credit

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1.0 unit BIOLOGY X412.28 credit through the University of California, Riverside Extension.

## Instructor Biography

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**Nuttapon (Nat) Pombubpa** received his Bachelor's degree with a double major in Molecular and Cellular Developmental Biology and Ecology and Evolutionary Biology from the University of Colorado Boulder in 2015. Then, he joined the Department of Microbiology and Plant Pathology at the University of California Riverside in Fall 2015, working under the supervision of Professor Jason E. Stajich. He is currently a Ph.D. candidate with research focuses on biological soil crusts (biocrusts), desert fungal diversity, and microbiome. He received Robert Lee Graduate Student Research Grant award from Joshua Tree National Park to work on using next generation amplicon sequencing to explore the composition of microbial communities and to investigate spatial and temporal patterns on biocrust microbiome in Joshua Tree National Park.

**Tania Kurbessoian** received her Bachelor's degree in Microbiology from California State University, Northridge (CSUN) in 2013. She continued her Masters education at CSUN in Biology until 2016 with Dr. Larry Baresi. It was after she joined the Microbiology program at the University of California Riverside in Summer 2017 to work with her advisor Dr. Jason E. Stajich. She is currently a Ph.D. candidate focusing her research on black yeasts found in desert biological soil crusts. She received the Emory Simmons Award from the Mycological Society of America to understand black yeast's role in biological soil crusts isolated from the Mojave Desert. She will be using a combination of next generation sequencing techniques to assess the composition of fungal and bacterial communities and investigate the role black yeasts play in protecting them from the harsh Mojave Desert.

**Julia Adam** received her Bachelor's degree from Wellesley College with a major in Biological Sciences. Then she became a short-term research fellow at the Smithsonian Tropical Research Institute (STRI) for a year and a half where she studied spatial stable isotopes and bipartite interaction networks of plants and the herbivores that consume them. Then she joined the Department of Botany and Plant Sciences in the summer of 2017 working under the supervision of Dr. Jason E. Stajich. She is now a PhD candidate working on using amplicon sequencing and metagenomics to resolve the microbial community of the yellow crustose lichen, *Acarospora socialis*. She received the NSF-GRFP Fellowship to work on lichen ecological genomics questions and also a Robert Lee Graduate Student Research Grant to better understand the microbiome of *A. socialis* across environmental gradients.

## **Suggested Readings**

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Technical reference: <http://www.soilcrust.org/crust.pdf>

Field guide: [http://sbsc.wr.usgs.gov/products/pdfs/Field\\_Guide\\_Book\\_25.pdf](http://sbsc.wr.usgs.gov/products/pdfs/Field_Guide_Book_25.pdf)

Informal reading: <http://geodermatophilia.blogspot.com/>

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\* The Desert Institute staff/instructors will attempt to accommodate participant's needs; however we reserve the right to deny a student participation in the course due to concerns regarding health and safety issues.