



Smithsonian  
*Tropical Research Institute*

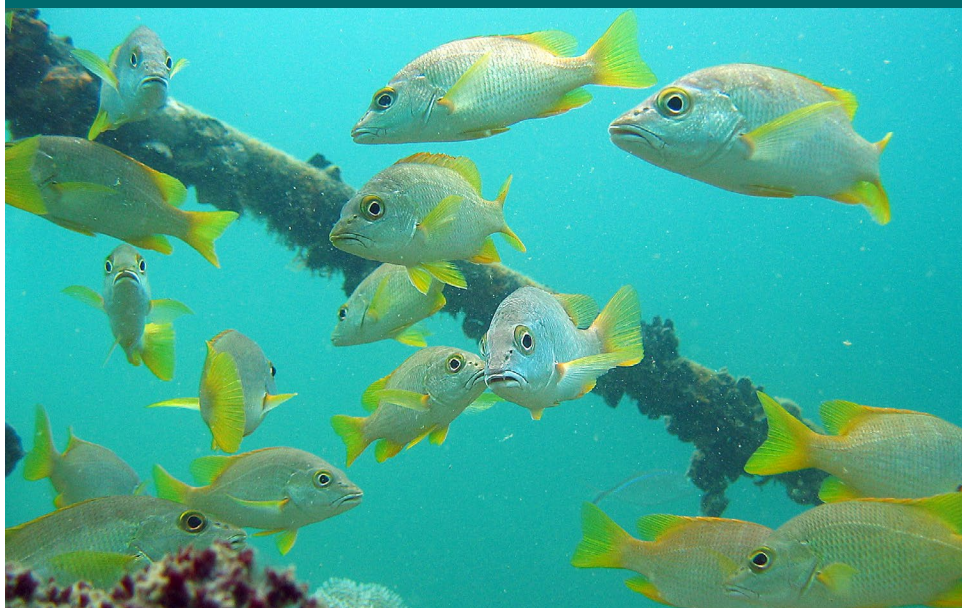
GORDON AND BETTY  
**MOORE**  
FOUNDATION

# The Isthmus of Panama for the study of microbial symbiosis:

## WHAT CAN WE LEARN FROM COMPARATIVE ANALYSIS OF HOST-ASSOCIATED MICROBIOMES ACROSS TWO OCEANS?

Smithsonian Tropical Research Institute  
Republic of Panamá

**PANAMA CITY - BOCAS DEL TORO**  
December 2-8, 2019



Workshop funding generously provided, in part,  
by the Smithsonian Office of the Provost's *One Smithsonian Symposia  
Program* and the Gordon and Betty Moore Foundation.

## MONDAY DECEMBER 2 | FIELD EXCURSION – PUNTA GALETA

8:15am Meet in the lobby.

8:30am (ESTIMATED) Board bus at Amador Radisson for Punta Galeta & Fossil Field Excursion STRI's Caribbean marine field station at the mouth of the Panama Canal. Visit to include a field visit to the Gatun formation, box lunch, talks, lab visits and snorkeling. Please bring your snorkeling gear or let the STRI team know if you need to borrow or rent.

**Fossil Field Excursion** | Stop en route at the Gatun Formation  
AARON O'DEA

**Participant & Galeta Site introduction** | Galeta Auditorium  
ALLEN HERRE

**INTRO TALKS** | 5-10 minutes each

**STRI facilities and academic programs**

► MATT, LAETITIA, STANLEY AND OWEN

**The Smithsonian Marine Station at Fort Pierce**

► BLAKE USHIJIMA

**Smithsonian National Zoo and Conservation Biology Institute**

► ROB FLEISCHER

**Smithsonian Environmental Research Station**

► MELISSA MCCORMICK

**MarineGEO**

► EMMETT DUFFY

### LUNCH IN THE AUDITORIUM

Snorkeling Excursion

MATT LERAY AND DAVEY KLINE

Mangrove walk

GABRIEL, MARINA AND ALFREDO

3:00pm (ESTIMATED) Return to hotel

PM

**SMALL GROUP DINNERS ON YOUR OWN.**

Restaurant suggestions will be provided.

## TUESDAY DECEMBER 3 | WORKSHOP GATHERING

**Location: AMADOR RADISSON HOTEL | ROOM: LAS AMERICAS**

8:30am **Opening Remarks**

**MATT LARSEN**

Ira Rubinoff Director, Smithsonian Tropical Research Institute

8:45am **Introduction to day's program and morning talks**

**ALLEN HERRE**

**The useful context provided by Terrestrial Census Plots, Long Term Monitoring of Plant populations, and water and fertilizer manipulation plots**

► **JOE WRIGHT**

**Factors affecting Symbiont Transmission, Community Assembly, and the Resulting Effects on Hosts: Implications of Three Case Studies of Mutualisms in Panama**

► **ALLEN HERRE**

**Specificity of microbial symbioses can drive patterns of diversity at higher levels**

► **MELISSA MCCORMICK**

10:15am **COFFEE BREAK**

10:45am **TALKS**

**Climate Homeostasis Arising From Plant-Microbe Interactions**

► **PAT MEGONIGAL**

**Case studies of Rice and seagrass interacting with their microbiomes to affect their environment**

► **JONATHAN EISEN**

11:45am **LUNCH AT THE HOTEL**

12:30pm **TALKS**

**Using microbiome research in conservation biology**

► **ROB FLEISCHER**

**The effects of phylogeny, habitat and adult diet on the milk microbiome**

► **MIKE POWER**

2:00pm **COFFEE BREAK**

## *Tuesday Program Continued*

### 2:30pm **TALKS**

**Avian gut microbiomes and host health**

► ELIN VIDEVALL

**Diversity of partners in the legume-rhizobial mutualism and its importance for ecosystem function**

► KIM KOMASTU

**Land use as a driver of change in microbial communities**

► KRISTIN SALTONSTALL

**The Population Biology of Oomycetes in the Tropics**

► KIRK BRODERS

5:30pm (TBC) Buses depart Radisson Hotel for Punta Culebra

6:00pm **Welcome and Intro**

HARIS LESSIOS

**The role of microorganisms in the nutrition of marine herbivorous fish: why mechanism is important**

KENDALL CLEMENTS PLENARY TALK

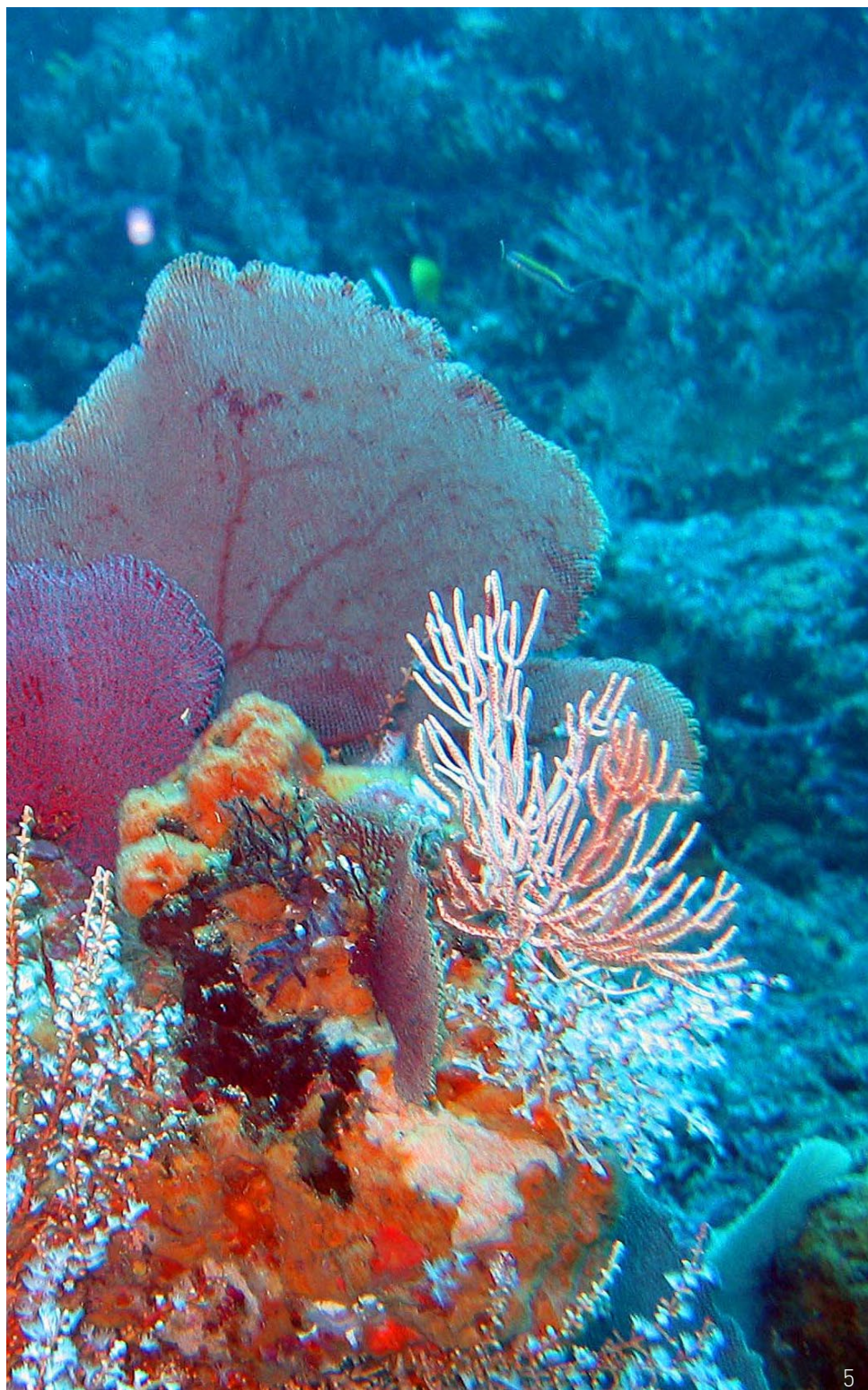
### **RECEPTION, PUNTA CULEBRA**

Buses will be available starting at 8:00 to drive back to the hotel

8:45pm Event Concludes. Transport back to hotel.







Location: **BOCAS DEL TORO**

7:00am Meet in the lobby for departure to Albrook Airport. We encourage guests to check out of the hotel the night before.

9:00am Flight #682 from Albrook Airport to Bocas del Toro

10:00am Arrive Bocas del Toro and transport to Playa Tortuga Hotel

12:00pm **LUNCH at Playa Tortuga Hotel Meeting Room | Dantara Room**

1:00pm **Introduction**  
BILL, LAETITIA AND MATT | Dantara Room

1:15pm **Welcome and Overview**  
RACHEL COLLIN,  
Staff Scientist and Bocas Station Director

1:30pm **The Moore project STRI/UC Davis |**  
**Directions and preliminary results**  
MATT/LAETITIA

2:00pm **BREAK**

2:30pm **BREAK out session #1**  
**What questions do comparisons across the isthmus help**  
**answer about symbiosis?**  
FACILITATORS: MATT, LAETITIA, ALLEN, BILL AND JONATHAN

3:30pm **Group Discussion**  
FACILITATORS: MATT, LAETITIA, ALLEN, BILL AND JONATHAN

4:40pm **BREAK**

5:00pm **400 Million years of symbiosis: Ecology and evolution**  
**of the ancient partnerships between marine lucinid clams**  
**and sulfur-oxidizing bacteria**  
► JILLIAN PETERSEN

5:30pm **Insights into host-microbe specificity, interactions and**  
**co-evolution from marine animals**  
► AMY APPRILL





### *Wednesday Program Continued*

6:00pm Talks conclude

PM Transport to Dinner at restaurant in Bocas del Toro  
[Venue: TBC]

## THURSDAY DECEMBER 5 | BOCAS WORKSHOP CONTINUED

AM Check out of Playa Tortuga Hotel

7:00am Meet at the lobby for transfer to Bocas Station

8:30am **ARRIVAL AND COFFEE AT THE BOCAS STATION**

Luggage to be stored while rooms are prepared

9:00am **Opening remarks**

MATT AND LAETITIA

**The pathogenesis of stony coral tissue loss disease and the development of probiotic treatments**

► BLAKE USHIJIMA

9:30am **Worms! Worms everywhere! - Symbiotic nematodes in shallow marine waters**

► NIKOLAUS TOBIAS LEISCH

10:00am **BREAK**

10:15am **BREAK out session #2**

FACILITATORS: MATT, LAETITIA, ALLEN BILL AND JONATHAN

11:00am **Group Discussion**

FACILITATORS: MATT, LAETITIA, ALLEN BILL AND JONATHAN

12:00pm **LUNCH AT THE BOCAS STATION DINING HALL**

1:00pm **FIELD TRIP**

6:00pm **DINNER AT THE BOCAS STATION DINING HALL**

7:30pm **Common interactions with reef fishes can alter coral microbiomes**

► LEILA EZZAT



### Thursday Program Continued

- 8:00pm Ecology of a keystone pathogen and its role in transforming North Atlantic coastal ecosystems  
► EMMETT DUFFY

## FRIDAY DECEMBER 6 | BOCAS WORKSHOP CONTINUED

Location: **BOCAS DEL TORO**

8:30am **COFFEE AND GATHERING**

- 9:00am Pathobiomes of oysters and corals are strongly influenced by location  
► SARAH GIGNOUX-WOLFSOHN

- 9:30am Seagrasses excrete sugars to their rhizosphere making them the sweet spots in the sea  
► EMILIA MARGARET SOGIN

10:00am **BREAK**

- 10:15am **BREAK out session #3**  
FACILITATORS: MATT, LAETITIA, ALLEN, BILL AND JONATHAN

- 11:00am **Group Discussion**  
FACILITATORS: MATT, LAETITIA, ALLEN, BILL AND JONATHAN

12:00pm **LUNCH AT THE BOCAS STATION DINING HALL**

- 1:00pm Ubiquitous but overlooked: the ecological and evolutionary importance of nematode-microbe associations  
► HOLLY BIK

- 1:30pm Anvi'o: an open-source, community-driven software platform for high-resolution microbial 'omics  
► A. MURAT EREN

2:00pm **BREAK**

2:30pm **BREAK out session #4**

FACILITATORS: MATT, LAETITIA, ALLEN, BILL AND JONATHAN

3:30pm **Group Discussion**

FACILITATORS: MATT, LAETITIA, ALLEN, BILL AND JONATHAN

4:30pm **BREAK**

5:00pm **Aperitif and Group Discussion**

6:30pm **Transport to dinner in Bocas del Toro town** [venue TBC]

## SATURDAY DECEMBER 7 | **BOCAS WORKSHOP** **TRAVEL TO PANAMA CITY**

**NOTE:** For travelers on 10:10am flight from Bocas del Toro to Panama City (Albrook Airport), a shuttle will leave at 8:30am from the Bocas station. At Albrook Airport, there will be a bus to take this group to the Radisson Hotel. If guests are not staying at the Radisson this evening, please talk to Patricia Leiro (leiro@si.edu) or Jenny McMillan (mcmillan@si.edu) for suggestions on getting from the Radisson to your final destination.

8:30am **ARRIVAL AND COFFEE**

9:00am **Group Writing Session: draft paper**

12:00pm **LUNCH at the Bocas Station Dining Hall**

1:00pm **Workshop Wrap Up and Next Steps**

**NOTE:** For later flights back to Panama City this day, please talk to station staff or your hotel about taxi or Uber transport both in Bocas and Panama City. For the Bocas del Toro airport, please plan to be at the airport at least 1.5 hours ahead of time.

## SUNDAY DECEMBER 8 | SUGGESTED DEPARTURE DAY

Depending on individual flight times: Hotel check out and personally secure transport (taxi, uber, etc) to airport for departure.

For departures from Panama City Tocumen international, please plan on being on the airport 2-3 hours ahead of time.

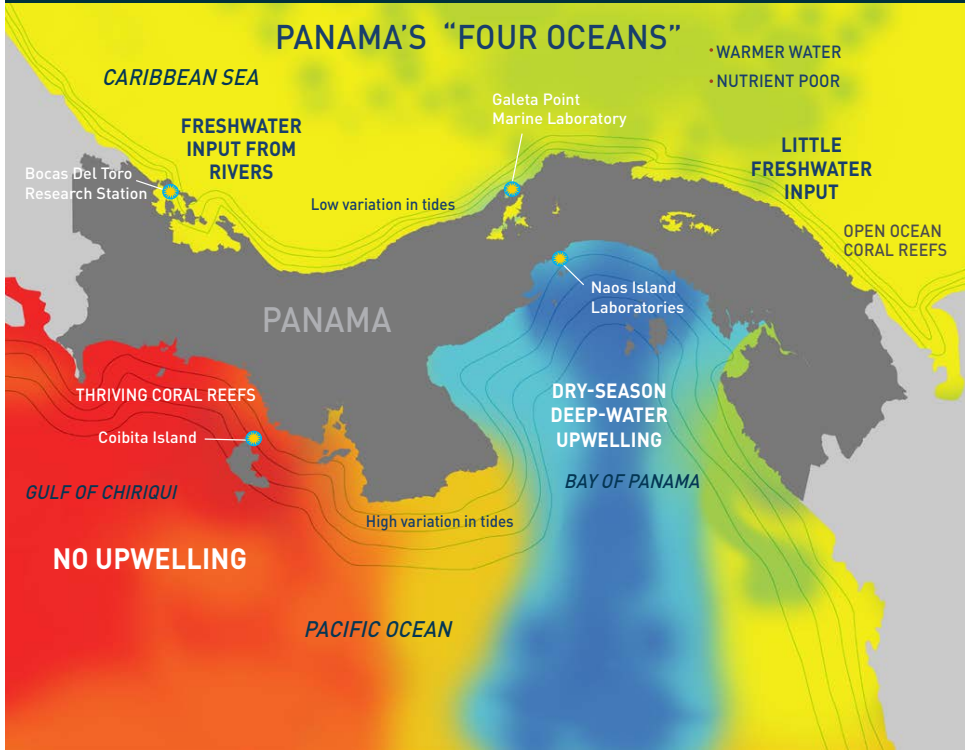
### EMERGENCY CONTACT INFORMATION:

For any questions on your personal travel schedule please contact:

- Jenny McMillan (mcmillan@si.edu) | +1.202.680.4515
- Matthieu Leray (leray.upmc@gmail.com) | +507.6495.097
- Bocas del Toro Research Station - Plinio Góndola (gondola@si.edu) | +507 212.8569




## PANAMA'S "FOUR OCEANS"



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