Escuela Superior Politécnica del Litoral

Centro Nacional de Acuicultura e Investigaciones Marinas

CENAIM-ESPOL

Mission: To promote the sustainable development of aquaculture and marine biodiversity in Ecuador through scientific research , technological development , training and dissemination , fostering a close relationship between the State, the productive sector and the academic community.

Karla B. Jaramillo
CENAIM-ESPOL

Escuela Superior Politecnica del Litoral,ESPOL, Centro Nacional de Acuacultura e Investigaciones Marinas, CENAIM, Campus Galindo Km30.5 Via Perimetral
P.O. Box 09-01-5863, Gyq-Ecuador.

Some history of CENAIM 1983-1989

- 80s ESPOL proposed the creation a center for aquaculture research (Ing. Victor Bastidas (Rector of ESPOL), Ing. Carlos Becerra (External Relations Coordinator) and M.Sc. Edgar Arellano (Project Manager Production Research shrimp larvae).
- Support of the National Government (President Ing. Sixto Duran)
- In addition support of the Government of Japan (Dr. Masateru Anraku, Head of Aquaculture, Mr. Takao Tominagua specialist Fisheries; Ing. Kenji Okamura, Administration).

Currently

- 103 workers.
- Area of 15,000 m2.
- Experimental Station : 83 pools.
- Offices for scientific staff : technical, undergraduate / postgraduate, administrative and financial.
- Research laboratories and cultivation of aquatic species: molecular biology, microbiology, pathology, immunology, genetics, environmental chemical analysis, biological environmental analysis, fish farming, shellfish farming, cultivation of shrimp larvae.
- 22 experimental halls.
- 2 meeting rooms.
- 1 conference room (capacity 50 people).
- 1 computing room.
- 5 meeting offices for technical staff and students (34 cubicles for technicians and graduate students, 16 cubicles for undergraduate students), 16 offices for researchers, bedroom.
- 45 rooms with a total of 90 beds.
- Dining area within the research center.

Infrastructure project funded by SENESCYT (2015-2017)

Project improvement and adaptation of the facilities of the National Center for Aquaculture and Marine Research CENAIM . $ 4,339,888.00

Research Projects funded by SENESCYT (2015-2017)

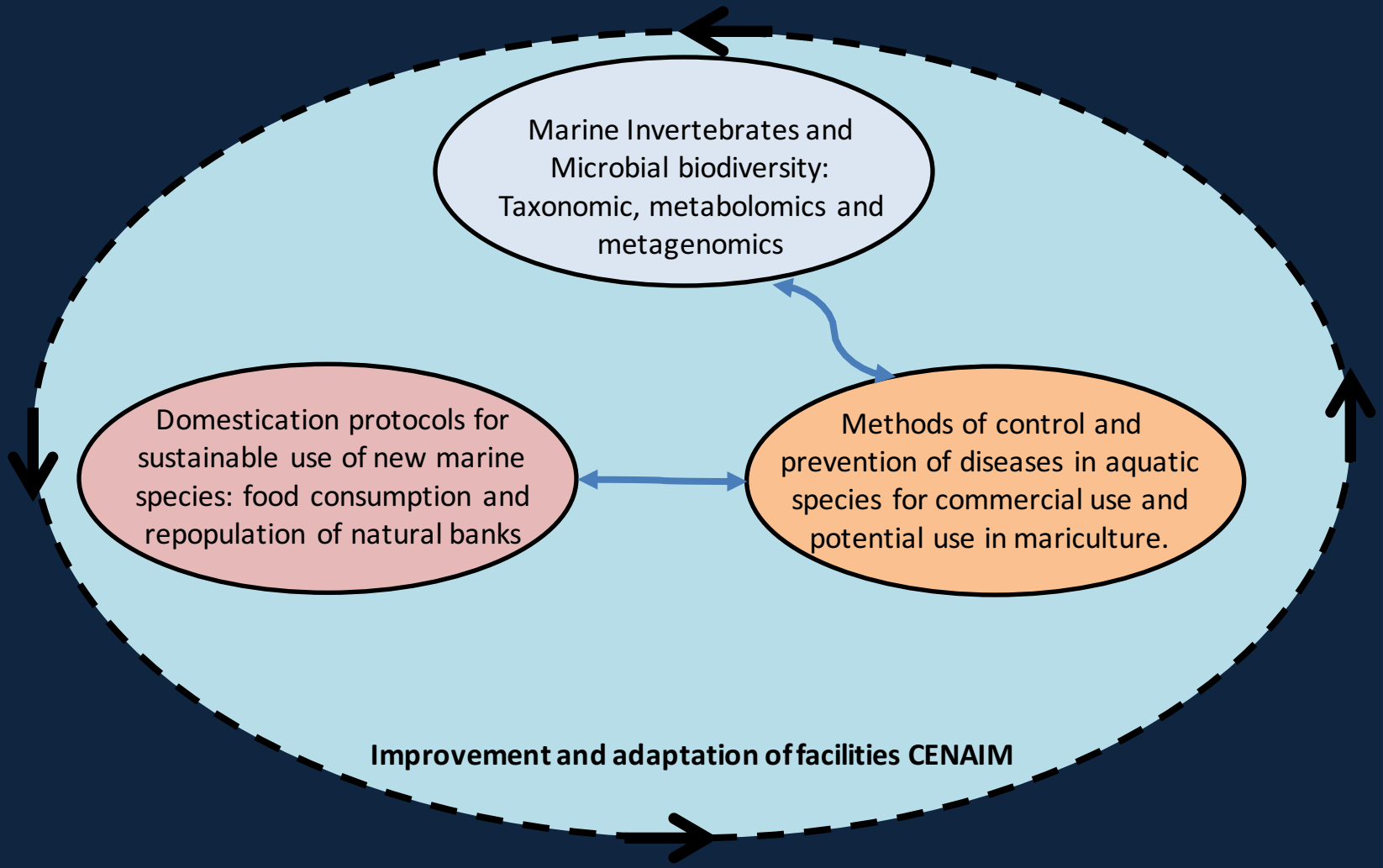
- Biodiversity: Characterization of the microbial and invertebrate biodiversity in the marine Marine Protect Area El Pelado including taxonomic, metabolomics and metagenomics scales, for use in human and animal health. PIC-14-CENAIM-001: $1'554.536,71.

- Domestication: Development of domestication protocols for sustainable use of new marine species for food consumption and repopulation of natural beds. PIC-14-CENAIM- 002: $1'435.670,00.

- Animal Health: Development and implementation of methods for the control and prevention of diseases in aquatic species for commercial use and potential use in mariculture or stocking. PIC-14-CENAIM-003 $1'349.682,73.

Use of marine organims

for health, nutrition and conservation.



RESEARCH PROJECT PROPOSAL:

Main objective: To describe the Marine Biodiversity at El Pelado Marine Protected Area in an integrative approach including metagenomics and metabolomics.

October 2015 - October 2017

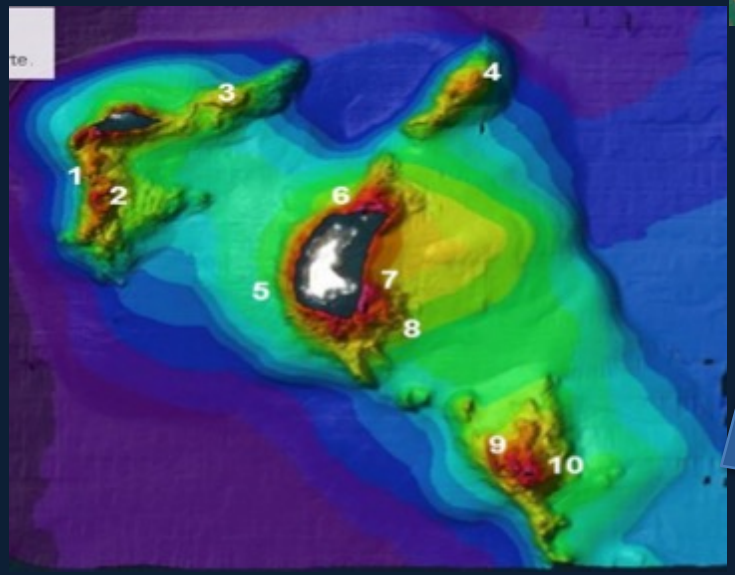
Principal Investigator: Dra. Jenny Rodriguez

Objectives:	
Objective 1. To characterize marine invertebrates at Reserve El Pelado and associated bacteria at taxonomic, systematic and molecular scales.	1. Inventory invertebrate marine reserve 2. Determining secondary metabolite profiles of invertebrates. 3. Study the chemical diversity as an indicator of biodiversity of invertebrates 4. Isolate cultivable bacteria associated with invertebrates and identify by classical taxonomic and molecular techniques (16S rDNA sequencing) 5. Metagenomics applied to biodiscovery gene invertebrates and bacteria associated with the exploration of taxonomic and functional diversity
Objective 2. Raise a database on the web as well as biological and chemical libraries	1. Raise a database on the web with broad and restricted access. Geographic information system installed in internet (WebGIS) on the site of ESPOL/SENESCYT. The database will include an inventory of species, as well as metabolites and identified genes 2. Prepare a bank of metabolites, a strain collection of cultivable bacteria and a metagenomic library
Objective 3. Applications of metabolites, genes and isolated organisms	1. Isolate, characterize and evaluate the properties of metabolites; antitumor and antimicrobial (antibacterial and antiviral) properties 2. Valuing metabolites in animal production, notably assessing their antimicrobial properties against pathogens of aquaculture interest. 3. Characterize the properties of the isolated cultivable microorganisms (probiotic potential , antifouling, pathogenic) 4. Determine the profile of metabolites of the bacteria of interest and study the sequenced genes through bioinformatics.
Objective 4. To study the ecology and the interactions between invertebrates of the reserve.	1. Describe the distribution of some groups of invertebrates in the reserve and the ecological impact of el Nino phenomenon on this distribution 2. Describe the interactions between marine invertebrates and the impact of “invasive species”

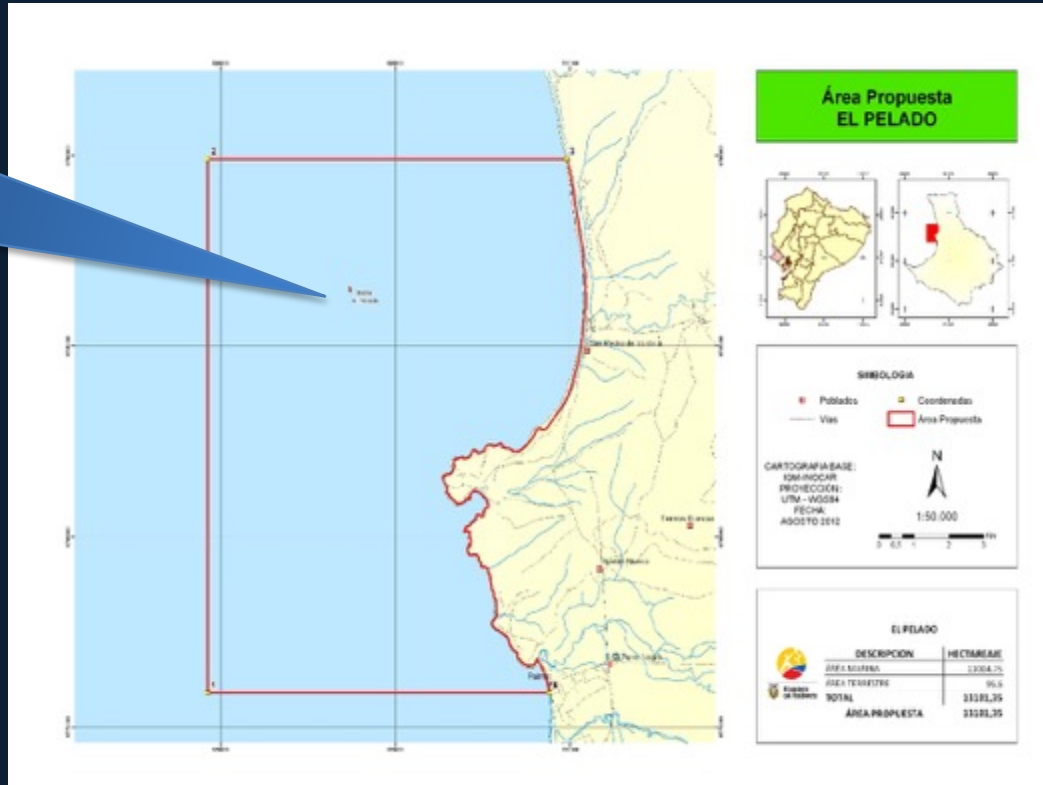
“EL PELADO” MARINE RESERVE

Marine area: 13004.75 has
Land area : 96.6 has
TOTAL area: 13101.35 has

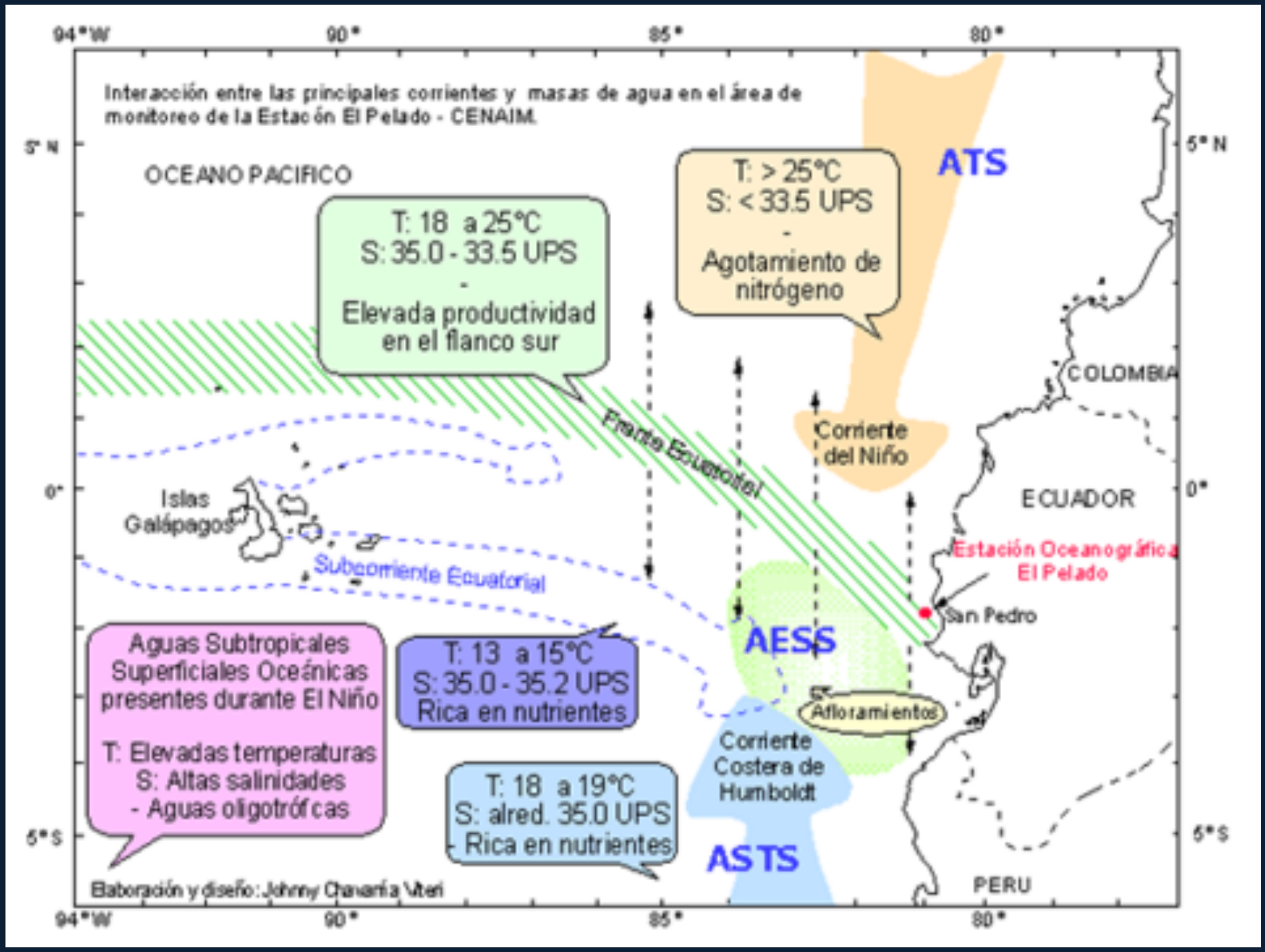
Rocky reef invertebrates



1. The Wall
2. El Planchón
3. La Viejita
4. San Ignacio
5. Labyrinth
6. Rabo del Viejo
7. Christ
8. The Aquarium
9. Under 40
10. Under Queen
11. Boat Rygel
12. Under Tello



OCEANOGRAPHIC CONDITIONS IN THE REMAPE



THE TEAM BIODIVERSITY

CENAIM-ESPOL

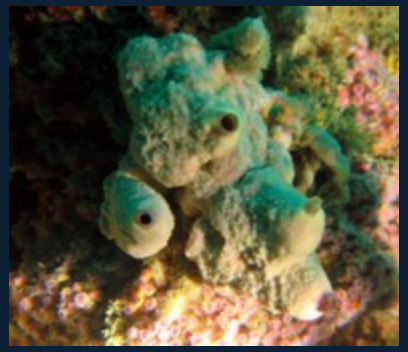
And Now…. Marine Biology - Taxonomy

2015/16

Cnidarians

K.B.Jaramillo (in PhD)

Sponges

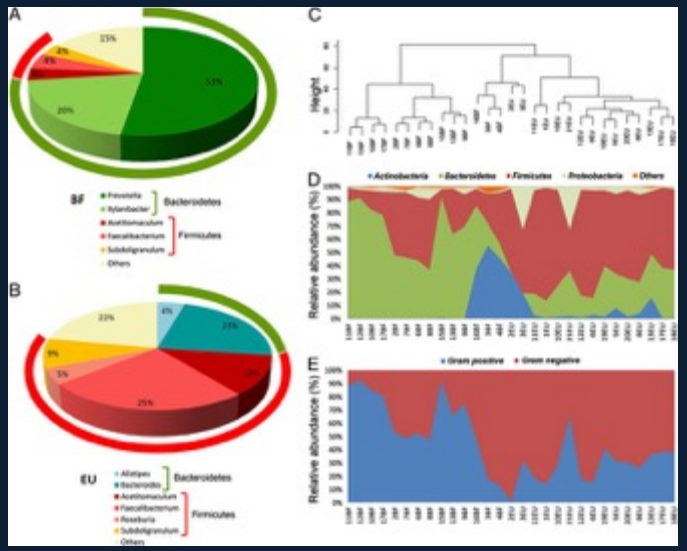


C. Dominguez (in Master)

Ascidians

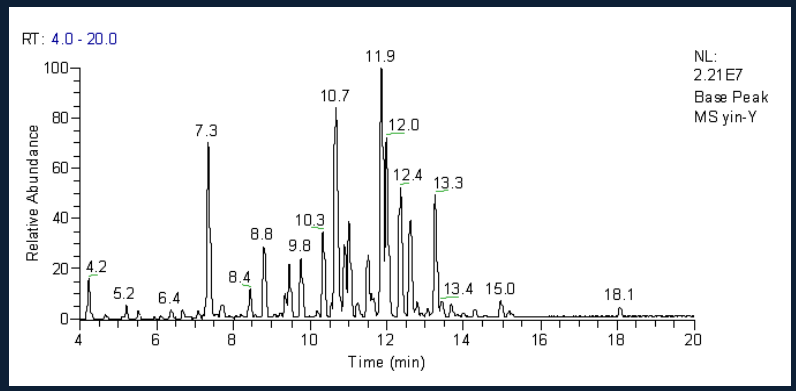
G. Agurto (in Master)

Metagenomics



G.Naranjo (in Master) and C.Tomala (in Master)

Metabolomics



P. Guillen (in PhD) and B. Chalen (in Master)

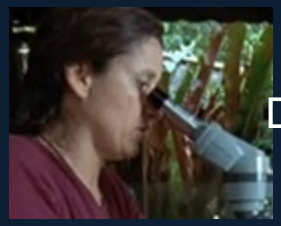
Supervisors:
- Taxonomists
- Marcela Villegas.
- Olivier P. Thomas

2016/17

Marine Biology

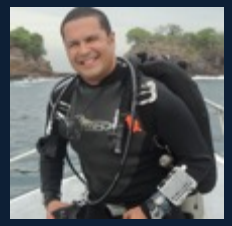
K.B. Jaramillo (***Taxonomists***)

Dr. F.Sinniger
Zoanthids



Dra. C. Diaz
Dr. G. McCormack
Dr. E. Hajdu
Sponges

Dr. X.Turon
Ascidians



Dr. J. A. Sanchez
Octocorals

Dr. F. Reyes
Pharmacology

Chemistry and metabolomics

P. Guillen and B. Chalen (O. P. Thomas)

Animal and Human Bioactivity assays

C. Dominguez (J. Rodriguez)

Functional metagenomics

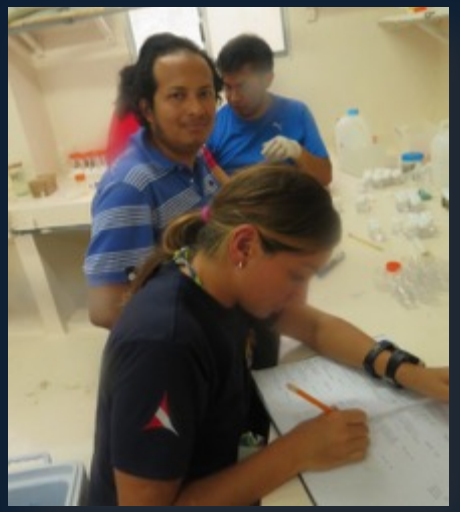
G. Naranjo, C. Tomala and G. Agurto (M. Villegas)

Methodology

1. The scientific diving training for monitoring and sample collection

- Training in marine biodiversity
- Pictures in situ
- Collection of the organism of interest
- Monitoring of the ecological interactions

2. Preservation of organisms in the laboratory for different uses



a) Picture ex situ

b) Quick description of the organism and codification for the preservation .

c) The sample cut into a maximum of 5 pieces to preserve in : Ethanol 95, Ethanol 70, Formol 4%, some samples in 10%, Glycerol 30% and samples for chemistry were stored at -20 C.

d) An Excel sheet is filled after each collection with the respective code and pictures of each organism.

Results

Preliminary Results Species under Study

Sponges : 11 species

Cnidarians:

- Octocorals: 15 species
- Ahermatypic corals: 8 species
- Black Corals: 3 species
- Zoanthids: 6 species

Chordata :

- Ascidians: 8 species

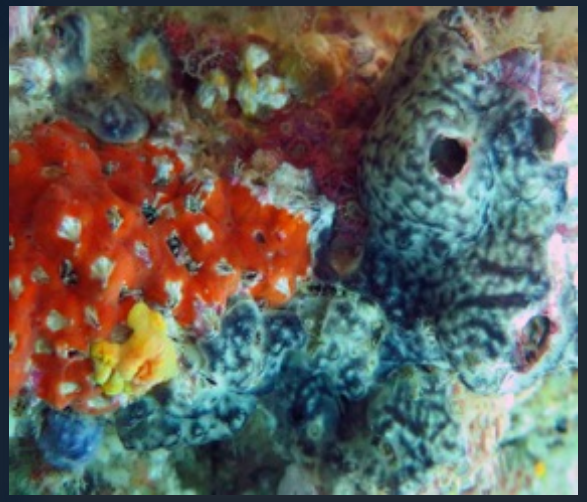
CHORDATA

ASCIDIANS

CHORDATA, Class Ascidiacea, Orders Aplousobranchia, Pleurogona and others to identify





K.B. Jaramillo

SPONGES

PORIFERA, Class Desmopongiae, Orders: VERONGIDA, HAPLOSCLERIDA

- Integrative taxonomy of Verongida, metabolomics of bromotyrosines

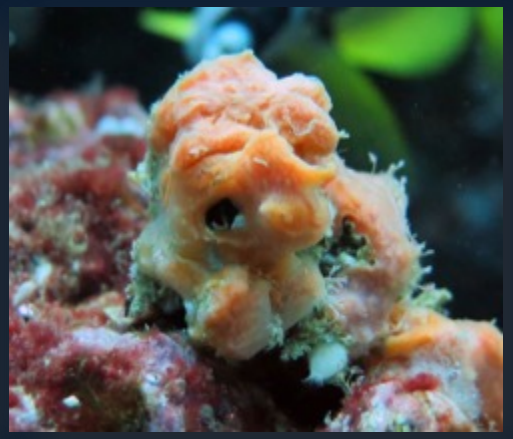
- Integrative taxonomy of Haplosclerida sponge and impact on scleratinian corals

K.B. Jaramillo

SPONGES

Other species to be classified (C. Diaz, T. Perez...): integrative taxonomy and chemistry






OCTOCORALS

Cnidaria, Class Anthozoa, Subclass Octocorallia, Order Alcyonacea, family: Plexauridae

- Integrative taxonomy, clasification and compariton with Gene Database of J. A. Sanchez from Colombia.
- Chemistry of these species.

Muricea sp.

Muricea sp.

- Ecology (diversity, abundance and distribution) Metagenomic and Metabolomic

-Evolution of Octocorals in the marine reserve during El niño phenomenon.

Muricea fruticosa

Muricea appressa

Muricea sp.

OCTOCORALS

Cnidaria, Class Anthozoa, Subclass Octocorallia, Order ALCYONACEA

Leptogorgia sp.

Leptogorgia sp.

Pacifigorgia sp.

To identify

To identify

To identify

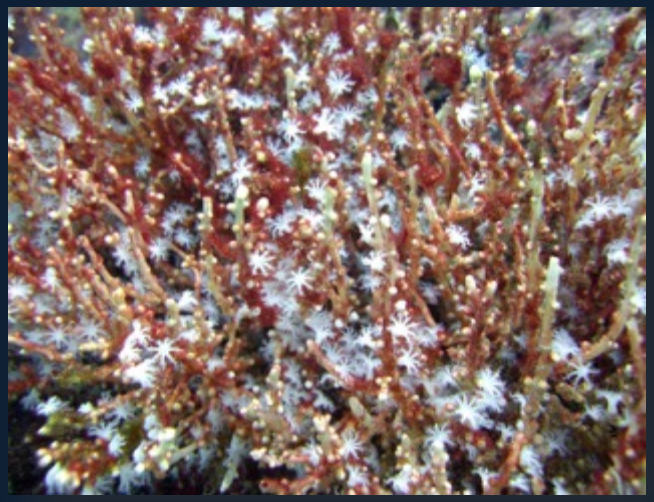
OCTOCORALS

Cnidaria, Class Anthozoa, Subclass Octocorallia, Order ALCYONACEA

Invasive species!!!

- Impact of the invasive *Carijoa* on these species (octocorals), chemical ecology
- Chemistry of these species

Family Clavulariidae

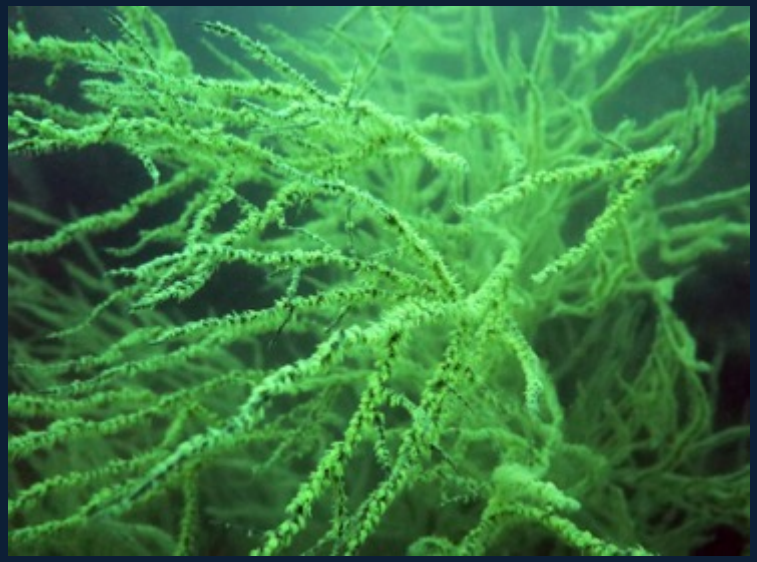


Carijoa riseii

BLACK CORALS

Cnidaria, Class Anthozoa, Subclass Hexacorallia, Order ANTIPATHARIA

Family Antipathidae



Antipathes galapaguensis

Family Myriopathidae

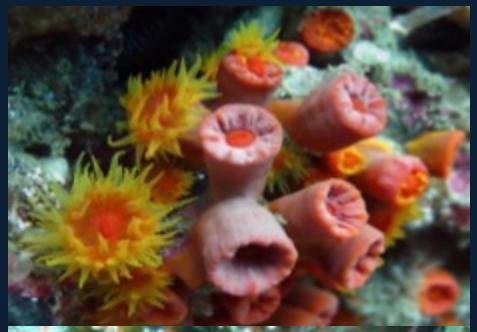
Myriopathes panamensis

- Impact of Parazoanthidae and the phenomenon " el niño" on their distribution.? chemical ecology
- Chemistry of these species

AHERMATYPIC CORALS

Cnidaria, Class Anthozoa, Subclass Hexacorallia, Order Scleractinia... Species to be clasificated

Tubastrea coccinea

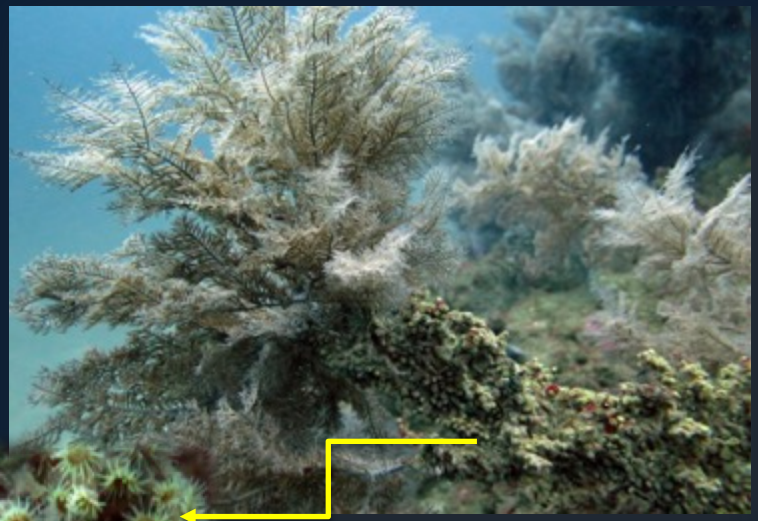


- Integrative taxonomy and clasification.
- Ecological study (diversity, abundance and Distribution) in the marine reserve.
- Chemistry of these species.

ZOANTHIDS

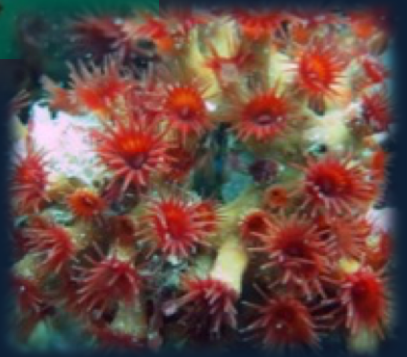
Cnidaria, Class Anthozoa, Subclass Hexacorallia, Order Zoantharia, family Parazoanthidae

- Ecological studies of the interaction (parasitism or symbiosis) between zoantharians, black corals and sea fans.
- Ecology (abundance and distribution) Metagenomic and Metabolomic
- Changes in the interaction of zoanthids with the black corals and sea fans in the marine reserve during the phenomenon " El niño".



Parazoanthus sp. G1

Parazoanthus sp. G3



ZOANTHIDS

Cnidaria, Class Anthozoa, Subclass Hexacorallia, Order Zoantharia

- Integrative taxonomy, clasification and comparison with the Gene Database of F. Sinniger from Japan.

- Taxonomy and phylogeography of Pacific Zoanthids (Malpelo-Colombia, Okinawa, Tahiti, New Caledonia and Ecuador) including metabolomic.

Main question: evolutionary perspective and migration of invasive species through the Panama straight

Carijoa riisei

Article: The invasive snowflake coral (Carijoa riisei) in the Tropical Eastern Pacific, Colombia
Juan A. Armando Sanchez · Diana C. Ballesteros
Revista de biologia tropical 02/2014; 62(1):197-207.

THANK YOU

for your attention

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