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## CONSERVATION PROYECTS

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### UNDERWATER DISEASES... A SILENT THREAT: FUNGAL INFECTIONS IN OCTOCORALS

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Research on wildlife diseases is a challenge that goes from determining a significant sample size to choosing the sampling site and then confronting the particularities of field work and the studied species. The challenge intensifies when it is in the ocean where marine biodiversity is threatened by infectious diseases. Marine diseases associated to the increase in warming ocean conditions are silent and can reach a large scale before being noticed. Underwater diseases need to be stopped from spreading by identifying their causative microorganisms and the environmental conditions that trigger them. This requires significant scientific investigations together with government funding.

Conservation Medicine is an emerging discipline which combines disease investigation and the relationships of host, environment and pathogens, as well as the factors that cause changes in these interactions by using a multidisciplinary approach as a useful tool to redirect the research on marine diseases.

Octocorals are marine invertebrates important components of marine ecosystems. They create environmental complexity, leading to higher biodiversity, are producers of secondary metabolites and are attractive animals for tourism. As many



*Gorgonia ventalina* from the Costa Rica Caribbean. Image from the Project.

other marine animals, octocorals are being threatened by global warming and other anthropogenic stressors, such as land-based pollution, over extraction, sedimentation and other human related activities (Burge et al., 2014) which have triggered emergence of pathogens.

Regarding pathogens, four out of five diseases and syndromes described in octocorals are related with fungal overgrowth: Black Band Disease, Aspergillosis, Fungal-Protozoan Syndrome and skeletal anomalies (Sutherland et al., 2004); the latter related with Labyrinthulomycetes overgrowth (Burge et al., 2012). All these pathologies have water temperatures increase as the common triggering factor. The most relevant example is aspergillosis, caused by *Aspergillus sydowii*, which produced several mortalities in the sea fan (*Gorgonia* spp.) during the last El Niño events at different sites in the Caribbean (Smith et al., 1996).

In Costa Rica, during the 1980's an episode of high rate mortalities occurred in gorgonians (*Gorgonia flabellum*) but the cause was never elucidated (Guzmán & Cortés, 1984). Researchers hypothesized that an infectious agent could have

been involved after other factors such as temperature, salinity, sedimentation, pollution and waves were ruled out since other individuals were exposed to the same factors but only gorgonians were affected. Three decades later, disease investigation in Costa Rican octocorals remains unexplored.

In order to provide a baseline study on the etiology of octocoral lesions and fungal involvement in the Caribbean of Costa Rica during the 2015-2016 El Niño event, an interdisciplinary group was integrated including a veterinarian, a microbiologist, a marine biologist specialized in corals and a veterinary pathologist. The aims of this study were to answer questions such as if are fungi present in octocorals?, do the octocorals have lesions?, is there any biotic or abiotic factor related with the presence of the lesions and/or the fungi? and lastly, are fungi present in the lesions?

To accomplish these goals, dives at different sites of La Amistad Caribe Conservation Area, on the southern Caribbean coast of Costa Rica, were performed. The diving sites were selected by a local fisherman and personnel of a tourism agency after they saw pictures of the octocorals. Tissue samples from 55 healthy and diseased colonies together with temperature, pH, depth, salinity, geographical coordinates, and size of the octocorals were recorded. Description of lesions and identification of fungi were carried out based on reference guides (Work & Aeby, 2006; Raymundo

et al., 2008; Samson et al., 2010; De Hoog et al., 2014). PCR using beta-tubulin primers followed by sequencing were used for *Aspergillus* identification.

This investigation demonstrated the presence of lesions in three out of ten colonies. Differences in the number and kind of fungal genera were found between healthy and diseased tissues suggesting changes in the mycobiota according to the health status. No relationship between octocoral dimensions and abiotic parameters, and the presence of lesions and / or isolated fungi were found. Fungal hyphae associated with tissue reaction were demonstrated by histopathology in some of the affected colonies. The isolation of hyaline and dematiaceous

fungi from these lesions matching with their parasitic adaptation leaves the question if new fungal etiologies could be involved in octocorals lesions in Costa Rica. It is worth noticing that the highest number of diseased colonies and fungal genera isolated where from three sites near rivers that cross agricultural lands (Calderón-Hernández, 2017).



Field work. Dr. Andrea Urbina giving to Dr. Alejandra Calderón a tissue sample from a *Pseudopterogorgia acerosa*. Notice the sea currents as an example of the field work particularities. Image from the project.

Multidisciplinary and longitudinal studies are necessary to elucidate the pathogenic or opportunistic role of that silent threat, the fungal infections, and the factors involved in tissue damage in order to provide knowledge leading to octocoral conservation.

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### Authors' Bio

Alejandra Calderón is a veterinarian and a Master student in Conservation Medicine. Andrea Urbina is a microbiologist, Master in Tropical Diseases and chief of the Mycology Laboratory. Juan Alberto Morales is a veterinary pathologist, who had special interest in wildlife and fish pathologies. Jorge Cortes is a marine biologist, coral's specialist and the CIMAR Director.

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## 66TH WDA ANNUAL INTERNATIONAL CONFERENCE

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Last July the 66<sup>th</sup> International Conference was held in San Cristobal de las Casas, Mexico. A total of 186 summaries were presented, 79 of which were Latin American studies. In the distribution by country, Mexico held the first place, with 44 abstracts, followed by Chile (15), Brazil (10), Costa Rica (4), Argentina (3), Trinidad and Tobago (2) and Colombia (1).



As for the awards, we have the honor to inform you that the Wildlife Veterinary Section Travel Award for Oral Presentation went to Dr. Lilian Catenacci, from Brazil, while the Wildlife Veterinary Section Travel Award for Poster Presentation went to Sofia Bernal, from Costa Rica. So we extend our congratulations, these girls represent well the Latin American community, well done!