

# Shape of Gorgonians

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Gorgonians are soft corals living in shallow water, and stirred by the waves. Their structure looks mostly like a 2D plate, composed of a reticulated network of branches.



Figure 1: Example of shapes. the first one is from the specie *Gorgonia ventalina*, approx 40cm of height. The rifts between the different parts imply a better reconfiguration during heavy flows and thus a lower drag. The second one, still *G. ventalina*, is a small one ( $\approx 15\text{cm}$ ), with simple tropism in the network of branches. The last one is a *G. flabellum* ( $\approx 30\text{cm}$ ), eaten by different predators in its environment (Guadeloupe). Regrown shapes from the old structure reinforcements imply very different mechanical properties and tropism.

Their interaction with the water flow is primordial : it changes their ability to catch food and sunlight, but also if their survival rate in violent events such as cyclones.

We study how does gorgonian shape impact their mechanical properties, and in consequence their adaptation to their environment. The final goal of our team is to determine how the morphogenetic process, influenced by mechanical tropism, allow or not adaptation and optimisation.

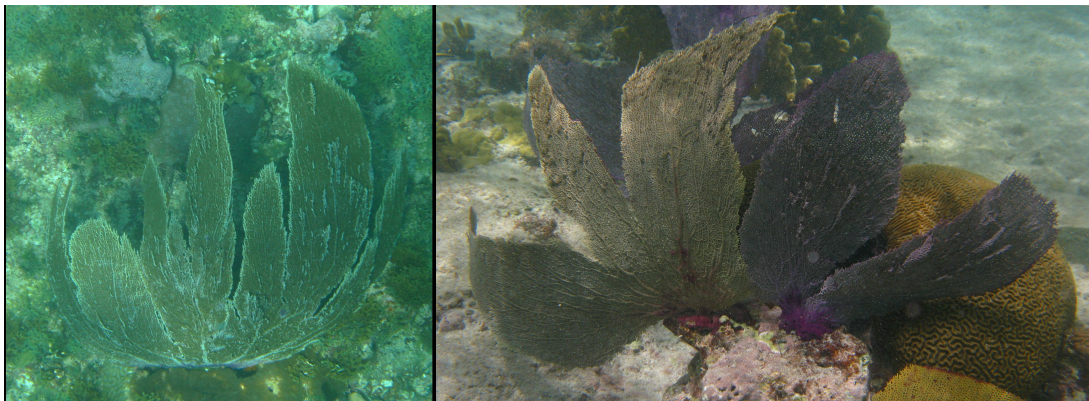


Figure 2: Figure 2 : example of in vivo deformations. The first one is taken from above, showing the reconfiguration from a plane to a sphere. The second one is the deformation of two neighboring gorgonians.

Our two main axes of work are :

- **Description of the shape** : image analysis and pattern recognition, analysis of reticulated structure structure in term of hypergraph, allometry and morphogenetic models
- **Mechanical measures** : theoretical models derived from fluid/elastic structure, applied to experimental datas, drag and reconfiguration measure, 3D reconstruction of the movement

If theses themes look interesting for you, please contact us !

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