Laboratoire Matière et Systèmes Complexes (MSC)

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From strain anisotropy of plant cell wall to growth anisotropy: a theoretical study.

The emergence of such complex shapes, as leaves and flowers, results from the integration at the organ level of inhomogeneous anisotropic growth at the cell level. Though flowers are the most beautifull examples of vegetal organs, recent attempts to go from one scale to the other have led to poorly robust models. Focusing on much simpler organisms, the internodes of corticated c*haraceae*, gigantic cylindrical algal cells (2 cm) surrounded by smaller cells, this theoretical training aims to understand how indivudal spiral growth of cell coupled through adhesion determines global growth provoke the spiral growth of the whole internode.
Departing from pressure inside the cell, generating anisotropic cell wall strain, the growth will be modeled using the framework of elastic growth. The role of the cortication geometry, the anisotropy of the cell wall and the adhesion between the cells will be peculiarly investigated. The training student is expected to have basic skills in programming.

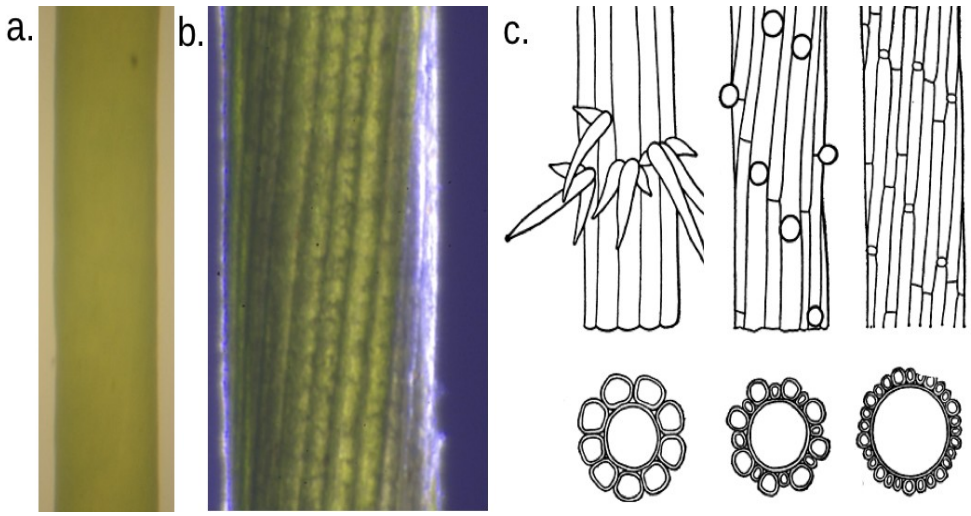

Figure. a. Acorticated internode of C. *corralina*. b. Corticated internode of *C. globularis*. c. *Characeae* with cortications[24]: *C. canenscens, C. contraria, C. fragilis.* Up. Lateral view: The corticationsinclination is varying from species to species.Down. Transversal view: A big central internode surrounded by smaller cortications.