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From strain anisotropy of plant cell wall to growth anisotropy: an experimental 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 experimental training aims to understand how local anisotropic growth determines global growth on firmer experimental basis, more tractable for theoretical analysis.

Unlike animal cells, the vegetal cell is surounded by a rigid shell made of cell-wall. For c*haraceae*, the anisotropic growth promoting cylindrical shape is due to the presence of rigid micro fibrils wounded orthogonaly to the cell axis. The training will further test how strain anisotropy and growth anisotropy are linked through kinematical growth studies of different uncorticated (single-cell) (Figure a) and corticated (multicellular) c*haraceae* (Figure b-c). The growth and rotation will be analyzed by PIV. The in fluence of temperature on growth will be studied.

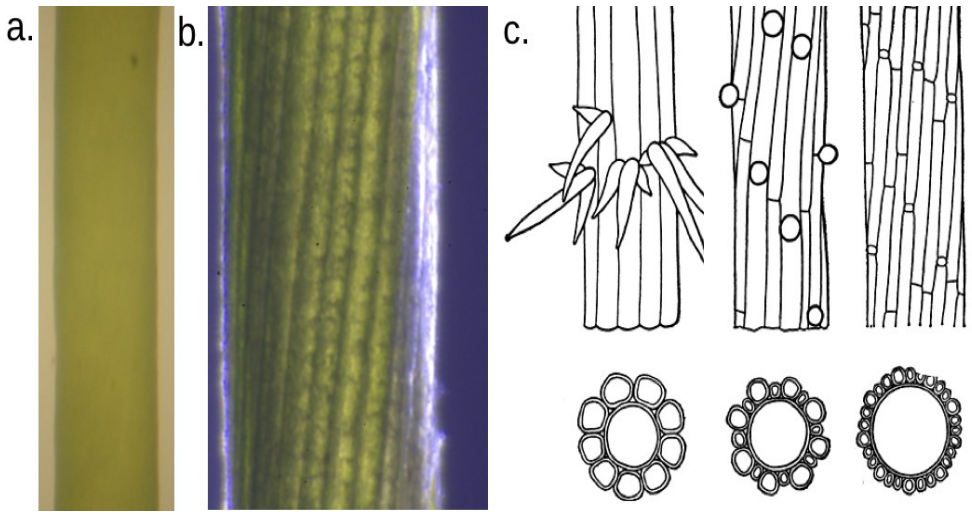

Figure. a. Acorticated internode of C. *Corralina*. b. Corticated internode of *C. Globularis*. c. *Characeae* with cortications[24]: *C. canenscens, C. contraria, C. fragilis.* Up. Lateral view: The corticationsinclination is varying from species to species.Down. Transversal view: A big central internode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