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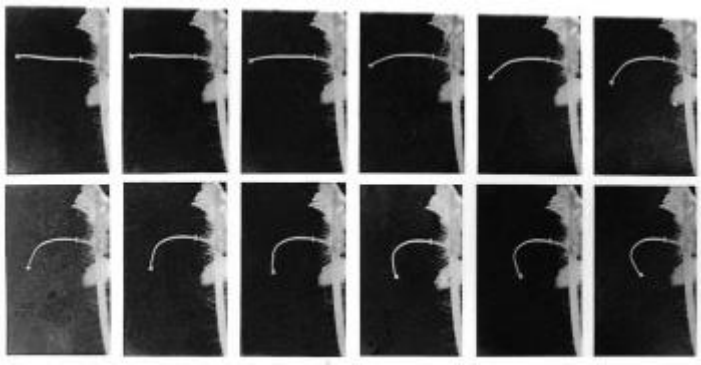
8.2.2??Thigmotropism



[1]

Figure 8.11 Initial thigmotropic curvature after touch stimulation can be very rapid. Time-lapse photographs, at 10 s intervals, or watermelon tendril following 10 s of touch stimulation. Compare the time scale here with much slower responses in Figure 8.8.

(Based on Carrington and Esnard 1989; reproduced with permission of Blackwell Science)

[2]

Figure 8.12 Thigmotropic twining of a tendril around a supporting stem, after touch contact by one side of the tendril. Later, tension coiling within the tendril has dragged the stem towards the support.

(Photograph courtesy J.H. Palmer)

Tendrils are specialised thread-like structures that can grasp objects with which they come into contact. They are modi?ed leaves or stems sensitive to sliding and/or repeated touch, such as occurs when a tendril contacts a neighbouring stem. Tendrils enable climbers and vines which have slender non-self-supporting stems to access sunlight at the top of the vegetation cover with less investment in shoot biomass per unit height gain. In effect, tendrils search for surrounding objects because the end of the tendril makes wide spon-taneous sweeping movements as it grows. On contact, the touch stimulus induces the tendril to coil around the object as a result of the cells on the non-stimulated side expanding more rapidly than those on the side making contact (Figure 8.11). Coiling is a tropic response, since direction of curvature relates to the direction of touch. Touch stimulation is con-tinued during coiling so that tendrils ultimately twine several times around the object. The rest of the tendril may then show spontaneous coiling which effectively pulls the stem nearer to the contacted object, giving mechanically superior support (Figure 8.12). This second phase is often in the opposite helical direction and may be initiated by tension.

Tendrils detect contact via sensory epidermal cells called tactile blebs. These cells are rich in microtubules and actin ?laments, suggesting an involvement of the cytoskeleton. Touch sensing by the sensory bleb is converted to a signal which results in coiling commencing only a few seconds after contact. Coiling is due partly to changes in cell turgor and partly to differential growth along opposite sides of the tendril.

Links:
[1] http://plantsinaction.science.uq.edu.au/edition1//?q=figure_view/558
[2] http://plantsinaction.science.uq.edu.au/edition1//?q=figure_view/559