RECORD: Anon. 1876. [Review of *Climbing plants*]. Climbing plants and revolution. *Chicago Daily Tribune*, (22 January), p. 9.

REVISION HISTORY: Transcribed by Christine Chua and edited by John van Wyhe 11.2020. RN1.

NOTE: Darwin, C. R. 1876. The movements and habits of climbing plants. 2d edition (F838).

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Climbing plants and revolution.
The movements and habits of climbing plants.
By Charles Darwin, M.A., F.R.S., etc. Second Edition, revised. With illustrations. [illeg]., pp. 208. New York: D. Appleton & Co.

The substance of this essay was originally contributed to the *Journal of the Linnean Society* in 1865, but it is here reproduced in an enlarged and amended form. Since Mr. Darwin first published his observations on *Climbing plants*, several distinguished botanists have studied the subject with painstaking fidelity, illuminating it with many curious facts not previously discovered.

To improve the value of his paper by incorporating into it the latest information gained by himself and others, has been the purpose of Mr. Darwin in the work of revision; but the chief object has apparently been to apply its conclusions anew to the question of evolution.

In accumulating the data on which his essay is based, Mr. Darwin investigated the habits of above 100 widely-distinct living species. From our previous knowledge of his methods of examination, we may know how patient, tireless, and exhaustive were his inquiries in the present instance.

Mr. Darwin divides Climbing plants into four classes, viz.: Twining Plants, Leaf-Climbers, Tendril-Bearers, and Hook-and-Root-Climbers.
The first is the largest subdivision, and is regarded by him as the primordial condition of the entire tube. The Hook-and-Root-Climbers are the fewest in number, and the least efficient of the whole. The Leaf-Climbers and Tendril-Bearers properly constitute one division, as they graduate into each other, and nearly all have the remarkable power of revolving spontaneously in the search for objects to clasp, and thereby lift and hold themselves up. Taken together, they far exceed in number the other two classes, as, by the superiority of their mechanism, they have been enabled to [illeg] the simple Twiners and Hook-and-Root-Climbers in the great struggle for existence.

Mr. Darwin believes that plants possessing the most perfect appliances for climbing once stood in the lowest rank, but, in the process of time, have developed, through the influence of need and opportunity, the advantageous facilities that now enable them to attain elevation, room, and light, in the most successful manner. – that is, with the least expenditure of organic matter.

He finds a reason for supposing that leaf-Climbers were primarily Twiners in the fact that the internodes of all the species revolve in exactly the same manner as they do in the Twiners, and that a few of the species still twine well, while many others twine in an imperfect manner. Several Leaf-Climbing genera are also closely allied to genera containing simple Twiners.

Similar reasons indicate that the Tendril-Bearers have descended from the Leaf-Climbers. These have been greatly modified in structure since leaving the rank below them; still the internodes of the majority revolve, and the flexible stem in a few species retains the capacity of twining. The Leaf-Climbers, as might be expected, are related to the Tendril-Bearers as they are to the Twiners, being intermediate between the two classes.

The greater portion of Mr. Darwin's monograph is given to the circumstantial description of the various kinds of movement exhibited by Climbing Plants. In the different classes the most diverse organs display an aptness for curving, revolving, and twining about or grasping a support. Stems, branches, flower-stalk, leaf-stalks, mid-ribs of the leaf and leaflets, and aerial roots, have developed the capacity. The proportion of Climbing Plants in the vegetable kingdom is surprisingly large, especially in Tropical forests. No less than thirty-five out of the fifty-nine alliances into which Lindley [1] divides flowering plants, include Leaf and Tendril Climbers and Twining Plants; and to these are to be added a few species of the Criptogamia, or flowerless plants. In considering the large number and the great diversity of species that possess the power of climbing, Mr. Darwin expresses the opinion that the capacity for revolving is inherent in almost every species. In conclusion, he remarks:

It has often been vaguely asserted that plants are distinguished from animals by not having the power of movement. It should rather be said that plants acquire and display this power only when it is of some advantage to them; this being of comparatively rare occurrence, as they are affixed to the ground, and food is brought to them by the air and rain. We see how high in the scale of organization a plant may rise, when we look at one of the more perfect tendril-bearers. It first places its tendrils ready for action, as a polypus places its tentacula. If the tendril be displaced, it is acted on by the force of gravity and rights itself. It is acted on by the light, and bends towards or from it, or disregards it, whichever may be most advantageous. During several days the tendrils or internodes, or both, spontaneously revolve with a steady motion. The tendril strikes some object, and quickly curls round and firmly grasps it. In the course of some hours it contracts into a spire, dragging up the stem, and forming an excellent spring. All movements now cease. By growth the tissues soon become wonderfully strong and durable. The tendril has done its work, and has done it in an admirable manner. [p. 206]

[1] John Lindley, *The vegetable kingdom, etc.*, 1853.