TENDRILS AND CLIMBING PLANTS.

Notes from Mr. Darwin.

By the AUTHOR of "Stone Edge."

A SHORT paper upon Tendrils and Climbing Plants was published by Mr. Darwin some years ago in a scientific periodical which comes into the hands of few but scientific men, and is now out of print. It is a perfect model of accurate and delicate observation, and the help to be derived from it towards the enjoyment of what we ought to see around us is so great, that a sketch of its contents is here attempted, in order that a more general public may share the benefit of Mr. Darwin's teaching as to the manner in which nature should be watched and questioned.

It is a proof of how dull and unobservant we most of us are, that such beautiful contrivances should so long have passed unnoticed. The absence of intelligent perception among men in general must indeed be great when these simple observations of objects which are before us all were never made until a German botanist, M. Hugo Mohl, wrote a paper upon the revolving motion in tendril-bearing plants in 1827. This was followed by two memoirs in 1843 by a Frenchman, M. Dutrochet, while the great circle of cosmopolitan science is carried on by the American Mr. Asa Gray, and finally by the Englishman who has thus methodised and interpreted the whole subject.

Plants mount and cling by four different methods. Firstly, those which twine their whole bodies round a support, like the Hop, the Honeysuckle, and Wistaria; next those which hang on by their leaves, like the Clematis; thirdly, the "real tendril-bearers," as the Passion-flower; and, lastly, the Hook and Root Climbers.

These all have the most determined likes and dislikes, and will only do exactly *as* they please, *when* they please. For instance, one particularly dainty Australian plant refused to cling to the thin or thick sticks, branched twigs, or stretched strings supplied to it by Mr. Darwin, but hung out its long arms helplessly in the air, until at length a pot with a second set of uprights having been placed alongside, it found what it wanted, *i.e.*, a number of little parallel posts, when it immediately travelled laterally backwards and forwards between them quite happily, with a sort of weaving process, sometimes embracing several supports at once, such as its parents had been accustomed to in the thick scrub at home.

Some of the Bignonias are wonderfully clever in their ways. One of them ascends an upright smooth stick by spirally twining round it, and "seizing it alternately by two tendrils, like a sailor pulling himself up by a rope hand over hand." Another of the family is "the most efficient climber" which Mr. Darwin knows, "and could probably ascend a polished stem incessantly tossed by heavy storms."

The tastes and distastes of the Virginian Creeper are especially strong. It does not approve of sticks or boughs, but when it meets with a flat wall, or even a smooth board, it turns all its tendrils, which bear a number of branches on each stem like fingers, towards it, and spreading them widely apart, brings their hooked tips into close contact with the surface. The curved ends then swell, become bright red, and form neat little cushions—like those of the feet of a fly—which adhere so tightly that even after the plant is dead they may be found still sticking fast to their places. A strain of two pounds has been borne by the single branchlet of a dead tendril estimated to have been nearly ten years exposed to the weather.

Tendrils have a curious tendency to turn *away* from the light. In one instance Mr. Darwin placed a plant of Bignonia—with six tendrils pointing different ways—in a box, with one side open to the light, set obliquely: in two days all six were turned, with unerring accuracy, to the darkest corner, though to do this each had to bend in a different manner. Their habit of inserting their tips into all the little dark holes and crevices they can find, by which they assist their chief to ascend, is perhaps owing to this taste for darkness. In some cases they have been seen to try a small fissure, and when for some reason it does not suit their taste, to withdraw their little noses again, and choose another more convenient, after a manner which in an animal would be called instinct. Indeed it is most difficult to define the limits either of intelligence or motion—both of which we are apt to confine to animals—when we find that the young shoots of Spiral Twiners, and indeed of many other climbers, have an extraordinary revolving motion in search of a support. Some of these move in a course *with* the sun, or the hands of a clock, *i.e.*, from left to right; but a still larger number revolve in an opposite direction. To take very common instances: the Hop turns *with* the sun's course, the garden Pea *against* it. In the case of one revolving tendril which Mr. Darwin watched attentively, he says, "it travelled so rapidly that it could be distinctly seen moving, like the hands of a gigantic clock." The tip of the shoot, thirty-one inches long, upon another plant standing in a pot on the study table of this indefatigable observer, revolved in a course opposed to the sun, making a circle of above five feet in diameter, and sixteen in circumference, in a time varying from five hours and a quarter to six hours and three quarters, so that it travelled at the rate of thirty-two to thirty-three inches in the hour. "It was an interesting spectacle to watch this long shoot, sweeping night and day this grand circle in search of some object round which to twine."

If the tendrils can catch nothing they contract into a close spire, or sometimes turn round and hook themselves on to the stem behind, serving thus to strengthen it. A

Fig. 1.

tendril begins by being long and straight, with an extremely sensitive end, which has a

natural tendency to curl round a support, like the tail of a monkey. As soon as it has secured its hold it begins to contract spirally, and the consequence of being tied at both ends (as may be seen by twisting a string thus fastened) is that the spires turn in contrary directions, with a short straight portion between. The two sets are the same in number (whether consisting of over thirty or only four turns), though often distributed differently. Here, for instance (fig. 1), in the caught tendril of a Passion-flower, are five in one direction, then seven on the opposite tack, and the addition made even by the remaining two required to complete the sum being added by themselves at the end where it has taken hold. There is an odd number only apparently while the plant is preparing to add a twist to the lacking account, which is done as soon it has the means.

The extreme elasticity of this species of support enables plants of a most delicate structure to brave a violent storm. "I have gone out," says Mr. Darwin, "to watch the Bryony on an exposed hedge, as the branches were tossed to and fro by the wind. Unless the tendrils had been excessively elastic they would have been torn off, and the plant thrown prostrate. As it was, the Bryony safely rode out the gale, like a ship with two anchors down, and with a long range of cable ahead to serve as a spring as she surges to the storm." He might even have added that it has the advantage of the new chain over the old hemp cables, the spires answering to the relief given by the links of the chain.

A very perfect specimen of tendril is that of the Cobœa; it is much branched, and each tiny finger is terminated by a minute hook, hard, transparent, sharp as a needle. "On an eleven-inch tendril I counted ninety-four of these beautifully constructed little hooks." Every part of every branch is highly sensitive, and the tendrils catch hold with peculiar readiness. All its operations, too, are conducted with unusual rapidity, and are therefore particularly well fitted for observation. A tendril, for instance, revolved only for thirty-six hours after the time when it first became sensitive, but during that period made at least twenty-seven revolutions. The "perfect manner in which the branches arrange themselves when they have caught a support, creeping like rootlets into crevices, is quite a pretty sight," and one which is the more easy to study as the upper surfaces of the branchlets are angular and green, and the lower sides are rounded and purple. The wind will often assist these extremely flexible tendrils to seize a distant twig, which it could not have reached by its revolving movement.

The provident Vine puts forth a strong tendril just under its flower (fig. 2)—although this is of course quite light, and stands upright—in order to be ready to support the cluster of grapes when it comes, which it knows will

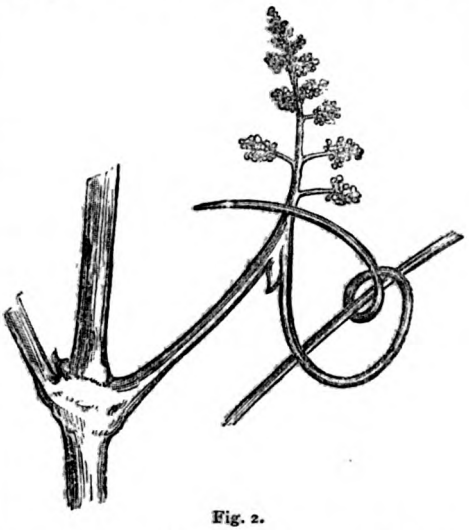

Fig. 2.

hang down, and be too heavy for the stalk alone. This looking forward and making provision for future wants is very curious.

The Leaf Climber, such as that of the Clematis (fig. 3), is very pretty and efficient, the leaf stalk curling round its support and doing duty as tendril.

Fig. 3.

A variety developed from the stalk of a composite leaf like the Lathyrus, or Everlasting Pea, seems to form a connecting link between the two classes of tendrils proper and leaf climbers. And the Maurandea (fig. 4) shows a curious variety where the footstalk of the flower has a twining grasping power.

Lastly come the Hook Climbers, such as the Rose, the least efficient of all, only fit to mount amongst tangled masses of vegetation and the next lowest in dignity, the Ivy, which

cannot pass from branch to branch, and must creep along continuous surfaces, as its rootlets will only adhere by long-continued and

Fig. 4.

close contact with a steady support; but which has the intelligence to change the form of its leaves and shoots, and omit the rootlets upon them, when it has reached the top of the wall or tree, and there is no longer any use for these in climbing further.

The whole question of the power of motion in living things is extremely curious. It cannot be said to belong exclusively to animals, since, when it is necessary for the well-being of plants, they are capable of acquiring a certain amount of it. As, however, their food is brought to them by the wind and rain, and by the ground to which they are fastened, their wants, in the general way, are limited. The spontaneous revolving motion first described is the most interesting of all, because it is continuous, and seems to depend upon no outward stimulus, but is contingent upon the youth of the part and upon its vigorous health. There are other movements, however, such as that of the pistil and stamens at a particular period of plant life—and the periodical closing and opening of petals, which takes place with the presence and absence of light—as when

> "A daisy whose leaves spread,
> Shuts when Titan goes to bed."

The manner also in which tendrils can change their direction when this is found to be for the benefit of the plant to which they belong, is truly wonderful, turning sometimes upwards to grasp a support above, sometimes downwards to serve as grapnels, sometimes dividing their forces, and crawling as it were over a surface to fix their claws into the holes which are most likely to be of use in assisting the shoots to ascend. "Some of the most perfect tendril bearers rise high in the scale of organisation." They may be seen putting out their tendrils ready for action like the tentaculæ of a polypus—bending to and from the light, or not in the least attending to it, as is most advantageous to the welfare of the plant, their master—during several days the internodes or tendrils, or both, spontaneously revolve with a steady motion till they strike an object, when the tendrils upon them grasp it firmly—in the course of some hours these contract into a spire, dragging up the stem, and forming an excellent spring. When the work required is done all movement ceases, the tissues of the tendrils become wonderfully strong and durable; they have finished their task in the most admirable, one might say intelligent, manner.

Indeed there is something almost ludicrously human in some of the descriptions. "A tendril which has not become attached to any body, shrinks to a fine thread, and drops off," or else hardens into "a useless self-involved spire." Such people, attached to no body or thing, and withering mentally and morally, or becoming "useless fine self-involved spires," are only too common in everybody's acquaintance. In another place it is said "that the gain in strength and durability in a tendril after its attachment is something wonderful," and there can be no doubt that the "increase in strength" and worth of a character which has become strongly "attached" to a proper "object" *is* astonishing.

One great charm of these investigations is that they may be carried out almost anywhere. There is no better specimen of the revolutions both of the internodes of stems and of tendrils than in the common Pea, which was, indeed, studied most accurately by Dutrochet, who gives an elaborate diagram of its elliptical motions.

In the most ordinary garden, where a row of Peas or of French Beans is to be found, and where the Ivy and Honey-suckle cover the walls—in the most uninteresting country walk, where, at least, the Bryony, Traveller's Joy, and Wild Rose may be found in the hedges—on the window-sill of a dark little town house, from which a Cobœa or Convolvulus may be trained, or in the backyard, where a few pots of Nasturtium, Cucumber, or Hop are kept, it will be found possible to observe and enjoy these exquisite contrivances towards an end. But how few of us trouble ourselves to see what is before our eyes, or to understand what is going on under our very noses!

To help the many, before whom these and similar delicate operations of nature are thus going on unnoticed—to look out for an interest so pleasant and so easily attainable—to teach us what to observe, and how to look at it, these observations of Mr. Darwin's are indeed invaluable.