



## *The Intelligence of Flowers*

### I

Here I wish simply to recall several facts known to all botanists. I have made no discovery, and my modest contribution comes down to a few basic observations. It goes without saying that I do not intend to review every proof of intelligence offered to us by plants. Those proofs are ongoing and innumerable, especially among flowers, where the striving of plant life for light and spirit is at its most focused.

If we allow for some awkward or unfortunate plants and flowers, none is entirely lacking in wisdom and ingenuity. All struggle to accomplish their task; all have the magnificent ambition to overrun and conquer the surface of the earth by thereupon multiplying infinitely the form of existence they represent. To reach this goal, they need, on account of the law that binds them to the soil, to overcome difficulties much greater than those facing the multiplication of animals. For that reason most of them have

recourse to ruses, schemes, mechanisms, and traps that in respect, for instance, of mechanics, ballistics, aviation, or observation of insects often predate the inventions and knowledge of mankind.

## II

It would be superfluous to redraw the picture of the great systems of floral fertilization: the play of stamens and pistil, the seductiveness of scents, the appeal of harmonious and striking colors, the development of nectar, totally useless to the flower, and which it manufactures only to attract and hold the foreign liberator, the messenger of love, bee, bumblebee, fly, butterfly, moth, which must bring it the kiss of the distant, invisible, motionless lover.

This plant world that strikes us as so tranquil, so resigned, where all seems to be acceptance, silence, obedience, reverence, is on the contrary one wherein the revolt against destiny is at its most vehement and most obstinate. The essential organ, the nourishing organ of the plant, its root, attaches it indissolubly to the soil. If it is difficult to ascertain, among the great laws that overwhelm us, the one that weighs heaviest on our shoulders, for the plant there is no doubt: it is the law that condemns it to immobility from birth to death. So it knows better than we, who fritter our energies, against what it must first arise. And the energy of its obsession, as it rises from the shadows of its roots to organize itself and to blossom in the light of its flower, is

an incomparable spectacle. It strains its whole being in one single plan: to escape above ground from the fatality below; to elude and transgress the dark and weighty law, to free itself, to break the narrow sphere, to invent or invoke wings, to escape as far as possible, to conquer the space wherein fate encloses it, to approach another kingdom, to enter a moving, animated world. Is not the fact that it succeeds in doing so as surprising as if we were to succeed in living outside the time assigned us by another destiny or in entering a universe freed from the weightiest laws of matter? We shall see that the flower sets man a prodigious example of insubordination, courage, perseverance, and ingenuity. If we had put into trying to uplift the various inevitabilities that weigh us down—those, for instance, of pain, old age, and death—even half the energy that some tiny flower in our garden has spent, we could be forgiven for thinking our fate would be very different from what it is.

### III

In most plants this need for movement, this appetite for space, manifests itself concurrently in both flower and fruit. It is easily explicable in the case of the fruit; or, at any rate, it only reveals a less complex experience and foresight. Contrary to what occurs in the animal kingdom, and because of the terrible law of absolute immobility, the main and worst enemy of the seed is the paternal strain. We are in a strange world where the parents, incapable of

moving, know they are condemned to stifle or starve their offspring. All seed that falls at the foot of a tree or plant is lost or will sprout in a hard place. Hence the immense effort to cast off the yoke and conquer space. Hence the marvelous systems of scattering, of propulsion, of aviation, that we find in all parts of the forest and on the plain; among others, merely to mention in passing a few of the most curious: the winged screw or samara of the maple, the bract of the lime, the gliding-machine of the thistle, dandelion, and salsify; the detonating springs of the spurge, the extraordinary squirting pear of the balsam apple, the woolen hooks of the eriophorous plants; and a thousand other unexpected and astonishing mechanisms, for there is, so to speak, no seed that has not invented some method wholly suited to itself for escaping the maternal shadow.

We simply would not believe, if we had not practiced botany, just how much imagination and genius expends itself in all the greenery that delights the eye. Look, for instance, at the pretty seed pod of the scarlet pimpernel, the five valves of the garden balsam, the five spring-loaded capsules of the geranium, etc. While you are at it, do not forget to examine the common poppyhead that one finds at any herbalist's. There is, in that nice big head, a prudence and foresight worthy of the highest praise. We know that it contains thousands of extremely fine, tiny black seeds. The goal is to scatter these seeds in the most adroit manner and as far as possible. If the capsule containing them were to split, fall, or open up underneath, the precious black powder would simply form a useless

heap at the foot of the stem. But it can only emerge from apertures pierced high up on the husk. Once ripened, this leans over on its peduncle, sways at the slightest breath of air and, literally with the very same gesture as a sower, scatters the seeds in space.

Shall I speak of the seeds that plan their own dispersal by birds, and which, to entice them, huddle, like the mistletoe, the juniper, the serviceberry, etc., within a sugary husk? There is such reasoning in this, such an understanding of final causes that we hardly dare insist on it for fear of renewing the naive errors of Bernardin de Saint-Pierre. Yet the facts cannot otherwise be explained. The sugary husk is as useless to the seed as is the nectar, which attracts the bees, to the flower. The bird eats the fruit because it is sweet and at the same time swallows the seed, *which is indigestible*. The bird takes off and shortly thereafter rends the seed just as it received it but stripped of its husk and ready to sprout far from the dangers of its place of birth.

#### IV

But let us get back to simpler schemes. Pick from the roadside, in the first fistful to hand, a blade of some grass or other, and you will catch a small, independent, unflagging, unexpected intelligence at work. Here are two poor creeping plants that you could have encountered a thousand times on your walks, for they may be found everywhere, even in the most barren corners where a pinch of soil has

strayed. They are two varieties of wild medic (*Medicago*), two weeds in the humblest sense of that word. One bears a reddish flower, the other a yellow powder puff the size of a pea. To see them slide and hide themselves in the lawn, among the proud grasses, one would never imagine that, well before the illustrious geometrician and physician of Syracuse, they have discovered the amazing properties of the Archimedean screw and attempted to apply it not to the raising of liquids but to the art of flying. So they lodge their seeds in easy spirals, made up of three or four admirably constructed revolutions, reckoning thereby to delay their fall and consequently, with the aid of the wind, to prolong their aerial voyage. One of them, the yellow one, has even perfected the device of the red one by decorating the edges of the spiral with a double row of spikes, with the clear intention of hooking it in passing to either human clothing or animal fleece. Clearly it hopes to ally the advantages of eriophily—that is to say, the scattering of seeds by sheep, goats, rabbits, etc.—to those of anemophily, that is to say, scattering by wind.

What is most touching in this entire huge effort is its uselessness. The poor red and yellow medics have made an error of judgment. Their extraordinary screws are of no use to them. They can only work if they fall from a certain height, from the top of a tall tree or from a grassy knoll; but, constructed at grass level, they have only a quarter-turn to make before hitting the ground. We have here a curious example of the mistakes, the trial and error, the experiments and the minor miscalculations, frequent enough,

of nature: for only those who have barely studied it would claim that nature never errs.

In passing, let us note that other varieties of medic (not to mention the clover, another leguminous and papilionaceous plant that is virtually indistinguishable from the one that concerns us here) have not adopted these aeronautical devices and retain the primitive method of the pod. In the case of one of them, the *Medicago aurantiaca*, we may easily grasp the transition from highly elaborate pod to screw. Another variety, the *Medicago scutellata*, rounds off the screw in the form of a bowl. It seems therefore that we are witnessing the stirring spectacle of a kind of invention in progress, the efforts of a family that has not yet worked out its destiny and is seeking the best way of ensuring its future. Is it not perhaps in the course of this research that, having been disappointed by the spiral, the yellow medic adds the spikes or the woolen hooks, telling itself not unreasonably that since its foliage attracts sheep, it is inevitable and proper that sheep should assume responsibility for its procreation? And, in the end, is it not on account of this fresh effort and this bright idea that the yellow-flowered medic is infinitely more widespread than its stronger red-flowered cousin?

V

It is not only in the seed or flower but in the whole plant, stems, leaves, roots that we discover, if we but lower our

heads for a moment over their humble work, many traces of a lively and shrewd intelligence. Remind yourselves of the magnificent efforts of thwarted branches seeking the light, or the ingenious and courageous struggle of trees in danger. For my part, I shall never forget the admirable example of heroism set to me by an enormous hundred-year-old laurel the other day in Provence, in the wild and delightful gorges of the Loup, fragrant all over with violets. You could easily read on its tortuous and, so to speak, convulsive trunk all the drama of its tough and difficult life. A bird or the wind, masters of destiny both, had carried the seed to the side of a rock that drops like an iron curtain, and the tree was born there, two hundred meters above the torrent, inaccessible and solitary, among scorching and barren stones. From its very first hours, it had sent its blind roots on a long and painful search for precious water and soil. But this was only the congenital concern of a species that knows the arid Midi. The young stem had to resolve a much graver and more unexpected problem: it set out on a vertical plane, so that its head, instead of reaching for the sky, leaned over the gulf. It had therefore, despite the crushing weight of the branches, to set the first surge straight, stubbornly to bend the frustrated trunk just above the surface of the rock, and thus—like a swimmer throwing back his head—by an incessant will, tension, and contraction, to sustain the heavy crown of leaves rising up into the sky.

From that point on, around that vital knot, were concentrated all the preoccupations, all the energy, all the



conscious, free genius of the plant. The monstrous bend, grown abnormally large, revealed one by one the successive anxieties of a kind of thought that knew how to avail itself of the warnings given to it by rain and gale. Year after year the dome of foliage grew weightier, with no other concern but to expand in the heat and light, while a dark canker ate away deeply at the tragic arm maintaining it in space. Then, obeying goodness knows what order of the instinct, two solid roots, two hairy cables, emerging from the trunk at more than two feet above the bend, came to moor it to the granite face. Had they truly been brought forth by distress, or else had they been waiting, perhaps with foresight, since the first days, for the critical hour of danger in order to enhance the value of their assistance? Or was it just a happy coincidence? What human eye will ever capture these silent dramas, too long-lasting for our brief lives?\*

## VI

Among the plants that offer the most striking proof of initiative, those we might call animated or capable of feelings would merit detailed study. I shall content myself by

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\*Let us put this together with the intelligent action of another root of which Brandis (*On Life and Polarity*) recounts to us the exploits. In getting stuck in the earth, it had met the old sole of a boot; to pass this obstacle, which it was apparently the first of its species to find in its way, it subdivided itself in as many parts as there were holes left by the stitch points, then, once past the obstacle, it reunited itself and knitted together again all its various rootlets, in such a way as to reconstitute a single, homogeneous taproot.

recalling the delightful terrors of that sensitive plant we all know, the shrinking mimosa. Other herbs with spontaneous movements are less well known; the *Hedysareae*, in particular, among which the *Hedysarum gyrans* or swaying sainfoin, which bestirs itself in a surprising way. This small leguminous plant, originally from Bengal but often grown in our hothouses, performs a kind of nonstop, intricate dance in honor of the light. Its leaves divide themselves into three leaflets, one broad and terminal, the other two narrow and planted at the base of the first. Each of these leaflets has its own different movement. They live in incessant, rhythmical, and almost chronometrical agitation. They are so sensitive to light that their dance slows down or speeds up according to whether the clouds hide or reveal the chink of sky they face. They are, as we can see, true photometers, and this well before Crookes's invention of the natural otheoscopes.

## VII

But these plants, to which we should add the *Droseras*, the *Dionaeas*, and many others, are nervous beings already going slightly beyond the mysterious and probably imaginary ridge that separates the plant from the animal kingdom. We have no need to climb that far, and we find as much intelligence and almost as much visible spontaneity at the other end of the world that concerns us, in the lower depths where the plant is barely distinguishable from silt or