PERSONALITY OF PLANTS

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PERSONALITY OF PLANTS

The Fuchsia has a Distinctive and Esthetic Manner.

To

EDWIN MARKHAM
and
ANNA CATHERINE MARKHAM

who live their poetry.

"That nothing walks with aimless feet;
That not one life shall be destroyed;
Or cast as rubbish to the void,
When God hath made the pile complete;

"That not one worm is cloven in vain;
That not a moth with vain desire
Is shrivel'd in a fruitless fire,
Or but subserves another's gain."

—*Tennyson.*

INTRODUCTION

“The natural world, so to speak, is the raw material of the spiritual. Therefore, ere man can understand the spiritual, he must understand the natural,” writes Thomas Gentry.

The authors of this book would go a step further and say that the natural world *is* the spiritual. Soul and body, ephemeral and material, on this plane of existence are ineffably bound together. If you would climb to sublime heights of ghostly exaltation, study first the grass at your feet. If you would unravel the mysteries of the universe, desert the cloistered hearth for the wonders of woods and meadows. Slow-thinking man will never understand the secret of his own existence, until he thoroughly understands the plants outside his window.

For one to examine dead, withered specimens and hope to understand Nature is as if a person should analyze hundreds of Egyptian mummies in order to acquaint himself with the human race. You must seek the flowers on their native heath and treat them as friends and equals. Too often is the human creature inclined to look upon members of the vegetable kingdom as things apart from the world of life—insensate beings which can be cut down and trampled without offense—mere “growths,” more akin to earth and stone than to himself.

As a matter of fact, among the many forms of matter which exist on this earth of ours, the only clear-cut division is between the organic and the inorganic. The primary characteristic which distinguishes a living creature from inanimate objects about it is, in

the words of Arthur Dendy, its power of "reacting toward its environment in such a manner as to conduce to its own well-being; of controlling not only its own behaviour but also the behaviour alike of its fellow creatures and of inanimate objects, in its own interests, thereby maintaining its own position in the universal struggle for existence."

If this, then, is the one characteristic which distinguishes all terrestrial life, it follows that all creatures from the unicellular protoza to man himself are intimately related, are all part and parcel of the same system, are recognizable by differences in degree but not in kind, and are all interesting manifestations of that mysterious thing we call life. No creature lives or dies to itself. The correlation of organisms in Nature is similiar to the correlation of organs in individual plants and animals.

If the reader will but face this fact, he will approach the study of Nature with a new reverence. He will recognize the oneness and kinship of all life.

It is largely the object of this book to explore the inner recesses of breathing and thinking plantdom—to take the reader beyond the limits of text-book botany into regions of sympathetic insight—to show how even human arts and sciences are unchangeably bound up with the lives and hopes of the grasses and flowers.

To do this comprehensively, it has been thought wise not only to indicate how plants think and act but to incorporate a broad general history of their race stretching back to their first appearance on the planet and carried forward to the Burbank creations. With this knowledge in hand, we are better equipped to approach that

fascinating realm which touches on the intelligence, the spirituality, the mysticism, the psychic phenomena, the higher life of plants.

In all this, the manifest independence of plant life and purpose is convincingly apparent. The plants have their own lives to lead and their own evolutionary processes to carry on. They completed the conquest of the earth long before the first human being appeared on its surface. Out of approximately a hundred thousand species of flowering plants, it has been estimated that only two hundred and forty-seven render direct and important service to man, and of these, only about fifty-four are utilized by him to any great extent.

While today it is no longer the fashion to believe that plants were created for man's *sole* benefit, yet it cannot be denied that, because of their physical limitations and inferior intelligence, the plants frequently become very docile servants of the human race, thereby thriving mightily and to their own great advantage. This is as it should be. It is a law of earthly life. The danger lies in the contempt which this servitude engenders in the consciousness of man, the master. The plants are inferiors but very wonderful inferiors. We should accord them the highest respect. We should accept our dominion over them as a favour of a beneficent Providence,—a priceless gift which it is criminal to squander or misuse.

CHAPTER I
ORIGIN OF PLANTS

"'Tis a quaint thought, and yet perchance,
Sweet blossoms, ye have sprung
From flowers that over Eden once
Their pristine fragrance flung."

"In the beginning God created the heaven and earth. And the earth was without form and void; and darkness was upon the face of the deep. And the spirit of God moved upon the face of the waters. And God said, Let there be light: and there was light!"

There is no greater mystery than the mystery of creation. Nowhere is its story told more eloquently and more scientifically than in the opening words of Genesis. All the fruitage of centuries of research but reaffirms this ancient narrative.

In the early days of this planet, when its crust was scarcely hardened from the molten state, there reigned what might be called the age of water. The entire surface of the globe was covered with a sea of restless, moving liquid, overcharged with a heavy atmosphere of vapour, so dense that not a single ray of light could penetrate it. As the process of cooling went on, more and more moisture condensed out of the air, until finally the first ray of light reached the universal sea and terrestrial day began.

Here in this dim, watery world, about the time that the first land began to emerge from the deep, by some divine, mysterious agency, the first life was born.

No doubt it was one-celled, free-moving, and like modern Flagellates, partaking of the nature of both plant and animal.

Slowly, and in response to evolutionary promptings, simple aquatic plant forms began to develop from the primary single cells. Animal life may have begun a simultaneous development, but if it did, it did not become strong enough to make any impress on the geologic rock from which we draw our data.

Certainly the plants were in the ascendency. The mobile green Algae were characteristic of the time. It is a remarkable thing that though they are probably the progenitors of all that vast world of vegetable life which enriches the world today, the Algae have always gone on reproducing their own kind. Today we can watch, under a microscope, the activities of the first form of terrestrial life, born incalculable aeons ago.

Mayhap the earth would be peopled exclusively by Algae and similar forms today, if it had not been for a prehistoric accident. One day, the water suddenly receded from a bit of land and left some Algae in the mud behind it. Now, the Algae had always been used to plenty of water and they saw that unless they did some quick thinking, they were in danger of drying up and blowing away. Accordingly, by common consent, they secreted and surrounded themselves with a jelly-like mass capable of absorbing and holding water. The amphibious Liverworts and the *Ricciocarpus Natans* do the same thing today.

With the Algae successfully living in the mud, surrounded by their mucilaginous water-reservoirs, it was but a step for some enterprising individual to extend a portion of his own tissue in

search of more water. By this simple act, the first root came into being, and lo! there were terrestrial plants.

It is to be noted that all development in the plant world is born of necessity. To the plants, dependence upon water, food and the impulse to reproduction may be ascribed the start of many a new form among them. In the more complex groups we seem to see a conscious striving for higher and better things, but the lowlier species often need the goad of circumstance to force them to attainment.

When the plants first emerged upon the land, a number of structural changes became necessary. Whereas in the marine world, water is absorbed directly by all parts of the plant, in land life special organs of absorption and conductivity must be developed. At first, the roots were mere rhizoids or hairs, aided by water-drinking leaves and tubers, as in the Mosses and Liverworts today; but it was not long before true root and vascular systems were evolved. Other changes which came with terrestrial life were greater rigidity of tissue and devices to guard against evaporation. Leaves were developed for the purposes of manufacturing starch by photosynthesis, spreading out into thin layers in order to present the greatest possible surface.

These lower land plants retained and still retain some characteristics of their aquatic ancestry, notably swimming spore cells, as in the Mosses. The formation of rigid cellulose about vegetable cells stops their movement, except when cilia or projections of protoplasm extend through openings in the cell walls. The Liverworts were probably among the first real land plants: their spores are non-motile and they have a massive, foot-like organ for the absorption of water.

To the liberality of Nature we must ascribe the development of the law which ties the plants to the soil. They started out as animals, but enjoyed such an abundance of food that it became unnecessary for them to go in search for it. Water and carbon dioxide, which formed their principal means of subsistence, were all about them; they settled down to a life of quiet ease. When Corals, Sponges, Oysters and other lower animals are similarly situated, they become as firmly rooted as any plant. Moreover, they have free-swimming larvae analogous to the active zoospores of certain members of the plant world.

The first land vegetation of the globe must have presented a curious spectacle. Imagine a forest consisting of endless repetitions of Algae, Fungi, Lichens, Liverworts and Mosses, with many forms of gigantic sizes. The fresh-water Algae early developed a clever device to save their race from extinction by drought. Certain cells in each plant became hard and devoid of water, presenting that phenomenon of suspended animation to be observed in many of the higher seeds. When drought overtook any particular plant, it died, but these special restive cells lived, and were carried about by the wind or other agencies until a new abundance of moisture called them out of their trance. As zygotes, they exist in the Nostoc today.

The first plants were non-sexual and propagated by cell division. They were therefore capable of little advancement. With the introduction of the sex element, infinite possibilities for racial improvement and differentiation were opened up. The Mosses and Ferns belonging to the family *Archegoniatae* early established an alternation of generation in which the spores give rise to a small plant which looks like a Liverwort and bears the reproductive organs. The fertilized ovum of this plant grows into a leafy, sexless

individual which produces spores non-sexually. We therefore have a generation endowed with sex organs making for development and progress, alternating with a sexless generation calculated to continue the tendencies of the race.

It is undoubtedly the sex element which accounts for those "sports" or mutations in plantdom which occasionally overstep the limits of species to form new species.

In the luxurious atmosphere of the early globe, vegetation waxed strong and vigorous and attained remarkable proportions. The primeval woods served to draw the superabundant carbon from the air and in millions of decayed bodies store it up as graphite, coal, petroleum and illuminating gas. The present day graphite beds alone represent vast quantities of ancient vegetation. It is a unique experience to be able to write or draw pictures of these prehistoric plants and use, in the carbon of our pencils, portions of their very bodies.

Everything was on a grand scale in the "Old Red Sandstone" age. There were no real trees yet, but the Asterophyllites, with their tall, slender stems, looked much like Palms. The Eryptogams were immense Mushrooms. Algae, Zostera and Psilophytons covered the shores with a tangle of seaweed vegetation.

In the succeeding carboniferous period, the plant world reached the climax of its dominion. While the variety was still very much limited, its vigor and luxuriance were astounding. The Tree-ferns seem to have come down to us unchanged from that time, but other plant descendants have dwindled in size greatly. Our humble Mares' Tails were then twenty or thirty foot trees called Calamites. The Club-Mosses were giant Lepidodendrons. Other immense

plants which have no direct descendants were the Sigillarias and the Lomatophylos. With its flexible, fluted and checkered stems, saw-edged leaves, and hanging garlands of parasitic Ferns, the carboniferous forest presented a remarkable scene.

The air was still very moist, covering the entire earth with a permanent fog and a uniform temperature. It is said that certain present-day islands in the Pacific Ocean approximate these ancient conditions.

All the plants of that time were flowerless, and belonged to neither the monocotyledonous nor the dicotyledonous classes, which include the greater number of families today. Thanks to many excellent specimens found in coal mines, it is possible for scientists to classify as many as five hundred families. It is believed that coal itself was mostly formed from small plants, but often entire trunks of the tree-like forms are found in bituminous strata. Bits of bark, cones and petrified leaves have also been unearthed at different times.

In the course of evolution, the Conifer trees were the next to develop extensively. They gained a great ascendency, but were succeeded by Palms, Alders, Cypress and Elms. By the Miocene period, all the forms known in tropic Africa today had come into existence, but were restricted by no such regional limitations as they labour under now. Oaks and Palms, Birches and Bamboos, Elms and Laurels grew side by side. The Palms reached as far north as Bohemia, Switzerland and Belgium. Maples, Lindens, Planes, Spruces, Magnolias, Persimmons and Pines flourished in Greenland. The Silver Fir and the Southern Cypress advanced to within two hundred leagues of the North Pole. The California

Redwoods and Sequoias are survivors of a race which flourished in this age.

Man came very late in the earth's evolution, but he has had a profound effect upon the plant world. His most noteworthy feat has been to take comparatively weak plants like the grains and, for his own purposes, give them large areas in which to grow. Wheat, Maize, Yams and Tobacco became widely diffused as cultivated plants before the historic era. It is probable that Rice and the Legumes were first domesticated in Asia; Barley and Wheat in Egypt; and Maize, Potatoes, Yams and Manioc in America.

The origin and development of plants is a fascinating study. So authentic are the records which they have left in the eternal rocks that we have little difficulty in reconstructing their entire race history.

THE LIFE OF A DAISY IS SPENT IN BRIGHTENING OUR FIELDS AND PASTURES

CHAPTER II
LIFE OF A PLANT

"We cannot pass a blade of grass unheeded by the way,
For it whispers to our thoughts and we its silent voice obey."

—J. E. Carpenter

The growth and development of a plant, though such a common thing, is full of very real wonder and mystery. It takes only a little observation to discover the various stages in the process, but how they are brought about and by what laws they are governed, not even the most astute investigators can always say.

To the lay mind, the statement that the plants depend upon the soil for their nourishment is quite self-evident, yet it is extremely inaccurate. It is now quite certain that the vegetable world relies upon the *air* for its largest and most important food supply. The great mass of carbon which is the chief constituent of all plant structure is drawn almost exclusively from the atmosphere. While it is true that many vital elements are obtained from the earth, all green plants manufacture the greater part of their solid material out of the carbon dioxide of the air. Of what the plants do obtain from the soil, water makes up the largest bulk. The bread and meat of the plant world is carbon dioxide; the drink is soil water in which is dissolved certain essential salts and condiments.

A chemical analysis of a Green Pea will show approximately 46.5% of carbon, 4.2% of nitrogen and 3.1% of all other elements,

exclusive of the hydrogen and oxygen which make up the water permeating all tissue.

This is truly a startling fact. Instead of belonging to the earth, the plants then belong primarily to the air. The air is their natural habitat; the earth serves to give them a fixed place in the world and provide them with flavoured water to drink.

Plants are born from seeds, the joint product of two previous individuals; they live by eating and drinking; they marry and in turn rear families of their own. It is our purpose in this chapter to show, in a very definite way, that this is not mere figurative language but a common-sense statement of fact.

The cycle of plant life can be illustrated by any dicotyledonous, herbaceous annual. If one is so inclined he may hark back to his high school days and plant a few Beans in a box as a practical illustration of the facts stated here.

The first action of the planted Bean is to absorb water to a prodigious amount, and so wake the quiescent life forces which may have been slumbering within it for years. It is a law of animal and vegetable life that all vital processes must be performed in solution. Without water, life is dead or somnolent.

When Nature made the Bean, she left a small opening or window in its skin-wall called the micropyle. Through this opening of the water-swollen seed, now issue two pale sprouts. One is long and pointed; it is the radicle or incipient root. The other is stubbier and is tipped by a cluster of folded, yellow-green leaves; it is the plumule or incipient stem. With unerring exactness, the radicle grows down into the soil and the plumule feels its way up into the air.