THE PRINCIPLES OF BOTANY: AS EXEMPLIFIED IN THE CRYPTOGAMIA. FOR THE USE OF SCHOOLS AND COLLEGES

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The Principles of Botany: As Exemplified in the Cryptogamia. For the Use of Schools and Colleges by Harland Coultas

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HARLAND COULTAS

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BY

HARLAND COULTAS.

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TO

T. S. ARTHUR, Esq.,

AS

A TRIBUTE OF ESTEEM FOR HIS TALENTS AND VIRTUES,

This Little Book

IS

RESPECTFULLY DEDICATED,

BY

THE AUTHOR.

INTRODUCTION.

THERE is no department of natural history which is more important, beautiful, and interesting than Botany, or the natural history of plants. Let us take, not a costly exotic from the conservatory, but any common wild flower or weed. What exquisite symmetry and elegance of form! The choicest works of art, the most finished productions of genius, are but as the poor efforts of savages when contrasted with this wonderful work of nature! We know that this humble flower grows when fanned by winds, watered by rains, warmed by the sun, and that it must derive some portion of its substance from the soil. But how does Nature form this green leaf and this beautiful blossom? We see her constantly engaged in building up these living forms, and weaving the air, the earth, and the water into every imaginable variety of vegetable fabric. The whole earth is, in fact, one vast chemical laboratory or workshop, where Nature is ever operating with an untiring industry in fabricating living forms out of lifeless inorganic matter. Let us endeavor to trace the movements of this glorious mechanism framed by the hand of the Almighty; let us "consider the lilies of the field, *how* they grow."

And let it not be assumed, at the outset of this investigation, that the intelligence of man is incapable of searching out

the mysteries of vegetation. Before the time of Newton, there were many men who had seen apples fall to the ground without ever reflecting on the cause of their fall. Newton saw the same, and thought. The result of his reflections was the production of his immortal work, the *Principia*, and the development of the theory of gravitation. He showed with what small means Nature attains the most magnificent results. It was the mutual attraction subsisting between the earth and apple that brought the apple to the earth's surface; and the same mutual attraction retains the moon and planets in their orbits, causing them to sweep out in immensity those sublime curves with which the mind of the geometer is familiarized. It is by the attraction of other suns that our own sun, or rather star, is upheld in space; whilst all the stars that sparkle on the roof of night, and whose light comes to us from the most distant regions of the universe, are upheld by mutual attraction. Such was the sublime discovery of the illustrious Newton. What though the means which Nature employs in the construction of the various forms of plants is at present only imperfectly understood—if the law that regulates the motion of masses of matter has been discovered, why not the law which governs the motion of atoms of matter, and causes them to collect around every germinating seed or growing plantlet, so as to develop it with such unchanging constancy and regularity into the same definite form of life and beauty? Man is not destined to continue forever hopeless and helpless amidst the forces of nature. It is his prerogative "to subdue the earth," and "have dominion."

The law of material attraction may be thus expressed: Mat-

ter may attract matter at all distances from zero to infinity. This attraction takes place with a force varying directly in proportion to its quantity, and inversely as the square of the distance. Now when matter collects into masses, as we see it has done in the case of the starry heavens and planetary bodies, two or more bodies, thus mutually attracting each other, separate sometimes to distances all but infinite, but according to a fixed and determinate mathematical law, the distance being in exact proportion to the ratio of their respective magnitudes and quantities of matter. We call the name of this species of attraction, *gravity*. But when matter retains its elementary condition, and exists in the form of those invisible particles called atoms, two or more mutually attracting particles must be brought by the same law infinitely near to each other before they can exercise any mutual influence; and we give the name of *chemical affinity* to this kind of attraction.

To apply this philosophy to plants. They are the result, principally, of the atomic or chemical affinity, *combined with other agents*, and are a beautiful pile of matter borrowed from the atoms in the earth and air, and united together by the operation of natural laws for a little space of time. Fabricated by nature as material for the building up of higher organic forms, they perform their part in the ever-shifting scenery of life, and either become incorporated as food into animal bodies, or else, retaining their state as plants, they are the instruments used by nature to extract fertilising principles from every falling shower and passing breeze, which they impart to the soil on which they finally decay. The end of