

## THE CRYPTOGRAMS OR NON-FLOWERING PLANTS—WHAT THEY ARE, AND THEIR IMPORTANCE

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(Editor's Note:—The Cryptogams, or non-flowering plants, are of immense importance in the economy of Nature, and comprise thirteen out of fourteen major divisions of the Plant Kingdom. Large collections of them have in the course of years accumulated in the Herbarium of Field Museum, and some of them are represented in the botanical exhibits, but it is only recently, with the addition of Dr. Francis Drouet to the Museum staff, that it has been possible to give them anything approaching the scientific attention which they demand. —B.E.D.)

Perhaps many more than half the species included in the Plant Kingdom are those which bear no flowers or seeds; most of them have no leaves, stems, or roots. Such plants as a group are often spoken of as the Cryptogams. Familiar to us are the ferns, the mosses, the fleshy fungi, the molds, the lichens, the seaweeds, and the pond-scums, most of them large enough to be recognized with the naked eye. Less familiar, but of far greater economic importance, are the thousands of species of bacteria, fungi, and algae, which may be seen and recognized only under the microscope.

The bacteria comprise many hundred species of extremely small, single-celled, and mostly colorless plants which have little distinguishable internal structure. They all are parasites on other living things, or secure their food from dead or other organic matter. Many are useful to man; others are harmful. Certain species live within the bodies of human beings and other animals, and some of these produce poisons which cause such diseases as tuberculosis and pneumonia. Other species live in the bodies of larger plants. The amount of damage which they do to the leaves and fruits of trees and herbs is of vast importance to the agriculturist. Nitrifying bacteria live in the soil and in the roots of leguminous plants; they convert nitrogen of the air into nitrates, which are absorbed by green plants. Certain bacteria are responsible for the souring of milk, the spoiling of foods, the production of vinegar, and the decay of organic matter of all sorts. The bacteria are of such unparalleled economic importance to medical science, agriculture, and various industries that the highly specialized science of bacteriology has been developed.

### THE CHIEF SOURCE OF IODINE

The algae are an even more extensive group of species, comprising both large and

microscopic forms. The plant bodies consist of single or many cells; they all contain the green coloring matter (chlorophyll) which enables them to manufacture food from inorganic substances. The largest algae are the seaweeds, some of which exceed all other plants in length. Most of these are colored red or brown and grow in greatest abundance in shallow marine waters along rocky shores. They are the world's chief source of iodine and an important one of agricultural fertilizers. Some are used as food by many people, especially in the Orient. In both fresh and salt water there occur the diatoms, flagellates, and other microscopic algae. The federal and state bureaus of fisheries expend much money and time in the study of these unicellular plants, which are the basic source

plants or animals, or from other organic matter. They are responsible for certain human ailments, especially those of the skin, and for the majority of diseases of crop plants, which entail yearly losses of millions of dollars to the farmer. The molds and the fleshy fungi, along with the bacteria, bring about the decay of dead bodies of animals and of other plants. Mushrooms and certain other fleshy fungi are annually assuming more and more importance in American cookery. Still other fleshy fungi are deadly poisonous when eaten. The yeasts are unicellular fungi upon whose life processes the baking and brewing industries are founded. The yeast plants change sugar to alcohol and carbon dioxide gas, and, according to species and ingredients, are agents in manufacturing beer, wine, whiskey, etc. Gas from yeast makes bread dough rise.

The lichens are composite plants, made up of fungi and algae living together. They grow on rocks, trees, and soil. All are large enough to be seen with the naked eye. They often develop best upon poor, barren soils, especially in arctic regions, where they constitute the only food of herbivorous animals.

### EROSION PREVENTIVE

The mosses and liverworts are small green plants, never microscopic, many with stems and distinct leaves. They grow on soil, rocks, and trees, and in water. Those in the water are responsible for the formation of bogs. By gradually filling lakes and ponds with their own remains they bring about the ultimate disappearance of these bodies of

water. The mosses, lichens, and soil algae cover bare soils, and are important in preventing erosion in deforested areas.

The most familiar green cryptogams are the ferns and their "allies," all rather similar in structure to the flowering plants. The ferns comprise many species, most of which live in the tropics, a few in temperate regions. Thousands of years ago these plants, with the horsetails, clubmosses, and extinct seed ferns, were a far more important component of the flora than they now are. Some grew to enormous sizes, as may be seen in the Hall of Plant Life (Hall 29), and in the reconstruction of the flora of the Carboniferous period in Ernest R. Graham Hall (Hall 38). Various species now living have economic uses.

Representative types of all these groups of cryptogams are on display in Hall 29.



Collecting Cryptogams

Curator Francis Drouet is seen in search of algae in a pool in the bed of the Rio Pacoty, Ceará, Brazil. The plants are gathered in the vasculum or collecting pan which is strapped over the explorer's shoulder, and brought back to camp for sorting, study, and packing for shipment home.

of food for all animals of the sea and of fresh water. The diatoms, the blue-green algae (Myxophyceae), and the green algae (Chlorophyceae) grow not only in water but also on soil and moist rocks. With the mosses and lichens, they are suspected of being responsible for the rehabilitation of poor and worn-out soils. The microscopic algae, and especially the Myxophyceae and flagellates, may develop in such abundance as "water-blooms" in reservoirs that serious damage may be done to city water supplies. Deposits of shells of diatoms which grew in the sea thousands of years ago, known now as diatomaceous earth, are used as polishing and insulating agents in industry.

The fungi are perhaps the largest group of cryptogams. They have single- or multi-celled bodies which contain no chlorophyll. Their food is derived from living





Drouet, Francis. 1939. "The Cryptogams or Non-flowering Plants - What They Are, and Their Importance." *Field Museum news* 10(4), 4-4.

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