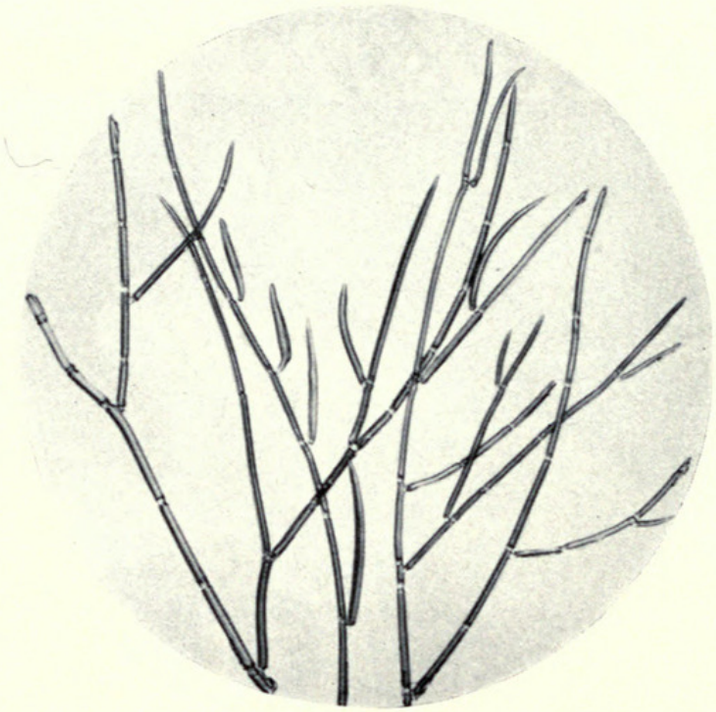
FEATURED EXHIBIT FOR SEPTEMBER



Cladophora: A widely distributed green alga.

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THERE are many marvels in the world of plant life. It is very difficult to see and appreciate many of these, however, because they are located in distant places, are rare, or are too small to be seen without a microscope. Chicagoans are fortunate to have at hand, in Lake Michigan, one of the most marvelous forms of life, the microscopic algae, which abound in these waters in a variety difficult to imagine—and to have in the Museum, in the Hall of Plant Life, a series of enlarged glass models, hand-blown with exquisite skill to illustrate the principal groups of bacteria and algae. These exhibits bring into view, as though one were peering at them through a microscope, details of form and color in a variety of these tiny plants which directly or indirectly are involved in our daily lives. It is in overcoming such difficulties of size, distance, time, and situation that Museum exhibits serve their most useful educational purpose.

Among members of the plant world which form a large part of the free swimming or floating organisms called plankton, are the diatoms: tiny, one-celled algae from 1/5000 of an inch in diameter up to the size of a pin head. Despite their small size, they have an unusual beauty scarcely equalled by any other form of life in the intricate markings, beadings, and designs borne by their exterior cell wall of silica. For this reason, diatoms are often called the "jewels of the waters." The outer layer of silica is as indestructible as glass or quartz. Among the great variety of forms we can find disc shapes, with radial or concentric designs, canoe shapes, triangles, quadrangles, and other geometric forms. Sometimes diatoms live free as single units, or they may be united in long filaments set end to end at opposite corners to resemble a complicated game of dominoes, or they may be joined together laterally like shells in a cartridge belt. In addition to beauty of design and unique form is the attraction of their golden color. When sunlight strikes shallow water containing diatoms the water appears to glow with a golden light, because in addition to the green chlorophyll common to all algae, diatoms have a brown pigment which masks the chlorophyll and produces the golden color.

These ornamented little gems possess a special and intriguing method of movement which is one of the most unique in the natural world. Without the aid of either flagellae or cilia, which are common to other motile unicellular forms, the diatoms appear to use a slow-motion form of jet propulsion achieved by expelling a mucilaginous substance which propels them forward.

Diatoms are a major source of food for all animals living in water, beginning a nutritional chain when, with the aid of sunlight, they build organic matter by photosynthesis. Diatoms are eaten by very small crustaceans; these are devoured by small fishes and by larger crustaceans; these in turn are eaten by larger fishes, which may be caught by man. Therefore, the chain of life begun by the diatoms is ended in the frying pan of a lucky fisherman.

Diatom "shells" form large deposits known as diatomaceous earth, which is used in many ways—in insulating and sound-proofing materials, paints, filters, toothpaste, and polishing powders, to name only a few. Although some of us may think that we and the diatoms lead separate lives, we are actually quite close, as there are many diatoms not only in our bird baths and fish tanks but we also brush our teeth with diatoms and take baths with diatoms!

The diatoms are not the only wonders offered us by Lake Michigan. There are the flagellates, which present characters of both the animal and the plant world, to such an extent that it is impossible to decide to which of the two great groups in which man has divided the living world these belong. For instance, in comparing a cat and a daisy, it is easy to apply our classification keys and decide which is plant and which is animal. Such keys, however, do not easily apply

OSCOPIC PLANTS:

Michigan's "Jewels"

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to this minute organism, for man's methods of classifying living material were made before he encountered this form of life. Therefore, in observing the specialities of *Euglena viridis* (a flagellate represented in our exhibit) we find that it contains chlorophyll as do most plants, that it moves about as do most animals (and some plants), and that it feeds at times as an animal does but at other times as a plant, manufacturing its own food with the aid of sunlight. Thus flagellates represent a generalized way of life that many plants and all animals still retain at some stage of their life cycles: the one-celled flagellate form.

Among the numerous other forms of microscopic plant life in the waters of our lake are green algae, many of them having unusual shapes that might have inspired the futuristic painters (see *Scenedesmus* and *Staurastrum* in our exhibit). One of the most important of the green algae, *Chlorella*, has become almost indispensable in physiological research laboratories because it is easy to obtain, to handle, and control, and exhibits very rapid reproduction and growth. It was chosen by Dr. Melvin Calvin and his associates at the Radiation Laboratory of the University of California as the green plant to be used in their efforts to uncover one of nature's most closely guarded secrets—the intermediate steps in photosynthesis. In addition, this diminutive alga has been considered as a possible solution to the problem of feeding the world's starving millions, as it can produce annually an estimated 20 tons of food per acre as compared with 1 to 2½ tons per acre produced by corn. In one day's time *Chlorella* can double its weight, using only the most simple materials and sunlight, and thus may well be the hope of future humanity.

In the shallow water of Lake Michigan's quiet areas are found the so-called "blue-green" algae, a group that has characteristics of very primitive organisms. Like bacteria, they have no organized nucleus; in fact, in some blue-greens there is no evidence of any structure resembling a nucleus. Reproduction takes place by simple division. They do have chlorophyll, enabling them to manufacture food as do other algae, but it is masked by a blue pigment. They, along with some of the bacteria, are able to utilize free nitrogens in their manufacture of food, which other algae cannot do. They can live alone or in colonies. These colonies may appear as filaments, or may form large gelatinous masses, such as *Nostoc*. Some genera move about by means of oscillation, turning from one side to the other, but the remainder of the genera are not motile.

On the lake bottom in shallow water can be observed many filaments of green color which belong to the sedentary green algae. Among them we find the common *Oedogonium* whose various stages are clearly illustrated in our exhibit; *Ulothrix*, which literally carpets the shallows of all of the Great Lakes and is responsible for the green appearance of Niagara Falls; *Cladophora*, which has the largest world distribution of any filamentous alga and forms great masses known as "lake balls"; and *Spirogyra*, or "water silk," with its ribbon-like chloroplasts interlaced in a spiral form, resulting in such great beauty as often to monopolize the attention of the students using a microscope. Another green alga is *Hydrodichtyon*, or "water-net," which forms colonies in the shape of a mesh bag. The net or mesh is made by the conjunction of many individuals at certain points to form pentagons and hexagons. Although *Hydrodichtyon* is very widely distributed throughout the world, it is also "rare" in the sense that it occurs only in isolated or locally limited spots—for example, one population may occur in South Africa, another in Siberia, another in Argentina, and one in Illinois.

Of course we have to tolerate a few inconveniences which accompany these marvelous algae—that fishy taste and smell of the water in the summer months is attributed to oily food reserves built up by diatoms and by the flagellate *Dinobryum* instead of starchy food reserves commonly built by other plants. The large colonies formed in our lake by these organisms may clog filters of pumping stations of the city water supply. However, when we consider our pleasure in their beauty, their great usefulness in numerous manufactured products, and in our research laboratories, the slight difficulties they may cause are far outweighed by the many benefits afforded us by these micro-organisms with which we are closely associated in our daily lives.