

algae and fungi. Algae are thallophytes which contain chlorophyll, the green coloring matter found in plants, and are able to manufacture food from inorganic material. They are variable in size, ranging from forms visible only by means of the microscope to salt water forms with enormously bulky bodies.

Although all algae contain chlorophyll, some of them do not appear green owing to the fact that other coloring matter is present in the cells. It is easy, therefore, to subdivide algae into groups according to their color, which variation is accompanied by constant differences in habits and methods of growth. The constant termination phyceae which appears in the names is a Greek word meaning "sea-weed," which is a common name for algae; while the prefix in each case is the Greek name for the color which characterizes the group.

The four subdivisions are as follows:

- (1) Cyanophyceae, or blue green algae.
- (2) Chlorophyceae, or green algae.
- (3) Phaeophyceae, or brown algae.
- (4) Rhodophyceae, or red algae.

The phaeophyceae and rhodophyceae are found only in salt water. Therefore, they are eliminated from consideration as affecting the fresh waters of the State. While the cyanophyceae, owing to their methods of reproduction and growth, are in some classifications not included in the algae, they are important in connection with the study of the storage of water and are accordingly placed with the algae for convenience. The cyanophyceae and chlorophyceae are therefore the important forms of algae in which we are directly interested. Each of these groups includes numerous varieties, the identification of which is sometimes difficult. By observing the characteristic color of the growth it is easy to classify the same into either of the two main subdivisions which are found in fresh water. If it is desired to ascertain the particular variety, it is necessary to use a microscope by means of which the individual cells may be observed and recognized.

The cyanophyceae give rise to grassy or moldy odors, while the chlorophyceae are characterized by a fishy or oily smell. Some of the growths appearing early in the summer are aromatic or sweetish. These odors become intensified as the algae increase in numbers and as others decay. In order that those who are not familiar with the effects of algae upon public water supply may realize to a degree the seriousness of such a condition, the following facts are given relative to a particular supply in Ohio.

The water supply of the village is obtained by impounding the waters of a stream having a small watershed. The water is delivered to the pumping station by gravity and is elevated to a small open distributing basin located on a hill near the village. The algal growths develop in the impounding reservoir each summer and are carried through the mains to the distributing tank, from which the water is delivered by gravity to the consumers. The open basin located on the hill is exposed during the summer to direct sunlight, which condition is especially suitable for the developing of algae. The tastes and odors which are observed early in the summer gradually become more pronounced as the season advances, until in the early fall the water is so objectionable that it cannot be used for drinking, cooking, or bathing purposes, and is used only for lawn and street sprinkling. It is objectionable even for these uses, and the odors caused by sprinkling are so marked that it is necessary to close windows and doors to keep them from entering the houses.

Algae are not only found in reservoirs used for the storage of surface water, as the one mentioned above, but also quite frequently in those in which well water or filtered

water is stored. The growths often appear on the surface of filters, and in such cases are very difficult to remove. When the temperature of the water is from 60 to 80 degrees Fahr., the algal growth is facilitated.

The prevention of algal growths in water to be used for drinking purposes is no small problem. It has been studied by many scientists who have practically decided that copper sulphate or blue vitriol is the best substance to use. Its use, however, is attended by many complications which require that it be applied only under expert supervision. Blue vitriol is known to be highly poisonous so that great care must be exercised in its use in order to prevent sickness. Another complication attending its use is the variable amount required to destroy the different species of algae. A careful microscopic analysis is therefore necessary in order to identify the growths. Even though the algae are destroyed, the tastes and odors will not disappear unless the decaying matter is removed. In many cases the growths soon reappear and it is necessary to repeat the treatment.

Probably the safest although not always the cheapest method of protecting water supplies against algae is to provide covers for the storage basins and at the same time keep the basins clean. The presence of organic matter and light, it will be remembered, are the two most important elements promoting the growth.

In one case the growth was prevented by pumping continuously to the reservoir, allowing it to overflow. This kept the temperature low and prevented the water from becoming stagnant. This, however, is a very expensive method as large quantities of water are thereby pumped to waste.

The removal of algae from filter beds is very difficult. In one instance, where tub filters are in use, much trouble has been experienced. The filters have been scraped and treated with copper sulphate, and several times the entire filtering material has been removed and washed. The treatment, however, was not successful though large quantities of algae growth were removed. The most successful method used at this particular plant was the sterilization of the filters by means of steam.

It will be readily seen, therefore, that the presence of algae in the water supplies of the State is a serious problem and one which requires careful and serious attention. No one method of protecting a water supply as outlined above will be successful in all cases, and it is evident that a careful study should be made of each particular problem. In order to do this a consulting engineer should be retained whose duty it should be to recommend possible changes in the method of handling the supply, or who should oversee the proper treatment of the water. This is the only logical and safe method to be used in preventing or destroying algal growths and in furnishing a water suitable for domestic and drinking purposes.

CANADIAN TIMBER.

Over three-fifths of the Canadian-grown timber used in the manufacture of furniture and cars in Canada is used in Ontario. Native hardwoods are more plentiful and varied in Ontario than in any other province, a consideration which is partly responsible for the importance of Ontario in furniture and musical-instrument manufacturing. Aside from Prince Edward Island, where, of the total of 79,000 feet used, 77,000 feet were native-grown, Ontario imports a smaller proportion of wood than any other province. About one-quarter of the wood used in Ontario is imported, as is one-third of the wood used in Quebec and seven-tenths of the wood used in Nova Scotia.