TREE TOADS.

C. FEW SEISS.

These arboreous batrachians quit their places of hibernation, and resort to ponds and other bodies of water, about the latter part of April or first of May, where they couple, and the female deposits her spawn or eggs. These are generally attached in clusters of three or four, and strung along the surface of the water, fastened to grass or water plants. The eggs hatch in two or three days, according to the temperature—cold retarding and heat accelerating the hatching. The little tadpoles have branching gills, as with the frogs generally, for about a week, when they disappear. In a little less than two months their legs and arms are fully developed, the tail is entirely absorbed, and they quit the water, perfect little tree toads.

When mature, they are generally solitary in habits, each toad having a particular tree for his habitation, mostly one containing a hole or crevice, into which he can retreat from the rays of the hot summer sun. A toad has been known to resort to the same tree for many years in succession. They are also found on old rail fences, but as they so nearly resemble the gray color of the fence rails, they are generally passed by unnoticed. In the month of October they creep into the soft earth, some sheltered crevice, or the decomposed debris under some old tree or rotten log, where they hibernate until the following spring.

I have had many of these tree toads in captivity for months at a time, and their prevailing color was pale ash, tinted here and there with delicate pale green, although they would assume various tints of gray and grayish-green.

During bright and sunny days they generally remained quiet in some corner, in a squatting position, with their legs closely drawn under their bodies; but toward evening would become active, springing and creeping from one side of the vivarium to the other for the greater part of the night. They could walk easily upon the glass, but if they stopped for an instant would slide slowly downward. They would seize with the tongue, and devour, all small insects given to them, and also half-grown earthworms, but they seemed to be afraid of large beetles and grasshoppers. Indeed, I have known the larger frogs to permit certain grasshoppers to escape after having been seized, because their tongue and jaws were so severely scratched by the grasshopper's strong and spiny leaping legs.

The upper figure shows the structure and pigment or spider-like cells of a piece of skin from the back of an adult tree toad, as seen under the high power of the microscope. The change of color is thought to be produced by the emptying or filling of these minute pigment cells. The change of tone from gray to green seems to be entirely at the will of the animal, and not caused by anger or fear, like blushing or pallor in man, as some have suggested. I have observed that neither frightening nor teasing would cause them to change from their normal color. The name of our noisy little tree toad is *Hyla versicolor*. Its form is toad-like, but more flattened; skin more or less warty above and granulated beneath.

Color changeable, from pale ashy-gray to delicate green and grayish-brown; back and sides blotched with irregular dark marks, sometimes conspicuous, at other times obscure. Generally a whitish spot under each eye. Abdomen white, yellow near the thighs. Legs, ash color above, with several transverse bars or spots of dark gray or brown, beneath yellow. Fingers, four; toes, five, well webbed or palmated—each of the digits ending in a cutaneous globule or disk. Length (from nose to vent) of a full grown adult, $1\frac{1}{4}$ inches. It has been found from Great Bear Lake south to Georgia and Louisiana, and from the Atlantic States westward to Michigan and Kansas.

THE *Northwestern Lumberman* thinks there is no reason to doubt that woods have what may be called their affinities. It has been stated on authority that has not been questioned, that certain woods (both dry) when placed in contact will soon rot, but when in contact with other woods will not rot. It would be reasonable to suppose that the nature of a piece of wood has its likes and dislikes, that it will repulse and attract; in other words, that it is affected by that with which it comes in contact. Were it not so, it would be an exception in the mineral, animal, and vegetable kingdoms.

A New Sewage Process.

BY A. MC DONALD GRAHAM, F.C.S.

In carrying out my experiments, I have observed that when a large excess of pyrites is acted on by the process, sulphurous anhydride is formed and passes off in the gaseous state, and sulphate of iron remains in the mixture. If any oxide is added to the mixture, such as oxide of zinc, iron, or manganese, then a sulphate of the metal is also obtained.

In order to obtain a good sewage precipitant by this process, an oxide must be selected which will form a stable salt with sulphuric acid, and is not liable to peroxidize, and which can also be acted on any number of times; and it is absolutely necessary that this oxide should exist in large quantities, and be obtainable at a moderate price. Binoxide of manganese fulfills these conditions; and in order to form my sewage precipitate, I take this oxide and add to it iron pyrites in a fine state of division, more than sufficient to convert the whole of the oxide of manganese into sulphate. As a medium for conveying the oxygen of the air to the mixture I use about 5 parts of finely divided clay to 1 part of manganese. This is cheaper than carbonate of soda, though somewhat slower in its action, and in the many experiments I have performed I have found that very few samples of clay are attacked during the operation. After well mixing the powdered binoxide with the pyrites and fine clay, I place them in a muffle furnace, and heat the mixture, gently at first, and afterward to incipient redness, or about 1,000° to 1,200° Fah. After heating for about three or four hours, the oxidation will generally be found to be complete, and the whole of the manganese will be converted into sulphate, together with a part of the iron. The mass when cool should be sprinkled with water, and allowed to remain in a damp condition for a week or more.

Two chemists of much experience as practical analysts have examined the process quantitatively, operating upon 3 or 4 pounds of the mixture, and have obtained excellent results.

In operating on the sewage, the sulphates of manganese and iron may be used with a certain proportion of clay, which is a well known defecator of sewage. Charcoal may also be associated with the manganese, etc., if the sewage is much discolored. Should the sewage be acid, from the influx of chemical refuse or any other cause, it will be necessary to use a little lime; but in a general way the sewage will be found to be sufficiently alkaline to insure the precipitation of the manganese and iron, and the constant use of lime should be avoided. An effluent water obtained by the addition of much lime to a sulphate of alumina or iron has been found by experience to generate sulphureted hydrogen and other offensive gases.

The effect of clay in carrying down organic matter may be demonstrated by a simple experiment. Take 10,000 grs. of fresh urine, and, after allowing it to stand for two hours, agitate it well with 50 grains of clay previously dried and powdered. No alteration will be apparent in the urine at the close of the operation; but on carefully collecting the clay on a filter, and drying it at a temperature below 100° C., it will be found by the soda lime process to contain about 4 to 5 per cent of ammonia. Of the action of the charcoal it is unnecessary to speak.

In order to convert the sewage mud into a useful precipitant, it must first be dried. Formerly the drying process was attended with much difficulty and expense, but as the nature of the product to be treated has become better understood, the drying difficulty has been to a great extent surmounted. It is found by experience that after such a precipitating medium as alumina, iron, or manganese has passed through the sewage, it has acquired a new property—that of spontaneous heating when mixed with organic matter, etc. If, therefore, the mud obtained by the use of such precipitants on the sewage be deprived of superfluous water by means of a filter press, and placed in heaps in a sheltered situation, a natural heating takes place, the thermometer frequently rising as high as 180° Fah. when inserted in the middle of the heap. This faculty of spontaneous heating has been attributed, and I believe correctly, to the small quantity of phosphoric acid recovered from the sewage by the precipitating medium. After this heating process has taken place, the mud will be found to be in a dry and friable condition, and can be readily brought into a fine state of division. It should then be furnaced with sufficient iron pyrites to reconvert the manganese and iron into sulphates. The oxidation of the organic matter by this process is very complete, and not the slightest nuisance is caused by the operation.

Iron pyrites (smalls) are now practically unsalable, and exist in enormous quantities. If copper pyrites are used, arrangements can be made for recovering the copper. It is estimated that a ton of the precipitating mixture, containing about 15 per cent of the mixed salts of manganese and iron and 85 per cent of fine clay, can be prepared for about 16 shillings, and the mud can be regenerated for about 8 or 9 shillings per ton.

The effluent water produced by the use of the clay, sulphate of manganese, etc., is clear and free from smell. It will keep for any length of time in an open or close vessel without giving off unpleasant gases or developing organic germs.—*Chem. News.*

THE TREE TOAD (HYLA VERSICOLOR).

A New Saccharine Substance.

A new sweetening agent has been produced from coal tar. It is known to chemists as "benzoyl sulphuric imide," but it is proposed to name it "saccharine." The discoverer is Dr. Fahlberg, and its preparation and properties were recently described by Mr. Ivan Levinstein at a meeting of the Manchester Section of the Society of Chemical Industry. Saccharine presents the appearance of a white powder, and crystallizes from its aqueous solution in thick, short prisms, which are with difficulty soluble in cold water, but more easily in warm. Alcohol, ether, glucose, glycerol, etc., are good solvents of saccharine. It melts at 200° C., with partial decomposition. Its taste in diluted solutions is intensely sweet; so much so, that one part will give a very sweet taste to 10,000 parts of water. Saccharine forms salts, all of which possess a powerful saccharine taste. It is endowed with moderately strong antiseptic properties, and is not decomposed in the human system, but eliminated from the body without undergoing any change. It is about 230 times sweeter than the best cane or beet-root sugar. The use of saccharine will therefore be not merely as a probable substitute for sugar, but it may even be applied to medicinal purposes where sugar is not permissible. One part of saccharine added to 1,000 parts of glucose forms a mixture quite as sweet as ordinary cane sugar. The present price is 50 s. per pound, but although very high, this is not prohibitory, as its sweetening power is so great; but it is very probable the cost of its manufacture will soon be very considerably reduced. The *Brewers' Guardian* says: "This new compound will be of great interest to brewers, for not only is it perfectly wholesome, but it possesses, in addition to its intensely sweet taste, decided antiseptic properties, and therefore may be usefully and advantageously added to beer."