Adulteration of Condiments.

The microscopist of the Department of Agriculture, Prof. Thomas Taylor, has begun an examination of the condiments of commerce for the purpose of ascertaining which of them are adulterated, the methods and extent of the adulteration, and of discovering methods by which the consumer may detect impure articles.

The first article treated was pepper, and the method of the investigation is here briefly described. A section of a pepper corn is placed under a microscope and magnified one hundred and fifty diameters. Its appearance is carefully noted and photographed, and a drawing in colors is made, showing exactly how it looks. The pure powder of pepper corns is then treated in the same way, and, from a comparison of the image of this with that of the section, the changes caused by grinding may be noted. The next step was to examine specimens of the pepper of commerce to ascertain if it presented the same appearance as the pure pepper already photographed and drawn. In a majority of cases it did not, the differences being so striking as to mark it as an entirely different article.

Professor Taylor has ascertained that the substance used in adulterating pepper is the seed or stone of the olive. These are obtained in large quantities from the olive oil factories, and ground up with the pepper corns, the extent of the adulteration being in some cases as great as fifty per cent.

No method of popularly detecting adulteration of pepper has yet been found. In bulk the pure pepper is darker in color than that to which olive seeds have been added; but the difference is so slight that no person, unless possessed of a sample to compare with, would be able to discover any difference.—*Science.*

Sonorous Sand.

At the last meeting of the New York Academy of Sciences, Dr. A. Julien and Prof. H. C. Bolton gave a report of the interesting results of their long continued researches on sonorous sands. The cause of this remarkable phenomenon, which was first known to occur in Arabia, has long been a mystery. In course of time many other localities in which sonorous sands occur became known, and, in fact, it may be found almost everywhere on beaches and in deserts. The authors collected samples from all parts of the world, and on close examination, found that all sonorous sands are clean; that no dust or silt is found mixed with the sand; that the diameter of the angular or rounded grains ranges between 0·3 and 0·5 of a millimeter; and that the material may be siliceous, calcareous, or any other, provided its specific gravity is not very great. When these sands are moistened by rain or by the rising tide, and the moisture is evaporated, a film of condensed air is formed on the surface of each grain, which acts as an elastic cushion, and enables the sand to vibrate when disturbed. In sands mixed with silt or dust, these small particles prevent the formation of a continuous air cushion, and therefore such sands are not sonorous. If this theory be correct, sonorous sand must become mute by removing the film of air. Experiments of the authors prove that by heating, rubbing, and shaking the sand is "killed." All these operations tend to destroy the film of air condensed on the surfaces. On the other hand, samples of sonorous sand were exhibited which had been kept undisturbed for many years. They had retained their sonorousness but, after having been rubbed for some time, became almost mute. The theory advanced by the authors appears very plausible, and will be firmly established when they succeed in making a sonorous sand. Their experiments in this line have not yet been completed, but promise fair success.—*Science.*

The Commercial Value of Old Boots and Shoes.

The *Journal* of the Constantinople Chamber of Commerce describes the industrial uses of old boots and shoes which are thrown out into the streets or into ash pits. After being collected, they are ripped open, and the leather is subjected to a treatment which renders it a pliable mass, from which a kind of artistic leather is derived. This, in appearance, resembles the finest Cordova leather. In the United States patterns are stamped on this, while in France it is used to cover trunks and boxes. The old boots and shoes are also treated in another way, by which they are converted into new ones. The prisoners in Central France are employed in this way, the old shoes coming chiefly from Spain.

They are taken to pieces as before, the nails being all removed, and the leather is soaked in water to soften it. The uppers for children's shoes are then cut from it. The soles are also used, for from the smaller pieces of the leather of the old soles the so-called Louis XV. heels for ladies' shoes are made, while the soles of children's shoes are made from the larger and thinner pieces. The old nails are also put to use, for by means of magnets the iron nails and the tacks and brads are separated and sold. The contractors of the military prison at Montpellier say that these nails alone pay for the old shoes. Nothing now remains but the scraps, and these have also their value, for they are much sought after by certain specialists for agricultural purposes.

MICROSCOPICAL NOTES.

At a recent meeting of the microscopical section of the Brooklyn Institute, Dr. S. E. Stiles, of Brooklyn, New York, exhibited samples of a new wax cell, and demonstrated the method of constructing the cell and mounting objects therein.

The cell is so simple in construction, so beautiful in appearance, and so effective, that we illustrate the method, and give a brief description of it for the benefit of our readers.

Sheet wax, such as is used by the makers of artificial flowers, is the material employed in the construction of this cell. Three or four sheets of different colors are

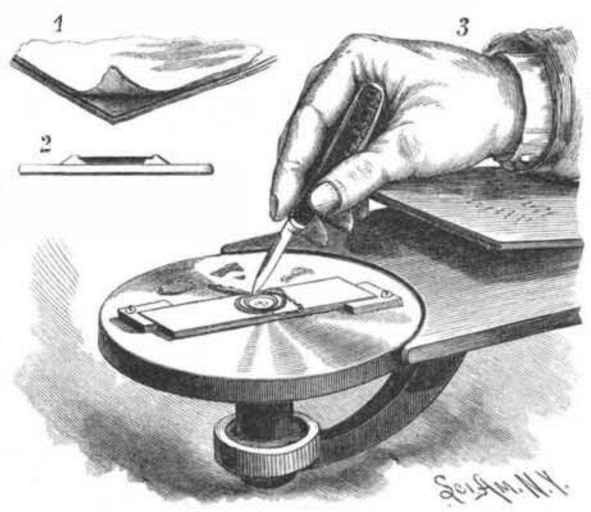

Fig. 1.—MAKING THE WAX CELL.

pressed together by the thumb and finger to cause them to adhere, and a square of the combined sheet thus formed of sufficient size for a cell is cut out and pressed upon a glass slide. The slide is then placed upon a turn table, as shown at 3, Fig. 1, when, by the dextrous manipulation of an ordinary penknife, the wax is cut into a circular form, and the center is cut out to the required depth. If the cell is to contain a transparent or translucent object, the entire central portion of the wax is removed, as shown at 2, Fig. 1; but if a ground is required for the object, one or more layers of wax are allowed to remain. A portion of the upper layer of wax is removed to form a rim for the reception of the cover glass. Where a black ground is required, a small disk of black paper is pressed upon the lower layer of wax. The final finish is given to the cell by a coating of shellac varnish, applied while the slide is on the turn table. These cells are very quickly made and have the finished appearance of a cell formed of different colored cements.

Mr. Stephen Helm, of the Royal Microscopic Society, who is also a member of the microscopical section of the Brooklyn Institute, described a simple and very efficient method of gathering pond life, and exhibited the implements, as well as a large quantity of material secured by his method. The objects are gathered by means of a wide-mouthed bottle clamped in tongs attached to a long handle, cane, or even a fishing rod. By means of this device mud can be removed from the

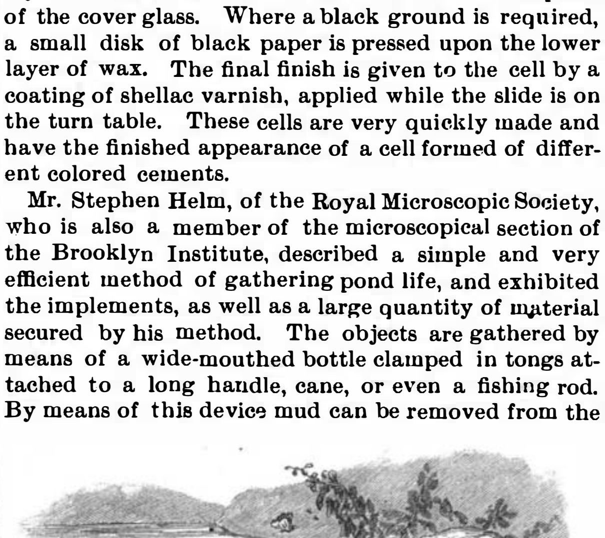

Fig. 2.—IMPLEMENTS FOR GATHERING MICROSCOPIC OBJECTS.

bottom, the stems and leaves of aquatic plants can be scraped so as to remove animalcules, and objects can be readily dipped from pools and shallow places. To concentrate the material, Mr. Helm employs a wide-mouthed bottle or jar provided with a perforated cork, in which is inserted a funnel for receiving the material, and another funnel is inverted and placed within the jar or bottle, with its nozzle extending upward through the stopper. Over the lower end of this funnel is stretched a piece of thin muslin, and to the upper end is applied a short piece of rubber pipe which is retained in a curved position by a thread tied around the neck of the bottle. The material gathered is poured into the funnel, the water escapes through the strainer, and the objects are retained in the bottle. Mr. Helm said that the hooked knife (which we have shown in the engraving) was of great utility in cutting and fishing out parts of aquatic plants and submerged branches and roots, which are often teeming with microscopic life.

G. M. H.

A Good Cement for Various Purposes.

Very often a form of cement is required around shops and mills for filling cracks in stone or brick work. New factories, especially, often develop awkward cracks between the window frames and the brick walls, and during the cold months the air entering here will largely reduce the coal pile. The *American Wood Worker* suggests the following:

Procure a lot of paint, old paint if possible, from a dealer, the skins forming on top of the paints, settlings from the bottom of paint pots, and, in fact, any refuse which contains oil, zinc, or other mineral body may be used for the purpose.

Reduce this mass, especially if hardened from continued standing exposed to air, to the consistency of cream by soaking in some cheap oil. Heating may be resorted to if the hard paints cannot otherwise be softened.

When the whole has become soft enough to be stirred into a homogeneous mass, more oil may be added and the whole worked through a sieve and then run through an ordinary paint mill.

A quantity of common whiting is next to be worked into the oil and paint, much in the way as when ordinary putty is to be made. The thickness of this putty, as we may now call it, should not be as dense as when used for glazing.

When the whiting has been thoroughly mixed in and the mass well worked over, add a quantity of good Portland cement, sufficient to bring the putty to consistency which will enable it to be handled readily.

When in this state, the putty may be worked into cracks in brick or stone work much as ordinary putty is used when allowed to set and harden, and it will become nearly as hard as iron, impervious to moisture and any reasonable degree of heat.

Adulteration as Defined in Law.

According to the Massachusetts Adulteration Act, an article of food is deemed to be "adulterated" within the meaning of the act:

"1. If any substance or substances have been mixed with it so as to reduce or lower or injuriously affect its quality or strength.

"2. If any inferior or cheaper substance or substances have been substituted wholly or in part for it.

"3. If any valuable constituent has been wholly or in part abstracted from it.

"4. If it is an imitation of, or is sold under the name of, another article.

"5. If it consists wholly or in part of a diseased, decomposed, putrid, or rotten animal or vegetable substance, whether manufactured or not, or, in the case of milk, if it is the product of a diseased animal.

"6. If it is colored, coated, polished, or powdered, whereby damage is concealed, or if it is made to appear better or of greater value than it really is.

"7. If it contains any added poisonous ingredient, or any ingredient which may render it injurious to the health of a person consuming it."

The Annealing of Tools.

Some tools, such as circular cutters, files, etc., after they are forged into the shape required, must have teeth cut into them. Before this can be successfully accomplished a preliminary process is necessary. Hammering or forging the steel into the shape required will have hardened the steel to such an extent as to make the cutting of teeth into it impossible or difficult. It must, consequently, be annealed. This process is a double process. The steel must be reheated as carefully as before, and afterward cooled as slowly as possible. Many tools are only required to be hardened on a small part of their surface, and it is important that the unhardened parts should possess the maximum amount of toughness with the minimum amount of brittleness that can be attained. These tools can also be annealed after they are forged. The process of annealing, or slow cooling, leaves the steel cross-grained, gives it its maximum of ductility, and causes it, in fact, to approach the properties of lead.—*The Ironmonger (London).*

The English Fast Train Record.

During the recent railway racing to Edinburgh and Glasgow, the Northeastern Company made no change in their engines; the regular engines that had been on the Scotch service were used all the time, and in nearly all cases these were compound engines. They had a pretty heavy train throughout, and well filled with passengers and luggage. On the last day of the accelerated running, they ran into Edinburgh thirty-four minutes before time; the run was done from Newcastle to Edinburgh—125 miles—in 128 minutes, by compound engine No. 117. This is at the rate of 58·6 miles for the whole run, and beats the record.