["OLD AND NEW."]

DENTISTRY IN THE UNITED STATES.

NUMBER 5.

THE DENTAL LABORATORY.

Though the operating department of the dentist's establishment makes a brilliant display, with its multitudinous and variously shaped instruments, the laboratory has, perhaps, equal mechanical merits. Its tools are almost as varied as those for operating, equally useful, but not quite as numerous. They make up in size what they lack in numbers. In the laboratory, the dentist uses his lathe, furnace, vulcanizer, forge, rolling mill, steam blowpipe, and gas generator and reservoir, with all their appurtenances, also such small tools as files, scrapers, saws, chisels, plate benders, cutters, punches, hammers, shears, and so on: a few hundred more articles complete the list; and of each of these there are various patterns, sizes, and styles. A first class practitioner usually has in his laboratory, besides these mechanical tools, a miniature chemist's shop, as in his practice he frequently has to use chloroform, ether, acids, tinctures, solutions, elixirs, tonics, chlorides, sulphates, a hundred different chemical preparations, not including the perfumery which he uses for flavoring tooth powder, soaps, and mouth washes. The mechanical department varies in quality and value like the others. A well appointed laboratory costs about six hundred dollars; but there are many dentists whose complete outfit, operative and mechanical, did not cost, originally, two hundred dollars. In the laboratory, the work of making the sets, of false teeth is done. As the mechanical tools are continually getting dull and wearing down in sharpening, and the materials are being used up, the workman has to keep replenishing his stock; and when there is a great deal of mechanical work going on, the outlay is considerable: lathe burrs breaking, furnace muffles cracking, vulcanizers exploding, flasks bursting under too much pressure, retorts breaking, and other such accidents continually occurring. I was once seated in the laboratory of a dentist in the West. He had two "cases" in his vulcanizer, undergoing the process. He had examined the thermometer to note the degree of heat, and turned toward me to make a remark about the amount of pressure which the boiler was sustaining: he had not finished his remark, when we heard a noise like the report of a six pounder loaded to the muzzle without ramming; and the room was instantly filled with steam. When, in a few moments, it settled, it appeared that the boiler had burst. The top had been blown off, and was buried in the ceiling. Had the accident occurred thirty seconds sooner, the practitioner would have been killed. I have witnessed other accidents equally dangerous, though it does not seem as if the business was a hazardous one. In the mechanical department, a moderate practice requires an outlay of three hundred dollars per annum, after having a good start. The receipts of one firm for sales of laboratory tools and material were $62,650; about three fifths of the goods being used in the Western division, one quarter in the Eastern, and the remaining three twentieths in the Southern.

DENTAL OFFICE FURNITURE.

The principal piece of furniture in the operating room is the dental chair, on the left of which generally stands the spittoon, with the dental operating case forward, to the right. This is what I term the "Torturing Trinity." These few pieces are about all that come under the head of furniture. Of each of these there are various patterns and makes; the chairs costing from thirty-five to two hundred dollars each, spittoons from fifteen to one hundred dollars each; and the case, as is previously stated, almost any price the dentist wants to pay. There are other pieces of furniture, such as the extension bracket table, footstools, and the stands used exclusively by dentists; but they are of minor importance. Nevertheless, all these separate pieces of furniture have to be kept in repair, which adds to the expenses of the office. The chair is so constructed that the seat rises, the back falls, and the head rest can be raised and moved to the right or left. As all these movements are independent of each other, it is easy to see that a considerable mass of machinery is contained among the upholstering, in order to do all this manœuvring. When this machinery gets out of order, the whole has to be taken to pieces before it can be adjusted. The spittoon meets with the greatest amount of mishaps. A patient will drop the tumbler into the glass bowl: at least two dollars is required to replace it. Another, in a fit of agonized abstraction, catches hold of the spittoon top, instead of the chair arm, and pulls it off its balance. The marble top smashes on the floor; the pieces, along with the remnants of the glass bowl and tumbler, are thrown into the dirt barrel; and the operator smiles, says "of no consequence," and puts down ten dollars to expense account. The operating case, being out of the patient's reach, is tolerably safe. But the color in the velvet of the chair will fade. Sometimes the veneer peels; the polish grows dull; the looking glass in the top gets cracked by the wood work warping; all these mishaps have to be remedied, and on such fine workmanship it is expensive. In one city in the Western division, eight dentists kept one dental cabinet maker constantly at work in repairing their furniture. The best furniture is used in the Western division; the next best, in the Southern; and the Eastern uses the poorest. The greater proportionate number of pieces is, however, used in the Eastern division, as there are more permanent dentists in proportion to population.

The uninitiated may imagine these statements exaggerated. Not only is every item mentioned to be found in actual use by dentists, but the enumeration is confined to articles that are commonly used.

The number of dentists in the United States exceeds five thousand; and allowing their gross receipts to be only one thousand dollars a year each, which is a low estimate, the grand total amount of money paid out by the people each year for tooth in and tooth out purposes (to pillage a recent pun) will not fall short of five million dollars.

ARSENIC IN AGRICULTURAL AND TECHNICAL PRODUCTS.

BY PROFESSOR AUGUST VOGEL.

It is an interesting fact that mineral substances which are poisonous to animals do not always exert a poisonous action on vegetation. Litharge and red oxide of mercury are known to be active poisons for animals, while seeds moistened and planted in either of these poisons germinate as soon as if planted in a fertile soil. This shows that vegetable organisms are not very sensitive to poisons. On the other hand, it is almost impossible to sprout seed in magnesia, a substance which is administered internally in large quantities as a medicine. The injurious influence exerted upon the germination of seed and the growth of the plant, by this apparently innocent substance, was made known in England through an unintentional experiment made on a large scale some years ago: A farmer there had a whole field sown with white earth which he supposed to be calcareous marl. The seed came up very sparingly in this field, and a chemical analysis of the fertilizer showed that it contained a large quantity of magnesia.

There are some poisons which exert the same powerful influence on vegetable and animal life. To these belong the salts of copper and, above all, arsenic with its numerous compounds. A strong, healthy plant can soon be killed by wetting it with a diluted solution of a salt of copper or of arsenious acid. The poisonous action of arsenic on vegetation is all the more striking because it is a substance very widely disseminated throughout the inorganic world; it has been found in many iron ores previously considered free, and in mineral springs, in bones, and even in garden soil. It confirms the statement of a talented chemist, that the analytical chemist of to-day can find everything everywhere if he earnestly hunts for it. Moreover, in the famous Lafarge poison case the celebrated toxicologist, Orfila, not without reason, pledged himself to prove the presence of arsenic in the chairs of the judge and jury at the Palace of Justice.

Without earnestly hunting for it, but rather by accident, we not long since found arsenic in the Munich street gas, which is now generally employed instead of alcohol lamps in chemical laboratories. The occurrence of arsenic in coal gas is not surprising, for it is known that coal always contains considerable quantities of sulphur, which is generally accompanied by traces of arsenic. In a shale, found at Linz on the Rhine, which is largely employed in the manufacture of photogen and paraffin, some not inconsiderable quantities of this poisonous substance were found. When distilled in large quantities, the collecting pipe, where it joins the distillation retort, often contains a brilliant crystaline crust, which is only partially soluble in water, and consists, for the greater part, of arsenious acid along with sulphuret of arsenic and arsenic. In drawing out the contents of the retort, the peculiar garlic odor of arsenic is perceptible. The workmen who charge the retorts frequently complain of colic, and also suffer from inflammation of the skin or ulcers at the root of the nose and in the joints. The inhalation of arsenious vapors must be supposed to be the cause of it. These arsenious vapors, of course, proceed from the decomposition of arsenical pyrites, which always accompany sulphur pyrites, either distributed in a fine state of division throughout the mass of the shale or present in single perfect crystals.

Since arsenic, as we have said, always accompanies sulphur, all the oil of vitriol made from it must contain arsenic; and through the oil of vitriol, the arsenic finds its way into a great many agricultural and technical products, in the manufacture of which this acid is employed. The acid phosphate of lime, known as superphosphate or prepared bone dust, and now so frequently employed as a fertilizer, is manufactured by the aid of crude sulphuric acid. The arsenic in the acid all goes into those artificial fertilizers. The ordinary analytical tests will prove the presence of arsenic in prepared bone dust.

The question naturally presents itself, whether the plants which grow upon soil manured with such substances will not take up the arsenic. Davy undertook to answer this question. For this purpose he set some cabbage plants, in a mixture of one part of bone dust containing arsenic and four parts of garden soil. At the end of four weeks he tested the grown plants for arsenic. The perceptible quantity of arsenic found in the plants proved, what was easy to foresee, that the arsenic of the fertilizer actually goes into the plant.

A no less important question is, whether such plants are able to exert an injurious effect upon the animal economy. With regard to this, Davy made the observation that sheep, fed upon Swedish turnips which were raised with prepared bone dust and hence contained arsenic, would not eat enough of them to fatten. It must not be overlooked that this is but a single observation. It still remains to be proved whether the arsenic contained in the plant is in such a form as to be dangerous to animals and men, and also whether the *quantity* is sufficient to be injurious. In a judicial-medical point of view these observations are very important, since it follows that the finding of a trace of arsenic in the viscera does not permit us to conclude with certainty that the person has been poisoned.

The traces of arsenic found in street gas and in artificial fertilizers are so small that, according to my opinion at least, it is scarcely possible to suppose that a case of direct or indirect poisoning could arise from it. It is, however, to be regretted that the undeniable fact of these fertilizers containing traces of arsenic will injure the confidence in artificial fertilizers which had begun to be so important to the agriculturist.

To set at ease the anxious minds of our farmers, it should here be remarked that a certain quantity of arsenic agrees very well with the animal economy. The expression "poison" is in general only a relative one, for under certain circumstances everything is a poison; and on the other hand, a substance which will kill when taken in large quantities may be employed as a medicine in moderate doses. The most common examples show that the administration of a medicine which is not usually considered a poison, under some circumstances, will become such, if given to a sick person. A teaspoonful of alcohol is evidently a poison in cases of inflammation; and, on the contrary, prussic acid or belladonna, in such quantities as a physician would give it to a person having dropsy, is not poisonous, while the same quantity administered to a healthy person would produce dangerous symptoms. The quantity of opium which a Turkish opium eater consumes is no poison for him, as his body is not in a normal condition. Moreover, Nature can accustom itself to poisons; we know that the workmen in arsenic mines, inhaling an arsenious atmosphere, frequently enjoy the best of health and reach a good old age. Horses fed upon two grains of arsenic, or more, per day, thrive and grow fat on it.

New Process for Estimating the Alcoholic Value of Wines.

M. Duclaux states that, when alcohol is added to water, the density and superficial tension of the liquid are diminished, and consequently the number of drops yielded by a given volume from a determined orifice is augmented. The dimensions of the orifice being constant, the number of drops corresponding to each alcoholic mixture is constant also, and the variations between one mixture and another are great enough for a very sensitive alcoholometric process to be founded upon them, in the limits within which the ordinary alcoholometer does not move freely, and is uncertain in its indications.

The instrument proposed is a simple pipette of 0·3 cubic inch volume. It is filled with the alcohol under examination, and the drops are counted. The alcoholic value is then determined from tables which have been calculated for various temperatures. The alcoholic value of wines may be thus estimated with considerable accuracy without previous distillation. In these liquids the density varies very little, and is always near that of water; and as their superficial tension depends solely upon the alcohol which they contain, it is but necessary to count the drops which they yield, and refer to the tables for the result.

If to alcohol or water slight traces of a substance with a high organic equivalent, and consequently a feeble superficial tension, be added, such as acetic ether, butylic or amylic alcohol, etc., the number of drops yielded by the alcohol or water rises very sensibly. A measurable effect can be produced with $\frac{1}{4000}$th part of acetic ether. This process is thus available for detecting and approximately estimating certain substances when present in such small proportions as would not be indicated by any other method. By the aid of this instrument, it may be seen that the distilate from wines contains more or less of other matters besides ordinary alcohol, probably alcohols of a higher series.

M. Salleron has proved that the weight of a drop of a mixture of alcohol and water is the smaller the more alcohol it contains; and as the following table shows, the difference becomes larger if the quantity of alcohol be small:

Percentage of alcohol.	0	1	2	3	4	5	14	15	16
Weight of 20 drops....	1 gram	0·940	0·895	0·858	0·826	0·797	0·640	0·630	0·617

This shows that a drop counter may be used for determining the quantity of alcohol in wines, and in the administration of Paris such an instrument is used in order to determine whether a wine entering Paris contains more or less than 15 per cent of alcohol.—*Comptes Rendus.*

Doing Much.

Dr. Hall, in the September issue of his *Journal of Health*—a most excellent family magazine, by the way—truthfully says that many persons seem to be always in a hurry, and yet never accomplish much; others never to be hurried, and yet do a very great deal. If you have fifty letters to answer, don't waste time in looking over to find which one should be noticed first; answer the one you first lay your hands on and then go through the whole pile. Some begin a thing and leave it partially completed, and hurry off to something else. A better plan is to complete whatever you undertake before you leave it, and be thorough in everything; it is the going back from one thing to another that wastes valuable time. Deliberate workers are those who accomplish the most work in a given time, and are less tired at the end of the day than many who have not accomplished half as much; the hurried worker has often to do his work twice over, and even then it is seldom done in the best manner, either as to neatness or durability. It is the deliberate and measured expenditure of strength which invigorates the constitution and builds up the health; multitudes of firemen have found an early death, while the plow boy lives healthily and lives long, going down to his grave beyond three score and ten.

INDIAN TEA EXPORTS.—The Bengal Chamber of Commerce remark, in their last report, that the growth of the tea industry of India has been almost unexampled in the history of its trade. The value of tea exported from Calcutta has increased from $1,150,000 in 1863–64 to $8,500,000 in 1873–74. The economic effects of the industry have not yet, however, been fully examined.