Correspondence.

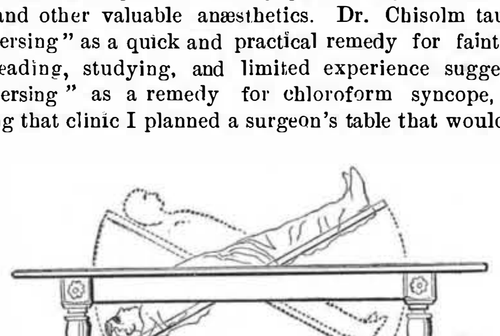
Syncope Treated by Reversing.

To the Editor of the Scientific American:

In your article of November 29, entitled "Chloroform Syncope treated by Reversing," reported by Dr. Garland in the *British Medical Journal*, he considers that the life of his patient was due to reversing the body, and that this simple treatment of a grave trouble was not used as much as it should be; that he only remembered seeing one report of its use. I am confident that it is not generally known and used, since about three years ago an article was published, and I think in your columns, stating that a French surgeon had discovered that mice chloroformed to complete insensibility were instantly restored by reversing, that is, holding them up by their tails. This was very generally received and reported as a new discovery in science.

It was not new, but valuable, however, as confirming the theories, opinions, and probably the practice of American surgeons.

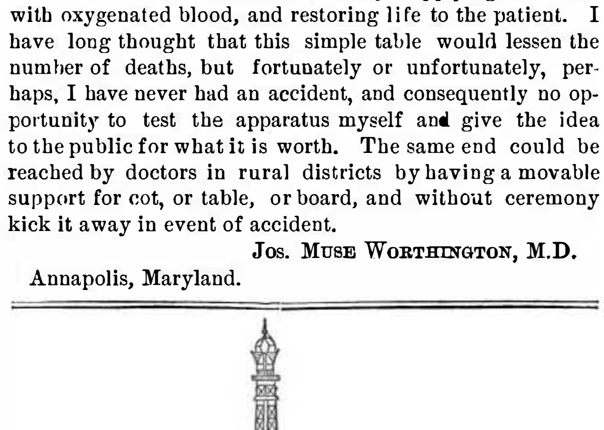
In 1872, while attending Dr. Julian J. Chisolm's eye and ear clinic as a student at University of Maryland, I witnessed what might have been an accident from chloroform in the hands of less experienced surgeons. Dr. Chisolm has a record of giving chloroform very boldly, and with remarkable success and good fortune; had the accident proved fatal, the moral effect would have been disastrous to the class, and prevented many possible operations with this and other valuable anæsthetics. Dr. Chisolm taught "reversing" as a quick and practical remedy for fainting. My reading, studying, and limited experience suggested "reversing" as a remedy for chloroform syncope, and during that clinic I planned a surgeon's table that would in-



stantly, by withdrawing a peg, permit the patient's head to go down and feet up, thus mechanically supplying the brain with oxygenated blood, and restoring life to the patient. I have long thought that this simple table would lessen the number of deaths, but fortunately or unfortunately, perhaps, I have never had an accident, and consequently no opportunity to test the apparatus myself and give the idea to the public for what it is worth. The same end could be reached by doctors in rural districts by having a movable support for cot, or table, or board, and without ceremony kick it away in event of accident.

JOS. MUSE WORTHINGTON, M.D.

Annapolis, Maryland.



ONE THOUSAND FOOT TOWER COMPARED WITH DOME OF CAPITOL AND WASHINGTON MONUMENT.

The Metric System.

In the report on weights and measures presented to Parliament by the Board of Trade, under the Weights and Measures Act, 1878, Sir T. H. Farrer remarks, in reference to the metric system, that an opinion has been expressed by the Board of Trade that the time has now arrived when this country might with advantage join the International Convention on Metric Standards under proper conditions, provided such a course is not to be taken as an adhesion, on the part of the United Kingdom, to the metric system. These observations appear to be intended as a reply to the eighth resolution of the conference of the International Geodetical Association, held in Rome in October last, which expresses a hope that, if the rest of the world accepts the meridian of Greenwich for the unification of longitude, England will find in this agreement an additional motive for taking a new step in favor of the unification of weights and measures by adhering to the metrical convention of May 20, 1875.

Oxalic Acid.

Oxalic acid exists in combination with ammonia in guano, with calcium in many plants, such as rhubarb, curcuma, ginger, squills, orris, valerian, quassia, and as acid potassium oxalate in phytolucca, belladonna, rumex, and oxalis, most lichens, and many vegetables. Some urinary calculi consist of oxalate of calcium. It is also found in the gall bladder, in uterine mucus, and in urinary sediments. It is formed by the action of nitric acid on most organic compounds; even sugar, gum, and sawdust yield oxalates when heated with hydrate of potassa or sodium. It is generally made from sugar, molasses, or starch, with nitric acid; one hundred parts of sugar make fifty-eight to sixty of oxalic acid. The dark mother liquids left in the preparation of tartaric acid yield it. Treated with glycerine, it is decomposed into carbonic and formic acids.

Acid potassium oxalates, called salts of sorrel or salts of lemon, will remove iron stains from paper, linen, and leather, but oxalic acid is generally used. Its taste is intensely sour. Large doses cause vomiting, with burning pain and constriction of the throat and stomach. The vomits are dark colored, and may contain blood. When the pain is very severe, collapse may ensue, with drowsiness. Sometimes the symptoms are unaccountably long delayed. Some patients may live to the twenty-third day, but death may occur in from three to twenty minutes, or eight hours. Dark discolorations of the œsophagus, stomach, gelatiniform softening of the stomach, and even perforation of it, may occur. The blood is said to be universally bright in color. *Antidotes:* Chalk in water, slaked lime, dried whitewash, etc. It is one of the most rapid and unerring of the common poisons, and hence has rarely been used in the treatment of disease. Still it can be as safely handled as arsenic, aconite, or atropine. It has been suggested in an induration of the stomach and sclerosis of other organs, especially of the brain and spine, in which it causes softening. It seems to have a specific action on the lumbar and dorsal spinal cord. In one case there was great weakness and numbness of the legs and back, so that the patient could scarcely stand, much less walk. In another case, the first thing complained of was acute pain in the back, gradually extending down the thighs, occasioning ere long great torture. In a third case the patient complained more of the pain shooting down from the loins to the thighs and legs, than of a pain in the belly. In a fourth case there was numbness, tingling, and pricking in the back and thighs. In a fifth case, there was almost complete loss of power and motion in the legs, which did not pass off for fifteen days. It evidently must be suited to diseases of the spinal cord, opposite, or very different, from those which it produces. The only preparations which are used are the oxalates of cerium and iron. The former sometimes controls vomiting, due to reflex irritation from pregnancy, nervous and uterine derangements. It is very insoluble, and hence often inert, and has been given in doses of from one to eight grains three or four times a day. The oxalate of iron is also comparatively insoluble, and hence nearly inert.

Pots within Pots.

I have often felt surprised, says a correspondent of *The Garden*, that the advantages of placing one pot within another have not been recognized by plant growers. In one pot the roots must be exposed to atmospheric changes calculated to act prejudicially upon them.

In warm houses which do not get much ventilation, and which are shaded from hot sunshine, this disadvantage is not so apparent, but in the case of cool houses where air is freely admitted, and where the force of the sun is fully felt, it is evident that those roots which work their way to the side of the pot are not happily placed. Let any one place their hand on the outside of a pot nearest the sun on a fine day, and they will be ready to admit that the tender rootlets of the plant growing in it must be sorely tried. It is the same in the open air, although it is possible, if not always practicable, to plunge the pots; but it is even worse in the case of pots standing on window ledges, balconies, and similar places, as they not only often get the full sun upon some portion of their surface, but are exposed to every drying current of air.

The wonder is that plants thus circumstanced can live and thrive. Wherever plant culture is attempted on the outside of windows, some provision should be made for screening the pots from the full force of the sun. There is nothing better than a box made to fit the window ledge, and the full depth of the pots intended to be placed in it. This alone will infinitely help the plants, and if in addition some moss is stuffed in between the pots, there will be a greater resemblance to the conditions which plants enjoy when growing naturally. Where this plan cannot be adopted the pots may be put in others a size larger, so that the roots will at any rate receive double protection.

When growing delicate rooted plants in cool houses I have frequently placed one pot in another two sizes larger, ramming moss or something similar in between them. The advantage of this is that it not only guards the roots against the chilling influence of a free circulation of air, but preserves the soil in a more equable condition as regards moisture. Every one who has much to do with plant growing is aware that there is one condition of the soil which greatly favors root production, viz., between wet and dry, or what is often termed "just moist." It is a knowledge of this fact which causes us to plunge and cover over bulbs when potted, as the greatest quantity of roots is made when the soil has not to be watered, and yet does not become dry ere the growth issues from the bulb. Mainly on this account, too, are cutting and seedlings kept rather close and always screened from currents of air until the roots fairly touch the sides of the pot. At one time I used to rather largely grow the tuberous rooted Tropæolum, and never succeeded so well under pot culture as when I set one pot within another, and filled the space between them with moss. Until I adopted this method I never could manage the rather miffy, delicate rooted T. azureum.

The pot within pot system I used to find helpful in regulating the watering of such plants as this, as, if on looking through in the morning the soil was nearly but not quite ready for more water, I knew I could leave it till the next day, and there is nothing so injurious as giving a plant water now because it will in all probability need some a few hours hence. I feel sure that in the case of plants grown in small pots for decorative purposes the plan here recommended would be found to answer well; and as to the labor involved therein, it would simply be a matter of first outlay, to be quickly compensated for by a decrease in the watering. A plant with its roots in a 2½ inch pot put into a 4½ inch pot with moss rammed in between the two is more easily managed and does not require half the attention that it would have done had it been shifted.

My impression is that plants are far too often repotted; with a top dressing and double potting better plants would often be obtained, and they would be better fitted for the purpose for which they are intended. In the raising of seeds I have often practiced the pot within pot system, as, when the pots or pans are removed to a more airy situation, more water is generally required, and tender rootlets frequently get surcharged. By thoroughly moistening the moss stuffing every day or two, the soil is easily kept in just the right state of moisture down to the bottom of the pot; whereas in an ordinary way the lowermost part of the compost dries out nearly as soon as the top, and a rather heavy watering is required to moisten it through. By wetting the stuffing material and giving a light sprinkling over the surface soil, the conditions best suited to root production, and therefore to healthy growth, are easily maintained.

Preparation of Paper Pulp with Sulphurous Acid.

The inventor of this process, Mr. Raoul Pictet, never tires of multiplying the applications of sulphurous acid, a product whose properties he has already utilized under various forms in the production of cold. At the sixty-sixth session of the Helvetian Society he read a paper on the use of this acid and of a low temperature for the manufacture of paper pulp from wood, an article that in recent years has come into extensive use in the paper industry.

When ligneous substances, such as wood, straw, sedges, etc., are heated, and their temperature is progressively raised, it is found that all the multiple products contained in these bodies undergo no appreciable transformation up to a temperature of 80° C. Above such a point the gums, resins, and all the products left in the wood by the rising and descending sap tend to become brown, to blacken, and to carbonize. The cellulose, which constitutes the essential element of each fiber, is capable of resisting without alteration up to 180°. Above that temperature it becomes decomposed and destroyed.

In the manufacture of pulp for the paper industry, the object to be attained is the disengagement of the fibers of the cellulose contained in the ligneous elements from the incrusting matters by which they are on every side enveloped. Up to the present time the disintegrating of the wood has been effected by placing it in small pieces (sawed or chopped) into strong boilers, and pouring upon it, simultaneously, solutions of sulphite of lime or magnesia. The whole is then raised to a temperature of 150° or 160°, and allowed to boil for several days. All the incrusting matters are gradually dissolved, and nothing remains except cellulose; but the carbonization of the incrustation has blackened the latter, and deposited millions of atoms of carbon upon the elastic sides of the fibers. So repeated washings and a costly bleaching are rendered necessary before it is possible to sell the product obtained.

Mr. Pictet thinks that the majority of these difficulties can be suppressed by the use of a properly selected liquid which shall have the property of dissolving the incrusting matters and of furnishing, at a temperature of about 80°, the pressure of five atmospheres, which is necessary to cause the dissolving liquid to enter the pores of the wood. Concentrated solutions of sulphurous acid and water give complete satisfaction from this point of view.

In the operations that are necessary to procure such solutions, we may obtain strong pressures at temperatures embraced between 75° and 80°. These solutions totally dissolve the incrusting materials without alteration, and the latter are found integrally in the lixivium. The natural cellulose, neither altered nor blackened, is bleached with chloride of lime with the greatest facility, and, through evaporation, one removes all the by-products that can be of immediate utility.

Mr. Pictet has obtained paper of varying quality from all the textiles found in the canton of Geneva, and from wild grasses, sedges, reeds, and the most diverse kinds of woods, such as white and red spruce, beech, ash, etc. It only remains to know whether the process is adapted to a sufficiently economical exploitation to allow it to be substituted for the methods of preparation that are usually adopted.—*La Nature.*

The Blood Fluke.

In the SCIENTIFIC AMERICAN for November 8 appeared an account of a parasitic worm (*Filaria Bancrofti*) belonging to the order *Nematoda*, whose larvæ inhabit the blood of human hosts. The blood fluke (*Bilharzia hæmatobia*) belongs to a quite different order of parasites, the *Trematoda*, and the adult worms have for their habitat the portal system of blood vessels and the veins of the bladder and mesentery of man.

This terrible parasite was discovered by Bilharz in 1851. It may be described as follows: The male and female organs occur in separate individuals, which differ from each other very decidedly in form and structure. The body of the male is cylindrical, and measures one-half inch in extreme length; the tail is pointed, and the intestine is represented by two simple blind canals. From a little below the ventral sucker to the tail runs a slit-like cavity—the *gynæcophoric canal*—in which the female is lodged during the copulatory act. The body of the female is filiform, much narrower than that of the male, and attains a length of four-fifths of an inch. The intestine is unlike that of the male, the two portions being united after a short separation to form a broad spiral tube extending down the center of the body. In both sexes the oral and ventral suckers are placed near each other, and at the anterior portion of the body. In both male and female the reproductive orifice is situated just below the ventral sucker.

The eggs are oval, pointed at one pole, and measure one-seventieth of an inch in length, though they vary somewhat in size. The shells are brown in color, and transparent, and through them can be seen the ciliated embryo in an advanced stage of larval growth. The embryo is cylindro-conical in shape, and has a conical head, and, as already mentioned, is covered with cilia. It possesses the power of rapid movement in a high degree.

The ova are passively transformed to the interior of the bladder through the ulcers on its walls, which are caused by the presence of the adult parasite, and which communicate with the blood vessels, which are inhabited by the latter. In persons suffering from this form of helminthiasis the urine is loaded with ova with their contained embryos.

These being passed, it is readily seen how easy is their transmission to ponds, streams, or rivers, especially as there is generally surface drainage only in the countries where this fluke is found. Once having reached fresh water, the embryos burst their egg envelopes and emerge as free swimming forms. It is a curious and most important practical fact that though the ova possess great resistance to outside agencies, and are difficult to destroy, the free embryos are at once killed by even a small amount of decomposing matter present in the water containing them, or a very low percentage of any acid or so-called "germicide" substance.

The subsequent history of these ciliated larvæ has not as yet been satisfactorily worked out; but it is probable that they enter the bodies of certain fresh water mollusks, and there undergo certain morphological changes, finally leaving their shellfish hosts, to again become free swimming forms. In this stage, if taken into the human stomach with drinking water or otherwise, they quickly attain their proper habitat in the blood vessels, there rapidly mature, and, copulation having taken place, new broods of ova are produced and set free in the urine.

The *Bilharzia* seems to be confined to Africa, and it is found throughout the length and breadth of that continent. In Egypt it is especially common, and there gives rise to a most formidable disease. It is also abundant at the Cape of Good Hope, and there causes a frequently fatal form of hæmaturia. The disease has been contracted during a few days' stay in Africa, and has then been carried to India, England, and, I believe, to this country.

The *symptoms* produced by the blood fluke are as follows: Diarrhœa, colic, anæmia, and great prostration of the vital powers, combined with bloody urine, the latter often amounting to most alarming hæmorrhages. The presence of the peculiar pointed ova in the urinary secretion, of course, renders the diagnosis certain.

On post mortem examination terrible lesions are found to exist in the urinary organs and intestines; the mucous (inner) surface of the bladder is more or less covered with minute extravasations of blood, and in many instances there are thickenings, ulcers, and fungus-like growths covering its surface; portions of mucous membrane may even be separated from the remaining walls of the bladder. The kidneys are found enlarged and congested, and the intestines show changes similar to those found in the bladder.

The *treatment* of this disease is not at all satisfactory, patients either recovering without interference—through innate vitality, and the early death of the parasites—or becoming completely broken down in health, or dying in spite of all treatment. The indications are, to support the general strength, and to treat, so far as possible, the symptoms, especially the bleeding and local lesions.

The sanitary measures most likely to control *Bilharzia* disease are such as will keep the supply of drinking water free from all sewage contamination, or the use of only filtered water, or of that which has been boiled.

The development of the *Trematoda*—to which the *Bilharzia* belongs—is of the greatest interest. One of the most closely studied species is the *Distoma militaire*, the adult form of which inhabits the intestines of several species of water birds. The ova produced by this species pass out of the body of their host, and from each of them emerges a ciliated embryo. This embryo finally loses its cilia, and develops into a sac-like *redia*, which lives attached to the body of a water snail. Within the body cavity of the *redia* there now appear a number of vesicles, which ultimately develop into larvæ (*Cercariæ*) having long tails and a somewhat tadpole-like form. These burst their way through the wall of the *redia* and escape into the water, and after swimming about freely for a time these *Cercariæ* bore their way into the bodies of various water snails. Here they become encysted, and their tails drop off, and a crown of hooklets is developed. This form then remains quiescent until its molluscan host has the misfortune to be eaten by a water bird. In that case its enveloping cyst wall is digested, and the young *Distoma* makes its escape into the alimentary canal of its feathered bearer. It now gradually develops into a perfect adult *Trematode*, attaches itself by its hooklets to the intestinal wall, acquires sexual organs, and produces a fresh crop of ova to propagate its species.

The developmental cycle of the *Trematoda* varies considerably in different genera, but the above may be considered the typical series of morphological changes through which these parasites pass. The *Bilharzia hæmatobia* is, however, a very aberrant form, and probably varies widely in its metamorphoses from the other *Trematoda*.

The "water vascular system" is well developed in all the *Trematoda;* it consists of "a contractile sac, which opens externally and communicates with longitudinal vessels with contractile, non-ciliated walls, from which proceed non-contractile and ciliated branches which ramify through the body." The ciliated larva of *Bilharzia* has this system highly developed; in it the vascular canals consist of two main tubes which pursue a tortuous course longitudinally from head to tail, and give off in their passage several anastomozing branches. RALPH W. SEISS, M.D.

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The Most Recent Naval Battle.

Le Temps, Paris, notices an account of the fighting in the Min River, published in pamphlet form at Shanghai, China, by James F. Roche and L. L. Cowen, U.S.N., who were present during the action between the French and the Chinese. Aside from the detail of the forces engaged on both sides and the skill of the naval combatants, which give us no new information, there is, says *Le Temps*, one point which deserves special consideration. These officers state that the result of the fight in favor of the French fleet was due to its armament of revolving cannon and the superiority of its torpedo service. They consider that these are the only points upon which instruction may be gained from this action. "The power of revolving cannon," they say, "their inestimable value in naval engagements, and the importance of a well organized torpedo service were plainly visible to all naval people." Before the shower of shell fired by the Hotchkiss revolver cannon from the tops of the French vessels the enemy went down like grain before the scythe. Reliefs could not get on deck fast enough to fill the gaps in the ranks of the Chinese gunners. The little shells pierced the rails and bulwarks of the vessels, and their explosion spread death in all directions. The torrents of fire poured into the Chinese vessels were so murderous that it is safe to estimate that 800 men out of the 1,000 manning the Chinese squadron were killed.

The importance of the role of revolving cannon in naval engagements was as fully appreciated, also, by the English officers who witnessed the fight. It is scarcely necessary to state, says the *Temps*, that the French officers who made such brilliant work with these guns have made a most thorough report with regard to their value. Nevertheless, the lesson to be learned by this combat is that hereafter no vessel can go into action if the guns which it has mounted on open decks are not protected against the effects of rapid-firing guns. It is therefore necessary that every piece of artillery should be covered by a metal shield as a protection against rapid-firing guns; that the gunners should be equally protected, not against the effects of heavy projectiles, which would necessitate covering the vessel completely with armor, but against machine gunfire directed from the enemy's tops, which send in showers of projectiles whose explosion would render totally untenable the decks of most vessels.

The caliber of the Hotchkiss revolver cannon which formed the auxiliary armament of the French vessels is 1½ inches, and the length of bore 29 inches. They weigh 450 pounds, and fire a shell weighing 1 pound, with a bursting charge of three-quarters of an ounce.

Preliminary Trial of Strength of New York Police Candidates.

An examination of applicants for positions on the police force lately came off at Wood's gymnasium, this city. Eighteen candidates presented themselves. They were first put through the dumb-bell exercise and lifting of weights up to fifty pounds. After this they were required to run a mile, twenty-two laps of the gymnasium, in 7¼ minutes. Some five failed to complete the time, but of the others many came in a minute and a minute and a half in advance.

They were then required to put on the gloves with the professor of the gymnasium, who occasionally got in a heavy blow to test the temper, and several of the competitors retired with a black eye and battered nose. Their strength was after this tested by pulleys.

The requirements of the commissioners were very fair and moderate, and nearly all the candidates, who were a very fine troop of young men, went through the ordeal satisfactorily.

A New Water Cooler.

The cooler consists of a revolving basket of wire gauze (something like an exaggerated squirrel's cage) surrounding an inner stationary vessel pierced with numerous small holes, through which the heated water discharged by the air pump of the engine finds its way into the revolving basket, to be thrown out in the form of fine spray to a distance of 20 feet on either side. The drops are received in the tank or dam; and in its rapid passage through the air, the water is sufficiently cooled to be again ready for injection into the condenser. The basket is about 3 feet in diameter; and it makes 300 revolutions per minute. The apparatus requires 3 to 4 indicated horse power to drive it; and will cool 300 gallons of water a minute. It is claimed that the driving power required is more than recovered in the increased power given to the engine through the greater perfection of the vacuum which is obtained in the condenser. The use of the apparatus also, of course, allows of great economy where water is taken from the town supply, or any other costly source. The patentees—Messrs. Boase and Miller—give some particulars of a recent trial made with the apparatus. The temperature of the water going in from the hot well was 158° Fah., and it was discharged ready for use again at 106°. The minimum result was obtained with an inlet temperature of 138°, which was brought down to 98°—a reduction of 40°. The results obtained at a Bradford, England, mill (using town's water) in two succeeding weeks were: Without the appliance, 204,000 gallons of water used; with the cooler in operation, 160,000 gallons—a saving of 36,000 gallons per week.

Silk Cannon.

A German inventor proposes to wrap a steel tube with silk until a diameter is attained corresponding with the ballistic power which is required for the cannon. For any given diameter silk possesses a tenacity as great as that of the best tempered steel, and has the advantage of a superior elasticity. After the tube has been made it is centered upon a lathe which turns with a great angular velocity. Above and parallel with the tube are arranged a number of spools of silk, which cover the surface in the form of a helix, by means of guides, without leaving any space between the threads. When the desired thickness has been obtained, the silk is coated with gutta-percha or hardened caoutchouc, in order to preserve it from air and dampness. The silk being a bad conductor of heat, the gun can be fired very often without getting hot, and it is stated that it can be more easily managed, since its weight is only one-third as great as if it only were of steel.

Oxygen Inhalation for Phthisis.

Dr. Albrecht, of Neuchatel, has been experimenting on consumption patients in a hospital at Berne, Switzerland, with a view of ascertaining its effects upon the development of phthisis, and whether, by increasing the rate of organic combustion by this means, the bacterium of consumption would not be destroyed and eliminated from the system. The subjects were tuberculous patients, in whose expectoration the bacterium of phthisis had been discovered with certainty on several occasions. The patients were first submitted to an appropriate highly nutritious diet, consisting of milk and peptone, and twice a week they were weighed with great care. It was observed that as soon as the oxygen inhalations began the daily loss of weight was checked, and in some cases the weight increased, dyspnœa diminished, and the number of bacteria seen under the microscope appeared smaller.

Weight of Drops.

Boymond has lately published an interesting notice upon the weight of drops. It is well known that the weight depends upon the exterior diameter of the tube; the interior diameter having no influence except upon the velocity of flow. The nature of the liquid determines the weight, whatever may be the proportion of dissolved material that it contains. Boymond used a dropper of one-eighth of an inch diameter, and determined the weights by an extremely sensitive balance. The mean of his results gave: for 15 grains of distilled water, 20 drops; alcohol of 90°, 61 drops; alcohol of 60°, 52 drops; alcoholic tinctures from 60° to 90°, 53 to 61 drops; ethereal tincture, 82 drops; a fatty oil, about 48 drops; a volatile oil, about 50 drops; an aqueous solution, whether diluted or saturated, 20 drops; a medicinal wine, 33 to 35 drops; laudanum, about 33 to 35 drops.

A Bell Ringing Eagle.

For some weeks past the crew of the ferryboat at Cornwall, N. Y., on the Hudson River, have heard a mysterious ringing of a bell while crossing the river. It has occurred at a certain hour every morning, and the attention of the passengers has been called to it. Many theories were advanced to account for the mystery, and the superstitious thought it a bad omen. It was noticed that a large bald eagle regularly flew north at the hour when the ringing was heard, but as eagles are not supposed to have bell attachments, this fact did not seem to solve the mystery. A few days ago the fog on the river became so thick that it not only interfered with the progress of the ferry, but it also made it hard for the eagle to keep its usual course. The consequence was that the boat and the bird came close together in the middle of the river, and it was discovered that the bell whose strange ringing was regularly heard every morning was fastened about the neck of the eagle.

Gilding a Dome.

To many, the coating of so exposed a part of a building as a dome or roof with thin gold leaf would seem to be a waste of material; the first snow or hail storm would pierce and tear it to shreds. The fact that the gold defies the wear of the weather induces the belief that it is much thicker than the leaf used by sign painters, bookbinders, and makers of fancy, ornamental articles. But the fact is that the gold leaf is precisely the same—airy, fleecy, and capable of floating in air like a gossamer fiber.

The gilder of the dome of the capitol at Hartford, Conn., Captain Thomas F. Burke, says that his principal trouble in doing the work was from currents of air, the altitude being more than 200 feet from the ground, and the site of the building itself being one of the highest in the city. To do the work properly he constructed a movable canvas shield made to fit the curvature of the dome and its twelve radial ribs, not so much to shield the workmen as to prevent the leaf from being blown away. To cover this dome—an area of 4,100 square feet—there were used 87,500 leaves of gold, each three and three-eighths inches square, weighing, in the whole, three pounds avoirdupois. The total cost of the gold and the labor was $1,600.

Trade Names of Leather and Grades of Shoes.

There are, says the *Shoe and Leather Reporter*, thousands of retail shoe dealers and a large number of jobbers whose practical knowledge of leather, its wearing qualities and its adaptability to boots and shoes, is very limited, and it may profit them to learn something about it. Of sole leather there are two divisions, hemlock and oak, and general subdivisions; these are of hemlock, acid and non-acid, while of oak some is tanned with oak bark exclusively, and some with oak and hemlock combined. The latter is called union. Then there is buffalo, an inferior East India hide, tanned in hemlock. All of these are adapted to heavy boots, brogans, plow shoes, wax, kip, and split, pebble grain, and the heavier grades of calf boots. Union leather is used almost entirely in the manufacture of women's shoes of the finer qualities, slippers, sandals, Newports, and all low cut shoes and fine button boots. Manufacturers of calf and flesh split shoes for men's wear use union leather extensively. Of upper leather there are still greater varieties. Wax, kip, and split leather are used extensively in the manufacture of heavy boots, brogans, and plow shoes. Men's, boys', and youths' balmorals, button and strap shoes, are made of a light kip, which, being taken off a young animal, is designated as veal calf. A flesh split is a most desirable and salable article for fine shoes, and commands nearly as high a price as calfskins. Buff leather, so called because in finishing the grain is buffed off, is made largely from Western and New England hides, and is one of the leading lines of upper leather. A large number of shoe manufacturers are engaged in the buff shoe business, and the product finds a market in all sections of the country. Buff leather is adapted to men's button balmoral and congress shoes, and the finer and lighter weights are made into women's shoes, almost wholly in polish cut. Buff leather shoes are very popular in all large cities, New York city being a great market for them, and the South being large consumers. Buff leather is the strongest competitor with calfskins, and it requires an expert to tell the difference when the shoes are made up. Grain leather is made in pebble and glove finish for all light work, and in a heavy pebble for men's wear.

Glove grain is comparatively a new article, and the adaptability of it in the manufacture of fine shoes, and toppings for men's calf shoes, has made it extremely popular. It differs from pebble grain in that the surface is finished with all the care that is used in the finish of calfskins, and it is extremely difficult for a novice to tell the difference. The consumption of glove grain is increasing every season. Pebble grain is made both light and heavy for women's work. It requires a 2½ to 3 ounce weight for a fine polish-sewed shoe, while pegged and nailed work requires a 4 ounce grade. Very little grain leather is used, except for these styles of foot gear. For working women and girls the pebble or glove grain polish shoe which can be bought in the vicinity of $1 per pair is a most desirable and serviceable shoe, and the demand is generally brisk enough to keep what limited number of manufacturers there are of them busy. The heavy boot or shoe grain used in shooting boots, balmorals, Napoleon long boots, and such, is made largely in Chicago, and has an extensive sale in the East. For winter service there is no shoe that can excel the grain balmoral. It is neat in appearance, and durable. It is practically waterproof. Calfskins are made for all sorts of boots and shoes. They run all weights from twenty pounds to the dozen up to a heavy veal kip weighing one hundred and thirty, perhaps more. Calf goods are made in every conceivable quality and style from the lightest shoe—even slippers—to the heaviest boot, and in many shapes—button, congress, balmoral, strap shoes, low cut, etc. A great many calf boots have split backs. Glove calf is a soft finish, resembling a sheepskin on the unfinished side, and is used for toppings of shoes, fly button pieces, and such.

Sheep leather is largely used for shoe linings, and for vamps and quarters in very cheap shoes for women's wear. They are made in creams, pinks, russets, and white, alum, sumac, and bark tanned, and the consumption is immense. Kid and goat leather enters into the manufacture of ladies' work exclusively. Goat is made both in pebble and smooth finish, is used in the heavier grades of shoes, having its competitor in the pebbles, grain, or imitation goat, "so called." Kid leather is extensively used for all kinds of fine button and polish shoes, slippers, sandals, and all low cut women's shoes. During the past few years there have been many discoveries and improvements in the method of tanning these skins, and they are now made in *Siamang, Caracal, Koodoo, Dongola, daisy kid*, etc., all of which are practically the same. They are all designed for ladies' shoes. The demand for novelty is met by russet and colored alligator, and imitations of it, russet and red pebbles, mat kids, leopard, grain, moroccoes, and such, but all these have a comparatively limited sale, and the bulk of the goods sold are of the kinds enumerated above.

Quicksilver as a Preventive of Phylloxera.

John A. Bauer, of San Francisco, states that he has found a sure and cheap preventive of the ravages of the phylloxera. His remedy is half an ounce of quicksilver, mixed in particles too small to be distinguished under an ordinary microscope, with an equal weight of pulverized clay, in the soil of the hole in which the vine is planted. The cost for the mercury, at the present price, is a little more than a cent for each vine, or, as the vineyards are set out in California, from $7 to $10 an acre.

It is supposed that a dose of the mixture will protect the vine for at least twenty years; but proof upon that point can be furnished by time alone.

The clay that is selected as the cheapest vehicle for keeping the metal in its proper place (bringing it into contact with a greater surface of root, and preventing it from sinking down into the ground, as it would if left in large globules) should be free from grit, and may be mixed with the metal in a revolving barrel.

The remedy is simple; it can be prepared, assayed for general purposes, and applied without danger or technical skill; its efficiency can be tested without much delay or expense by any one who has phylloxera and a microscope.

Mexican Railways.

David B. Hunt, former assistant treasurer of the Connecticut River Railroad, who had been connected with the Mexican Central Railway since April, 1882, has returned home to Massachusetts for a brief stay, and has given some particulars of Mexican railroading to the Springfield *Republican*, which says:

Mr. Hunt went to Mexico when about 200 miles of the main line of the road from the city of Mexico to El Paso was completed, and watched the progress of construction until the connection of the two divisions was made last March. The number of men employed in the work was 15,000 or 20,000. The length of the road is 1,225 miles. The Southern division has a considerable grade, but the Northern division is remarkably even, as it runs through a level country and makes few curves. The road follows the table land through its whole length. The expenses of building for these reasons were comparatively light, and the road promises to be a liberally paying enterprise. The earnings for October were nearly $300,000, and one good passenger and freight train a day will more than pay expenses and interest. The time from El Paso to the city of Mexico is two days and three nights. The road depends mostly upon its through business, but has a paying local business between the city of Mexico and Zacatecas, a city of 65,000 inhabitants 24 hours' run to the north. The freight handled is almost entirely from the United States, and the return trade is very small in comparison. Machinery has thus far been the principal import over the line. There has been considerable furniture and a great deal of beer, which is shipped by the car load from St. Louis, and which is eagerly welcomed by the Mexicans, as they have heretofore been compelled to pay $1 a bottle for it. There is not much to come out of Mexico as yet except minerals.

The passenger business is excellent, especially between Mexico and Zacatecas. It is found impossible to have a single class of carriages, as in this country; and the English system of three classes has been adopted. The first class carriages are similar to the ordinary cars in use on our railways. The second class are plain, with wooden seats and no cushion. The third class have four rows of seats running lengthwise. The fare for the respective classes is 3 cents, 2 cents, and 1½ cents a mile. Two-thirds of the passengers come from the lowest class. These are mostly Indians, half-breeds, and people of the sort that the others will associate with on no condition. The Pullman cars in use on the road are said to be the richest to be found on the continent. The conductors are all Americans, but the rest of the train men are Mexicans. Every train is furnished with an interpreter. Two side lines are now being built, one from Tampico westerly through San Luis to the main line; the other from the main line to the city of Guadalajara, and thence to San Blas on the Pacific coast. When completed, the total length of the road will be about 2,000 miles. The principal other line in Mexico is the Vera Cruz road, which is one of the best made in the world, and has long been famous for the beauty of the scenery along its line. The Mexican Central road, however, seems likely to get most of the business from this country, as it can take freight from New Orleans to the city of Mexico at a less rate than the tariff of the other road from Vera Cruz to Mexico. Besides, the exposed condition of the harbor of Vera Cruz and the unhealthy atmosphere of the town are great hinderances to its progress or to the success of any railroad line leading out of it. The growth of Mexico at present is much slower than it should be, considering the richness of its natural resources. The laws are crude and antiquated. One especially, which allows taxation only on cultivated land, is inimical to all agricultural progress. The business men of the city of Mexico are enterprising, but as they are almost entirely Germans and Frenchmen, Americans have only third choice in the market. Indeed, the class of Americans in the city is low as a rule. One great advantage of the country is its equable climate, the temperature varying little from 60 or 70 degrees the year round. This evenness of temperature, however, is not of so great value to the railroads in the preservation of their rolling stock as it would be if the direct beating of the sun's rays upon the cars did not shrink and split them. Mr. Hunt expresses great confidence in the good results that will follow the inauguration of the progressive government of President Diaz.

Self-purification of Sewage Contaminated Rivers.

Some investigations have been carried out by Herr Hulwa on the water of the river Oder before it entered and after it had passed through the city of Breslau, receiving in its transit the sewage of the city; and the results thus obtained may be commended to the consideration of those scientific alarmists who declaim so forcibly against the contamination of rivers by sewage, etc. Immediately after leaving the city, the self-purification, by the combined action of the oxygen of the air and of vegetable and animal life in the stream itself, was very marked; the impurities diminishing so rapidly that at a distance of less than nine miles from the city the water was as pure both to chemical and microscopical tests as when it entered it. The author considers it a mistake to forbid the outflow of sewage into rivers, provided the outfall is below the city, and the rapidity and volume of the stream are sufficient to carry the sewage to such a distance as will allow the operation of the natural causes of purification.

Artificial Gutta Percha.

The following is from a German patent, No. 20,939, for a method for the manufacture of gutta percha: About 50 kilos of powdered gum copal, and from 7½ to 15 kilos of flowers of sulphur, are under continual agitation heated in a boiler with double the quantity of turpentine, or with from 55 to 62 liters of petroleum, to a temperature of 126 to 150 deg. C. till completely dissolved. The mixture is then allowed to cool down to about 38 deg. C., when a solution of 3 kilos of caseine is added, the latter being dissolved in weak ammonia with the addition of a small quantity of alcohol and wood spirit. The mixture is now heated for a second time to the same temperature until it assumes the consistency of a thin fluid. It is then boiled with a solution containing from 15 to 25 per cent of tannic acid—galls of catechu—to which ½ a kilo of ammonia has been added. After having been boiled for several hours the mass is allowed to cool, washed with cold water, and kneaded out in hot water. After this treatment it is rolled out and dried.

Give Water to Infants.

A physician of the New York Nursery and Child's Hospital believes, from his practice, that infants generally, whether brought up at the breast or artificially, are not supplied with sufficient water, the fluid portion of their food being quickly taken up, and leaving the solid too thick to be easily digested. In warm, dry weather, healthy babies will take water every hour with advantage, and their frequent fretfulness and rise of temperature is often directly due to their not having it. A free supply of water, and restricting the frequency of nursing, has been found at the nursery to be a most effectual check in cases of incipient fever, a diminished rate of mortality and marked reduction in the number of gastric and intestinal complaints being attributed to this cause. In teeth cutting water soothes the gums, and frequently stops the fretting and restlessness universal in children at this period.

The Amyl-Acetate Light.

Dr. Bunte has recently described the Hefner-Alteneck standard of light before the German Gas and Water Works Managers' Society. This standard consists of a lamp burning amyl-acetate by means of a simple cotton wick. The designer has deliberately adopted a lamp with a wick, because he has found, on experiment, that a lamp without a wick is a comparatively complicated and troublesome affair. The height of the lamp-flame is, however, fixed, because experience shows that with a known diameter and height of flame the illuminating power is constant; and this is true of all descriptions of luminous material, whether paraffin, oil, or candles. The standard is defined as being the light given by a freely burning flame of amyl-acetate, burning to a height of 40 mm. from a solid round wick contained in a tube of German silver, 8 mm. in diameter internally, and 8·3 mm. in diameter externally, standing 25 mm. above the body of the lamp, and lighted 10 minutes before the observation is made. The power of the lamp is equal to the average of an English standard candle with a flame 43 mm. high. The lamp itself is very simple, without a chimney; and the height of the wick is regulated by a cog mechanism of the most ordinary kind. An upright rod with a projecting wire stands upon the lamp to gauge the height of the flame. The amyl-acetate is sold in Berlin at 6 marks the kilogramme delivered.