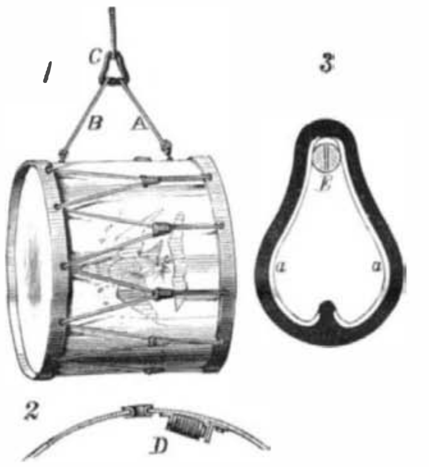
ELECTRICAL MAGIC.

Electricity in its ordinary every-day uses surpasses all the feats of the ancient magi or modern prestidigitators. Sending light, heat, power, signals, and speech to a distance over a wire, the phenomena of induction, the transfer of metals as in electro-metallurgy, and the numerous other uses to which electricity is applied in the arts, are all truly magical and mysterious, since the most profound is unable to assert the true nature of this subtle force.

The application of electricity to magical operations is quite common, but it is capable of more extended and more effective uses.

The few examples shown in the engravings are such as to afford entertainment in the drawing-room and give practice in the applications of electricity.

The mysterious drum, shown in Figs. 1, 2, and 3, has been constructed in various forms. It is designed to beat by means invisible and undiscoverable without removing the drum heads. The drum is suspended from what appears to be an ordinary hook, and the operative parts are concealed so as to be invisible either through the translucent heads or through the embouchure. The drum is suspended from the ring, C, by chains, A B, or by straps concealing metallic wires. The screw-rings extending through the body of the drum communicate electrically with the magnet, D, which is placed so near the embouchure as to be incapable of being seen through it. The armature of the magnet is supported very near its poles by an angle plate rigidly secured to the body of the drum, as shown in Fig. 2. The chains, A B, touch metallic contact pieces, *a a*, embedded in the inner surface of the ring, C, which may be either wood or rubber (Fig. 3). These contact pieces at their upper ends touch on opposite sides of the hook, E. This hook is divided vertically into two parts throughout its length, the two portions being separated by a thin piece of mica and bound together by a hard rubber knob at the outer end, and hard rubber ring or base-piece near the end inserted in the wall. The two halves of the hook are connected with battery wires leading to some distant point, and an interrupter worked by hand or clockwork is put in the electrical circuit. A wheel, notched



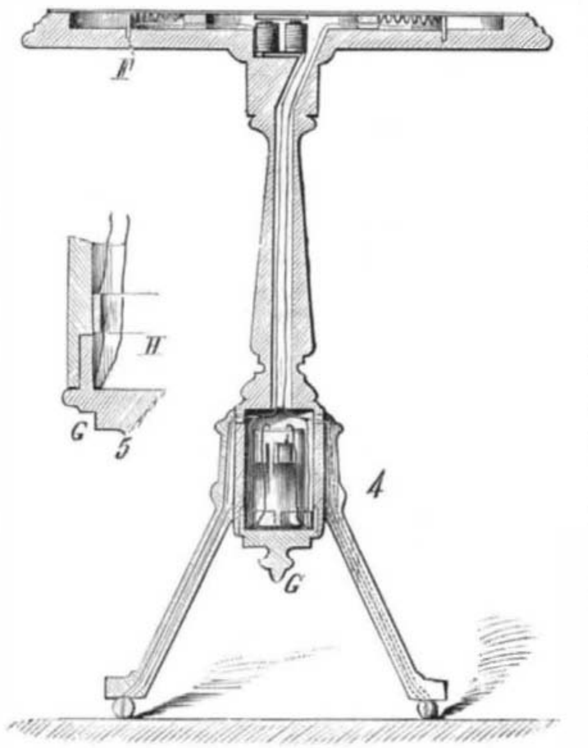
MYSTERIOUS DRUM.

according to the kind of call required, attached to the revolving spindle of a spring motor and touched by a contact spring, makes a good interrupter for this purpose.

This device is puzzling to the uninitiated, as it is impossible to see how the results are obtained without dismembering the apparatus. By means of a spur in each heel, and wires extending under the garments to the hands, it is possible to transfer the drum from its hook to the finger and secure the same results, provided two long conducting plates or strips, to be touched by the spurs, are placed beneath the carpet, and connected with the battery and interrupter. The removal of the drum from the hook to the finger adds another element of mystery to the device.

Much that cannot be otherwise satisfactorily explained is charged to the supernatural. The phenomenal sounds said to be evoked from tables by the weird inhabitants of the spirit world may be very successfully imitated by means of simple electrical contrivance shown in Figs. 4 and 5, and not only may the raps be produced, but sepulchral voices may be heard from the face of the table.

The table-top consists of two parts, the thicker portion being hollowed out, so as to form a circular cavity in the middle, surrounded by an annular cavity. The whole is covered with a top about one-eighth of an inch thick. The table standard is hollow, and chambered out sufficiently at the lower end to receive a compactly made Leclanché battery, which rests in the cap, G, fitted to the lower end of the standard. From the battery two wires extend to springs in the cap, G, and these springs touch two semicircular pieces, H, of metal attached to the inner surface of the chamber containing the battery (see Fig. 5), so that when the battery is in place, one of its conductors will touch one of the pieces of metal, and the other spring will touch the other piece. The two semicircular pieces of metal are connected with two wires extending upward through the table standard, one wire being connected with a serrated metallic hoop, F, placed in the annular space in the table-top; the other wire is connected with one terminal of an electro-magnet whose other terminal is connected with a flat metallic ring attached to the thin portion of the table-top and located immediately above and very near the serrated hoop, F, but not touching it. Now, by placing the hand flat upon that part of the thin cover of the annular space in the thicker portion of the table-top and pressing so as to spring the cover ever so little, the electrical circuit is closed and the electro-magnet draws down the armature which is attached to the thin



RAPPING AND TALKING TABLE.

table-top near the poles of the magnet, but not touching them. This makes a loud rap, and when the electrical circuit is broken by removing the pressure, a similar rap is produced. The movement of the hand in this operation is imperceptible.

From each of the wires extending upward in the standard, a wire extends down one of the table legs, and terminates in a single point, having sufficient length to pass through a carpet and touch two plates of metal communicating with a transmitting telephone or with a telegraph key and battery. With the former the table answers as a receiving telephone, and the magnet will be more efficient for this purpose if it be polarized. When the key is used, the raps may be produced by some one operating the key at a point remote from the table. In either case a confederate is required.

By placing conductors under the carpet at different points, the table may be moved about to enhance the delusion.

Figures 6 and 7 show insects that appear to be animated when disturbed, and as they are similar in construction, the description of one will answer for both. The pot containing the plants upon which the insects are mounted is broken away in the engraving, to show the interior, and the dragon-fly is shown in section in Figure 7. This is nothing more nor less than a vibrator-interrupter, made in the form of a dragon-fly, with mica wings attached to the vibratory spring and striped with asphaltum varnish, in imitation of nature.

The body of the fly consists of an iron wire wrapped for a part of its length with No. 24 silk-covered wire, forming a small electro-magnet, whose armature, *b*, is attached to a spring forming a part of the back, and fastened at *c* to the wire forming the core of the magnet by means of binding wire and jeweler's cement, or sealing wax. One terminal of the magnet wire communicates through one of the legs of

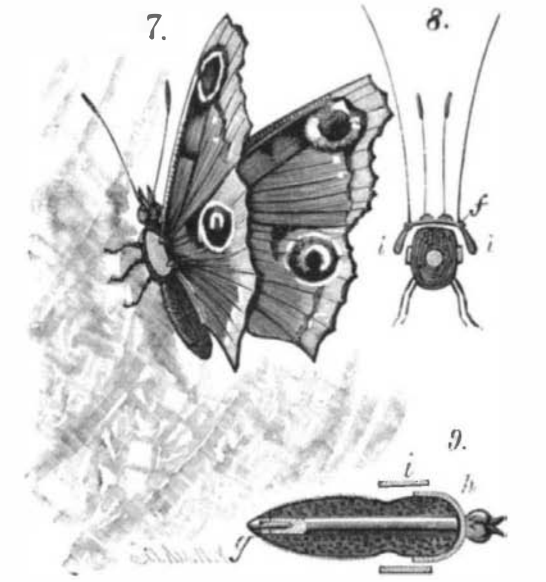
ELECTRICAL DRAGON FLY.

the fly with a wire running through the stalk of the plant to the carbon pole of a small Leclanché battery concealed in the flower pot. The other terminal of the magnet wire is connected with the vibrator spring at *c*. The free end of the vibrator spring extends from the armature, *b*, downward, and is provided with a platinum contact screw, *d*, which touches the contact spring, *e*, the latter being in electrical communication with a button on the under side of the flower pot cover, which is touched by a spring attached to the side of the pot. This spring is connected with a wire that extends downward and terminates in several points disposed about a circle concentric with the bottom of the pot. The zinc pole of the battery is provided with a wire having several terminal points alternating with the points previously mentioned. The bottom of the pot is slightly concave, and contains a small quantity of mercury, which, in consequence of its great mobility, completes the electrical current between some of the wire terminals in the bottom of the pot when the latter is taken in the hand and moved ever so little.

The battery is of small size, the jar consisting of a common tumbler. When the device is taken in the hand, the wings, which are attached to the vibrator, spring immediately, tremble and buzz in true insect fashion. If the plants and insects are firmly made, they are sure to be taken in the hand for examination, when the latter will exhibit signs of life.

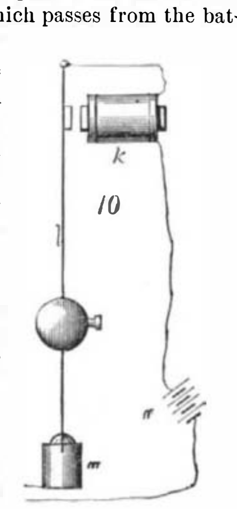
The butterfly shown in perspective in Figure 7, and in transverse and longitudinal section in Figures 8 and 9 respectively, is intended to be placed upon lace curtains or on a picture frame. The body, as in the case of the dragon-fly, consists of an electro-magnet having its polar extremity, *h*, returned upon the magnet wire. The back of the butterfly consists of an iron shell swaged into the proper form and attached to the smaller end of the magnet by means of a screw, *g*. To this shell are pivoted on delicate pivots, *f*, two small armatures, *i*, which extend downward over the returned pole extension of the magnet. These armatures carry the natural wings of a butterfly, and as the pulsating electrical current runs through the magnet the wings are vibrated in accordance with the intervals of open and closed circuit.

The electrical impulses may be controlled by hand or by



ELECTRICAL BUTTERFLY.

clockwork, or by means of an electric pendulum interrupter, shown in Figure 9. The current which passes from the battery, *n*, through the butterfly, passes also through the magnet, *k*, of the interrupter through the pendulum rod, *l*, and through the mercury contact cup, *m*. When the pendulum is drawn toward the magnet the circuit is broken; when the pendulum is released the circuit is instantly closed, and the pendulum is drawn forward again. The electrical pulsations produced in this way move the wings of the butterfly more or less rapidly according to the length of the pendulum.



Current Breaker.

Three or four of these butterflies may be controlled by a single pendulum. These objects placed on a lace curtain are amusing and make very pretty ornaments.

The fine wire forming the conductor may be white cotton covered, which may be easily concealed in a lace curtain.

Fast Work in Cloth Making.

Governor's day at the Atlanta Exposition was signalized by the manufacture of two complete suits of clothes from growing cotton, all the processes being finished within twelve hours. A large crowd watched the skillful workmen. The gathering, ginning, picking, carding, spinning, weaving, and dyeing were successively completed with great rapidity and perfection, and at 12:55 o'clock in the afternoon the cloth went to the tailor. That evening at 7 o'clock Governor Bigelow, of Connecticut, arrayed in one of the suits, was receiving a delegation from the Atlanta University at the residence of Director General Kimball, while in the other Governor Colquitt was submitting himself to admiration at the Executive Mansion.

Poisons and their Antidotes.

Under the head of poison may be classed any substance—gas, liquid, or solid—which by its own inherent qualities is capable of injuring health or destroying life.

As a rule poisons prove most rapidly fatal when introduced, by a wound in a vein or by hypodermic injection, directly into the blood. Their action is also speedy when brought into contact with the membrane of the lungs. They are, as a rule, readily absorbed through the serous and mucous membranes of the body, while through the skin the absorption is slow.

When taken into the stomach, poisons—especially if liquid—act more speedily when the latter is empty than when it is full.

Most poisons injuriously affect the system, no matter how introduced into it, but there are exceptions to this rule—the sting of the viper may be deadly, but the poison is harmless when swallowed. There are also a class of bodies which when swallowed most directly affect the nervous system, but fail to act when applied to the brain or nerve trunks.

Some poisons disorganize or corrode the organs with which they come in contact, but there are many—especially among the narcotics—that, while producing very slight local change, often develop remarkable remote effects. Belladonna, in whatever way introduced into the system, paralyzes the ciliary nerves, and so causes dilatation of the pupil.

The preparations of arsenic, opium, and the prussiates (cyanides) are the substances most frequently employed as poisons in this country. The symptoms attending slow poisoning by arsenical and antimonial compounds are frequently such as might appear to be owing to natural causes, and it is to be feared that more instances of secret murder due to such causes have occurred than have been detected.

The following is a condensed statement of the characteristics, symptoms, antidotes, and simple methods of testing for and identifying some of the more common poisons:

Poisons are usually divided into three classes—irritant, narcotic, and narcotic-irritant. Irritant poisons are usually considered under the heads of mineral—or metallic and non-metallic—irritants, vegetable irritants, and animal irritants. In the first of these divisions is arsenic and its compounds—arsenious acid (white arsenic), metallic arsenic, fly powder, potassium arsenite (Fowler's solution), arsenic acid, arsenic sulphides (yellow orpiment and red realgar), arsenical pastes, soaps, etc. This fearful poison has of late years caused more untimely deaths than any other mineral poison. Some of the insoluble compounds of arsenic are not so rapid in their action upon the system as the more soluble ones, but there is not a single compound into which arsenic enters that is not capable of causing fatal results when taken into the system.

From half an hour to an hour after the arsenic has been swallowed the person begins to feel a nameless uneasiness, developing into faintness, depression, and nausea, with an intense burning pain in the region of the stomach, increased by pressure, retching, vomiting, sense of constriction in the throat, with intense thirst; diarrhea, more or less violent, accompanied by cramps in the calves of the legs; matter discharged from the stomach of a dark greenish color, sometimes streaked with blood. The pulse becomes small, frequent, and irregular; skin cold and clammy in the state of collapse, at other times very hot; respiration painful; eyes red and bright. Sometimes the sufferer becomes unconscious or suffers partial paralysis or tetanic convulsions—precursors of death. These symptoms will vary according to the nature of the compound and the quantity taken.

There is no *specific* antidote for arsenic, and remedies are rarely attended with success if not applied at an early stage. Mixtures of olive oil and lime water promptly administered after the effectual use of an emetic have been recommended; recently precipitated hydrated oxide of iron mixed with magnesia has also been used with favorable results. No chemical antidote should ever supersede active evacuent treatment by emetics and with the stomach pump.

To test a suspected liquid or powder for arsenic, mix it with a small quantity of pure dilute hydrochloric acid, heat nearly to boiling, filter, and pass through the nearly neutral liquid a stream of washed hydrogen sulphide gas. If arsenic is present a lemon-yellow precipitate or yellow cloudiness (arsenic sulphide) will be formed, and will subside after boiling or exposure to the atmosphere. The presence of much animal or vegetable matters may change the yellow to a brown tint.

In Reinsch's test the substance is boiled with about one-sixth part of pure hydrochloric acid and a slip of bright, clean copper wire or foil placed in the solution. If arsenic is present the copper quickly acquires a dark iron-gray color. When this is washed, dried, and heated in a reduction tube the coating is converted into white arsenious acid, which sublimes in minute octahedral crystals. With Marsh's process very minute quantities of arsenic can be detected in a substance, but in the hands of an amateur the experiment is very apt to terminate in an explosion.

Lead or its salts are often taken into the system unawares—in drinking water which has been allowed to stand in lead pipes or reservoirs, or in preserved vegetables and fruit cooked or allowed to stand for a long time in contact with lead soldered joints. All lead salts are more or less poisonous, and their effects are accumulative—as with the painter who becomes "leaded" by the gradual absorption of lead from the paints with which he is in constant contact. When any considerable quantity of this metal has been swallowed or when it has accumulated in the system the usual symptoms are: a burning, prickling sensation in the throat, with dryness and thirst, uneasiness of the stomach, and irritation of the alimentary canal, followed by violent and obstinate colic and great pain in the abdomen, relieved somewhat by pressure, the pain being intermittent. There is usually obstinate constipation, cold skin, and general prostration. In extreme cases the extremities become numb or paralyzed, followed by convulsions and insensibility.

For lead poisoning sulphate of soda or Epsom salts is the prescribed antidote; powdered charcoal and sulphate of magnesia are also recommended. Large quantities of cream and albumen (or white of egg) also retard the action of lead poisons, and emetics are given to promote vomiting if the poison does not itself occasion it. Lead is easily detected in a substance by heating the latter with a little pure acetic acid and testing samples of the solution with sulphuric acid, chromic acid (or bichromate of potassium), sodium sulphide, and zinc. The first produces a heavy white precipitate, the second a bright yellow, the third a black precipitate, and the last—the zinc—when suspended in the liquid becomes covered with a crystalline formation of metallic lead.

The action on the system of the salts of antimony when taken in considerable doses is somewhat similar to that of arsenic. The usual antidotes are solution of tannin, strong tea, and magnesia and milk. Antimony is detected by the orange-red precipitate it gives with hydrogen sulphide and the alkaline sulphides. The dried precipitate is easily reduced to metallic antimony with the characteristic reaction on heated charcoal.

The symptoms of poisoning with copper salts are similar to those produced by arsenic, but the vomited matters are blue or green, and there is usually a "coppery taste" in the mouth. The usual antidotes are warm water to promote vomiting, white of eggs, strong tea or tannin solutions, and weak solutions of protosulphate of iron or potassium ferrocyanide in water. Copper in solution is detected by the blue color it forms with ammonia when the latter is added in slight excess, and by the brownish-red precipitate which forms on the addition of solution of potassium ferrocyanide. Most of the salts of copper have a clear blue or green color, easily recognizable.

Salts or preparations containing mercury in any form—corrosive sublimate, white precipitate, black oxide, red precipitate, mercuric iodide, vermilion, mercuric sulphate, mercuric ointments, etc.—are extremely poisonous. A few minutes after swallowing any of these a "coppery" taste is observed, followed by a sense of constriction in the throat and irritation of the throat and stomach. Nausea and vomiting soon occur, the vomited matter consisting of coagulated mucus and blood. Diarrhea follows, and the face of the patient becomes swollen and alternately flushed and pale. The pulse becomes small and irregular, the skin clammy, and respiration labored. In extreme cases the interior of the lips become swollen, and the tongue white and shriveled. The case frequently terminates with syncope, convulsions, or general insensibility. Egg albumen administered with warm water to allay the irritation and produce vomiting is the usual antidote. Milk and gluten or flour is also recommended. Active efforts should at once be made to effect the entire expulsion of the contents of the stomach. The stomach pump cannot be used.

The operation of such narcotic poisons as opium and prussic acid or prussiate of potash (hydrocyanic acid or potassium cyanide) is confined chiefly to the spinal marrow and brain.

The effects of hydrocyanic acid (and potassium or other similar cyanide) are almost instantaneous; it is very rarely the case that they are delayed more than two or three minutes. On the other hand, cases of fatal poisoning by opium do not terminate earlier than from six to twelve hours.

In cases of poisoning by cyanides emetics and the stomach pump are at once called into requisition. Freshly precipitated hydro-iron oxide, if administered immediately, is perhaps one of the best antidotes. Chlorine water injected into the stomach is also recommended.

Nitrate of silver yields with solution of the soluble cyanides a white precipitate. When a few drops of a solution of potash in gum water is mixed with a small sample of the suspected liquid and solution of sulphate of iron is then added a dark brown precipitate separates in a few minutes. This precipitate, when agitated with sulphuric acid, develops a deep blue color if cyanides were present.

These are only a few of the long list of active poisons, but they include those which are in nine cases out of ten responsible for the fearful record of poisoning cases. And it is assuredly true that but for the want of a little timely and definite knowledge respecting common poisons and their antidotes—such as we have endeavored to briefly sketch above—the list of fatalities from poisoning might have been shortened one-third.

Diamonds and Other Mineral Products of South Africa.

The diamond industry in South Africa continues to be exceedingly productive. The gross weight of diamonds sent through the Kimberley post office last year was 1,440 pounds avoirdupois, valued at nearly $17,000,000. According to the Manchester *Courier*, the annual value is estimated as follows: Kimberley, £4,000,000; Old de Beer's, £2,000,000; Du Toit's Pan, £2,000,000; Bultfontein, £1,500,000. At the end of last year 22,000 black and 1,700 white men were employed at these mines. From the Kimberley and Old de Beer's mines alone diamonds to the extent of 3,200,000 carats are annually raised, while the other two mines above named yielded 300,000 carats last year. At the diggings on the Vaal River about 250 men were at work last year. The other important mining industries of the colony are the copper mines of Namaqualand, from which last year 15,310 tons of copper were exported, valued at £306,790. From the manganese mines in the Paarl division 206 tons were exported; while at the coal mines in the Wodehouse and Albert divisions about 1,000 were raised. The salt pans in Simon's Town, Malmesbury, Piquetberg, Fraserberg, Uitenhage, and Cradock, yielded about 9,000 tons of salt. Mineral springs abound in the colony, many of them being well resorted to, but accommodation for visitors is, as a rule, indifferent.

Casting and Moulding in Brass and Bronze.

The methods of technical instruction abroad are indicated in the following brief extract from a foreign journal regarding the Bavarian Technical Museum at Nuremberg. This institution possesses a foundry built on the French plan in imitation of that of Barbedienne in Paris. The tools and material employed are the same as those in use in Paris, for it is conceded that France leads in casting works of art in brass and bronze.

The material used for the mould is a mixture of two parts of yellow sand with one of black. The former is sand from Fontenay-aux-Roses, near Paris. The latter is from moulds that have been used, and is prepared by breaking them up and sifting them. To impart to this moulding sand the necessary fineness and consistency it is moistened with water and run through a sand mill twenty or twenty-five times. For economical reasons this carefully prepared sand is not used to fill the whole flask, but only a rather thin layer is placed next to the pattern. The moulding flasks are wrought iron frames, ribbed inside to secure the mass of sand, and so fixed that they always have the same position in regard to each other.

In moulding they begin by filling one frame on the moulding board with coarse black sand and ramming it down, then the pattern or model is embedded in it, generally to the middle. Then the freely exposed half of the pattern is covered with the prepared moulding sand, which is prevented from adhering to it by dusting it with powdered soapstone. To prevent the upper and lower sand masses from adhering the surfaces in contact are covered with potato starch. The fine sand having been pressed down upon the model, one-half of the casting flask is placed over and around it. The fine sand that is in contact with the pattern, as well as the exposed portions of the black sand on the moulding board, is dusted with potato flour, and then the flask is packed with coarse black sand firmly stamped and pounded down. When this half of the flask is lifted up the black sand which was thus packed in adheres to it and is lifted up with it. The whole is turned over and laid on a board. The core pieces are taken up in inverse order, the pattern lifted up and placed with the cores, etc., in the impression left in the black sand of the other half. The other half of the pattern, which was previously embedded in coarse sand, is now exposed, and is moulded as the other half was in fine sand, the other half of the flask placed around it and stamped full of coarse sand as before.

Before moulding the other half the channels are cut for pouring in the metal, as well as the escape holes for air and gases, and are one-half in the upper and half in the lower part. When both halves are filled and stamped the mould is opened and the pattern taken out, and the mould dusted with extremely fine argillaceous sand, then with talc powder. The pattern is then put in again, and the mould closed and gently hammered. This gives the mould greater smoothness and fineness. Finally, the pattern is taken out, and the mould painted over with a mixture of English red, charcoal powder, and water, so it may offer greater resistance to the inflowing metal, especially in the fine ornaments.

As soon as this is dry it is painted over with a vegetable oil, which makes the sand easy to remove from the casting, while it imparts to the surface of the latter a fine dark color. It is now ready for drying. The two halves are separated and put in the drying oven, where they are left twenty-four hours. On taking them out they are smoked with a pitch torch and then put in the casting press. The moulds are placed inclined, so that the casting holes are upward. The casting is done directly from the crucible in which the metal or alloy is melted.

Castings made by the process above described are massive. If they are to be hollow with a core inside, which is frequently done in small articles and always for large ones, the core is made inside of the mould. The material for the core consists of rather more black sand than for the mould, and is not worked so fine. It is exclusively made by pressing the core sand in the mould, since this is so firm, owing to the excellent quality of the moulding sand, that it is not injured thereby. The core is afterward trimmed around to make it enough smaller to allow for the thickness of the casting. Of course this has to be supported so as to leave the proper space empty around it. For this purpose wires are inserted in the cores and rest on the sand outside of the impression of the mould. Beside the wires one or more sheet iron or tin tubes with perforated walls are stuck in the cores and serve to carry off the air and gases.

The castings made as above in the foundry of the Bavarian Museum, it is said, are not inferior to the French, and the process has been successfully introduced into several Bavarian establishments by pupils of the Nuremberg school. This is carrying out the practical idea of technical fine art in education in a manner worthy of imitation and with a success not to be despised. P. N.

The Brotherhood of Locomotive Engineers.

At the morning session of the International Brotherhood of Locomotive Engineers, in Baltimore, October 22, the annual election of officers took place, and Chief Engineer Arthur holds over until 1883. Mr. T. S. Ingraham, of Cleveland, was unanimously re-elected First Graud Engineer for three years; Robert Thomas, of St. Thomas, Ontario, Canada, Second Grand Engineer for one year; and E. A. Stevens, of Boston, Second Grand Assistant Engineer.

THE SPOTTED AMBLYSTOME.

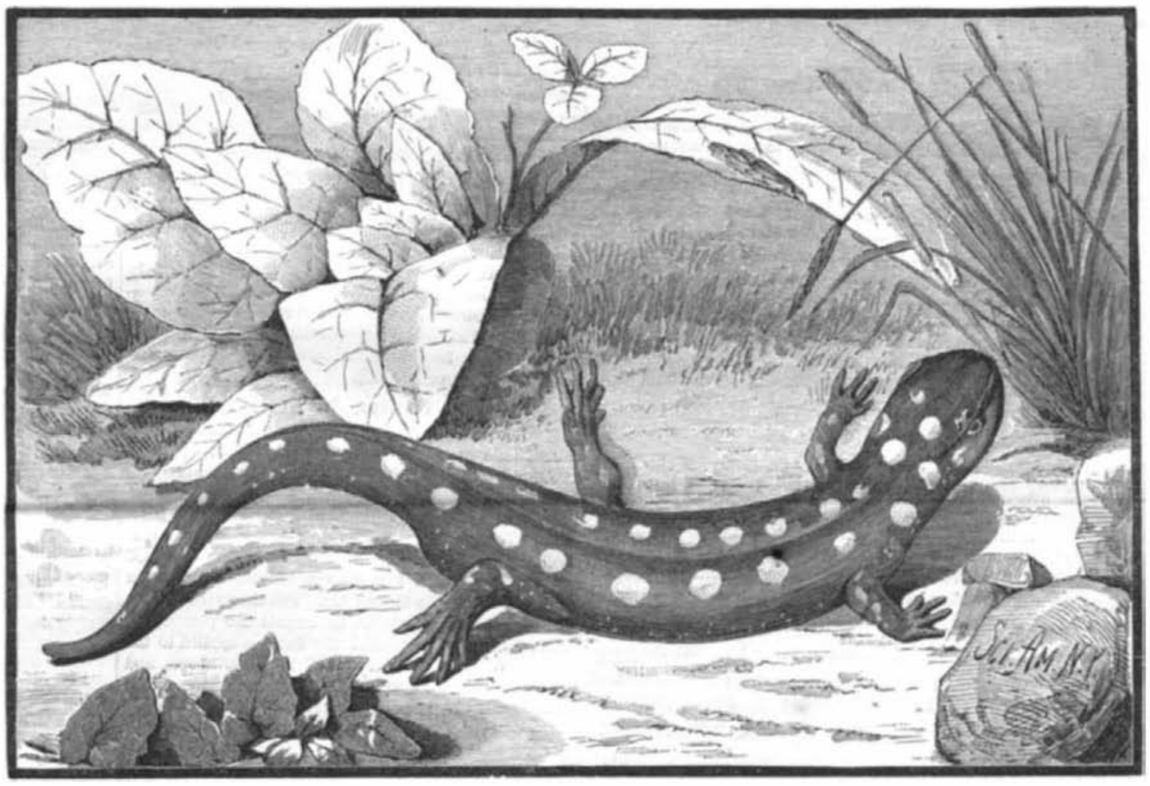
C. FEW SEISS.

This brilliantly marked amblystome was first described by Linnæus, in 1767, under the name of *Lacerta punctata*, that is, dotted lizard. But in 1803, Barton, in "Daudin's History of Reptiles," renamed it the *Salamandra veneuosa*, or venomous salamander. Barton subsequently burdened it with another specific name, *subviolacea*, which was adopted by several naturalists; but the law of priority forces us to reject all except that of Linnæus, namely, *punctata*. We of course know that our animal is not a lizard. It does not even belong to the class of reptiles. But although Linnæus' classification and nomenclature were admirable in their time, they are now totally inadequate to embrace the vast kingdom of nature, so great has been the investigations and advancement of science.

For what reason Barton called it venomous we are at a loss to know, unless he was so informed by ignorant persons, and without testing the truth of the assertion, so published it to the world. It is hardly necessary for me to say that this amblystome, and in fact all of the salamander family, are non-venomous and harmless.

The salamanders are interesting on account of the wonderful metamorphoses they undergo. Thus, during the first part of their lives, they breathe by gills alone, and then are closely related to the fishes; and, in the latter part, breathe by lungs, and then in many points resemble the higher animals. The evolutionist, therefore, looks to this quarter for the link between the fishes and the mammals.

The spotted amblystome, *Amblystoma punctatum* (Linnæus), Baird, is of a coal-black color above, and dull purple gray beneath. On each side of the dorsal line is a series of large round lemon-yellow spots. These spots are about the size of the eye or a little larger, and number generally eight or ten from the head to the hind limbs. On the sides and abdomen are scattered small bluish-white dots. There are a few yellow spots and whitish dots on the legs. There is a strong groove or furrow along the back from the head to the base of the tail. In alcohol the spots become white, and the animal is not so pretty as in life. Its average length is six inches, but it frequently attains the size of six and a half inches and more. It can be distinguished from the tiger amblystome (*A. tigrinum*), to which it bears a slight resemblance, by its strong dorsal groove, and in having two rows of yellow spots, while in *tigrinum* there are many and irregular. It is found under rotten logs and bark in moist woods and forests, from Canada to Louisiana, and west to Missouri.



THE SPOTTED AMBLYSTOME.—(*Amblystoma punctatum.*)

Extraction of Tannin.

Mr. O. Kohlrausch has succeeded in devising a process of extracting tannin in almost theoretical quantities from many different kinds of barks. He concludes that as in tannin the tannic acid (tannin) enters the skin by osmosis, it similarly leaves the cells of plants through their permeable membrane; chemical and microscopical examination having shown that the interior of the uninjured cells is the same as the exterior of thick bark which had already been utilized. It is therefore not the solution of the tannin set free by finely dividing the bark, and taken up by the skins, *but dialysis of the tannin through the permeable membrane* of the plant cells, and also through the animal membrane of the skin.

Hence it is not necessary to divide the bark into very small fragments, but, on the contrary, pieces may be used with advantage which are small enough to allow the dialyzing operation to take place in a battery of closed vessels, thus avoiding any danger of choking up the valves or pipes of the apparatus.

The result of this is that purer extracts are obtained in a more economical manner, so that lighter colored extracts rich in tannin can be prepared at a smaller cost than usual, and in the case of tannin lighter colored leather is produced. In the latter circumstance the author is of opinion that if the freshly prepared dialyzed extracts are used at once considerably less tannin would be required.

The researches of the author have shown that *tannin passes through the animal membrane very rapidly in the dialyzer*, so that in a short interval of time fine extracts run from a battery, and the residual bark is almost entirely free from tannic acid. It appears from this curious result that tannin must be a *crystalloid*, although it has never been obtained in a crystalline state in the laboratory.

The Vegetable Origin of Diphtheria.

In a recent lecture before the Academy of Natural Science, in Philadelphia, Prof. H. C. Wood, of that city, gave a statement of the results of certain researches upon the nature of diphtheria undertaken by him and Dr. H. F. Formad, at the instigation of the National Board of Health. The investigations embraced not only the ordinary endemic diphtheria prevailing in Philadelphia, but also the more violent forms of the disease occurring from time to time in different places.

In this pursuit Dr. Formad visited an infected town on Lake Michigan, where one-third of all the children in a marshy district died of the epidemic, and brought back with him specimens of the diphtheric virus, several of the false membranes which are invariably formed in the throats of afflicted persons, and portions of their viscera. In all blood, said the professor, as reported by the Philadelphia *Times*, there are two kinds of corpuscles, the red or color-giving and the white. By careful study and experiments, both in human beings and the lower animals, it was found that this infinitesimal plant fastens upon the white corpuscles and multiplies its cells, altering their character until, with the interior destroyed, they burst, and the plants, set loose in an irregular mass, separate and go off individually, to continue the destructive work on other corpuscles. Thus increased, they poison the blood, choke the vessels, and are found in myriad numbers in the spleen and other organs rich in blood. Prof. Wood's investigations show that the false membrane, supposed to invariably indicate the presence of diphtheria, may be caused by ammonia, Spanish fly, or any other irritating influence in the throat, so that its presence is not infallible as indicating the existence of this disease.

But in any case the false membrane is built up by this parasitical plant, which grows and multiplies upon its inflamed surroundings, whatever may be its cause. It is when the plants grow strong enough to extend to the blood, either poisoning it themselves or carrying the poison with them, that diphtheria sets in. This little plant is exactly the same as found upon the coated tongue. When Prof. Wood put plants such as are found upon a healthy tongue in sterilized matter they failed to grow. On the contrary, plants from the throat or blood of a person affected with diphtheria multiplied rapidly. The practical result of the investigation pointed out was the possibility that diphtheria, if existing theories hold good, may be prevented by artificial vaccination.

In the case of splenic fever caught from animals, which has been proved to originate in a somewhat similar plant, Pasteur has found that the plant, when exposed a sufficient time to the air, by the action of oxygen loses its virulent character, and when then introduced into the system makes the animal sick, but is no longer fatal. The deduction is that this diphtheric plant, scientifically known as "micrococcus," may in time be cultivated so that when inoculated with it the system will be no longer subject to the disease in its fatal form. Concluding the lecture, Prof. Wood was applauded when he said that these discoveries could never have been made but for the aid of vivisection, against which there is a foolish prejudice in the minds of many.

Choice of Seed in Cotton Growing

A Mississippi planter has on exhibition at the Atlanta Cotton Fair a bale of cotton, pronounced by many good judges as the finest short staple cotton ever seen in Atlanta. His especial hobby is the selection of his seed. It is not a question of different varieties, but of good and bad seed of the common variety. He has the seed of his best stalks selected every year for planting; and he claims that it is by a judicious selection of seed that the cotton can be made better. It is needless to say, remarks a critical observer, that as a rule the selection of seed and of guano, as well as the methods of culture, are matters of accident and not of exact study. There is no reason why the greater part of the inferior cotton that sells for eight or nine cents might not, under a careful system of agriculture and manipulation, be made to sell for ten or twelve cents. Careful agriculture, if need be scientific agriculture—this is what the South needs quite as much as manufactures and capital. These samples of cotton are not a very great attraction to the Southern farmers that visit the exhibition, but the lessons that are to be learned from the experiments that have produced them are the most important lessons by all odds that the exhibition can teach.

Soles and Turbots in New York Waters.

The United States Fish Commission lately received from England three live soles and six turbots out of a consignment of seventy soles and thirty-five turbots. The fish were set free off Coney Island. Previous attempts to transplant these fish to American waters have not been successful.

The turbot is a soft-rayed flat fish, whose left side is of a brownish color and under or right side white. Without the tail its body is almost round. The common size of the fish varies from five pounds to ten pounds weight, although occasionally it attains to twenty pounds and sometimes thirty pounds. It is the most prolific fish known. One weighing twenty-three pounds was once found to contain a roe weighing five pounds nine ounces, which contained 14,311,200 eggs. The majority of turbot are taken along the east coast of England and the coast of Holland. It is caught in trawl nets and also on lines, the most taking bait being those fishes of bright color. The sole is also a soft-rayed flat fish, which, to the casual eye, somewhat resembles the flounder. Its length varies from ten to twenty inches. Its color is a uniform dark brown above and a white below, the pectoral being tipped with black. To the British public soles are the most important of all sea fishes. Little is known of their habits. They are caught in great quantities off the coast of England, in the North Sea, where they breed. Both fishes are considered great delicacies in England.

Carrier Pigeons as Doctors' Messengers.

The *Medical Record* has the following: A physician of Erie, Pa., is training homing pigeons for use in his practice. Some of his young birds, put upon the road to make records for distance, have made very good time, namely, fifty miles in ninety minutes, sixty-six miles in eighty-two minutes. Homing pigeons are largely used by country physicians, both here and abroad. One doctor in Hamilton county, N. Y., uses them constantly in his practice, extending over nearly two townships, and considers them an almost invaluable aid. After visiting a patient he sends the necessary prescription to his dispensary by pigeon; also any other advice or instruction the case or situation may demand. He frequently also leaves pigeons at places from which he wishes reports of progress to be dispatched at specified times, or at certain crises. He says he is enabled to attend to a third more business at least through the time saved to him by the use of pigeons. In critical cases he is able to keep posted by hourly bulletins from the bedside between daylight and nightfall, and he can recall case after case where lives have been saved that must have been lost if he had been obliged to depend upon ordinary means of conveying information.

BUFFON spoke wisely when he said: "How much useful knowledge is lost by the scattered forms in which it is ushered to the world! How many solitary students spend half their lives in making discoveries which had been perfected a century before their time, for want of a condensed exhibition of what is known!" This want is met by the SCIENTIFIC AMERICAN, and our notices of new inventions alone are worth many times the cost of the paper to inventors and others, with whom it is more than ordinarily important to know not only what is doing but what has been done.