raft at about 1,000 feet distance. The boat, having a five-pound torpedo fastened on the stern, was handled from the croquet lawn by Lieutenant Bradford. The boat is made almost in the shape of a cigar, with two pointed ends, and is almost totally submerged, the green outline appearing above the water being almost like a huge green fish. The boat is fitted inside with a small oscillating engine, driven and steered by carbonic acid gas, the steering being regulated through the electric machine, and by means of which it can be made to perform the most difficult evolutions so long as there is any gas left in the receiver. The object of this invention is to attack an enemy's vessel at a distance of two or two and a half miles, and, by means of immense torpedoes or charges of gunpowder or nitro-glycerin, destroy the enemy and the boat also. After a few fancy manœuvers, the deadly looking craft made right for the target, and in a few seconds the edge posts were shivered into atoms and thrown into the air a distance of twenty feet. Then the boat was sent on a cruise among the sailing boats and turned round and round with a rapidity that was astonishing, considering the distance.

Experiments were next made with the Ericsson torpedo boat. The engine was worked by compressed air, which was forced through an inch india rubber tube from the air box of a twenty-five horse power engine. The hose supplying the air is 800 feet long. The length used is also used to draw back the boat. The engine was started and the two propellers, which work in opposite directions, were set in motion. The air pressure was from seventy-five to a hundred pounds, and soon the tube, like an immense tail, began to run out after the boat.

In a few seconds the boat began to sink; and as the speed of the stationary engine, on the Nina, was increased, she sunk deeper and deeper, until the white disk on the ten-foot iron shaft on the upper portion of the boat was only three feet above the surface. Unlike the Lay boat, she made no ripple, and all that could be seen above water at 600 feet distance was the disk. The air is made to steer her through the tube that supplies her cylinder as effectually as the carbonic acid gas is made to govern the movements of the other boat. Great interest was manifested in this invention. As soon as the pressure is taken off, the boat rises to the surface; when speed is gained she sinks completely.

Next a group of torpedoes, six in number, were exploded north of the landing. They were in about six feet of water and charged with powder, from ten to forty pounds. These were fired by several ladies present. There was another row of startling water jets, which would have sent a small fleet to "Davy Jones' locker" in a few seconds.

A steam launch next appeared, with two seventy-five pounders rigged on spars at the bow. These were rapidly fired by Lieutenant Commander Wildes and several assistants. When the splash and splinters had cleared away, the Nina came past the stand with a 100-pound service torpedo rigged to a spar, which was exploded as she passed the stand. The torpedo used in this way is intended as a substitute for the ram which is attracting so much attention in modern naval warfare. In a few seconds, however, she returned to the charge, towing in her wake a "Harvey," which she quickly dragged against a floating raft and sent everything literally sky high. Now followed in rapid succession three fifteen pounders, which were fired by the contact of a small steam launch with buoys containing circuit losers of a peculiar construction.

In connection with these experiments the circuit indicator designed by Lieutenant Converse was used, which gives to the officer in charge absolute information as to the condition of his cables and torpedoes at all times. If a wire becomes defective or broken, it is signaled instantly by the ringing of a bell, which sound is kept up until the defect is repaired. It also enables him to fire the torpedo at will when the enemy's vessel does not come in contact with the circuit closer, and yet is near enough, in his judgment, to send her to the bottom. At the same time all the torpedoes can be rendered safe to a friendly vessel, their approach being merely signaled by the ringing of a bell, this being, in fact, the most complete apparatus yet designed. When one torpedo is fired, however, all others are thereby disconnected from the battery for half a minute, thus rendering it impossible for one torpedo to be fired by the action of another.

The next experiment was the simultaneous firing of seventy-nine dozen igniters. These were followed again by two extemporized torpedoes, the one in an old tin oil can, the other in a molasses jug, which rattled and thundered so that the whole of Newport must have been affected. These were constructed, at the request of the Secretary, by Messrs. Higginson and Davenport from the materials at hand. After the experiments on the east side of the island, Professor Hill created a commotion by exploding a hundred pounds of nitro-glycerin, placed to the west of the island, five feet from the surface of the water. The shock was quick and severe, and thousands of fish came instantly to the surface, apparently stunned, while many others were treated to a brief aerial voyage.

At the spot called Junction No. 12 by the experimenters, was effected the explosion of twenty-five pounds of dynamite under a raft which was floating on the surface of the water. This was the most splendid piece of work yet accomplished. The water was agitated a quarter of a mile distant from the raft, and the volume of water thrown in the air was laden with the splinters, which fell again into the water like match wood. The grandest spectacle of all was the last. The old coast survey schooner Bowditch lay quietly at anchor, 1,300 fect distant, under bare poles. Near her were a hundred little sailboats, which the steam launch was endeavoring to drive off; beneath her, however, was a terrific mine, consisting of three 100-pound gunpowder torpedoes and 250 pounds of dynamite in two others.

Mrs. Field, wife of Judge Field, of the Supreme Court, closed the circuit, and in an instant a vast column of water ascended about 300 hundred feet, followed by a roar and a concussion, and the timbers of the stately looking old craft were flying through the air. In the place where she had rested so placidly but a few seconds before a whirlpool was now seen spreading out its waves and receiving the falling *débris* as it descended, splash, splash, into the harbor; it was a complete annihilation. Not enough to make a doorpost, scarcely, was left whole. The hulk disappeared like a dream, for the instant the explosion took place she was crushed and carried up in the form of chips in the vast volume of water thrown by the force of the mine beneath.

Ballooning at Night.

M. Wilfrid de Fonvielle made a successful night ascent on August 1, for the purpose of observing meteorites. From 10 P. M. to 4 A. M., forty-two meteorites were observed between Rheims and Fontainebleau. Some of these emanated from *Cassiopeia*, others from *Perseus*, and as many as nine took a vertical direction, descending from the part of the heavens which was concealed by the balloon. None of these were very noteworthy, and it is probable that none would have been observed at the surface of the earth. Eight persons were in the car.

Correspondence.

What is the Electric Force?

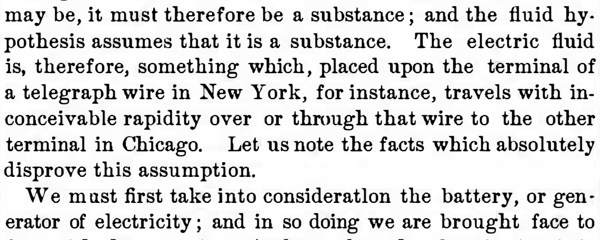
To the Editor of the Scientific American:

At the close of a life of patent research and experiment, it was the conclusion of Faraday that the electric force could not be defined; and it is almost universally conceded today that the nature and functional character of electricity must for ever remain one of the things unknowable. It is the purpose of the present article, in simple terms, to point out the partial fallacies of this proposition; and in order to arrive at a correct understanding of the subject, it is necessary that we frequently step aside from our subject to consider the bearings of other forces in respect of the electric force.

We may or may not accept at the outset a fact, susceptible of easy demonstration, that there is but one law regulating the transmission or continuation of force. It is of no sort of consequence what kind of force we may have in hand; there is one law inherent in all forces, and that law, in brief, is that no force can be transmitted except by molecular action. By molecular action I mean this: the first molecule or atomic particle of matter to which a force is imparted imparts that force to the next, and the next to the next, and so on indefinitely, in the same manner, generally speaking, that we topple over a row of bricks standing on end merely by toppling over the first brick. The correctness of this assumption will be seen further along.

The electric force is characterized as a subtle fluid flowing through or over a conductor. However subtle this "fluid" may be, it must therefore be a substance; and the fluid hypothesis assumes that it is a substance. The electric fluid is, therefore, something which, placed upon the terminal of a telegraph wire in New York, for instance, travels with inconceivable rapidity over or through that wire to the other terminal in Chicago. Let us note the facts which absolutely disprove this assumption.

We must first take into consideration the battery, or generator of electricity; and in so doing we are brought face to face with the question whether, when the electric circuit is established, any substance passes over or through the wire. In order that it may not be asserted that the fluid which leaves one pole of the battery returns to the other pole, thereby maintaining the equilibrium, we apply the battery to an induction coil, and for hours we discharge into the earth, from the secondary wire, a stream of brilliant sparks, the electricity generated by the battery. This will be understood as shown in Fig. 1, in which B is the battery, the electricity generated by which flows in the local primary coil, A: and C is the secondary coil, insulated from the coil, A, whose circuit is to the earth by way of the separated points, D.



We find an immense volume of electricity collecting at the points, D, and we know that the discharges cannot return to the battery. Therefore, if the electric force be a fluid or substance proceeding from the battery, the battery will in a certain period of time, have lost a certain quantity of its substance.

The battery is composed of certain metals, and chemicals in solution. By the action of the battery the nature of the metals and chemicals is changed, in precisely the same general manner that fire converts fuel into dust and gases, or water into steam. Now we have used our battery, we will say, for weeks, until the chemicals wholly, and the metals partially, have been converted; but although the electricity generated by the battery has been constantly given off, we find, if the battery be properly guarded from evaporation and its fumes collected, that not one atom of weight or substance has been lost. Therefore we can assert positively that the electricity generated by our battery, which has been constantly discharging in vivid sparks, not into the local circuit of the battery, but into the secondary earth circuit, is not a fluid or substance; that nothing leaves the battery and passes through the wire; that nothing passes through the wire, in the sense of substance; for this we do know, that, however subtle a "fluid" electricity may be argued to be, if it really be a fluid or substance flowing from the battery, there must inevitably be a loss in the weight of the substances comprising the battery, which we know there is not. There can be nothing more positive than these facts; and in view of them it cannot be argued that electricity is a substance, or a fluid, or a subtle fluid.*

Having gained this much, it will presently be seen that we have gained a great deal. What, then, is electricity?

First, it is clearly a force. Secondly, it is transmissible.

Being a force and being transmissible, it is like all other forces (all of which are transmissible) i.. its transmissibility. Like all other forces, electricity exists in a certain condition of the molecular or atomic structure of substances. It is no more a subtle fluid, nor is its transmission any more singular, than the force of traction is a subtle fluid or its transmission singular. And it is proposed to adduce the most striking facts to prove that the electric force differs from other forces only in the character of the molecular action in which the forces exist, without entering into a discussion of the ultimates of matter and force, for we can never have knowledge of these ultimates. We know there are matter and force; but when we arrive at a studious questioning, we find it impossible to distinguish between matter and force, to decide whether matter is an attribute of force, or force an attribute of matter; and finally we might carry the thing so far as to wonder whether force is not everything and everything is nothing.

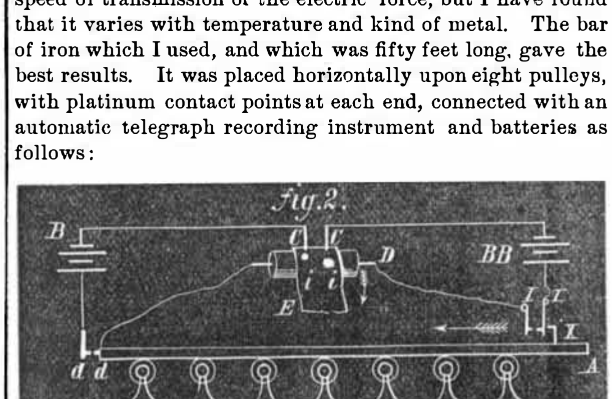
It may be confidently asserted that in the transmission of any force whatever, from the transmission of force through a simple lever to the transmission of electricity and light there is but one law, which is perhaps best exemplified in the toppling over of a row of bricks, as herein before mentioned. In this example, each brick crudely stands in the position of a molecule of matter, and acts upon the next brick in precisely the same manner (that is, as to imparting of force) that one molecule of matter acts upon another. If you blow a quantity of air into one end of a long tube, the same quantity of air will emerge from the other end; but you know that it is not the same air that is blown into the tube. The first impelled quantity of air yields its impulse to the next, and the next to the next, and so on indefinitely So if you take, with proper shape, a tube of water a mile long, for instance, and pour a certain quantity of water into one end, the same quantity will be displaced at the other end; but it would not be said that the water poured into the tube had traveled the length of the tube and emerged at the other end, although the effect is the same as though the quantity of water poured in had so traveled. It is the same with a belt or a lever; if you impart to one end a certain force, each atom or molecule of the belt or lever imparts that force to the next until finally the force is manifested at the distant end. And if the medium of transmission could be perfectly rigid or unyielding, the force applied at one end would be manifested almost instantaneously at the distant end; yet no one is astonished in witnessing the three general operations of an ordinary lever, namely:

1. The application of force at one end.

2. The transmission of that force to the other end by the molecular action of the matter composing the lever.

3. The manifestation, at the distant end, of the force applied.

The first and third operations, are visible; the second is invisible, but apparently instantaneous. I say apparently instantaneous, for I have made several experiments with a view to determining the speed of transmission of this force, and have ascertained that a reasonable period of time is required for the transmission of force through a rigid bar of iron as short as fifty feet in length. My first experiments led me to approximate the speed of this transmission to the speed of transmission of the electric force, but I have found that it varies with temperature and kind of metal. The bar of iron which I used, and which was fifty feet long, gave the best results. It was placed horizontally upon eight pulleys, with platinum contact points at each end, connected with an automatic telegraph recording instrument and batteries as follows:



Here are shown the bar A, fifty feet in length, running on pulleys, and the electrical connections, X being a projecting piece fixed to the bar, whose duty is to close the circuit of battery, B B, by forcing together the contact points, I I. The circuit of battery, B, is completed by the bar bringing together the contact points, *d d*, one of which is fixed to the bar. C C are the recording points, bearing upon the chemically prepared paper, E, which is carried over the metallic drum, D. It will be seen that a blow struck upon the end of

* It is a singular fact that, whenever something appears which is not capable of ready definition, instead of seeking for a solution, and suspending judgment until a solution is found, refuge is taken in hypothetical subtle fluids, or synonymous somethings

the bar at A, to move it in the direction of the arrow, will close both circuits by bringing together the contact points, *d d* and I I, and that a discoloration of the chemical paper under the recording points, C C, will take place at the instant of such contact. Therefore, if the force applied at A be instantaneously transmitted through the bar, the points of chemical discoloration will be side by side on the paper E, moving in the direction of the arrow; whereas they really stand with relation to each other as shown at *i i*, the first mark made being that caused by the closing of the circuit at I I, where the blow is struck, and the second being that caused by the closing of the circuit at *d d*, which closing of circuit will not take place until the force applied at A shall have been transmitted to the other end of the bar by the action of the atomic particles of the bar.

In my experiment, the length of chemical paper carried beneath the recording points was 90 inches per second, any greater speed occasioning a break, and the dots caused by the contacts were $\frac{1}{40}$ of an inch apart; that is $\frac{1}{40}$ of an inch from the line they would have observed had the contacts been simultaneous. Therefore the time required for the transmission of the force applied from one end of the bar to the other was the $\frac{1}{3600}$ part of a second, or at the rate of 2,045 miles per minute. These results, however, were probably far from accurate. The speed of transmission may not only be much greater than attained in my experiments, but the process of determining it by chemical decomposition is faulty in many particulars. I do not claim that it does more than show a remarkable speed of transmission of ordinary force, and that not only this transmission could not have taken place without the molecular action of the metal, but that the molecular action of the metal alone accounts for the difference in time between the imparting of the force at one end of the bar and its manifestation at the other end. And I doubt whether any one, witnessing this phenomenon would attempt to account for this transmission of force by urging the passing through the bar of a subtle fluid, generated by the bone, flesh, and blood of the person applying the force: yet we have in electricity the selfsame principle in the molecular action in which the electric force exists and by which it is transmitted.

The sun emits light. Now we know that this light has sufficient force, falling upon a surface properly placed, to impart motion to that surface. Therefore a ray of light must either consist of a solid projected from the sun, traveling through space and falling upon that surface, or it must be a certain condition of the molecular or atomic structure pervading everything, which condition is propagated, with inconceivable rapidity, from one atom to another, until, finally, the atomic light condition of the sun, though in less intensity, is reproduced at the earth. Now it is not only beyond all reason and hopelessly absurd to suppose that an atom of matter is projected from a burning body through a resisting medium at the rate of 192,000 miles a second, as, for instance, a ray from a feeble candle frame traveling through atmosphere and glass; but such a supposition is controverted by all the phenomena of forces. All forces—light, heat, sound, expansion, gravity, electricity—are transmitted in a similar manner to the transmission of force through a tube of water or air, as related; and as this is the fact, so all forces must reside in a certain condition of the atomic or molecular structure of matter. Primarily, there must be a normal condition of the molecules of matter as to shape and state of motion or quiescence. What that normal condition is, whether in shape the atomic particles are round, square, or otherwise, whether their motion is vibratory or circular, whether a certain motion attracts and another repels, we can of course never accurately determine, although we may theoretically approximate some of the conditions, as, for instance, the conditions necessary to the expansion of a metal by heat.

Washington, D. C. W. E. SAWYER.

Salycilic Acid for the Preservation of Infusions, etc.

"The wonderful reports of the conservative properties of salycilic acid led me some time ago to commence a series of experiments to determine the proportions of acid necessary to add to infusions, etc., in order to keep them a reasonable length of time without change. The results I have obtained are not quite as satisfactory as I had anticipated, but probably they will not on that account be less interesting to pharmacists in general.

Before experimenting with the infusions, I sought a suitable solvent for the acid, and several weeks ago found that solution of borax was its best solvent; but this does not take up a sufficient quantity to allow of its being added to medicinal preparations for the purpose of preservation. Boiling water dissolves the acid in proportions sufficiently large for the purpose, and does not deposit it again on cooling; therefore I made the infusions, etc., upon which I experimented, with water in which I had previously dissolved the requisite proportion of the salycilic acid. The following are the results of the investigation:

Infusion of cascarilla, without acid, kept two days; with acid (five grains to pint), kept five days. Another infusion made of double strength, with water containing ten grains of acid to the pint, has now kept over a fortnight and is perfectly fresh.

Infusion of quassia.—A quart of concentrated infusion (one to seven) was prepared, having forty grains of the acid dissolved in it: this has kept now over a month, and is as nice as when first made. One part of it was diluted with seven of water and kept for comparison with a simple infusion; the latter was unfit for use on the fourth day, whereas the former kept for six days.

Infusion of orange, made with water containing five grains of the acid to the pint, kept perfectly bright and fresh for eleven days, but then gradually became turbid.

Infusion of calumba went bad in three days, and a sample with three grains of acid to the pint only kept four days. A stronger infusion, with ten grains to the pint, was put into an uncovered beaker, and was clear and good at the end of the week; but spots of mold then began to form upon its surface though it still remained bright.

Infusion of senna with eight grains of acid to the pint kept seven days, being four days longer than one without acid.

Infusion of malt (two ounces to pint).—A simple infusion was quite sour in three days; but with eight grains of the acid to the pint, a portion of the same infusion retained its odor upwards of fourteen days, and even now, at the expiration of twenty-one days, the odor might be distinguished.

Tragacanth mucilage.—The addition of acid, in the proportion of eight grains to the twenty ounces, causes this to keep for a length of time, a sample prepared nearly a month ago being quite fresh, while a mucilage without this addition had acquired a repulsive odor in about eleven days.

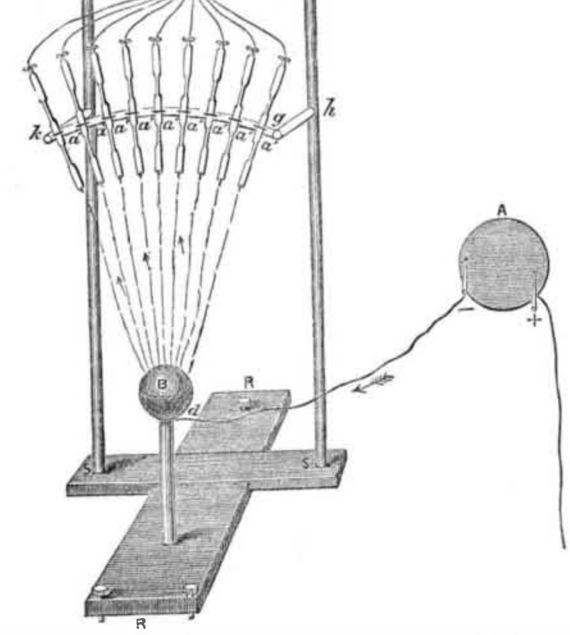
Mucilage of acacia also appears to keep well with this addition.

Lemon juice will retain its odor for weeks, and will not turn moldy, even if kept in an uncovered vessel, if five grains of salycilic acid are added to each pint.

Having read that this acid would keep leeches healthy and prevent the water in which they were kept becoming foul, I added ten ounces of acid solution (eight grains to pint) to half a gallon of water into which fifty leeches were put. Previous to this addition, we had found two or three dead leeches every week when the water was changed; but since, we have not lost a single leech, and the water keeps fresh for weeks. I forgot to note that, by adding ten grains of acid to each pint of sirups of red and white poppies, violets, etc., fermentation is effectually prevented. The addition of a little yeast to several of the samples produced no effect."—*J. C. Thresh, in Pharmaceutical Journal.*

AN EXPERIMENTAL AURORA.

M. Lynström, of the University of Helsingfors, has sent to the Geographical Exhibition, Paris, an interesting instrument invented by him to demonstrate that auroræ are produced by electrical currents passing through the atmosphere in the polar regions. Our illustration will give an idea of the apparatus.



A is an electrical machine, the negative pole being connected with a copper sphere and the positive with the earth. S S' are of ebonite, as well as R R *d d*, so that B is quite isolated as the earth in the space. B is surrounded by the atmosphere. *a' a' a' a' a' a'* are a series of Geissler tubes with copper ends above and below. All the upper ends are connected with a wire which goes to the earth, consequently a current runs in the direction of the arrows through the air, and the Geissler tubes become luminous when the electrical machine is set in operation. These Geissler tubes represent the upper part of the atmosphere, which becomes luminous when the aurora borealis is observed in the northern hemisphere. The phenomena produced by the Lynström apparatus are quite consistent with the theory, advocated by Swedish observers, that electrical currents emanating from the earth and penetrating into the upper regions produce auroræ in both hemispheres. The experiment, says *Nature*, differs from the apparatus of M De la Rive, who placed his current *in vacuo*, and did not show the property of ordinary atmospheric air of allowing to pass unobserved, at the pressure of 2 feet 6½ inches, a stream of electricity which illuminates a rarified atmosphere. The experiment was most attractive, and hundreds of persons witnessed it every day.

A board of engineers is now in session in this city, examining Captain Eads' plan for the improvement of the mouth of the Mississippi river. The recommendations thus far carry the total length of the east jetty to 12,700 feet, or 300 feet beyond the west jetty, and fix upon 1,000 feet as the space to be left for the current between the two artificial walls.

SCIENTIFIC AND PRACTICAL INFORMATION.

THE BARNACLES ON THE GREAT EASTERN.

Mr. Henry Lee describes in *Land and Water* a recent examination of the bottom of the Great Eastern, made by him in search of new barnacles and other marine animals. His labors were unrewarded with much of novelty; but among other interesting facts remarked, he notes that the portion of the hull usually submerged was clad with an enormous multitude of mussels, extending over a surface of 52,000 square feet of iron plates, and in some parts six inches thick. The average weight of the mussels was from 12 to 13 pounds per square foot, so that the vessel was cumbered with fully 300 tuns of living marine animals, enough to load, with full cargoes, two ordinary collier brigs.

ANOTHER NEW ANTISEPTIC.

Among the benzol group, all of which are derived from coal tar, are (besides the phenol or carbolic acid ($C_6 H_6 O$) and its many compounds) the cresol ($C_7 H_8 O$), the phlorol ($C_9 H_{10} O_3$), and the phynol. The latter, of which the composition is $C_{10} H_{14} O$, is also found in the volatile oil of thyme, together with thymene, $C_{10} H_{16}$, and cymene, $C_{10} H_{14}$; but the cheapest source of its production is coal tar. Several compounds of the phynol were studied by chemis s long ago; but it was reserved for Lewin, of Berlin, to discover that it is a powerful antiseptic. When pure, it consists of transparent crystals of a very agreeable and strongly aromatic odor: while it is so powerful that a single grain in thirteen ounces of hot water is a sufficiently strong mixture for all purposes. Comparative experiments have shown that it possesses a much greater power to arrest fermentation and putrefaction than either carbolic or salycilic acid. Added to a solution of sugar, with yeast, it arrested fermentation; added to milk, it arrested coagulation till 20 days later than is usual, and after 40 days there was no vegetation visible. Albumen of eggs did not show putrefaction at the end of 11 weeks, and the peculiar aromatic smell was still prevalent at that time. Even in bony substances, otherwise so ready to start decomposition and putrefaction, it was able to arrest all putrefactive change for not less than 35 days.

It appears thus that the benzol series contains the best disinfectants, and that carbolic acid, which has hitherto enjoyed the highest reputation, is by no means the best in the series; and that it will be superseded by the fragrant thymol, until perhaps some better antiseptic is discovered.

A NEW OLEAGINOUS SEED.

The commission of the permanent Exposition of the French Colonies has lately called the attention of Marseilles soap makers to a new source of oil, found in the seed of the carapa, which is a tree abounding in immense forests in French Guiana. Twice a year the tree produces an abundant harvest of seeds, which at certain times cover the earth to a depth of four or five inches. These, immediately subjected to pressure, give 35 per cent of their weight in an excellent soap-making or illuminating oil.

NATIONAL TREE PROTECTION.

By a United States statute of March 3, 1875, a penalty of $200 or six months' imprisonment is attached to permitting cattle to run on national lands, and to break down trees and hedges. The unlawful cutting or wanton destruction or injury of "any timber tree or any shade or ornamental tree, or any other kind of tree" on the lands of the United States is punishable by $500 fine or a year's imprisonment.

A Shower of Hay.

Dr. Hawtrey Benson, of Dublin, writing in the Dublin *Daily Express* under date July 27, describes a remarkable shower of small pieces of hay which he witnessed at Monkstown that morning. It appeared in the form of "a number of dark flocculent bodies floating slowly down through the air from a great hight, appearing as if falling from a very heavy dark cloud, which hung over the house." The pieces of hay picked up were wet, "as if a very heavy dew had been deposited on it. The average weight of the larger flocks was probably not more than one or two ounces, and, from that, all sizes were perceptible down to a simple blade. The air was very calm, with a gentle under current from S.E.; the clouds were moving in an upper current from S.S. W." The air was tolerably warm and dry, and the phenomenon is thus accounted for by Dr. J. W. Moore: "The coincidence of a hot sun and two air currents probably caused the development of a whirlwind some distance to the south of Monkstown. By it the hay was raised into the air, to fall, as already described, over Monkstown and the adjoining districts."

A similar shower of hay fell near Wrexham, England, July 25.

Collodion.

Few bodies are more easily electrified than collodion. With the least friction by the hand, the membrane adheres to the fingers. If a collodion sheet be fixed, like a flag, to a glass tube, and waved in dry and hot air, it is electrified. Other uses of collodion sheets, here mentioned, are in experiments on polarization of light, on colors of thin films, on diathermancy, on vibrations in acoustics. M. Gripon prepares these sheets by dissolving 1·5 to 1·7 grains gun cotton in a mixture of 50 grains alcohol and 50 grains ether. The collodion is poured on a glass plate after the latter has been breathed upon so as to receive a coating of moisture. When—after some hours—the collodion is dry, the plate is put in water; and a sheet of paper having been applied and attached to the collodion by the edges, the film is drawn off with the paper