

impaired, and by having the thinnest or most elastic part near the head the spring is not so liable to "stay back" after usage, as is commonly the case with springs of even thickness and with those that are thickest near the head.

#### THE STAG BEETLE AND CHAMPION BEETLE.

The common stag beetle (*Lucanus cervus*) must have been known to the ancients, for Pliny says in one of his books on natural history: "Beetles (he calls them scarabei) have a hard covering over their feeble wings, but none of them have a sting. There is, however, a large family, which have horns, on whose points are two-pronged forks, which can be closed at will and are capable of pinching. They are hung on the necks of children as a charm." Rigidius calls them *Lucanus*. Moutet, who, in his "Insectorum sive Minimorum Animalium Theatrum," has collected with great industry all that was known about insects up to his time, describes the stag beetle, but believes that the same description will apply to the female; while Aristotle asserts that in insects the males are always smaller than the females. Now every boy who is acquainted with beetles and lives in a region abounding in oaks, where the stag beetles make their appearance, knows that those having horns are males, while the females have simply short curved mandibles in no way conspicuous. The most recent observations on other kinds of stag beetles have taught us that according to the scanty or abundant nourishment of the larvæ, the beetles turn out small or large, and this is especially true of the males. The horn-like mandibles of the smaller beetles through small development confers upon the whole beetle a changed appearance, in comparison with a fully developed one. We may, therefore, see in a single family medium and smaller forms, without bestowing on them special names, as in earlier times.

The stag beetle is the largest of the European beetles. The male has enormous horn-like jaws or mandibles, the tips being armed with antler-like projections, slender antennæ, the upper lip is bent downward, and the tongue is deeply slit. The color is a dull black, the wing covers and horns are a glistening chestnut brown.

In June these beetles are found in the oak forests, where on beautiful evenings the males fly with a loud humming noise about the tops of the trees, while the females keep themselves concealed. In the daytime they run among the dry leaves on the ground and betray their presence by their rustling, or they sit on the bleeding trunks of the oaks and lap up the sap. Chop gives an interesting account in his "Garten-laube" of their behavior at these feasts.

In June, 1863, while lying under the cooling shade of an old oak tree on a very warm afternoon, a peculiar rustling sound attracted his attention. A soft snapping or grating was heard at short intervals, as if small dry twigs were being broken. Shortly a blackish object fell from the tree to the ground; it proved to be a stag beetle, which he found after a long search in the act of creeping up the rough bark again. The rustling did not cease, and when the observer looked upward he saw, seven or eight feet up the trunk, a peculiar brown mass. In the course of half an hour eleven stag beetles, of both sexes, had fallen down one after another, and because the crackling sound was still heard Chop procured a ladder in order to examine this remarkable appearance. A curious sight met his view. Upon a small surface the sap was flowing down from the old bark. To this dainty meal a very mixed company of insects had invited themselves as guests.

Large ants climbed busily up and down, dainty flies of all kinds sat together in crowded heaps, and hornets swarmed fiercely humming around the trunk. But the most conspicuous guests were undoubtedly the stag beetles. There were twenty-four individuals of them counted, those already captured not being reckoned. They played apparently the most important character at this banquet, and in spite of the sweet food did not seem to be in very good humor. Even the bold hornets avoided coming too near the powerful nippers of their clumsy companions, and held themselves at a respectful distance. The beetles fought a furious battle with one another, and certainly two-thirds of them contended to-

gether. The females, with their short, strong teeth, angrily bit each other in their struggle for the food. The contest between the males was especially interesting. Their horns were interlocked and projected over the neck shields of their antagonists, and they fought furiously together until one of the combatants dropped to the ground from sheer exhaustion. Sometimes a skillful fighter would succeed in seizing his opponent about the body, and with his head erected let him struggle in the air for a little while, and finally drop him. The observer, although near, was unnoticed, the fighters struggling and the victors licking the sap greedily. They seemed disturbed when the breath touched them, and the slightest noise, as the breaking of a twig, immediately affected the whole company. They would all raise themselves quickly and appear to listen. A similar thing would happen if one of the beetles that had fallen to the ground ascended the tree again and approached the others. In this case the males would move toward them with wide open mandibles eager to engage in a combat with them. Toward evening the greater part of the beetles buzzed away, and the crack-

The larvæ grow very slowly, and are nourished by the decayed wood of the oak tree. It requires four or five years for them to attain their growth of about four and one quarter inches and the thickness of a finger.

Their appearance is similar to that of others of their family. They have four-jointed antennæ on the horn-like head; the last joint is very short. The anterior of the three rings around the body is imperfectly defined on account of the cross folds, and has six strong legs which are yellow like the body; the horny parts about the mouth are black.

These larvæ were without doubt known to the ancients, for Pliny says: "The large wood worms which are found in hollow oaks and called 'cossis' are regarded as a choice morsel, and are even fattened with meal." They must have long been in use as a means of nourishment, for Hieronymus says: "In Pontus and Phrygia large, fat, white worms with black heads, which are generated in decayed wood, afford a considerable source of revenue and are valued as very dainty food." The full grown larva prepares a firm case, as large as the fist, from the decayed splinters of wood, and smooths

it out well inside. Three months sometimes pass before the larva assumes a chrysalis state and afterward becomes a beetle. From the hatching of the egg to the development of the perfect beetle requires about five years, some say six, and they enjoy for scarcely four weeks their winged existence. They may be kept in confinement by nourishing them with sweetened water or sweet beer.

Bültner mentions a swarm of stag beetles which were drowned in the Baltic and washed ashore. Cornelius gives an account of the great number of beetles which appeared in a limited locality at Elberfeld, in 1867, and thinks that every five years they will return again, and that the supposed developing time must be five instead of six years. Haaber mentions this and thinks this supposition is confirmed, as he observed a large number of beetles in 1862 and again in 1867 in the region of Prague.

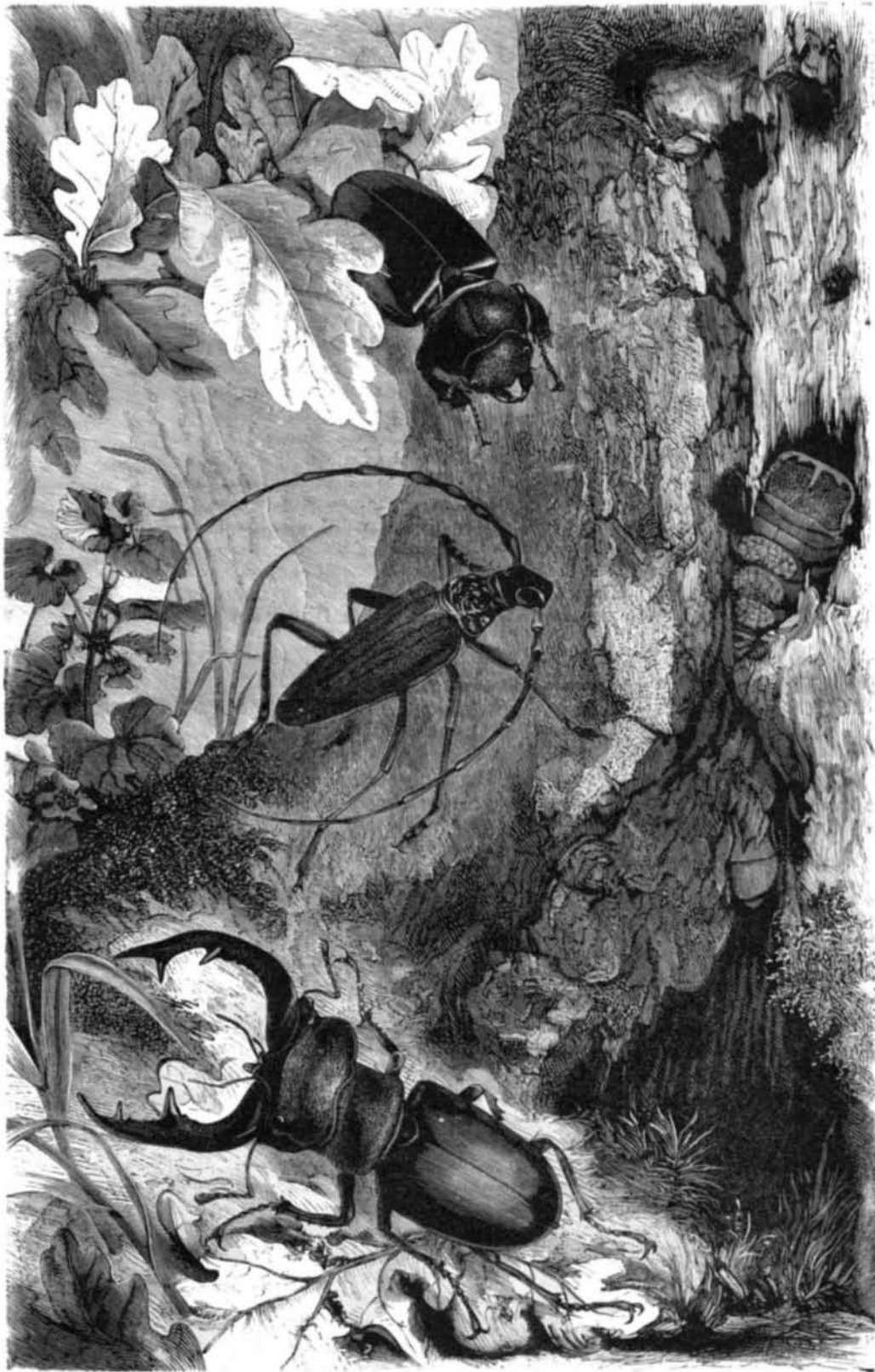
Here, as at Elberfeld, they flourished in old oak stumps, which appear especially favorable to their propagation. It would be of interest for other regions to note the flying year of the stag beetles. These beetles extend over the whole of middle and northern Europe, and are only wanting in regions where there are no oaks.

The champion beetle (*Cerambyx heros*) may be seen on an oak stem with the stag beetle in our engraving. It is a magnificent insect, of a glittering black. The head is long, the eleven-jointed antennæ swell out in the third to fifth joint into a club-shape, and end in a long slender joint, which appears to be separated, and in the male is considerably longer than the body. The neck shield is grooved or wrinkled, and has in the middle a thorny point at the broadest place. The wing covers have a blunt three-cornered shield in front. The under part of the body is covered with silky hairs, and is silvery white.

The larva has a granulated horny shield on the back of most of the joints, and lives three or four years in the inside of decayed oak trees. The broad flat passageways in the decayed wood which they bore out wind in various directions next to the bark. A trunk which is already perforated seems to possess a particular attraction for the female, and the work accomplished by these

colossal larva is enormous. The beetle emerges from the chrysalis in July, and is not seen by day; it only projects the points of its antennæ out of its retreat and speedily draws them back again if it is not approached very cautiously. The antennæ must project a long distance to enable one to bring the sly fellow to light. In most cases they will allow the points to be torn off before they can be drawn out of their retreat. After the sun has set they come out voluntarily and fly swiftly around, but not very high, in search of others of their family. The pairing ensues during the night, and the swarming time is, as with the stag beetle, a limited one.—*Brehm's Animal Life.*

EIGHTY-THREE thousand buffalo hides were sold at Miles City, Montana, alone, during the past fall and winter. At this rate the buffaloes will become extinct before long.



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ling sound was much diminished when the observer left the garden at eight o'clock. The struggles of a male over a female are of a more serious and determined nature, as the deep impressions and perforations in the wing covers show.

At the end of June or the first days of July the short swarming time is past. The pairing takes place in the night, the females lay their eggs in the decayed wood of an old oak tree, and the hard remains of the dead bodies of the males lie strewn around. It may even occur, and has frequently been observed, that after the pairing the feeble males, while still alive, are eaten by the rapacious ants, the hard front of the body being robbed of the soft back part, and they drag themselves painfully along on their long legs, a singular habitation for solitary ants. The bodies of the females are seldom found, because few of them come forth from their brooding places, and because the females are much more seldom met with than the males, who are about six times as numerous.

**Wasting Color.**

In looking over the imports of aniline dyes, and comparing them with the amount of goods dyed in this country, we are astonished to see how much more color we require to produce a certain shade than in the old countries. Does our cotton and wool require more coloring than foreign goods? There is no reason why it should, but where is the cause of this large consumption? We have principally to attribute it to the indifference of our dyers. If we look in our dye-houses, especially those which are connected with large establishments, we notice an almost constant stream of colored water of all shades running into our rivers, thus actually throwing away large amounts of money, which might be saved by very little care and attention. It might be the easiest way for the dyers in large dyeworks, after they have acquired the desired strength of their color, to let the liquor which remains in the dye-bath simply run away, especially if a color of the same shade should not be immediately wanted again. But could not this color be saved and worked over again and be used afterwards? We have noticed in large dyeworks a constant stream of blue water running into the river, which would surely carry with it at least one pound of dry blue every hour. This is worth saving, even if some care and trouble is needed. If these dyeworks would arrange cisterns large enough to hold the remainder of one certain color, and give it time to settle or precipitate the coloring matter with some chemical agent, a large amount of money could be saved. It might look at the first glance on this matter that this idea might not be very well carried out in large dyeworks, where so many shades are produced every day. It might need too many cisterns and too much extra work to make it pay; but a trial would not cost too much, and practical experience would bring the matter into a very easy state of working.

This might be a practical idea: After every dyeing process, when the liquor of a certain color is no more needed, collect it in a barrel, and add to it the same color every time during that day. Let stand for at least two or three days or longer, if the capacity of the establishment allow of it. Then draw off the liquor through holes in the barrel into a second one, and a large amount of color, in paste form, will be found at the sides and on the bottom of the barrel. This collect carefully, and dry. The barrel is, without washing out again, used for the same color and the whole commenced in the same manner again. The dry color, although sometimes not as good and bright as in its original state, will do very well for dark shades. Many dyeworks will be able to save in this manner up to one third of the color, which is certainly inducement enough to give the matter a thorough trial.—*Textile Colorist.*

**A New Thermograph.**

Dr. A. Wellington Adams, of Colorado Springs, has invented a new form of thermograph, which is designed for measuring and recording automatically the heat of the human body for a given or indefinite length of time. It is said to be a very ingenious contrivance, and is based upon the principles advocated by Breschet. There has long been need of an apparatus which would register accurately the rise and fall of temperature during sickness, the system in use being sadly limited by many imperfections and the very narrow range of its applications.

The thermometer proper in Dr. Adams' instrument consists of a spiral spring made of two lamellæ of brass and steel respectively, soldered together, the brass occupying the outer side. As this spring expands uniformly with equal increments of heat, the brass, the more expansible of the two metals, will, upon a rise of temperature, give a platinum knob attached to the free end of the spring a concentric twist. In this way there is produced a varying pressure upon the contents of a vulcanite tube against which the knob impinges. The vulcanite tube is filled with a powder made of finely divided plumbago, gas carbon, and silver, and these contents, at the other extremity of the tube, abut against a platinum knob attached to a hard rubber bracket. The whole is inclosed in a circular, perforated German silver case, with rounded edges. The two platinum knobs are placed in electrical communication by means of binding posts. When the apparatus is introduced into an electrical current the latter enters through one of the binding posts and emerges at the other, passing in its course through the substance in the vulcanite tube. Two handles are provided at the sides of the thermometer for securing it in proper position in the axilla. The salient feature of the apparatus is the changing of its electrical resistance with pressure, and the ratio of these changes, moreover, corresponding exactly with the pressure, the latter, in turn, being dependent upon and in unison with the rise and fall of temperature.

By subjecting this instrument to varying degrees of temperature the resistance of the powder varies in precise accordance with the pressure exerted by the uniform expansion of the spiral spring under equal increments of heat, and consequently a proportionate variation will be produced in the strength of the current. The latter possesses, therefore, all the character of heat waves, and, by its reaction through the medium of an ingenious electro-magnetic piece of mechanism devised by Dr. Adams, these are transferred to a movable surface, in the form of a sinuous line whose rising and falling inflections give a graphic representation of them. Not only is it possible with this instrument to procure a continuous curve denoting the constant febrile condition of a subject, but, with the addition of certain accessories, now in process of construction, there may be procured on the

same strip of paper, at the same time and under similar conditions, a sphygmographic and a respiratory curve, thus enabling pathologists, therapists, physiologists, and, in fact, general practitioners to study the inter-relationship of these three cardinal symptoms under various modifying circumstances. The inventor feels confident that he shall be able to make additions that may also furnish a moisture curve.

**Correspondence.****History of the New Mineral "Hiddenite" So-called.**  
*To the Editor of the Scientific American:*

I have seen the various articles in your paper touching the discovery of the new mineral as above. I discovered this mineral at White Plains, Alexander County, N. C., in 1876, and collected it as a beautiful variety of diopside, associated with beryl and other minerals. Shortly after its discovery I sent a number of specimens to different mineralogists, among these Prof. N. Spang, of Etna; and some time after that, or in 1879, Prof. W. E. Hidden came to Statesville with a letter of introduction and recommendation to me. I showed him my collection, and showed him some of this mineral, which was the first he had ever seen. I then took him to White Plains, and showed him the locality where I had been collecting this green mineral. Prof. Hidden went away, and some time after that returned with another gentleman. They called to see me, and Mr. H. remarked that they were going to take a ride. He, accompanied by his companion, then went, without my knowledge or consent, to the locality which I had shown him, and leased the land.

Up to this time the mineral had been pronounced diopside, but when Prof. Hidden commenced work upon the lease he sent some specimens to Prof. J. Lawrence Smith, who examined it and found it to be a new mineral, and wrote to Prof. Hidden, proposing to call it "Hiddenite." I at once, upon learning of this letter, wrote to Prof. Smith, informing him that I had discovered the mineral about three years before Prof. Hidden came to North Carolina, and asked if I, as the discoverer, did not have the right to say what it should be named (intending to call it "Mitchellite," in honor of the late Rev. Prof. Elisha Mitchell, D.D., of this State, an able and devoted scientist). Prof. Smith's reply of November, 1880, led me to believe that the mineral would have no distinctive name, but would only be called spodumene, so I let the matter rest until I saw his article in the *American Journal of Science* for February, describing the mineral and conferring the honor of the name upon Prof. Hidden, and so wording the article as to deprive me of the credit of the discovery. I. A. D. STEPHENSON.

Statesville, N. C., April 2, 1881.

**The Fusing Disk.**

*To the Editor of the Scientific American:*

In your paper of the 16th inst. I find a reprint (with cuts) of an article from *Engineering* (London), relating to the fusing disk. I have written *Engineering* that the statements made in the article are so astonishing, and the work exhibited is so radically different from any that I have ever seen produced by the fusing disk, that I think the gentlemen who furnished the article and cuts and made the statements contained in the article have made a mistake, and I asked for their address that I might give them attention first.

In answer to Mr. Emerson, permit me to say that I do not feel called upon to specifically answer in detail every article published relating to the fusing disk, or the theory which I, at the urgent request of many eminent scientists, have advanced, explaining the phenomena exhibited in its operation, as the machine and theory are now being considered in all civilized countries, as my receipts of letters and scientific journals show. But I will from time to time explain my theory, and will cheerfully accept the result of its discussion, whatever that may be.

I call the machine a fusing disk because I conceive that the material operated on is changed instantly from the solid state to the fluid state. I conceive that the change of state occurs because the material disengaged from the solid bar operated on flows downward and welds into a solid mass (nine inches below the point of fusion). I consider fusion simply as a phenomenal indication of the degree of intermolecular velocity, as temperature, luminosity, and incandescence are phenomenal measures of molecular velocity; therefore, whatever increases molecular velocity tends to bring the metal nearer to the velocity of fusion.

Not a single atom composing a molecule, nor a molecule composing a physical structure in the universe, is at any time in an absolute state of rest.

Matter *per se* is inert; its energy is derived from the physical forces. The force of attraction is inherent in the atoms, and can neither be increased nor diminished. It tends to draw the atoms together and hold them in a state of rest. The force of caloric accompanies the atoms. It may be increased or diminished; and tends to push the atoms apart into a state of activity. By virtue of the resultant force so exerted, the atoms composing a molecule, and the molecules composing a physical structure, are held at a certain distance from each other and kept in a continuous state of activity.

The force of attraction being inherent, its energy is exerted in an inverse ratio with the distance of its object, hence its greatest power is exerted when the atoms and the molecules are nearest to each other, and least when they are furthest apart. The change of distance is the result of the activity of the atoms and the molecules. An increased mo-

tion separates them, and a decreased motion brings them nearer together.

When the molecular velocity of a body is of that low degree that the molecular resultant force exceeds the force of gravity, the molecules remain in a relative local position to each other, and are said to be in the solid state. Now, when the molecular velocity is increased to that degree so as to separate the molecules to such a distance from each other that the molecular resultant force which holds them together is reduced to a less measure than the force of gravity, the molecules are no longer held in a correlative position; they become mobile, and gravitate into the fluid state. And this is what I call fusion.

The essential requisite of fusion, therefore, is the molecular velocity of fusion, and I conceive that this is attained in the fusing disk as follows: A round bar of steel is placed in front of the disk and caused to revolve at the rate of 200 revolutions per minute. The disk is revolved at a rate equal to a peripheral velocity of 25,000 feet per minute. The atmosphere, pressing against the sides of the disk at nearly 15 pounds to the square inch, is thrown outward. The increased velocity of the air separates its molecules to a greater distance, and they abstract additional caloric from the surrounding atmosphere. This column of air, surcharged with caloric in proportion to its velocity, is carried around the periphery of the disk at the rate of five miles per minute. Now, when the revolving bar is brought into close proximity to the disk, the passage of the air is retarded, its velocity reduced, and the molecules approach nearer to each other. This unlocks the surcharged caloric, and it becomes sensible heat, which enters the bar and increases its intermolecular activity to the velocity of fusion. The fused metal flows away and a fresh point of the bar is continually presented to the disk. In addition to the caloric unlocked from the air, a portion of the metal oxidizes, which furnishes additional caloric, which, with the impact of the air traveling at a velocity of five miles per minute, keeps up the velocity of fusion in front of the disk until the bar is severed in two.

Now, gentlemen, please remember this is only a theory based on my limited knowledge of molecular physics, and in your criticisms don't be personal, but let us endeavor to increase our knowledge of the physical forces which energize the universe. JACOB REESE.

Pittsburg, Pa., April, 1881.

**Medical Properties of Sulphocyanide of Mercury.**

*To the Editor of the Scientific American:*

Inasmuch as many inquiries have been elicited by your publication of item regarding the medical properties of sulphocyanide of mercury in certain affections of air passages of the human body, as more fully specified in your issue of April 9, 1881, and inasmuch as your generous impulse led to a more pretentious heading to the article in question than was intended by the insertion of the word "catarrh," it is hoped you may not be indisposed to add these few lines in explanation.

The prevalent idea attached to the term "catarrh" lies in an entirely different direction from the line and scope of experience indicated in the article in question. It is doubtless safe to say that nothing whatever is known as to the action of the compound under consideration in connection with "catarrh" in the popular sense of that term.

Judging from letters of inquiry from different parts of this country, it seems probable that some may endeavor to make the substance in their own way. Let not any unskilled manipulator undertake the production and preparation of this compound for his own use or that of his friends; the chances are altogether in favor of his finding something decidedly more "snaky" and poisonous than the veritable "eggs of Pharaoh's serpents." The substance for use, as suggested by experience, must be pure sulphocyanide of mercury; from the *per-nitrate*, not *proto-nitrate*, and washed until there be no acid reaction. The use of this in the manner and quantity and for the purpose indicated in your issue of April 9, 1881, will be attended with prompt and effectual relief, and without the slightest injurious results.

J. DE WALDEN CHURCHILL.

Richmond, Va., April 10, 1881.

**Ammonia for Preventing Petroleum Fires.**

M. Schlumberger has communicated a note to the Société Française d'Hygiène on the "Automatic Extinction of Petroleum Fires." Many accidents are caused, he says, chiefly by the igniting of this substance through imprudence. The druggist, for instance, in going into the cellar where the oil is kept does not always take proper precaution, and the result is that a disastrous explosion often takes place. He proposes a method of extinction in this and similar cases which he recommends shall be made compulsory under police regulations. His plan is to place on each barrel of petroleum a large bottle of liquid ammonia, so that, at the least explosion or on contact with the flames, the glass will be broken and the vapor of the liberated ammonia will form an automatic mode of extinction. The author states that he speaks from practical experience, and that he has frequently been indebted to ammonia for safety while conducting distillations of a dangerous character. He suggests that the plan should be extended to mining operations, and that easily broken vessels filled with ammonia should be stored wherever there may be a risk of accident from fire-damp explosions. Carbonic oxide cannot burn in an ammoniacal atmosphere.