

divided into one section 100 feet in length and three stories high, for the reception of hogs, and another occupying the remaining space, but four stories in height, for bees, calves, and sheep. The ground floor is utilized for cattle and the upper stories for the sheep, broad inclined planes being the means of ascent. The interior is thoroughly illuminated by a large skylight and innumerable windows, and the ventilation, obtained by flumes and hundreds of apertures in the walls, is thorough; 20,000 hogs, 30,000 sheep, and 2,000 calves can be accommodated at once on the various floors, which aggregate in area nearly seven acres. The yards outside offer quarters for 4,500 head of cattle. The land included in these new improvements, for conducting freighting business by this company, is some 20 acres, nearly all of which is made or filled in ground, which has heretofore been useless.

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### PUBLISHERS' CARD.

The present volume of the SCIENTIFIC AMERICAN is drawing rapidly to a close. The next number ends the year. Some eighteen thousand of our subscribers will find, printed on their wrappers covering this week's papers, the announcement that their subscriptions are about to expire, and the request that they will remit for the new volume. To prevent any break in the continuity of their subscriptions, and to enable the publishers to know how large an edition to print at the commencement of the year, subscribers are invited to remit for a renewal as early as possible. Simultaneously with the mailing of this week's paper, an envelope, containing Prospectus for 1876, a beautiful chromo Name List, a Catalogue of our Publications, and an Illustrated Hand Book, useful for inventors and others, will be mailed to all our subscribers; and we hope to receive all the lists back again filled with the names of those who wish in the future to take our paper.

To save our friends all the trouble possible, we also inclose an envelope with our address printed thereon, so that all the subscriber and getter-up, of a club has to do, is to place his name or list of subscribers in the envelope, with the postal order, draft, or money, put a 3 cent stamp on the former, and drop it into his post office.

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### DIPHTHERIA.

There has been recently in this city, and throughout the country, quite an alarming spread of diphtheria, amounting almost to an epidemic. The disease is one which fastens on children most readily, although it attacks adults with often fatal effect. Its chief causes are neglect of proper sanitary precautions and the inhalation of foul sewer gas and of the emanations from damp and badly drained ground. We believe that it is not realized, by dwellers in and owners of our city houses, how imminent the danger of such disease is, or else we should see more efforts directed by private individuals toward the closing up of any possible avenue of entrance for mephitic gases into dwellings. It may be laid down, as a general rule, that the merest whiff of sewer gas pervading a hall or room should be considered as a signal of impending peril, and not a moment's delay should intervene before measures are taken to discover its origin. If the drain pipes in a house are properly constructed, there should be no smell whatever; and the first points to look to are whether there is a good trap in the sewer pipe in the cellar, and whether there is a ventilating tube leading from the soil pipe into a chimney, or to a high at least two feet above the roof. If not, these additions should at once be made. If a tenant be the sufferer by foul odors, and the proprietor neglect the proper safeguards, in this city, the former has only to apply to the Health Board, when an inspector will examine the premises, and the result will be a peremptory summons to the recreant landlord to make the necessary alterations within three days or thereabouts, or in default pay a fine, and also the cost of the work which the Health Board will proceed to perform for him. It is well for tenants to remember this, as we happen to know of cases where many people have all but risked their lives, perhaps through inability to take the precautions themselves, and supposed inability to force their landlords to do so.

About a year ago, Dr. Stephen Smith, of the New York Health Department, published some useful suggestions relative to diphtheria which are well worth remembering. Under the heading of precautions, in addition to the removing of sources of sewer gas escape as mentioned above, he advises the removal of every kind of filth from around the house, the cleaning and white washing of dirty walls, and the disinfection of cellars and ventilation of all apartments, especially those which have been occupied by people suffering with the disease. It is well, in such rooms, not only to lime-wash the ceilings but to paint the woodwork, boil or subject to a high degree of heat every article that can be so treated, and expose the room and its contents to currents of fresh air for at least a week before reoccupation. Children that are well should not be allowed to kiss others affected with sore throat, or sleep in the same room, or use toys or other articles previously handled by the sick. It is safer to isolate ill ones from all the family, except, of course, the necessary attendants. The air in the sick room should be changed at least hourly, and all discharges from the mouth and nose should be received into vessels containing disinfectants, such as solutions of carbolic acid or sulphate of zinc, or upon cloths which are to be immediately burnt or else boiled or soaked in disinfecting fluid.

Diphtheria, like many other serious maladies, is not difficult to check if attended to in time; but it frequently baffles the highest skill if allowed to run. Its distinctive feature is the formation of a false membrane in the throat, which shows itself in grayish brown patches. Sometimes the whole membrane forms suddenly; but as a rule, the patches first appear accompanied by fever and prostration. The first symptoms of the disease, sore throat and abnormal heat, are too often considered as premonitory of a simple cold; but there is no necessity of such error if parents will carefully examine the throats of their children as soon as soreness is complained of. The patches can almost always be well recognized, and a competent physician should be instantly summoned. Home-made remedies and gargles should not be depended upon; and the only treatment worth practising before the doctor arrives is to administer pounded ice, the use of which was found very effectual during the ravages of the disease in the Oneida community in this State. The prevailing dampness peculiar to the winter months may lead to increased numbers of cases of the malady. It is well therefore to keep in mind that there are but three safeguards: first, cut off the foul air; second, watch all sore throats in the family; and thirdly, summon the doctor immediately.

### A VALUABLE GIFT BY CHEMISTRY TO THE WORLD.

A celebrated physician, the late Dr. Valentine Mott, used to say that iodine was the greatest gift which medicine had ever received from chemistry; and it may now be said that one of the most remarkable and important services rendered by chemical investigators to the arts and sciences is the discovery of bromine, by Balard in France, just 50 years ago. Berzelius, while describing it in his "Chemistry," mentions that no use had been found for it, but he cautiously adds the words "thus far," showing that he confidently expected that a use would ultimately be found. The discovery was fruitless in a period of 15 years, when daguerreotypy was invented; and bromine soon took an important place as one of the most valuable ingredients in the necessary materials, and now bromine compounds are indispensable to the photo-

grapher. Another 15 years elapsed; and then physicians commenced to experiment with the new element, and they soon ascertained its great value as a remedial agent, and the salts of bromine now form a series of the most important substances in the materia medica. Lately it has been found that bromine and some of its compounds are the very best etching materials for engraving metals, surpassing all acids and other agents, as described on page 369 of our current volume. But there is no reason to believe that this will close the list of the uses of this remarkable elementary substance, which is found in sufficient abundance in the waters of the sea and of many saline springs to make it comparatively cheap. A short account of the manner in which it is produced will undoubtedly interest many readers.

Bromine is commonly obtained from the mother liquor or bitters of salt works, which is rich in bromine compounds, the latter being retained in the liquor, as they do not crystallize out as easily as the chlorine compounds, of which common salt is the principal. The old method is to pass chlorine gas through the liquor, which, as the chlorine has greater affinity to the bases than bromine, sets the bromine free. The latter is then absorbed by shaking portions of the thus chlorinated liquid with ether, which dissolves out the bromine, and is darkly colored by it. Then the ether is shaken with caustic potash or soda, which combines with the bromine, and so a bromide of potassium or sodium is obtained, out of which the bromine may be set free again in the same way as chlorine is disengaged from common salt, namely, by mixing it with sulphuric acid and black oxide of manganese, and heating, when the bromine distils over.

According to an improved method, the bromine is obtained directly from the mother lye or bitters, by heating the latter with the sulphuric acid and black oxide of manganese, which decomposes the chlorides and yields chlorine gas; this in its turn sets the bromine free from the bromides, and the vapors, with that of water, pass over to a cool receiver, where they condense; while the pure bromine at last floats over a layer of saturated solution, containing 1 part bromine to 40 of water. We ought to add that pure bromine is a virulent corrosive poison. When a small piece of phosphorus is thrown on a few drops of bromine in a tall beaker glass, it is at once violently projected upward with an explosive noise, and in an ignited condition; this forms a striking lecture room experiment, illustrating the effects of very active chemical affinity.

Bromine is a very disagreeably smelling brown liquid, freezing at  $-8^{\circ}$  Fah., and boiling at  $150^{\circ}$ , when it changes into a deep red vapor, nearly 6 times heavier than the air. According to Wagner's last *Jahresbericht des chemischen Technologie*, the total production of bromine at present equals 245,000 lbs., of which the United States and Germany produce the greatest part, namely, 100,000 lbs. each. Scotland produces 30,000 lbs., and France 10,000 lbs.

### MAKING EXCUSES.

It has been said that a person who is good at making excuses is good for nothing else. Nature never accepts an excuse, the law seldom does, and yet in ordinary affairs of life excuses play a large and pernicious part. There are some people who spend half their time in inventing excuses for what they do in the other half of the time. What a pity this inventive power could not be directed into a useful channel, and made to benefit instead of injuring their fellow men! The habit of making excuses grows on what it feeds upon. If excuses were never accepted they would be seldom offered; but on the contrary, our whole primary school system is built on a plan that fosters the fabrication of excuses, many of which are little better than lies. There is a story of a school-master who called up one of his favorite scholars and asked him why he was late. "Oh," said the little excuse maker, "I dreamt I was going to California, and when I heard the school bell I thought it was the steamboat bell." Glad to avoid punishing his favorite, this absurd excuse was accepted and the delinquent pardoned. We fear there are too many parents and teachers so willing to accept excuses that they greatly encourage excuse making, and indirectly encourage lying. As these pupils grow older and begin to feel a personal responsibility for their actions, they naturally fall into the habit of making excuses to their own consciences and of deceiving themselves. How quickly an ingenious excuse heals the prick of conscience!

We do not mean to assert that, frail and imperfect mortals as we are, we should require perfection of our fellows, nor, like Shylock, demand that the letter of the bond be fulfilled. Justice must be tempered with mercy, but sometimes we must be cruel in order to be kind. Nature's laws are inflexible; there is no escape from the severities of her just penalties. If we breathe infected air through ignorance, we suffer as much as if we had entered it with full knowledge; ignorance of the law does not relieve us from its penalties. Our statute and other laws distinguish between murder committed with premeditation and malice from that committed without forethought. The insane escape punishment for their crimes, however heinous. The man who shoots his sister by accident is at once acquitted. But does the bullet discharged by accident, or by a lunatic, or by any one in the heat of passion, prove less fatal than it would had murder been intended? The severed artery, the pierced lung, the congested brain listen to no excuses. To him that is murdered it is all one whether it was premeditated or not.

The infraction of any and all of Nature's laws brings as certain punishment as does Recorder Hackett's court, nay, more certain, if less speedy. The tight shoe, whether of satin or cowhide, worn voluntarily or involuntarily, by a city belle or a rustic clown, is sure to produce the well known corn. Undue exposure leads to consumption; over study and

excitement produce brain diseases as frequently in the pulpit as in Wall street. How often are people engaged in charitable work stricken down by disease incurred in the fulfilment of a holy mission! Most undeserving of such a fate, we are inclined to exclaim; but Nature accepts no excuses. Violate her laws, and ye die!

But what is the great harm in excuses? we think our reader begins to inquire. First, it encourages story telling, untruth, prevarication, and white lies. Second, it makes people careless. Railway trains are our best examples of punctuality; if you reach the depot but 15 seconds too late, you are left and must wait, perhaps for hours. It is of no avail to tell the doorkeeper that your delay was unavoidable, that the omnibus broke down, or the street was blockaded, or the car ran off the track. People know that the rule is as inflexible as the law of the Medes; they do not flatter themselves, as does the tardy school boy, that their excuse is a good one, and thus loiter along at a convenient gait. One of the blessings of railway travel is that it makes people more prompt and more diligent. The banks are another class of institutions that will not accept excuses; if your note is not paid by three o'clock, it goes to protest. It matters not that the money promised you fails to come to hand in time, the train bringing your draft was delayed by snow drifts, or the telegraphic remittance was stopped by a broken wire, or the messenger on his way to the bank fell into an open coal hole and is maimed for life: the bank asks none of these questions, it listens to none of these excuses; the law is carried out.

The publishers of the SCIENTIFIC AMERICAN discontinue sending it to a subscriber as soon as he stops paying. The forgetful subscriber, who would continue forgetful if his paper kept on coming, arouses from his lethargy, and the next year he does not forget to renew it in time to avoid any loss.

The poorest of all excuses is forgetfulness, and the best method of cultivating the memory is to resolve never to accept this excuse from yourself nor make it to others. "I forgot" and "I didn't think" have caused untold misery, and should be stricken from the vocabulary of every ambitious youth. Conductors and switchmen sometimes forget that a certain train is due, and the next morning we read in heavy head lines: "Fearful Railroad Accident! Dreadful Loss of Life." The innocent (?) conductor is acquitted of the murder because he renders an acceptable excuse, and history goes on repeating itself. In some eastern countries, it is said, when a house burns down, the owner, instead of getting paid for it, loses his head. Fires are not of frequent occurrence there.

The old saw, that where there is a will there is a way, is true more frequently than is generally supposed. Let a man know that no excuse will avail for the omission of duty, and nine times out of ten he will contrive to accomplish what he had supposed to be impossible.

**WEAK SPARKS.**

Poggendorff's *Annalen* for February, 1875, contains an interesting account of many experiments by the celebrated German electrician, Professor Reiss, concerning a new form of electric spark, which he discovered several years ago, and which he denominates "weak sparks." He states that they differ from the ordinary strong electric sparks, not only in form, light, and sound, but in other and very various properties. For example, the length of the conductor makes no difference in the production of the weak sparks; in reference to length, light, and sound, they are independent of the composition of the circuit in which they occur; they produce no marked indication of heating in the circuit, and no magnetization. So far as we have examined the accounts of M. Reiss's results, he appears to have experimented chiefly with the Holtz frictional machine; but doubtless he has tried other apparatus. We however do not observe that he anywhere suggests any form of apparatus for telegraphy or other practical uses of the weak sparks.

It would naturally follow, from what we know of electricity and from the extensive series of experiments and the careful investigations of the nature of the weak sparks by the author, that they might be produced by any of the various known forms of electrical apparatus; and this would appear to be confirmed by certain recent experiments of Mr. T. A. Edison, the well known telegraph engineer and inventor, of Newark, N. J. Mr. Edison has recently ascertained that the weak sparks may be produced by means of an ordinary electro-magnet, and has also put the new sparks into working harness in the form of a telegraph apparatus. As before intimated, we have not carried our examination of Professor Reiss' experiments far enough back to determine whether he describes any method of obtaining them from magnets, and will therefore leave that branch of the subject for further consideration, giving briefly an account of Mr. Edison's new experiments, and what he supposes he has discovered.

The method by which Mr. Edison generates the weak sparks is so simple that any telegrapher or electrician can test it. A bar of metal (cadmium seems to be best) is placed on or over an electro-magnet in an electric circuit: attached to the metal is a wire (of iron or copper, possibly any other metal) which conveys the current of newly discovered force. On breaking the electric circuit with an ordinary telegraphic key, sparks are observed when the free end of the wire is brought in contact with any metallic substance. When the wire from the cadmium is attached to a gas pipe, sparks may be drawn from any part of the entire system of gas pipes simply by touching it with a piece of metal. By this simple means signals have been sent for long distances, as from Mr. Edison's laboratory to his dwelling house, in another part of the city, the only connection being the common system of gas

pipes. Mr. Edison states that signals have also been sent the distance of seventy-five miles on an open circuit, by attaching a conducting wire to the Western Union telegraph line.

For some time Mr. Edison has been industriously studying the weak sparks, and the developments, he thinks, are unceasingly novel and surprising.

Thus far his examination has resulted chiefly in determining the fact that the weak sparks, first supposed to be a phase of inductive electricity, have really no further likeness to electricity than similarity of origin, the power of furnishing sparks, and the ability to transverse electric conductors. On the other hand, the sparks seem to travel over electric non-conductors with equal facility, a glass rod or a strip of hard rubber conveying them as well as a bar of metal. They require no closed circuit. They cannot be grounded, and seem to be incapable of insulation. They are retroactive, sparks appearing when the conducting wire is turned back upon itself, just the same as when the free end of the wire is brought in contact with any other metallic substance. They have no polarity, and apparently no mechanical power. With carbon points and points of several metals, the spark is highly actinic; yet the current seems to have no physiological effect, and does not influence in any way the most sensitive of electrosopes or galvanometers.

Such, in brief, are the leading points of Mr. Edison's observations concerning weak sparks from magnetism, and they closely correspond with the long prior observations of Professor Reiss.

We shall recur to the subject in our next.

**WORKING MEN'S READING ROOMS.**

We are very much in favor of the plan, which some contemporaries are just now discussing, of free evening reading rooms for workmen; and if such resorts could be started and maintained in every manufacturing village, we believe that an immense amount of good would be done, both in educating the men and checking the spread of intemperance. The average workman gets very little time to read except during the evenings; and if he be single and live in a boarding house, the lack of light, fire, and other necessities for comfort effectually precludes his doing so there. The tavern is, however, open to him, well lighted and well warmed; and there, perforce almost, he spends his evenings in idleness and in the acquisition of habits which are the reverse of beneficial. The trouble with most reading rooms which we have seen in country villages is the fact that they are generally the work of excellent and pious people who unfortunately imagine that a selection of religious literature and a pious cast over the general surroundings of the place are beneficial. However good the motive, this often fails to induce workmen to visit the places. The effect is indeed ordinarily the reverse; for working men are but human beings, and prefer the joviality and lack of restraint at the tavern to the perusal of tracts or the mental digestion of Sunday school books, be the morals and precepts of the last never so good.

The true way of making a reading room both successful and useful is first to render its advantages absolutely free, and secondly to make the room both comfortable and attractive so that every man of average intelligence may avail himself of its privileges. The literary fare may consist at the beginning of periodicals alone, leaving the formation of a library to the future, when a membership becomes established and the members feel like subscribing to enlarge its scope of usefulness by adding a library. Publishers will generally send their journals to such reading rooms at reduced prices; or the charitable in the town or village may often be successfully appealed to for contributions of papers, magazines, and sometimes books which they have read. If there be a local journal, and few towns in this country exist where one is not published, the editor will gladly contribute such of his exchanges as he does not need. In this way, it will be found, plenty of good reading matter can, with a little energy, be collected, and it will prove serviceable in benefiting the community without much expense.

Our plan for a working men's reading room is a plain apartment, as easily accessible to everybody as the tavern. There is no need of costly appointments of any kind; but plenty of good light and a warm fire are indispensable. A table and sufficient chairs, some files for newspapers, and a few shelves for books, include all the furniture absolutely necessary. If the philanthropic projectors can afford a few pictures, a tasteful paper for the walls, or any other ornamentation, so much the better; money thus laid out will not be lost, as such articles lend a home-like air which, to most people, is attractive beyond all else.

A few weekly papers and three or four monthly magazines will be enough for a start; and then, as it becomes apparent that the people of the town are growing more interested in the work, plans can be matured for a wider selection of reading matter; and perhaps, as we before intimated, a subscription among the readers can be taken towards putting the establishment on a broader basis. This is the season of church and similar fairs, for raising money for various benevolent purposes. Perhaps we may venture the suggestion that a small amount may be raised in this way, thus enlisting the cooperation of the young people in the good work. Certainly a free reading room would be a noble Christmas gift from the churches of a village to the working men residing in its limits, or from the proprietors of factories to their employees.

A PIECE of rubber belting fastened around the belt pulley of an engine will keep the belt from slipping.

**THAT OBNOXIOUS POSTAL LAW.**

Postmaster General Jewell, in recommending in his recent report the repeal of the Act of Congress passed last January which doubled the postage on transient newspapers, books, and similar third class mail matter, raising the same from one cent for every two ounces or fraction to one cent for every ounce or fraction, simply reflects public sentiment relative to that illconsidered and obnoxious law. It was a stupid blunder, on the part of those who framed the bill, that, contrary to their intent, by their own admission, language open to construction as affecting anything but the miscellaneous merchandise which the mails are allowed to carry should ever have entered into it; and the passage of the act shows even more reprehensible negligence on the part of those members who voted for it, in not subjecting the measure to proper examination. Except in the opinion of the express companies, who have been greatly benefited, and by whose influence the act was adopted, there was no necessity for increasing rates even on the miscellaneous matter, as the cheap postage on similar parcels, like seeds, bulbs, samples of merchandise, etc., was a great convenience to the public, and especially such to people living in out-of-the-way localities.

The Postmaster General excepts this mixed material from his recommendation to return to the old rate on printed matter, but fails to show a good reason therefore, based on a possible benefit to the Department. In fact in this respect the report logically contradicts itself flatly, for it may be justly inferred that: if, as the writer paradoxically asserts, "the sending of public documents through the mails has not delayed the delivery of ordinary mails or perceptibly increased their cost," some 200 to 300 tons being the estimated amount sent: the sending of small parcels, not exceeding, if altogether aggregating, in weight the hundreds of tons of documents which the members of Congress heretofore sent free through the mails, would, if the matter were paid for at any price, result in positive gain. It may be remarked in passing, that the sentence above quoted is unfortunate from another point of view, as it apparently offers an argument to those who are seeking the return of the franking privilege; for it is easy to predicate the assumption thereon that, if several scores of tons of matter is imperceptible in point of cost or trouble, then as many hundred tons would be practically inconsiderable.

There are rumors that Congress will act upon this subject early in the session. We trust that the same are well founded, and that our representatives will use no delay in restoring the old and popular rates, including all articles coming under what is "third class matter."

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**A Gas Shadow.**

A striking and curious experiment, showing the superior weight of carbonic acid gas over air, may be made by projecting the shadow of the gas, as it is poured from its containing vessel, upon a screen. The latter should be of white paper and bright sunlight should fall on the stream of gas, which should be poured from the spout of a pitcher held within 10 inches of the screen. The curious result, of a shadow produced by apparently nothing, will be seen, the former resembling descending smoke, quite black at the spout of the vessel, but brightly illuminated whenever the sunlight is concentrated by passing through the gas.

To prepare tin for tinning brass, copper, and iron. Melt the metal in a crucible which has previously been slightly warmed; and at the moment the metal begins to set, and when it is very brittle, pound it up rapidly, and sift when cold to remove any large particles.