

## Correspondence.

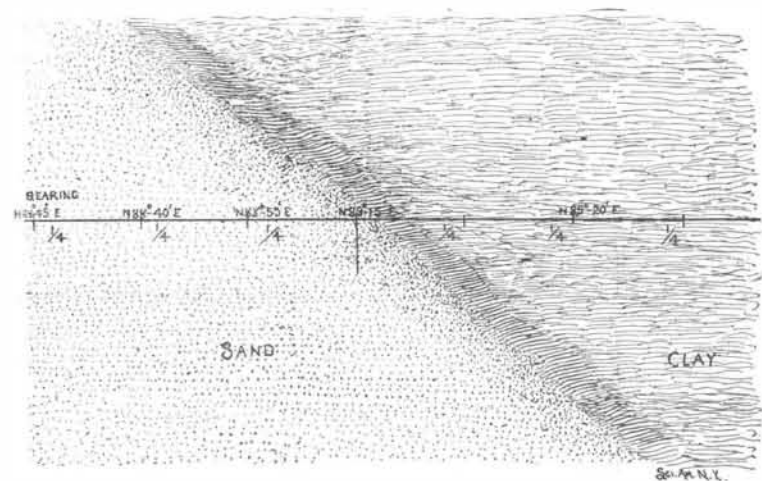
## THE MAGNETIC NEEDLE.

To the Editor of the SCIENTIFIC AMERICAN :

In running a line east and west recently, I ran from off a high table composed of sand to a low plain composed of clay. The sand was warm, the clay cold. The variation of the compass was different on the plain from that on the table land, being in a direction that would indicate that the two kinds of soil formed a thermal magnet, or, rather, that currents of electricity were formed, running from one to the other at right angles to the line of division, which was northwest and southeast. This is the second time I have noticed the same effect on needle of two soils of different temperature marked by a well defined line of division, and in each case it was the same, viz., there was apparently an electric current established, running at right angles to the line of division, and the needle had a tendency to vary in a direction which would bring it at right angles to this line of current.

This has led me to wonder if, after all the scientific research, the matter of the magnetic needle is not a little more simple than supposed, and that the two oceans and the two continents do not form electric currents running at right angles to their general line of division, to which the magnetic needle, as is natural, turns at right angles, and if the lines of no variation are not the points at which the centers of electric force are due east and west of each other.

The oceans retain their coolness almost completely, and the continents their warmer temperature, thus making the different temperatures for the forming of two large thermo-magnets. I have not made a study of this, but the idea merely struck me, and it would be in accord with everything, so far as I can see, and explain many things, such as line of no variation and diurnal and seasonal changes of variation, which do



VARIATIONS OF THE NEEDLE.

not seem easily accounted for. If this theory is plausible from a scientific standpoint, from the light thrown on it by other scientific truths that I know anything of, I wish you would put it into discussion. Herewith find a diagram of the point referred to.

L. S. C.

## The Acetylene Gas Hazard.

To the Editor of the SCIENTIFIC AMERICAN :

It is but perfectly natural that after such explosions and casualties, resulting in loss of life and property, which have occurred from time to time in the manufacture and subsequent manipulation of acetylene gas, both in this country and abroad, that the insurance companies and the public at large should be a little anxious to establish some fixed form of regulation which will insure safety to all concerned in future operations on this line.

It is, however, to be deplored that at the present stage of investigation of the manufacture and use of acetylene, the proposed legislation should be so strenuous and at the same time impose impossible conditions, as is set forth in the set of rules approved by the National Board of Fire Underwriters, at its recent annual meeting.

It has been conclusively proved that in no single instance have any of these explosions taken place at the hands of other than so-called experts; and, moreover, these explosions have all been the results of work conducted on experimental basis; and, in all but one instance (explosion at Wilmington, Del.), these disasters have taken place as the result of attempts to liquefy the gas and to control it under pressure; and in each and every case said disasters have taken place solely through either carelessness or gross ignorance on the part of the operators. Of course, as is well known, acetylene will combine with air in certain proportions to form mixtures which are extremely explosive under certain conditions, but even these mixtures, when intelligently handled, are not dangerous, and in properly constructed apparatus explosions cannot occur.

The most dangerous form of acetylene is its liquid state, when it requires a pressure of 600 pounds per

square inch to keep it in its normal condition. These points were very strongly brought out at the investigation following the explosion in Jersey City, December 4, 1897, as published in The Progressive Age of May 2, 1898.

As per Dr. Henry Morton's testimony at the above mentioned inquiry, acetylene in its native and quiescent state is no more dangerous than our ordinary illuminating gas, which, indeed, contains a certain amount of acetylene.

Some of the most distinguished and expert chemists of all time have experimented with this gas, and such men as Berthelot, Le Chatelier, Moissan, and Pictet have all arrived at the same conclusion, and this independent of each other, that gaseous acetylene at atmospheric pressure is absolutely harmless as regards spontaneous decomposition and subsequent explosion.

The dangerous qualities are not developed in the slightest particular until the gas is compressed or liquefied, in which condition, when subjected to a rise in temperature, it becomes an exceedingly dangerous compound, owing to its great liability to decompose.

As regards the wholesale generation and liquefaction of acetylene, strong measures should be taken to bring these operations within the safety limit, and the proposed legislation on this point should by all means be adopted.

In such small amounts of acetylene as are generated in a bicycle lamp, or, in fact, in any lamp having a portable generator and operating at atmospheric pressure, no dangerous conditions can, under any circumstances, occur.

Regarding the paragraph in the proposed insurance regulations which relates to the construction of a lamp, it is sufficient to state that it is an utter impossibility to so construct a portable generator that it will not disengage gas for some little time after the water has been turned off. Any lamp that has been constructed with this principle in view would be absolutely worthless as a continual light giver, and at the same time would become a dangerous instrument.

The proviso is, in my opinion, ridiculous in its entirety, and, if enforced, would practically mean the complete prohibition of the manufacture of all kinds of portable generator lamps.

Regarding the regulation restricting the material of which the lamps should be constructed, there seems to be a misunderstanding among scientists on this point.

It is asserted by many experimenters that acetylene, upon coming in contact with metallic copper, will form a compound which is highly explosive when heated or struck; while, on the other hand, there are an equal number who claim the contrary.

The result of my experiments in this direction are as follows: A copper tube 4 feet in length, 4 inches in diameter, was thoroughly pickled and cleaned. This tube was filled with the gas taken direct from a generator without being cleaned or purified in any manner, and the tube was then hermetically sealed and allowed to lie on its side for two months. It was then opened, and the compound formed was scraped off and dried and then tested for explosibility, with the result that it was found to be perfectly harmless.

My second experiment was to pass the gas through, first, water, then through a lead salt solution, thence through a quantity of calcic chloride, in order to dry it, and then through a saturated ammonia solution of cuprous chloride. When free acetylene was observed to be issuing from the escape tube of the last bottle, the experiment was taken to be concluded; the precipitate formed was then filtered and dried at 100° F. This compound was found to be extremely explosive when confined.

From these experiments I draw the following conclusions:

First. Acetylene in contact with a metallic surface of either pure copper or of any alloy containing copper does form a compound which is not explosive or at all dangerous.

Second. When acetylene gas, in a free state, is brought in contact with copper held in solution in an alkaline form, a chemical reaction takes place, whereby the true acetylide of copper is formed, which is explosive in a dry form when confined; or, in other words, there must be opportunity for cuprous oxide to form before we can have the acetylide.

Third. That the compound formed in experiment No. 1 is different in its physical deportment from that formed in experiment No. 2, and although it appears to have the same chemical construction, it really is not the acetylide of copper.

Regarding the last paragraph of the recommendations, "It is also recommended that the generator be so designed that it can be supplied with calcium carbide, and the residuum withdrawn without the escape of gas or the admission of air, in order to insure the prevention of dangerous explosive admixtures of air

with the gas in the generator," it is not at all clear in my mind how such an arrangement can be designed without making a complicated and expensive form of generator.

L. J. KROM.

Waterbury, Conn.

## Mistake of a Mud Wasp.

To the Editor of the SCIENTIFIC AMERICAN :

It is generally supposed that instinct unerringly teaches birds and insects the best way in which to build their homes or nests, and also to provide for their offspring. The following incident, recently under personal observation, will show that instinct is not always infallible.

A friend placed three small empty vials in an open box, on a shelf, in an upright position in close contact, and they were uncorked. A short time afterward it was a matter of surprise to find that these had been appropriated by a female mud wasp. She had placed a goodly number of spiders in the center vial, doubtless intended to serve as food for her future brood; then proceeded to deposit her eggs in those on either side. She next closed tightly the mouths of all three receptacles with a hard lime cement. Having finished her work, she then doubtless went on her way, satisfied all had been done for her offspring that a thoughtful mother could do.

But just think of the sensations of those little wasps when they come into existence, for, while starving in their sealed cages, they can plainly see, through the impenetrable glass walls, the bountiful supply of food which was provided for their use.

Rodney, Miss.

F. W. COLEMAN.

## Old Papyri at the Chicago University.

Chicago has come into the possession within the last few weeks of what promises to be the most valuable collection of ancient writings ever on this side of the Atlantic Ocean. Through the efforts of Edgar J. Goodspeed, of the Chicago University, son of the secretary of the institution, it has secured the latest and most promising find of manuscripts made in Egypt in years. In the neighborhood of two or three hundred complete pieces of papyri, in a good state of preservation, are included in the collection, besides hundreds of fragments. This collection of manuscripts, of which such interesting things are expected, was found by an old Arab sheik while digging about in the sands somewhere along the bank of the Nile. It is supposed by the two or three scholars who have already glanced at this collection of papyri that they were found in the neighborhood of what was once the city of Asiut or Asiat. They were written in Greek during or before the time of the Roman occupation of Egypt, and some few of them, partially deciphered, show a date approximating 160 A. D., or during the reign of Emperor Hadrian. But there are many others not yet investigated which are evidently of a much older writing, and give promise of some most interesting results. Among them is a fragment of Homer of great value, and the chances of finding another scrap of the New Testament of a similar nature to that recently discovered in Egypt are thought bright.

The manuscripts are found to be principally commercial documents of Hadrian's time, with a few pieces of a literary nature. In the days in which they were written the Romans farmed out the collection of taxes, intrusting the work to various contractors. The receipts and statements which the latter made in their accountings with the government officials compose the bulk of the smaller fragments. They are interspersed with business letters and memoranda of a commercial nature. Frequently scraps of large manuscripts have been taken and used for hasty figuring and notes of transactions. Several months, possibly years, will be needed to complete the work of translating the whole of the papyri. Each of the larger pieces of papyri will be preserved between sheets of glass, and then carefully translated.

## Physiological Signification of Eating Salt.

Some diversity of opinion has existed among physiologists as to the physiological signification of eating salt. According to Bunge, the use of sodium chloride with food is to counteract the effects of the potassium salts predominating, especially in vegetable diet, while other physiologists regard salt purely in the nature of a condiment with no special action. M. Léon Fredericq, writing in the Bulletin de l'Académie Royale de Belgique, describes his observations on certain salts used by the natives of the Congo State. These salts are produced by the incineration of aquatic plants, and are placed on the market in the form of cakes produced by evaporation of the solution formed by dissolving the residue. An analysis shows them to consist almost entirely of chloride and sulphate of potassium, the former largely preponderating, and the presence of sodium being only detectable by the spectroscope. The fact that salts of potassium are thus used for cooking purposes seems to negative the views of Bunge, and to support the opinion, previously advanced by Lapieque, that the use of salt is primarily to improve the flavor of food.