yet controlled by our influence, so that the figure moves when and in whatever manner desired."

To show diversity of effects, we make the figure calculate numbers and play whist. But it is adapted for many other things that we may choose to set it to; and it works precisely as if there were a person inside, and yet there is nothing beyond the mechanism. The audacious part of the invention is that a maker of automata, or other person, is allowed to see and feel all the inside of the figure, so as to satisfy all senses that there are no spaces concealed by optical arrangement or otherwise. The chief difficulty was in demonstrating to the public that the automaton is really insulated from all connection with the stage or with the performer: and it is sometimes exhibited in one way and sometimes in another. It is placed upon a hollow glass cylinder 24 inches in hight, as shown in the engraving, or upon the carpet or upon a loose wooden stand, with legs to keep the automaton from the floor. Another way is that the glass cylinder is set loose upon a small wooden stool that is set loose upon another wooden stand, and the legs of the latter are set loose on glass pianoforte insulators.

The audience are at liberty to go upon the stage and handle and examine all the parts as much as they please, and anybody may remain close to it while it is in operation, and see and feel that no threads, or wires, or any other things connect any parts of the apparatus with the outside.

I should say that a single pillar, instead of a solid glass pillar or two glass pillars, was adopted, because a former invention worked by one piece of glass sliding or revolving inside another, while the appearance was that of a single solid piece; and to suspend Psycho by cords would suggest electricity.

Thus it will be seen that the arrangement precludes the theory of a Mr. Coffin, from America, who published an explanation representing that air is forced into or down out of the glass. If it were, how could it produce the great number of movements which Psycho performs? Besides, it will act just as well in any private room as on a public stage. It does not require any contrivance under or behind a stage which cannot be worked in a private room.

The figure sits upon a small box; the latter is much larger than it need have been, for we did not know how much space the mechanical movements would require. Were another box to be made it would be much more compact.

Psycho has worked twice a day (half an hour each time) since the middle of January last, and nothing has ever got out of order beyond the wearing of a few of the cords by which the counterpoise weights are suspended over a pulley.

As at present exhibited, the performance is as follows: The audience names two numbers, and Psycho multiplies them together and shows the answer (one figure at a time) by opening a little door in a small box and sliding the figure in front by a movement of its left hand. The audience give it a sum in division, and it shows the answer in the same manner. Then three persons go on the stage, inspect Psycho and the apparatus, and, sitting at a side table, play a game of whist. The thirteen cards for Psycho are placed, upright and singly, in a quadrant rack over the range of the figure's right hand. The arm has a radial motion horizontally to find any card wanted, and Psycho lifts the card and holds it up in view of the audience. It lifts the card up repeatedly, or keeps it up, at command of any person among the audience. The figure then covers the card to be played. Mr. Maskelyne then takes the card to the table, and calls out the names of the cards as the player plays them; and sometimes he retires from the figure and card table, to show that Psycho goes on with the game independently of the conductor. After the game, it tells, by movements of its arm, the state of the game and the number of tricks in its favor. Psycho shakes hands with the players, and answers questions by ringing a bell. It also takes part in some usual card tricks.

An infinite number of effects may be produced, but the above are sufficient to show in general what Psycho does."

He closes his letter by saying: "I hope this general description will enable my friends in America to understand and appreciate some of the merits of the automaton card player."

Correspondence.

The Electric Force and Magnetism.

To the Editor of the Scientific American:

On pages 229 and 260 of the current volume of the SCIENTIFIC AMERICAN, I observe that two of your readers take some exceptions to certain of my assertions in respect of terrestrial magnetism and the electric force. I cannot do better, in continuing the discussion of these interesting subjects, than reply in explanation and further elucidation.

There is every reason to believe that magnetism, so to speak, is a crystallization of the electric current.* This expression may at first glance strike the reader as somewhat singular; but after ten years of almost constant practical experiment in this branch of the science, I am unable to advance any more expressive or significant proposition than is compassed by this phrase. Electricity and magnetism are, as we know, interconvertible, and the great difficulty with electricians is to draw between them a distinguishing line; for, paradoxical though it may seem, while one is the other, there is so marked a dissimilarity that we cannot reasonably overlook the difference. With all deference to those who believe that my statement "that the earth is not a great magnet, but that the phenomena of the magnetic needle are due to the electric earth currents which flow at right angles to the earth's axis" is contradictory, because the earth, being surrounded by such currents, is as much a magnet as the magnetic needle, I see no reason why the statement should be qualified. For these reasons, susceptible of easy proof:

That if the earth were a great magnet, the phenomena of the magnetic needle would not exist.

That even those scientists who accept the magnetic theory are forced to acknowledge that a very complex system of magnets indeed, in the earth's interior, instead of the earth being a great magnet, is necessary to account for the phenomena of the magnetic needle. (In a discussion of magnetism, we should obviously confine ourselves within distinguishing lines, otherwise we might confound the attraction of gravitation with magnetism. We have no right to formulate a generality, but should individualize details and branches.)

That it is impossible for the earth to be magnetized (I use the word in its distinctive sense) by the electric earth currents encircling it. The utmost that can be urged is that those portions of the earth's surface which are traversed by the electric currents are magnetic; but even this would be an erroneous hypothesis, for it is in the atomic action or condition alone that magnetism exists and is, and this atomic action is transferable to and through any matter whatever; and air, like a metal, is in this sense magnetic, for it serves merely as the conductor or medium for propagation of magnetism; to which conductor the magnetic force is confined, and which conductor, the same thus being the medium for the propagation of the force, obeys the action of the force, which is inseparable from the conductor, bound to it by those links which render the magnetic or electric force impossible without the conductor. If one desire illustration of this fact, he need only repeat the experiment of revolving a disk of a non-magnetic metal, such as copper, which a magnet does not attract, practically speaking, between the poles of a magnet. It may be heated in this manner to redness, the heat being produced by the resistance offered to the revolutions of the disk by the condition of the atomic particles of the space intervening between the poles of the magnet. Or he may seek for a solution of the magnetic effect, and he will find sufficient answer in the phenomenon which he will observe of a magnet drawing to itself a magnetic metal placed at some distance from it, which phenomenon is explainable alone upon the hypothesis that the atomic condition of the magnet is transferred to the intervening space and thence to the armature, the armature only being attracted, but the intervening space being the medium for the propagation of the magnetic force, which causes the magnet and armature to unite, just as a belt in a machine shop acts as the medium of transmission of the force which causes one pulley to follow the motions of another.

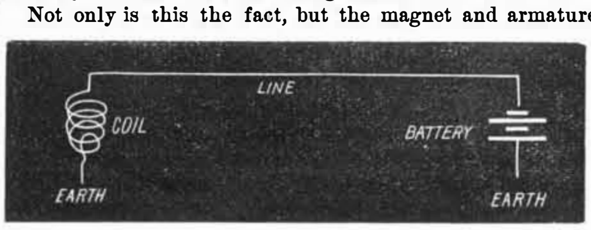
The electric force or the magnetic force is thus nothing in itself; it cannot exist without a so-called conductor; and as all substances are more or less conductors, we have clear proof that the electric force, which is nothing in itself, is merely a certain condition of the atomic particles of those substances. It will, upon close inspection, be found that the only difference between me and those who sustain the objection under review relates to a question of terms: while they combine, and thus confound, I have sought to separate phenomena, which, though intrinsically the same, are in reality separated by as wide a gulf as that which divides the sects in religion, or distinguishes attraction from repulsion, or a live man from a dead man, in the latter case the body being the same, dead or alive. To define the differences and present the same in terms plain and forcible is a purpose soon to be accomplished.

It is my design at present to reply especially to the communication upon page 260, in which your correspondent frankly confesses his inability to realize the circumstances set forth in the following quotation from a past communication by me: "When one pulls a bell cord, and instantaneously a bell is rung in a distant room by the molecular transmission over or through the bell wire of the force applied at the cord, does not one realize that he is as veritably, as wonderfully, and by a similar molecular motion transmitting it by applying a battery to a telegraph wire, and thus setting the atomic particles in motion?" Your correspondent acknowledges that in the case of the bell cord one can easily realize the disturbance of the atomic particles from ocular demonstration, but he adds: "In the case of the telegraph, he sees no motion, either where the force is applied or where it is taken off, even when the force so applied is very powerful." If I could have your correspondent on my premises for an hour, I am confident I could clear his mind of doubts by a few practical exhibitions; but as I shall probably never have that pleasure, I am constrained to resort to the example of argument and the logic of stated facts.

In the first place, he assuredly would not deny the verity of a proposition upon the ground that it is incapable of ocular demonstration. By so doing, he would deny the confirmed theories of the propagation of light, sound, and heat; for, taking an example, one can never have ocular demonstration that so many million light waves are necessary to produce a certain color, and so many another color, or that so many waves or vibrations of matter are necessary to produce a certain sound. Now I am enabled positively to assert that the propagation of the electric force is by molecular action, that the electric force is a certain active condition of the atomic particles of matter, for, unlike your correspondent, I have had ocular demonstration of this molecular action. It was not my design to allude to experiments I am now conducting until such time as I should be able to lay a mass of absolutely convincing facts before your readers, and I cannot even now enter into a statement which not only requires careful preparation, but would be premature, in view of the incompleteness of detail which would result from a presentation previous to such time as that in which the necessary instruments can be prepared for observation and accurate measurements be taken. I could not undertake the task at present without injustice and risk to myself; but I can promise that a series of interesting and novel facts shall be forthcoming within the next two months which will for ever set at rest all conflicting theories in respect of the electric force. But leaving out of the question these new developments, I trust that I can satisfy your correspondent by other proof. He says: "The wire terminates in a coil, and inside of this coil, entirely separated from it, is a bar of metal, and entirely separated from this is the bell lever. Now it is difficult to conceive how the mere molecular disturbance of the wire causes a like disturbance in the bar, which again causes the same in the bell lever or armature. If the motion were transmitted directly to the bell lever by a material connection, as in the first case (the case of the bell wire and bell cord), then there would be no difficulty in understanding this application of the theory." It should be well known that magnetism is the result of induction, for it is a well settled fact, thus: that a current of electricity moving in the vicinity of a magnetic metal extends to that metal "tubes" (convenient term) of electric force which magnetize the metal. This fact is so well established that discussion is out of the question, and it is apparent that this can only be the case upon the hypothesis that the intervening space or substance partakes of the nature of the electric action of the conductor, by which means a transfer of force is effected; for it must be borne in mind that no substance whatever is a non-conductor of the electric force, the conductivity simply differing in degree in different substances. For this very reason a current of low tension, that is, a current which has not sufficient electro-motive force to leap a very short length of a poor conductor, such as wood or air, in preference to traversing a very long good conductor, will enable a telegraphic signal to be transmitted a proportionally greater distance than a current of greater electro-motive force, the maximum of which electro-motive force is secured in an induced current or in frictional electricity. Thus with a Grove or a carbon battery, the elements of which are of considerable proportions, a current may be transmitted from New York to Chicago, automatically, at the rate of twenty-five words per minute; but by reducing the size of the elements one half and doubling the number of elements, a speed of fifty or more words per minute may be obtained, because we have increased the electro-motive force of the current while decreasing its quantity, and the current has therefore greater tendency to leap the wire, that is to say, to follow a short poor conductor to the earth through wood, glass, or air, in preference to following a long good conductor for an immensely greater distance, thereby in great measure preventing that elongation of a signal, which is inimical to rapid transmission over a long circuit. But this merely illustrates the point, at which I wish to arrive, that any current of electricity whatever has its direct and inductive circuit, and that one pole only of a battery put to a wire will give a circuit, without regard to whether the other pole of the battery or the other end of the wire be connected to the earth, as can be demonstrated by sufficiently delicate instruments, markedly when the atmosphere is moist, the reason being that the atmosphere acts as a conductor from the other pole of the battery to the earth, and from the other end of the wire to the earth.

The induced current has, as is well known, a very high tension, so high that it may reach a point at which it will not traverse a hundred feet of wire in preference to leaping to earth, and it is also well known that the magnetism which actuates the bell lever is the resultant of this induced current. The effect of induction should be understood precisely the same as we understand imparted heat. For instance, if we bring a heated body near another, the heat will be imparted from the one to the other. In precisely the same manner, when we bring an electrified body into proximity with another body, the latter partakes of the electrification of the former. By what means? Precisely as the cold body partakes of the heat of the warmer body, or the warm partakes of the cold of the colder body, by means of the intervening substance, to which the atomic conditions of the heat and the cold are imparted. Your correspondent will doubtless now realize that what is termed insulation or isolation, in respect of the electric force, is really no insulation or isolation at all, but a poorer connection, the inferiority of which may be compensated by the electro-motive force of the current. Therefore, contrary to what he supposes, it is not "difficult to conceive how the mere molecular disturbance of the wire causes a like disturbance in the bar, which again causes the same in the bell lever or armature;" it is only difficult to conceive how the case could be otherwise; and, as Mr. Marckley says, "if the motion were transmitted directly to the bell lever by a material connection, then there would be no difficulty in understanding this application of the theory," it will be apparent from the foregoing that there is the most direct material connection, the tubes of force extending from the coil to the bar, and from the magnetic bar to the armature, by means of the intervening substance, air or other.

Not only is this the fact, but the magnet and armature



may be dispensed with altogether, and your correspondent will be able to witness an ocular manifestation. Let him construct a circuit as shown in the engraving.

* Electric current, like electric potential, will some day be positively defined—"a convenient term."

Now as he closes the circuit at the battery, the coil will contract, that is, the various convolutions will draw together. It makes no difference of what kind of metal the coil be composed; and here we have an ocular demonstration, not safe to repudiate, although it clearly only demonstrates the divisible or indivisible fact, either that the current renders each convolution attractive, or that the current alters the atomic particles in a manner, or that both results are effected. These experiments may be varied in many ways.

But if more direct ocular demonstration be needed, the coil may be omitted; and it will be found that every time a current is transmitted over a wire, markedly an iron wire, it is increased in length and decreased in size by transverse contraction, showing that its volume undergoes no change. Note the similarity of this result to the effect upon an elastic substance stretched out; the volume is the same, but the form is changed, and we know that we have changed, by our stretching, the molecular structure.

The above was Joule's experiment. But I need not dwell at present upon the fact that the electric or magnetic force exists in and is a certain action of the atomic particles of matter, when it is so well known, and has been so prominently shown by Tyndall, that, when magnetization is suddenly effected by completing an electric circuit, an ear close to the bar hears a clink, and another clink is heard when the circuit is broken. The condition therefore continues without clinks corresponding to the electric force waves during the continuation of the circuit. Therefore, to give a single reason, I term the magnetic effect a crystallization of the electric current. W. E. SAWYER.

New York city.

Life-Saving Devices.

To the Editor of the Scientific American:

I have lately read some articles in your esteemed journal on torpedo boats. Cannot such life-destroying apparatus be converted into life-saving ones, by substituting (for the torpedo) lines, and other apparatus, and conveying them to the shipwrecked? H. J. F.

The Education of the Mechanical Engineer.

We are indebted to Professor R. H. Thurston, of the Stevens Institute of Technology, for a copy of an address, entitled "The Mechanical Engineer: his Preparation and his Work," delivered before a recent graduating class of the above named college.

As a *resumé* of what a mechanical engineer ought to know, it is the best production we have ever met with, and we especially commend the extracts below given to all who contemplate devoting themselves to that great and useful calling. It is hardly necessary to remark that the speaker had particular reference to the Stevens Institute course, through which his audience of graduates had just passed. To these young men he talks as follows:-

"You have been taught here, not only a course of pure mathematics, such as was formerly prized principally for the mental training which it gave, but you have been led to make useful applications to those problems of practical, every day life and work which, while no less valuable as intellectual gymnastics, give development to good common sense, and which assist to make the man as symmetrical as the gymnast and as skillful as the world's best workers. You have not only been given a set of useful tools, but you have been shown how to handle them. But the greatest value of these acquirements, as aiding you professionally, will be seen later in life, when, perhaps after years of hard work and of severe competition, you may have arrived at the hight of professional practice, and when you will begin to meet with those exceptional problems, difficult of solution by all, and soluble by very few. It is then that you will see most plainly the advantages of this early and extended preparation, and will learn that success in these exceptional cases may make you leading men in your profession. You will find multitudes doing ordinary work well; but between the leaders, success in competition is won by overcoming great and rare obstacles. Great fields of application lie before you in the new and yet undeveloped science of thermodynamics, and in its application to the theory of heat engines and to practical problems of inestimable importance. Those of your comrades who have preceded you have shown you where to look for them.

"In the laboratory you have pursued the study of chemistry. You will have frequent occasion to apply your knowledge of this science, and to put in practice that adroitness in manipulation which you have here acquired.

"Metallurgy offers you a score of attractive fields for its application and for study and most valuable research. You will be sometimes called upon to examine new materials processes, and industries in the course of professional practice. When this occurs, study the subject cautiously, critically, and thoroughly, deceiving neither yourself nor your client. That later science, physics or natural philosophy—I like the old name best—has been opened to you with all the completeness that these collections of delicate and wonder-working apparatus and the knowledge and skill of your accomplished preceptors could secure. The beautiful phenomena of optics have become familiar to you by frequent observation; and their occasional exhibition in this hall on a grander scale has assisted to impress upon you their characteristics. You have yourselves read, in a ray of light, the composition of a complex metallic alloy, and of the salts of every kind collected in the laboratory of our President, and you have, in the same curious way, seen the constitution determined of the sun and the farthest stars.

"The sciences of heat and of the chemico-physical phenomena of evaporation and combustion and of thermo-dynamics will find daily application in your work, which affords a field, not only for the use of that theoretical knowledge obtained from the text books, but for the exercise of all that familiarity with the laws and the facts of the sciences which is secured by actual manipulation and personal attention. They will demand such methods as you have practised in the physical laboratory, where you were not simply told how the thing was done, but were shown how to do it for yourself. The design and construction of heat engines, the study of special applications of thermotic principles, and sometimes their theoretical investigation, are now the occasional tasks of the engineer, and may, after a time, become yours. They are every day arising more frequently and assuming higher importance.

"The study of modern languages has pleasantly varied your course. You have been prepared to make your own all of those splendid treasures of scientific learning which have so long enriched the French, and all of the inestimably valuable literature of engineering of which German literature is now so prolific. In both languages, as in the English, you will find the periodical literature most immediately useful, as presenting you with the latest discoveries, the subjects of most direct importance, and the views of contemporary authorities.

"Your studies of history and of English literature have been by no means the least important part of this preparatory training. This branch of your education is not only necessary, as of frequent use, but it is a most satisfactory and thoroughly enjoyable portion of your knowledge. These studies, however, are by no means to be regarded as giving you purely ornamental accomplishments, or as furnishing only entertainment for hours of leisure. You will have daily occasion to apply them usefully. The power thus acquired of expressing thought, and of stating facts with elegance, precision, and conciseness, is an important element of an engineer's success. A report made to a client, worded carelessly, expressed in vague terms and with orthography not beyond criticism, sometimes casts a dark shade over the professional reputation of a really talented, experienced, and reliable man. A specification so drawn as to be capable of double interpretation may subject one or both of the parties to the contract to serious annoyance or to great loss of time and money.

"You have given a large part of your time, during these four years of study, to the acquirement of a knowledge of the principles of engineering and to the practice of the arts which are in daily application in the practice of the profession. You have, from the beginning of your course, studied the theory of the graphic art and the geometry of machinery. You have spent such an amount of time in the drawing room, copying well known plans, and designing new forms of mechanism, that you have become familiar with every principle of common application in graphic construction, and every detail of ordinary draftsman's work. You will find this skill, in sketching your plans, in making accurate drawings, and in reading the drawings of others, of daily use and of incalculable value to you. Without this power of comprehending plans existing only on paper, you would be absolutely crippled in your efforts to advance yourselves. Without the ability to sketch rapidly and draw readily and accurately, you would have the greatest difficulty in securing the prompt and thorough working of your own schemes. You have mastered the fundamental principles of applied mechanics and of mechanical construction, and have become acquainted with the nature and uses of the materials with which you are to work. You can, I presume, make a stronger lever of a built beam than could Archimedes. The water wheel, the mariner's compass, gunpowder and nitro-glycerin, the telegraph, the chronometer, the steam engine, the printing press, the spinning frame and the loom, and a thousand other inventions seem already perfected. Yet, some one, whether man of science or working mechanic or educated engineer, none can tell, will yet rival Fourneyron, and give us better turbines, will find a means of giving us safety in navigating iron ships, will excel Frodsham in making accurate timekeepers, will give us better printing presses, will supersede the spinning frame and the loom, and will earn a greater fame than Watt by giving us, in some new motor, a means of approaching that theoretical efficiency to which no heat engine has approximated.

"Who has greater reason to aspire to fame and fortune in these coming years of such noble competition than have you? The development of the natural resources of this broad land of ours will afford ample opportunity for the application of your knowledge and the practice of your art, and for the employment of every faculty, natural or acquired, that you may possess, and in whatever way your inclination may prompt, and to any extent that ambition may urge, and that your strength and endurance may permit. Take hold of the work which offers itself, never standing idle, waiting for something more perfectly satisfactory, and do the work as promptly and skillfully as possible, and you will ultimately find that no man need complain that opportunities do not present themselves. Your competitors possess the advantages of training in the rough school of the world, of a knowledge of men, of business methods, and of the rights and the wrongs of daily experience. They have had hard knocks and become callous, or have learned by dint of long practice, and by natural tact frequently, to evade them, and to push on without giving a thought to their scars. They will have the advantage of you at first, for these experiences are essential to early success. They may smile at your book knowledge, and may sometimes even deride your more precise methods and scientific ways; but—bide your time! Make yourselves masters of all the accomplishments, and seek to acquire all of the knowledge, of these rough and ready but untaught competitors, never refusing to give them a liberal reward from your own stores of information, should they ask it."

We shall publish some more extracts from this interesting address in our next issue.

The Relation of Food to Work.

Dr. Du Chaumont, in a recent lecture, said that up to a quite late date there was an absence of any satisfactory theory as to the relation of food to work, and it was supposed that bodily force was due to a chemical change in the muscles themselves, and that the nitrogenous matter in food repaired the waste. But the researches of Joule, Playfair, Frankland, and others, on the conservation of energy, have led to the conclusion that active force is produced chiefly by the potential energy stored up in the carboniferous food, and set free by oxidation. Hence it was seen that to credit the chemical changes in the muscles with the origination of force in the body was not more philosophical than to credit the force exerted by a steam engine to the wearing away of its wheels and pistons.

The lecturer then proceeded through a large number of elaborate circulations, based upon actual observation, for the purpose of showing the ordinary amount of productive work of which a man of average hight is capable, and its equivalent in foot tuns—a foot tun representing the amount of force required to raise one tun one foot high. It appears that the work done in walking three miles an hour is equal to about one tenth the work done by direct ascent. Three hundred foot tuns is a fair day's work for a man of average hight. This would be equivalent to walking fifteen miles in a little over five hours. A hard day's work would be equivalent to walking twenty-four miles in eight hours. Dr. Parkes mentions an extreme case, in which a man in a copper mill did as much as 723 foot tuns in a day, his average work being 443 foot tuns. The ordinary work of a military prisoner is 310 foot tuns. The velocity at which work was done, and the consequent resistance, greatly affect the quantity of potential energy required for its accomplishment. For the production of any amount of what may be termed productive work, a much larger amount of potential energy has to be expended. Professor Haughton, of Dublin, has calculated that, of the total potential energy produced in the body, 260 foot tuns are required for the action of the heart. Then the animal heat absorbs from 2,000 to 2,500 foot tuns, or more.

According to Helmholtz, about five times as much energy is used in the internal work of the body as is expended in ordinary productive work. In the case of severe work, the proportion of internal work to productive work is still greater. Supposing the work performed by a man to consist of walking, the most economical rate, both as regards the amount of food required to sustain it, and the amount of potential energy expended on the body itself, is about three miles an hour. Both above and below that speed there is a decrease in the amount of active work as compared with the non-productive energy. A man walking fifteen or sixteen miles a day, or doing an equivalent amount of work in another form, would require 23 ozs. of food, composed of albuminates 4·6 ozs., fat 3 ozs., starch 14·3 ozs., and salts 1·1. ozs. This would yield a potential energy of 4,430 foot tuns, and 300 foot tuns for productive work. A mere subsistence diet for a man at rest would be 15 ozs., but with this amount a man would lose weight. About 7,000 foot tuns a day of potential energy is about the greatest amount which is possible as a permanency. This would yield 600 foot tuns of productive work. These calculations apply only to men in health.

Magnetisation of Ilmenite (Titanic Ironstone).

Dr. T. L. Phipson says: "Some fine specimens of ilmenite having been sent to my laboratory from Norway, it seemed a good opportunity to investigate the magnetic properties of this mineral. The composition of that which served in my experiments was: Titanic acid, 24·60; protoxide of iron, 72·10; Fe S_2., 2·06; manganese, trace; silicic acid, 1·24. Total, 100.

Its specific gravity was 4·8, and it acted with tolerable energy upon the magnetic needle. From the inspection of this action, I concluded that it was possessed of a very considerable number of poles in close proximity to each other, so that scarcely two closely adjacent parts acted in the same manner upon the north pole of the needle; hence it was evidently built up by a mass of crystals. An elongated rectangular piece of this mineral was separated by a blow of the hammer; it measured 1½ inches in length and was about ¼ inch broad. This was placed upon a table and submitted to magnetization by friction with good magnets for upwards of an hour. It was then found to have a pole at each extremity, which it certainly had not before, and was accordingly suspended to a piece of silk, and hung up in a quiet corner of the laboratory. It pointed constantly towards the north, and returned to that position when deviated. It continued to do so for some weeks; but one morning I found it pointing east-west, or nearly so; it had lost its acquired magnetism entirely, having retained it for rather more than a month.

This loss occurred rather suddenly, and I believe that it coincided with a magnetic storm of some intensity which happened about the time. If these experiments could be continued by some who have more time to devote to them, they might lead to some interesting results. It is possible that some minerals that show action upon the needle might be made magnetic in the above manner."—*Chemical News.*