The Report of the United States Fish Commission* for the year 1878 constitutes a volume of nearly 1,000 pages of interesting matter, and, from the economic interests involved, should command more than a passing attention from those who are desirous of having the natural resources of this country fully developed.

A large portion of the Report, relating to purely scientific work, will be highly appreciated by every naturalist. For instance, the first division of the work including researches into the character of the fishes belonging to the North American fauna, was in charge of Mr. G. Brown Goode, assisted by Dr. T. H. Bean; while it is sufficient to say that the collection and investigation of marine invertebrates was conducted by Professor A. E. Verrill, assisted by Mr. Richard Rathbun, Mr. Sanderson Smith and Mr. Warren Upham, to show the value of the researches in this direction.

Few persons will peruse this Report without feeling an obligation to Professor Spencer F. Baird for the very thorough manner in which he is carrying out the objects of this Commission; for the ground he proposes to cover would appall one of less experience.

The amount of labor involved in carrying out the work of this Commission may be estimated by a brief reference to the programme which Professor Baird has sketched for future guidance:

1st. The preparation of a series of reports upon the various groups of aquatic animals and plants of North America, especially those having relation to the wants or luxuries of mankind, to be afterwards published as monographs, with suitable illustrations.

2d. The distribution of specimens of aquatic animals and plants, not required for the National Museum, to the numerous educational and scientific establishments in the United States.

3d. A complete account of the physical character and conditions of the waters of the United States, as to chemical composition, temperature, etc., with special reference to their availability in nurturing the proper species of food fishes.

4th. A history and description of the various methods, employed in the United States, in the pursuit, capture and utilization of fishes and other aquatic animals.

5th. Statistics of the various branches of the American fisheries from the earliest dates to the present time, so as to show the development of this important industry and its actual condition.

6th. The establishment by the General Government, or in connection with the States, of a thoroughly reliable and exhaustive system of recording fishery statistics for the future.

7th. The bringing together in the National Museum not only of a complete collection of the aquatic animals and plants referred to, but illustrations of all apparatus or devices, used at home or abroad, in the prosecution of the fisheries.

8th. An investigation of the movements and habits of various kinds of fish, to serve as a basis for legislation, either by the General Government or by the States.

9. The arrangement of a code of regulations in respect to close seasons, and other matters of detail respecting the capture of fish.

10th. The stocking of the various waters of the United States with the fish most suited to them, either by artificial propagation or transfer, and the best apparatus and methods for accomplishing this object.

Professor Baird intends to supplement this immense amount of work by collecting and compiling statistics for the proper treatment of international questions connected with the common use, by the United States and the British Provinces, of the waters of the North Atlantic.

The volume before us bears ample proof of the power of Professor Baird and his assistants, to carry out this programme to its fullest extent, and if the work progresses at the present rate, its accomplishment will not be so far in the future as many would suppose.

A. Inquiry into the Decrease of Food-Fishes.
B. The Propagation of Food-Fishes in the Waters of the United States.
Cayenne pepper in a trance, believing it to be sugar, appeared to be not inconvenienced in the least when he returned to a normal condition. But still more remarkable was the behavior of the patient who was made "stone deaf." Dr. Beard shouted in vain to this man, a tuning fork was sounded, a bell rung, and even a pistol fired close to his devoted head, while the patient remained eloquently silent and apparently oblivious to all external sounds.

To de-hypnotize the subject, Dr. Beard, unmindful of the fact that he was supposed to be addressing a deaf person, said, in an ordinary tone of voice: "It's all right!" that being the usual phrase employed. To the surprise of many present, the patient (perhaps not desiring a contretemps to mar the performance) took the cue and quietly resumed his seat.

To a popular audience Dr. Beard's theories and experiments might have partaken of the character of a revelation, but we believe that nearly all our present knowledge of the subject dates from Braid's book on Hypnotism, published more than twenty years ago.

The policy of such public exhibitions may be well questioned; in Vienna they have been prohibited, and as no new truth can be gained or science advanced by repeating these experiments in such a manner, why make them the subject for an evening's amusement before a scientific society?

The patients selected perform their parts constantly, and thus become finally, perhaps unconsciously, more and more trained to elaborate their ancie, so that, even admitting the genuineness of the performance, the experiments may be, at least so far, manufactured.

The subjects of Dr. Beard are chiefly selected from the nervous classes of our population, and although they may be willing to air their peculiarities before a fashionable audience, it would appear to be a charitable course to keep them from such public exhibitions which can result only in aggravating their morbid tendencies.

NEW YORK ACADEMY OF SCIENCES.

The Committee on Lectures announces that the remainder of the course will embrace five lectures, to be delivered at the new Hall of the Academy of Medicine, No. 12 West Thirty-first street, New York City, on the third Monday of each month.

These lectures are free to the public, but admission is strictly confined to those holding tickets, which may be obtained of D. S. Martin, 236 West Fourth street; W. P. Trowbridge, School of Mines, East Forty-ninth street; and Alex. A. Julien, School of Mines, East Forty-ninth street.

The programme includes the following lectures: January 17th, Respiration, by Dr. J. W. S. Arnold; February 21st, The Repilian Affinities of Birds, by Professor Edward S. Morse; March 21st, Sensation and Pain, by Dr. Charles Fayette Taylor; April 18th, Temple Architecture of the Tenth to the Fifteenth Century, by Professor George W. Plympton; May 10th, The Organic Elements, by Professor Albert R. Leeds.
Lieutenant Schwatka still remains a prisoner in his quarters on Governor's Island in New York harbor, in consequence of his recent accident. Surrounded by many of the trophies of his arctic experiences, he relieves the monotony of his situation by preparing for the press his forthcoming history of the expedition, with which his name must be forever associated.

Any reference to arctic expeditions at this moment naturally recalls to mind the fact, that a brave American officer and his crew are now locked in the firm embraces of the frozen solitudes of that desolate region, heroically struggling to accomplish a service to humanity.

The gallant De Long may be safe in winter quarters with the Jeannette, waiting for the moment when a channel may be opened for his ship's return; but all past experiences in the polar regions suggest that none but the over-sanguine should rely on such a fortunate conclusion of the voyage, and the common instincts of humanity demand that a relief expedition be immediately organized, to sail at the earliest possible moment to carry succor to De Long and his party, and to report on his condition.

There are other reasons for immediately sending aid to the Jeannette; the attempt to reach the North Pole entails a colossal task, and it is perhaps vain to expect any expedition to reach it by a sudden and unexpected stroke of success; probably nearly four hundred miles of sleigh travelling over rugged and almost impassable hummocks of ice will have to be accomplished at an average speed of six to eight miles a day; this would occupy fifty consecutive days, and then, if all went well, would come the return journey with equal dangers and difficulties. Captain Nares pronounced such travelling impossible.

Lieutenant Schwatka has, however, shown that with better organization and different methods, the dangers of a sleigh expedition can be much reduced. Unfortunately, De Long has not the benefit of "Schwatka's" experiences, and has probably, like "Nares," harnessed his men to the sleigh and not depended upon dogs to drag it over so many tedious miles of dreary wastes. It would, therefore, appear obvious that even should the Jeannette expedition be actually safe and intact, the arrival of new supplies and general aid at the side of De Long would be most opportune, and may even lead to accomplishing the great object in view.

Possibly some of our readers may consider that the time for sending a relief expedition to the Jeannette has not arrived, and that it may be prudent to await tidings of disaster before help is sent. We have somewhat anticipated such reasoning, but would add that the consequences of such a course in the case of the lost Franklin Expedition led to a final outlay of $10,000,000 by the English nation with negative results.

We now know that had a relief expedition been sent immediately to the rescue of Franklin, the brave officers and crew might have been easily saved.

Lieutenant Schwatka strongly urges the necessity of sending immediate relief to the Jeannette expedition, and at our request will state in our next issue some of the reasons which lead him to that conclusion. No names have been so far mentioned to take a part in this undertaking, but we trust the services of Lieutenant Schwatka may be secured, as his past experience and great success would give us hope of the best results being accomplished.

The excellent work accomplished by Lieutenant Schwatka, an officer of the United States Army, in arctic explorations, would appear to teach us one lesson, that too great reliance on Naval men reaching the North Pole unaided should not be entertained. Sailors proverbially stick to their ships, are out of their element on shore, and appear unable to cope with difficulties when away from the base of their supplies. Compare the sleigh expeditions of Nares and Schwatka, and note how differently they were managed, the former starting without necessary material, making his men beasts of burden, and failing miserably from the collapse of all his resources.

Schwatka, on the contrary, so contrived that the necessaries of life were always available. Forty dogs merrily drew his sleigh, and with the instincts of a military man he carefully husbanded his resources, and accomplished sufficient to make his expedition a memorable success.

It seems on this account possible that the two arms of the service may profitably combine in the next effort to solve the great Polar problem, for the best results may be anticipated by such united action.
The advantages of having a good public library in a large city are so obvious that it appears incomprehensible that the most important city in the United States is practically without such an institution.

The city of New York appears to have been fortunate in being made the recipient of munificent testamentary gifts for the purpose of founding a great public library suited to the needs of such a community, but also unexceptionally unfortunate in the disposition of the funds so bequeathed.

The Astor Library contains a collection of books which have been most judiciously selected to form the nucleus of a good public library, and one peculiarly suited to the needs of those residing in such a city as New York. Unfortunately, the trustees of the library permit its use only between the hours of 10 A.M. and 4 P.M., thus practically shutting out the majority of those who desire to consult the literary treasures it contains.

Of the Lenox Library, recently bequeathed to the citizens of New York, it may be premature to speak; possibly in time its doors may be open to the public; but under what conditions and restrictions can only be conjectured from the eccentric formalities of the past.

Thus with the Astor Library open for a few fashionable hours during the day, and the Lennox Library closed altogether, the public of New York finds itself after four o'clock, P. M., daily, and during the whole of Sunday, without a free public library. Such a state of things is not creditable to the largest and most important city in this Republic, and should not continue a day longer.

The good policy of establishing a public library for New York city, which shall be under the full control of the city authorities, is daily becoming more apparent, and we trust the time is not distant when the wishes of the people in this respect may be fully realized.

A letter will be found in another page of this issue relating to our notice of Dr. Beard's lecture on "Mesmeric Trance." The writer is not correct in stating that we threw a doubt on the genuineness of the "phenomena, as a whole," as on the contrary our remarks questioned the integrity of the "subjects" produced by Dr. Beard. These men and boys, since the lecture in question, have been nightly performing the same tricks in a room on Sixth avenue, the advertisement for which is headed "Marvels and Fun of Mesmerism." The propriety of bringing such "subjects" before the New York Academy of Sciences, may well be questioned, and so far from accepting their performances as genuine exhibitions of the phenomena of Hypnotism, we apprehend the closest scrutiny should be made to test the genuineness of their acts.

Professor Hitchcock admits that he and others observed what appeared to us as evidence of collusion between Dr. Beard and his subjects, but objects to our having pointed out these facts, without having first permitted Dr. Beard to give his explanation of them. This amounts to a request to suppress all criticism, except that controlled by the person criticised, which appears to us one of the least inviting methods of arriving at the truth.

The subject is one of undoubted interest, and as we do not wish to prejudice the question, we defer any detailed reply to Professor Hitchcock's letter until others have had an opportunity of expressing their views. Our columns will be open to any correspondent who can add to our knowledge of this subject, or who can give a rational explanation of the phenomenon of Hypnotism.

SCIENTIFIC SOCIETIES IN WASHINGTON.

THE ANTHROPOLOGICAL SOCIETY.

NEW OFFICERS ELECTED AND A CHANGE OF LOCATION AGREED UPON.

The Anthropological Society met at the Smithsonian Institution on the evening of January 18th, Major J. W. Powell, the president, in the chair. The following new members were elected: Dr. A. F. A. King, Dr. William Lee, and Mr. Ivan Petroff for active membership, and Mr. J. C. Tache and B. B. Redding for corresponding membership. It being the evening of the annual election, no papers were read. A motion to remove from the present location to the lecture-hall of the National Medical College of the Columbian University was introduced by a committee of the council, and adopted by the society.

The election of officers to serve during the ensuing year resulted as follows: President, Major J. W. Powell; vice-presidents, Colonel Garrick Mallory, Dr. George A. Otis, Professor O. T. Mason, Dr. H. C. Yarrow; corres-
ON MATTER AS A FORM OF ENERGY.

In the vortex-ring theory of matter as propounded by Sir William Thomson, the characteristic differences between the elements is supposed to be due to complications in the rings themselves, as they may be knotted in innumerable ways. Several such forms are drawn in the memoir, and one such is stamped upon the cover of "The Unseen Universe," by Tait and Stewart.

This vortex-ring theory assumes that matter is a form of energy, not interchangeable with the other variable forms, such as heat, electricity, etc., for the simple reason that its form renders it impossible, but if the elements be forms of energy, the law of energy may possibly be traced in them. Now, the energy of a given mass of matter varies as the square of its velocity, but the properties of the mass vary with the form of the energy, that is to say, the physical properties of a heated body are not identical with those of the same body when it is cool, but possesses the same amount of energy in free path motion. The physical properties of atoms and molecules vary with atomic and molecular velocities; for example, whether a piece of iron or steel is magnetic or not depends upon its temperature, that is, its rate of molecular vibration. It is not, therefore, a priori improbable that such differences as exist between the ultimate atoms constituting what we call mass, may be due to relative velocities of rotation of the vortex-ring. Atomic weights represent numerically these constant differences, and one might expect to find in any one of these atomic weights the two factors that constitute energy, namely a mass (or its equivalent) and a velocity; so we might write \( \frac{m v^2}{2} \) = atomic weight. Applying this to a specific case, suppose \( \frac{m v^2}{2} = 75 \) = atomic weight of Arsenic; by inspection it is seen that \( m = 6 \) and \( v = 5 \). If \( m = 6 \) and \( v = 2 \), then \( \frac{6 \times 2^2}{2} = 12 \) = At. Wt. Carbon. Let a table now be constructed \( m = 6 \) and \( v \) with values \( 2, 3, 4 \), and so on, and there results a series of numbers \( N \) either exactly the same as the atomic weights of some of the elements or a very close approximation to such numbers. The elements have their symbols under \( E \) with their atomic weights as given under At. Wt. for comparison.

\[ \frac{m v^2}{2} = \text{Energy} = \text{Atomic Weight}. \]

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By changing the value of \( m \) to 7, 8, 9, etc., a new series of numbers is obtained and the process is carried until the resulting number is higher than any known atomic weight, namely, that of Thallium 233.9. Where the number obtained is not that of any known atomic weight an interrogation point is placed. In several cases the resulting number is the same as the ones given by Mendelejoff as those of probable elements yet to be discovered; for example, in table \( m = 9 \). 72 is such a number and is marked \( m \) in the line of atomic weights.

Now, here is a series of forty numbers calculated serially, and thirty-three of them are either the exact atomic weights of elements or vary less than one unit from them, and it does not seem probable that so large a proportion could be the result of chance, for the numbers range from 12 to 234. Moreover, by carrying the process still further many more of the atomic weights are obtained. Thus, with \( m = 13 \) we have Co. Ni. Ru. Rh. and Th.
It appears to be a fact not generally known in the United States that a prize is annually offered by His Majesty, the King of the Belgians, amounting to the sum of twenty-five thousand francs, for the encouragement of intellectual effort. The intentions of the King were made known by a decree dated the 14th of December, 1874, inviting the authors of all nations to compete, and placing the settlement of the award in the hands of a jury appointed by His Majesty, composed of seven members, three of whom must be Belgians, and four foreigners of different nationalities. The prize for the year 1881 will be awarded "to the best work on the means of improving ports established on low and sandy coasts like those of Belgium." The original time for sending in these essays, which may be either printed or in manuscript, was the 1st of January, now last past, but we are authorized in stating that the time has been extended to the 31st day of March, 1881.

Foreigners desiring to compete for this prize are required to send their works to the Minister of the Interior at Brussels; but Mr. John Eaton, U. S. Commissioner of Education, advises competitors in the United States to forward their articles through the Department of State at Washington.

We are informed that the manuscript work obtaining the prize must be published in the course of the year following that in which the prize shall have been awarded, but in what manner the publication shall be made is not stated in the document placed in our hands.

Engineers and scientific men who would avail themselves of this opportunity must act promptly, and we would advise such to apply directly to Mr. John Eaton, of the Bureau of Education, in regard to any further information required for facilitating their work.

TRICHIN.E IN PORK.

Dr. Ed. W. Germer, Health officer, of Erie, Pa., sends to us a portion of trichinous pork, as a sample of meat which infected a family of seven persons with trichinosis. The pigs were killed at the same time, and an examination by Dr. Germer showed that one of these pigs was infected with trichinae while the other was free from the parasite.

The owner of the diseased pig, his wife and two children were all taken sick simultaneously, and were treated for typhoid fever. Their symptoms were similar to those of trichinosis, but they were not as severe.

We have examined the sample of trichinous pork, and confirm Dr. Germer's report; stripping a portion of the sarcocelenna from the muscle we found several trichinae in the field of the microscope, using a 4th objective. The trichinae were in a free condition without cysts, and very transparent; for this reason they could be seen only by making very thin sections.
To saddle the enterprise with a rental of $10,000 a year for the bare ground on which the building stood was to court ruin, but all the outlays were made on the same extravagant basis. Then came the fatal mistake of appealing for support to the few affluent, and making each admission fifty cents, instead of trusting to the multitude who could and would have paid twenty-five cents.

Even under these circumstances we are now told by Mr. Reiche that for a time it did pay. We think this very convincing proof that under more economical management and with a less pretentious establishment, success would have been secured.

On behalf of many scientific men, we extend our thanks to Mr. Reiche for the liberal facilities he has throughout extended to those who desired to visit and make use of the aquarium for scientific purposes; to such the place has always been open and a cordial welcome given. Under instructions, the officers in charge have been courteous in offering the fullest facilities for study and freely gave such specimens as could be spared. How little such opportunities have been appreciated and used by naturalists within reach of the institution reflects little credit on those who should have seized the occasion with avidity.

Unfortunately the facilities were too great, and too conveniently at hand to be appreciated, and because they were offered as a gift they were neglected. The New York Aquarium had the benefit of the services of the best professional collectors in this country, and the coast from Maine to Florida was constantly searched for living species of rare and interesting forms of animal life, and yet many naturalists preferred to waste their time and money, travelling hundreds of miles, to obtain objects which could be had at their very doors.

The same results have happened in Europe under similar circumstances. When Mr. Lloyd, of London, was asked if he thought the aquarium at the Channel Islands would answer, he replied, that he feared it was too near home, too convenient of access; for said he, "I have known persons prefer to travel from to the Bay of Naples to collect specimens, which I had in my aquarium at the Crystal Palace."

We trust that steps may be taken to preserve the fittings of the New York Aquarium, and that they may be replaced in some part of the city where a site will be inexpensive, and that a plan may be arranged for maintaining it on a remunerative basis, which in our opinion should not be a difficult matter; but to secure success we should advise the institution to be placed in the charge of some well-known professional naturalist, who could be well named by Professor Spencer F. Baird.
MICROSCOPES AND THEIR OBJECTIVES.

We are told by one maker of microscopes that he has orders in advance which will prevent his undertaking new work for at least four months from the present time. Supposing his statement to be true, and we heartily trust it is, it would appear to show that the number of those undertaking microscopical investigations is largely on the increase, and as the probabilities are that many of those now investing their money in microscopes and objectives, are doing so with little experience to guide them in their selection, it may be useful at this moment to take a review of the microscope market.

The purchase of the microscope stand and the objectives to use with it will be considered separately. They are usually purchased together, but there is no reason for doing so, and we would like to see each handled by a distinct branch of trade. To make a good microscope stand needs only the skill of a good worker in brass, under suitable direction. On the other hand, the manufacture of objectives, and the other optical parts of a microscope, requires the skilled labor of an optician.

In regard to the microscope stand, we would state that many improvements have been recently made, so that to avoid being saddled with one which may be considered obsolete, it would be as well to go directly to one who manufacturers his own stands, and direct him to make one to order; by so doing, the additional advantage will be secured of obtaining an instrument specially suited for particular work—a very important point.

The temptation is great to name one or two microscope stands which, in our opinion, are perfect in workmanship, designed on the best model and, withal, quite moderate in price; but to do so would court misinterpretation of our motives; so we may state that such firms as Bausch & Lomb, Beck, Bullock, Grunow, Schrauer, Slidel, Zentmayer, are all reliable American manufacturers, and that most of these firms now produce such an instrument as we would advise, at a cost of about 40 to 50 dollars for a Monocular stand, not including accessory apparatus or objectives. We have just seen an instrument, for the latter price, having perfection of workmanship and the latest improvements.

In regard to microscope objectives, the greatest caution should be employed by the inexperienced at this moment, for after twenty-five years experience in purchasing objectives, the present price-lists of opticians appear to us a perfect chaos of quotations.

In the first place, the objection has been raised by purchasers that object-glasses of a certain focal length and stated aperture, vary in their linear magnifying power, among different makers, so that a quarter-inch which, for instance, should give 200 diameters with an A eye-piece, is found to be a 4-10, allowing only 120 diameters if purchased of another maker, or perhaps it will give 225 diameters similar to a 1-5th, when obtained from a third manufacturer—even when the conditions are alike. This, no doubt, originated in one of the tricks of the trade. A makes a 1-4th which, in resolving power, equals the 1-6th of B; in consequence, A claims at once a superiority of workmanship, and perhaps secures a reputation for objectives, when, if the truth was known, the 1-4th was in fact a 1-6th.

It must be remembered also that all objectives vary in quality even from the same maker, and that one may be given to an inexperienced person which is very far from the supposed standard of excellence; with some makers not more than one in twelve would be accepted by an expert.

Lastly, there appears to be a feeling that considerable improvements are imminent in the manufacture of objectives, rendering those of yesterday commercially valueless. If we may judge by a price list just forwarded, a panic appears to have commenced among those holding objectives made as recently as four years ago. By a circular, we are informed that the objectives of one of the most esteemed makers are now offered at prices 50 per cent. lower than those charged by the maker. "These lenses are of the best quality and perfectly new, "simply to close out our stock of these objectives." This offer is made by an optician in the same city with the original maker. Objectives which cost $150 can be had for $75, and others as follows: $110 for $55; $50 for $30. $40 for
INSANITY VERSUS CIVILIZATION.

It is interesting to note the steady progress made by Alienists in solving the many difficult problems which appear to underlie the practice of their profession, and we would give full credit to those who, in a purely scientific spirit, are building a foundation on which a system of treatment for mental diseases may be erected, which shall accord with modern anatomical discovery and the latest theories which have been developed by a careful study of insanity in all its forms.

The last number of the "Journal of Nervous and Mental Diseases" may be studied with advantage by those who would gather a few opinions expressed by those who "minister to a mind diseased." In the first place, we have the authority of Dr. J. S. Jewell for stating that insanity is on the increase, and must still increase with the advance of civilization. In this opinion he is confirmed by Professor W. Erb, of Leipzig, and others. Among the reasons advanced for alleging that the advance of civilization is favorable to an increase in nervous and mental diseases, it is stated, that the nervous systems of highly cultivated and refined individuals among civilized people are more complex and refined in structure and more delicate in susceptibility and action, at least in their higher parts, than the nervous systems of savages. As civilization advances, the occupations increase which imply a cultivation of the sensibilities, more especially those comprehended under the sense of beauty. A relatively large number of persons give themselves to the study and practice of art in its various forms, to polite literature, and to sedentary occupations. The more a part of the nervous system is used the more extended its development. In highly civilized communities there is a constant tendency to a loss of balance in nerve development, in which the sensitive side of the nervous system preponderates over the motor part of the same. Now, all disturbances of symmetry or balance in development tend toward disease; they do not constitute disease, but verge in that direction. This state of things is the result of advancing civilization, and involve a world of minor consequences, both for the weal and woe of the people.

Such is the substance of Dr. Jewell's views, who also charges the system of education in public schools with being the cause of increasing the number of cases of insanity, by breaking up the "nervous health" of youths. This remark applies equally to the course of study in Colleges and Universities, and the overworked student in hundreds of cases obtains his degree at the expense of loss of health, and retires with general nervous and brain exhaustion, and afflicted with melancholia, hysteria, vascular irregularities, cerebral congestion, neuralgias and other disorders of the same character.

Space will not permit us to describe the many forms in which the adult, in civilized life, courts the approach of the various forms of insanity; but they can be easily surmised, and are often referred to in articles treating on this subject.

We admit, with Dr. Jewell, that the higher developments of civilized life may produce a higher strain on the nervous system which may lead to more frequent cases of its derangement; but we think he draws too wide a parallel when he makes a distinction between our present modes of existence and actual savage life. When speaking of the increase of insanity, it is presumed reference is made to a period covering, perhaps, the last fifty years. Such being the case, we think Dr. Jewell has hardly done justice to the subject, by omitting the many mitigating circumstances attending an advanced civilization, which certainly alleviate many of the mental strains spoken of by him.

Within the last fifty years, the hours of labor have been curtailed both in manufactories and among the industrial classes in cities. Stores which at one time were open until midnight are now closed at 7 P. M. Means of recreation and amusements which until recently were monopolized by a few, are now enjoyed by the millions. Improved methods of transit now enable citizens to enjoy their evenings after the hours of labor, strolling upon grassy meadows or upon the shores of the ocean. Literature of an entertaining character is also now produced so cheaply as to make its use universal. The laws of hygiene are also at this present day better understood, and, by perfecting man's physical condition, instill fresh energy into his mental powers.

We thus find that, so far from all the conditions attending an advanced civilization being favorable to
SCIENCE.

A WEEKLY RECORD OF SCIENTIFIC PROGRESS.

JOHN MICHELS, Editor.

PUBLISHED AT
229 BROADWAY, NEW YORK.
P. O. Box 8898

SATURDAY, MARCH 26, 1881.

ANATOMICAL NOMENCLATURE.

In this and in the preceding number considerable space is devoted to a somewhat elaborate discussion of the general subject of Anatomical Nomenclature, accompanied by practical suggestions with regard to the brain.

When we consider that, as stated by Professor Wilder, the brain presents about 150 parts or regions which are visible to the unaided eye, that these parts are more and more frequently mentioned in connection with the progressive sciences of Anatomy, Zoology, Physiology and Psychology, and that many of them have received from two to a dozen, more or less, ponderous names, there would seem to be no question as to the desirability of some improvement upon the existing terminology.

The author of this article has undertaken to amend the matter by selecting the shortest or otherwise most appropriate one of the several names by which some parts are known, or by abbreviating descriptive phrases either by discarding all but the most significant word, or converting qualifying adjectives into prefixes, or, in a few cases, mostly of parts observed by himself, by proposing new terms altogether.

The fact is, as every original investigator is aware, all scientific nomenclature is more or less provisional, and must be constantly modified to suit the additions to knowledge and the clearing up of ideas. The author has given a few instances of the employment of new terms by modern writers, and many more might have been adduced. Marsh uses "postpubis," Huxley "epipubes, pyangium, synangium, intravular;" Foster employs—if he did not originate—"hemisection and aspychical;" "oral" is used by Thayer in place of cephalad, while "dorsal" occurs in recent writings of Mivart, and in Huxley's latest utterance, the paper on "Evolution," parts of which were reprinted in this journal.

Among all the arguments in favor of some modification of the existing nomenclature, the strongest—to the mind of the unprejudiced layman—is, perhaps, the very one which will least commend itself to the professional anatomist: namely, that the ease and comfort of those now living should be held of little moment as compared with any advantage which the change may confer upon the "cavily more numerous anatomical workers of the future."

Those who object to the strictly technical construction of the proposed vocabulary should try to realize what would be the outcome of a total disuse of all technical terms, and the substitution thereof of the vernacular words which are current among the people of the various countries in which anatomy is cultivated. Ancient Babylon would have a parallel in modern Science, and there would result confusion, misunderstanding, contention, and finally apathy and ignorance. Professor Wilder has evidently prepared his article in the hope of eliciting criticism from the working-anatomists of all parts of the world, and not with a view to the hasty praise or dissent of English-speakers alone.

The pages of "SCIENCE" are open to the fullest and freest discussion of the whole subject.

A PARTIAL REVISION OF ANATOMICAL NOMENCLATURE, WITH ESPECIAL REFERENCE TO THAT OF THE BRAIN.*

By HORT.G. WILDER, M.D.,
Professor of Comparative Anatomy, etc., in Cornell University, and of Physiology in the Medical School of Maine.

II. GENERAL NAMES OF ORGANS, AND THEIR ABBREVIATIONS.

For ease of reference these words are arranged in the alphabetical order of their abbreviations.


LIST OF NAMES OF PARTS OR FEATURES OF THE BRAIN.

This list includes between 150 and 160 names. Unless otherwise stated they apply to the brains of Man and the Domestic Cat. Most of the names refer to more

* Continued from No. 58, page 126, March 19, 1881.
It has been well said, that the poorest day that passes over us is the conflux of two eternities: it is made up of currents that issue from the remotest past, and flow onward into the remotest future.

On the 27th of June, 1829, an event took place which was to have a marked influence on the intellectual development of the United States, for on that day James Smithson died at Genoa, Italy, bequeathing his whole fortune to the citizens of the United States, in trust, "for the increase and diffusion of knowledge among men."

On the 6th of December, 1838, President Van Buren had the satisfaction of announcing to Congress that the claim of the United States to this legacy had been fully established, and that the money had been received by the Government.

The question then arose, what plan could be devised to carry out the intentions of the testator. In other words, how could "the increase and diffusion of knowledge among men" be best accomplished.

One of the first proposals for utilizing the Smithsonian fund was a scheme of founding a university of high grade, to "teach Latin, Greek, Hebrew, Oriental languages, and other branches of learning, including rhetoric, poetry, laws of nations, &c." Fortunately, such counsel did not prevail, and after nearly eight years of debate, and even a proposal to return the money to England being voted on, a bill was passed by Congress organizing the Smithsonian Institution on its present basis.

Such, briefly stated, was the origin of the Smithsonian Institution, and in memory of its founder the present Secretary, Professor Spencer F. Baird, directed Mr. William J. Rhiees to compile a biography of James Smithson, this work being one of the most recent publications of the Institution.

The general scope of this work is good, and it must be admitted that some account of the establishment of this Institution was desired for. We must, however, express our regret that such an elaborate description of Smithson's aristocratic connections was presented, especially as the history would have been equally complete without this superfluous addition. The connection of the "proud" Dukes of Northumberland and Somerset with Smithson was hardly of a nature to be recorded in a form which should constantly bring the facts before the present generation and posterity.

The circumstances of Smithson's birth cannot be ignored, but there is no reason why they should be paraded before the public; we therefore would have dispensed with the portrait of the first Duke of Northumberland in this volume, and relegated the history of his life and death to the highest shelf in the Smithsonian Library.

Stript of such surroundings, the memory of Smithson must ever be dear to the people of this country. He was a man thoroughly imbued with the spirit of true science, and an active and industrious laborer in one of the most interesting and important branches of research—"mineral chemistry." His happiest hours were spent in the laboratory, where he carried on a series of experiments, which were recorded in the transactions of the Royal Society of London and other scientific journals of the day. Such being the direction of Smithson's scientific pursuits, we trust that the advancement of the physical sciences may claim the attention of the officers of this institution, and that they may be more duly represented in future reports.

Since the death of Smithson, Chemistry has attained a higher rank among the exact sciences. New methods and instruments of analysis have been introduced, while other branches of science have advanced at an equal ratio. New means "for the increase and diffusion of knowledge among men," have come to light, and among these the production of improved scientific manuals, and the increased number and excellence of scientific periodicals and journals, may be mentioned as having largely contributed to such results. Science at the present day is no longer monopolized by a select few, but is claimed as the common heritage of the thousands who have the intelligence to appreciate its value in developing the highest faculties of man.

Thomas Carlyle considered that "to know the divine laws and harm onies of this Universe must always be the highest glory of a man, and not to know them the highest disgrace for a man." This Journal represents one of the latest attempts to place at the disposal of all interested in scientific pursuits and human progress, a weekly journal worthy of the subject discussed. We are glad to find that our efforts have been appreciated, and the constant receipt of letters of welcome, co-operation and aid, increases our hopes for the future. Among our latest subscribers, we find three residing in Japan, one in Lucknow, India, another in New Zealand, and the directors of the Royal observatories of Brussels, Lisbon, and Rome have added their names. If "Science" is thus in demand in foreign countries, we trust to find our home subscription list rapidly increase, which will enable us to enlarge and improve the journal in various ways, thus adding to its usefulness.

Lord Brougham observed, that to instruct the people in the rudiments of philosophy, and to obtain...
SCIENCE: A WEEKLY RECORD OF SCIENTIFIC PROGRESS.

JOHN MICHELS, Editor.

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SATURDAY, APRIL 9, 1881.

UNIFORM TIME.

The question of the introduction of uniform standard time into daily use, for both popular and scientific purposes, having been examined by the American Metrological Society, the president, Prof. F. A. P. Barnard directs attention to the following considerations, and invites exchange of views upon this subject.

He says "local time," in the astronomical sense of this term, varies with every change of meridian; it can therefore not be conveniently retained by travellers, and transportation and telegraph companies, which adopt whatever meridian may be the most convenient. Over seventy such standard meridians are now in use by railroad and other companies throughout the United States and Canada; the larger towns and cities frequently adopt their own special local times, and the smaller ones adopt the railroad times most convenient to them; there are thus now in ordinary use at least 100 local times or meridians, many of them differing but a few minutes from each other.

Professor Barnard believes that a more thorough uniformity of accurate time would be to the daily advantage of all members of the community and all business transactions, and would immensely facilitate the study of certain natural phenomena, such as tornados, auroras, earthquakes, meteors, &c., for the observation of which we must depend largely upon those who chance to be favorably located.

It is accordingly proposed that the community unite upon a division of this continent into a few sections, throughout each of which the times adopted by railroad, canal, steamboat and telegraph companies, the city or town clocks and the clock makers, shall all be kept as nearly as possible in agreement with one standard meridian.

The system that especially commends itself for adoption, is that which also has the best prospect of being ultimately adopted by all nations throughout the world. It requires that, for the United States, we should adopt a central meridian in the Mississippi Valley, exactly 90° or six hours west of Greenwich, and proceed to the east or west by steps of exactly one hour each, so that the sectional times would be about as in the following schedule.

We have already given attention to this subject, and in "SCIENCE," Vol. I, p. 14, will be found some excellent suggestions in regard to "uniform time," by Professor Ormond Stone.

In this article we merely present the views of Professor Barnard, the President of the American Metrological Society, and reserve a fuller consideration of the same for a future occasion. We may state, however, that we are heartily in accord with the object Professor Barnard has in view, and are pleased to find the matter in such able hands.

### Proposed Schedule of Standard Times

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<thead>
<tr>
<th>Geographical Section</th>
<th>Standard Meridian west of Greenwich</th>
<th>Standard Time slower than Greenwich</th>
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<tbody>
<tr>
<td>Newfoundland</td>
<td>60°</td>
<td>6°</td>
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<td>New Brunswick</td>
<td>5°</td>
<td>4°. 0. 0.</td>
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<td>Nova Scotia</td>
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<td>3°. 0. 0.</td>
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<tr>
<td>Canada</td>
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<td>to Florida</td>
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<td>to Ohio</td>
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<td>to Alabama</td>
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<tr>
<td>Lower Lakes</td>
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<tr>
<td>Mississippi Valley</td>
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<td>Missouri</td>
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<tr>
<td>Upper Lakes</td>
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<td>Rocky Mt. Region</td>
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<tr>
<td>Pacific States</td>
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<th>Standard Time Slower or Faster than True &quot;Local Times.&quot;</th>
<th>Designation of Proposed Standard Time.</th>
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<tr>
<td>99 minutes slower than St. Johns, N. F.</td>
<td>Eastern Time.</td>
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<td>24 &quot; faster than St. John, N. B.</td>
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<td>24 &quot; faster than Halfay, N. S.</td>
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<td>14 &quot; faster than Toronto</td>
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<td>45 &quot; faster than Montgomery</td>
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<td>45 &quot; faster than Buffalo</td>
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<td>28 &quot; faster than Cincinnati</td>
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<td>28 &quot; faster than New Orleans</td>
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<td>1 &quot; faster than St. Louis</td>
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SCIENCE.
We present in another column a communication from Professor Alexander Winchell, of the University of Michigan, who, in response to a request from ourselves, has presented a very clear statement of his views relating to some conditions of primitive matter. This subject was introduced in "Science" by Mr. Larkin (March 26), and followed by Mr. Morris in our last issue.

Much difference of opinion exists on this subject, which is one of the highest interest, and we trust that the open discussion we have permitted may elicit some truth, and lead to a removal of many of the difficulties which underlie this question. Without anticipating our opinion on the merits of the respective arguments which have been adduced or the conclusions to which they lead, we may state that both Mr. Larkin and Mr. Morris, in speaking of gravity, magnetism, heat, light, electricity, motion, etc., etc., appear to make statements which do not accord with the standard authorities on these subjects.

That such difference of opinion should exist on what may be considered fundamental points, should cause no surprise, when even the terminology of the physical sciences is in a state of confusion. On this subject we refer our readers to an able article by Professor A. E. Dolbear, published in "Science" last November (Vol. r, page 238); this paper demands the careful study of all who would take part in this discussion, and affords a basis on which it may be conducted with profitable results.

We make no apology for introducing this subject to our readers, especially as it has been recently mentioned in popular and scientific books, in connection with philosophical, ethical and theological questions. The objective point of Mr. Larkin's arguments appears to be directed against the Nebular hypothesis of Laplace.

Professor H. Helmholtz, whose lecture on this subject has been recently published by Messrs. Appleton & Co., makes a stout defence of this hypothesis. He asserts that "science is not only entitled, but is helden, to make such an investigation. For her it is a definite and important question, as it involves the existence of limits to the validity of the laws of nature, which rule all that now surrounds us; the question whether they have always held in the past, and whether they will always hold in the future; or whether, on the supposition of an everlasting uniformity of natural laws, our conclusions from present circumstances as to the past, and as to the future imperatively lead us to an impossible state of things; that is, to the necessity of an infraction of natural laws, of a beginning that could not have been due to processes known to us."

As Mr. Helmholtz observes, to commence such an investigation as to the possible or probable prismatic history of our present world considered as a question of science, is no idle speculation, for it is a question as to the limits of its methods, and as to the extent to which existing laws are valid.

We have received several interesting letters on this subject which will be found in our next issue.

THE SEA-SIDE LABORATORY.

The liberality and co-operation of the Woman's Education Association enables the Boston Society of Natural History to announce that a Sea-side Laboratory, under the direction of the Curator, and capable of accommodating a limited number of students, will be open at Annisquam, Mass., from June 5th to September 15th.

Annisquam is situated on an inlet of Ipswich Bay, on the north side of Cape Ann, and is about three and a half miles by coach from the Eastern Railroad Company's station in Gloucester.

The purpose of this Laboratory is to afford opportunities for the study and observation of the development, anatomy and habits of common types of marine animals under suitable direction and advice. There will therefore be no attempt, during the coming summer, to give any stated course of instruction or lectures.

It is believed that such a Laboratory will meet the wants of a number of students, teachers and others who have already made a beginning in the study of Natural History. Those who have had some limited experience in a laboratory, or who have attended the practical lessons given by the 'Teachers' School of Science of the Boston Society of Natural History, are sufficiently qualified to make use of this opportunity.

The work in the Laboratory will be under the immediate care of Mr. B. H. Van Vleck, Assistant in the Museum and Laboratory of the Boston Society of Natural History, a thoroughly competent instructor, and one who has also had long experience in collecting and observing at the sea-side.

Those who would avail themselves of this excellent opportunity to study living objects at the sea-shore should make application to Mr. Alpheus Hyatt, Curator of the Boston Society of Natural History.
The growth of abstract science in this country is perhaps no better illustrated than by the advance which has been made of late years in the various departments of mathematics. It is only a few years since Prof. Peirce was about the only person in the United States who held a position among the original mathematicians of the world, while to-day there is in this country a number of persons whose writings are destined to rank among the classics, and a journal of mathematics of the highest rank is published under the auspices of the Johns Hopkins University and sustained almost entirely by American contributors. Among the best of the abstract writers referred to is Mr. William Ferrel, who has been hitherto best known by his tidal researches, but is now engaged in investigations on the mathematical principles of meteorology. His latest work, just published by the Coast Survey, is now before us, and although nominally consisting only of researches on Cyclones, Waterspouts and Tornadoes, is in reality a valuable contribution to the theory of storms in general.

The Board of Directors of the Ohio Mechanics' Institute have organized a "Department of Science and Arts" for the purpose of increasing the usefulness of the Institution. A Section of Mechanics and Engineering under the chairmanship of Professor H. T. Edly, and one of Chemistry under Professor F. W. Clark, have been arranged. Meetings for the public discussion of scientific subjects will be held once a month, and various other arrangements are in progress which will contribute to the success of the present attempt to provide increased facilities for technical and scientific education for the youths of Cincinnati.

**SCIENTIFIC SOCIETIES OF WASHINGTON.**

**THE BIOLOGICAL SOCIETY, WASHINGTON.**—Since our last report the following papers have been read: "Roan Mountain, North Carolina, and its Flora," by Prof. J. W. Chickering, Jr.; "Notes on the Flowering of Solanum rostratum and Cassia chamaecrista, with illustrations," by Prof. J. E. Todd; "A Critical Review of Günther's Ichthyology," by Prof. Theodore Gill; "On the Mortality of Marine Animals in the Gulf of Mexico," by Mr. Ernst Ingersoll; "A Statistical View of the Flora of the District of Columbia," by Prof. Lester F. Ward. It is to be regretted that the absence of our Washington correspondent from the meetings deprives us of abstracts of these valuable papers.

**THE ANTHROPOLOGICAL SOCIETY.**—The Constitution of this society, now in its third year, makes it obligatory upon the President to prepare the compilation of each year, a summary of the transactions of the organization during the past year. At the close of the first year, the President overlooked this fact, but made ample amends at the commencement of the third year by preparing a pamphlet containing both annual addresses, and copious abstracts of all the papers that had ever been read.

Since our last report, the following papers have been read: "The Savage Mind in the Presence of Civilization," by Prof. Otis T. Mason; "Prehistoric Trephining," by Dr. Robert Fletcher; "Some Superstitions of the Sioux Indians," by Dr. H. Yaddow; "The Chief's Son and the Thunders: An Omaha Myth," by Rev. J. Owen Dorsey. The design of the first named paper was two-fold: first, to show that the presence of other peoples better furnished and skilled in some respect had always operated as a stimulus in the onward march of civilization; and second, to draw attention to the fact that in the treatment of the Indians, Chinese, and Negroes, the phenomena of the past history of civilization were being re-presented. The two latter papers were recitals of exceedingly interesting Indian myths, Dr. Fletcher, who is associated with Dr. Billings in publishing "Index Medicus," having collected all that could be gathered on the subject of prehistoric-trephining, from two years reading— gave an elaborate summary of his investigations.

**THE PHILOSOPHICAL SOCIETY OF WASHINGTON.**—The Spectrophone.—At the 198th meeting of the Philosophical Society of Washington, Prof. Alexander Graham Bell communicated the announcement of his discovery of the Spectrophone, the latest outgrowth of the Photophone. In a paper read before the American Association for the Advancement of Science, in which he announced the discovery of the photophone, Mr. Bell ventured the prediction that probably all matter would be found to possess sonorous properties of the same nature as those manifested by the discs used in that instrument. More recent investigations in Europe with gases and liquids have fully verified this prophecy. Any liquid or gas placed in a test tube and exposed to the action of a beam of light condensed upon it by a lens can be made, by means of an interrupter, to emit musical tones. This has been shown by Prof. Tyndall in his memoir, to the Royal Society, on Radiant Heat. Some substances thus emit feeble sounds, others stronger ones. Iodine vapor, Nitrogen Oxide and Bromine give very loud sounds. It is found that those substances which emit loud sounds are those which absorb in a high degree, and emit heat in a high degree, and among these lamp-black is especially remarkable. It has been questioned whether such sounds are provoked by the luminous rays or by the dark ones. M. Mercadier expressed the belief that the incandescent rays are the sounds.

This led Mr. Bell, with the assistance of Mr. Sumner Taintor, to experiment with the sonorous properties of Carbon Disulphide, actuated by the light of the Spectrum.
The latest discoveries of Dr. Detmers we are able to place before our readers in another column of this issue. Possibly the conclusions drawn in this paper may be criticised, and our columns will be open to any exceptions taken on scientific grounds, but our readers must unite in giving credit to Dr. Detmers for the very thorough and exhaustive treatment which this subject has received at his hands.

The researches of Pasteur in a somewhat similar direction, which have been reported in this journal, suggest to us that Dr. Detmers should, like Pasteur, endeavor to arrest the spread of Hog Cholera by a system of vaccination. Dr. Detmers shows in his present paper that by cultivating the Bacterian infecting element, a contagious principle is secured which by inoculation produces a very mild form of the disease. Could not advantage be taken of this fact in the direction we have indicated?

We are glad to announce that Hog Cholera is rapidly becoming a thing of the past, and has decreased since 1878 so rapidly that at the present time it is difficult to obtain badly infected specimens for scientific experimental purposes. This fact, which is communicated to us by Dr. Detmers in a private letter, will be welcome news to those interested in this extensive industry and to the public generally. In Dr. Detmer's report, which we publish this day, it should be noticed that he states that in 1878 the malignant or fatal form (with ulcerous tumors) was found in about 75 per cent. of all fatal cases (in Illinois), whereas now their occurrence is probably limited to about 5 per cent. of all cases.

Thus the Swine-plague is now under control and is rapidly disappearing. These results are clearly due to the wise policy of publicly making known the evil and the danger, and promptly taking precautionary measures. Let the credit then be given where it is due, even if extended to that much abused Department of Agriculture at Washington, which first raised a voice of warning and secured funds from Congress to "investigate and determine the causes, and if possible to discover remedies" of one of the most destructive diseases that ever assailed domestic animals.

Of the Trichinae trouble we have but a few words to offer, as it can be more profitably described without reference to other subjects. We may, however, observe that it is one of the least formidable of diseases found in hogs, and can probably be eradicated, if proper measures are taken. It is useless to assert that it does not exist, and the only common sense view of the case to be taken, is to acknowledge the evil and root it out. Action should be taken by Boards of Trade to at once gather statistics by proper examinations. If, as they assert, there are no Trichinae in Ameri-
The alleged discovery of a new motive force for driving engines, patented by Professor Gamgee, of Washington, is already condemned on theoretical grounds, both in this country and in Europe.

The principle involved is not a new one, and, so far, all previous attempts in the same direction have ended in failure. In this case, Chief Engineer Isherwood, of the United States Navy, gives an endorsement to Professor Gamgee’s scheme, which has caused some eminent physicists to give an attention to it which perhaps it hardly deserved.

From what we can gather, we understand that Professor Gamgee proposes to work his engine with ammonia, taking advantage of the fact that in a liquefied state it boils at—37.3° Fahr., and that at 60° Fahr. it exerts a pressure of seven atmospheres—or, say, 100 lbs. to the square inch.

Authorities differ on this subject, but so far as liquid ammonia is concerned, it is stated as follows: “That at atmospheric pressure, and a temperature of 62° Fahr., 1 lb. of the gas occupies about 23 cubic feet, while 1 lb. of liquid ammonia would occupy only 36 cubic inches.”

According to Mr. Isherwood, the “zero-motor” is an apparatus in which liquid ammonia can be vaporized under considerable pressure by means of the heat in water, or in the external atmosphere, and the gas so obtained is used to propel a piston through a cylinder—the gas being employed with the greatest measure of expansion found possible.

At this point the difficulty is presented of returning the ammonia to the boiler. Professor Gamgee offers no explanation, but claims to be able to accomplish it by some method he has invented. He asserts that in its expansion the liberated gas is refrigerated and diminished in bulk, and becomes partially liquefied at the end of the stroke of the piston, when it is exhausted and returned from whence it came.

Against this, Professor Simon Newcomb and some English writers assert, that in the absence of demonstration to the contrary, it will absorb as much power to convert the ammonia gas into the liquid form as the latter will give out when vaporized.

In the “zero-motor” Professor Gamgee professes to have an engine capable of exerting great power, and without the necessity of using any fuel, and indirectly the claim is made of solving successfully the problem of perpetual motion.

Apart from some fundamental errors which underlie the scheme, many theoretical difficulties could be suggested, but as a practical test of “the discovery” will probably be made, further discussion may profitably be postponed until the result of the trial is known.

It will no doubt be a genuine surprise to all students of nature to learn that a German scientist has found fossil plants and animal forms in most of the meteorites (chondrites) which he has examined for the purpose.

Dr. Otto Hahn, who has taken a prominent part in the discussion on the “Eozon canadense” has, in the usual way, prepared sections of many of these bodies. These he has had photographed and thereby attained a result which is independent of the microscopist’s vision. Dr. Hahn claims that they show many forms of plants and animals in a fossil state contained in their mass, of which the highest forms are crinoids, corals and allied species. He has placed this collection of sections in the hands of Dr. WEiland of Tübingen, (formerly of Philadelphia) for thorough classification.

We regret that we are unable to endorse this interesting discovery. Professor Whitfield, superintendent of the fossils and minerals in the American Museum of Natural History, has seen Dr. Hahn’s drawings and was unable to verify the presence of the organic forms referred to. He attributed Dr. Hahn’s error to a too sanguine temperament, and an “imagination which bodies forth the form of things unknown.”

We are indebted to our Washington correspondent for a brief mention of an interesting paper by Dr. George M. Sternberg, on “A Fatal Form of Septicemia in the Rabbit, produced by Subcutaneous Injection of Human Saliva.”

Dr. Sternberg recently published a translation of Dr. Antoine Magnin’s work on Bacteria, and has had considerable experience in making investigations on septic organisms. He now asserts that the human saliva carries with it a deadly poison, which will kill a rabbit in forty-eight hours; other animals also appear to be influenced more or less by the same cause, while still others—the dog, for instance—resist the
The announcement is made of an improved method of storing electricity, by M. Camille Faure, of Paris, the London Times asserting that "a box of electric energy nearly equivalent to a million feet, contained within less than a cubic foot of space, intact and potential, has been transported from France to Great Britain."

Sir William Thomson is said to have given some endorsement to the discovery, and tests and measurements are in progress at the laboratory of the Glasgow University.

The principle involved in M. Faure's discovery is understood in this country, and the possibility of its general correctness is conceded. The language employed in the announcement is rather equivocal, and the misuse of scientific terms render the exact extent of M. Faure's discovery a matter of some doubt.

We gladly welcome any progress in electrical science; but as the necessity for storing electrical energy is of value only in very rare cases, the practical usefulness of M. Faure's discovery must be limited in extent.

Mr. Edison has courteously responded to a request on our part, to offer his opinion on M. Faure's discovery, and we take pleasure in placing before the readers of "Science" his reply, received since our own notes were in type.

To the Editor of "Science."

Dear Sir: The Faure battery is an improvement on the Plante battery.

Planté was, I think, the original inventor of the battery which bears his name, invented some years ago for the purpose of storing up electricity.

Faure has simply made a Plante battery, by some means reducing its resistance, and thus reducing the percentage of loss. This is all there is in it.

Some two years ago I patented and applied a method for using the Plante battery in connection with electric lighting.

Yours truly,

Thos. A. Edison.
The Zoological Society of London has made an interesting addition to their gardens, by building an Insectarium for rearing insects in captivity, watching their transformations, and making a thorough study of their life history and habits.

The building erected for the purpose is a substantial structure of iron and glass, the cases containing the insects being arranged on stands all round the building, and occupying two tables in the centre. These cases are formed of zinc, the upper part glazed on all four sides, and the top arranged with a perforated zinc cover for the purpose of admitting air.

The Insectarium has been opened with an exhibition of specimens of some of the larger and finer species of silk-producing moths of the family Bombycidae. Among these more specially noticed by a correspondent of "Nature" are Glover's Silk-moth (Samia Glaevi), and the Ceropion Silk-moth (S. acrophi) of North America, Perny's Silk-moth (Attacus Pernyi) of Northern China, the Tusche Silk-moth (A. mylitta) of India, and the great Emperor Moth (Saturnia pyri) of Europe. "These have been imported from their native countries in the stage of chrysalis. Of the first three above named, many examples are already hatched, and the splendid Imago, or perfect insects, are appearing one by one. Soon after appearing the sexes unite and eggs are produced, after which the parents quickly perish. The fertilized eggs remain to produce caterpillars, which eventually form a second set of pupae or chrysalis, and thus continue the species."

"On the north side of the Insectarium the smaller cases are devoted principally to the rarer and more noticeable moths and butterflies of Europe, such as the Swallow-tailed Butterfly (Papilio machaon), the Black-veined Butterfly (Aporia crenata), the Purple Emperor (Aphaura iris), and the Orange-tip (Anthocharis cardamines) among the former, and the Scarlet Tiger Moth (Callimorpha dominula) and the Emperor Moth (Saturnia carni) among the latter group. The series is continued, mixed with other forms, at the east end of the building. On the large tables in the middle of the Insectarium are examples of other butterflies, moths, beetles, mayflies, stoneflies, and aquatic insects of different kinds, all well worthy of attention and study. The whole series exhibited, now contains examples of about fifty species, but daily additions are made to it."

The establishment of the London Insectarium may be the means of calling the attention of our authorities to the necessity of establishing a similar institution in this country, where an Insectarium is much more needed than in Europe. The United States Congress has granted large sums for scientific investigations, in the hope that means might be suggested for mitigating the ravages of insects. Twenty-five thousand dollars represented the expenses of the Entomological Commission, the report of which will be noticed in our issue of next week. A large proportion of this sum was devoted by the Commissioners to an exhaustive examination of the brain of the locust and other interesting histological work.

It appears to us that such histological work might be well accomplished in an Insectarium, and twenty-five thousand dollars would be a very handsome appropriation for such an establishment; the work could then be concentrated, the mental and physical attributes of insects, with all their habits of life, could be studied in a systematic manner. This arrangement, with reports from the field, would probably cover more work than has been accomplished in this direction by previous commissions.

Perhaps under the new management of the Agricultural Department the propriety of establishing an Insectarium may be considered, for the Commissioner would have no difficulty in securing a competent entomologist to take charge of it.

Localization by the Eyes.—Professor Helmholtz recently addressed the Physical Society on the localization of objects by the eyes. We estimate distance with one eye by the outlines of the more distant objects being covered by the nearer one where they meet, and by the shadows thrown by the anterior objects. These conditions are very rarely overpowered by others, as for instance, binocular vision. This is shown by Dove's pseudoscope, and the fact that closing or blinding one eye makes little difference to the power of judging distance, especially when not very close to the eye. The relative shifting of objects as the eye is moved from side to side, or to and fro, or up or down, which may be called the parallax of motion, is also a strong factor in estimating distance. He concludes from a study of the stereoscope that the perception of the absolute convergence of our eyes is very indistinct, and that only differences of convergence related to apparently near or distant objects produce the stereoscopic effect.
SCIENCE:
A WEEKLY RECORD OF SCIENTIFIC PROGRESS.

JOHN MICHELS, Editor.

Published at TRIBUNE BUILDING, NEW YORK.

P. O. BOX 3838.

SATURDAY, JUNE 11, 1881.

We have received a copy of the Annuaire de l'Observatoire Royal de Bruxelles—a book of nearly four hundred pages, published under the supervision of Dr. J. C. Houzeau. This number is the forty-eighth issue of the series, and contains the customary data regarding calendars; rising, setting and meridian passages of the sun, moon and planets; eclipses of the sun and moon, and transit of Mercury; occultations of stars by the moon; eclipses of the satellites of Jupiter; positions of fixed stars; elements of the planets and their satellites, and of the periodic comets; various data pertaining to weights and measures, geographical positions, etc. It is a noteworthy fact, that while the astronomical repertoire supplies a need for Belgium—as the similar Annuaire du Bureau des Longitudes does for France—we have no like publication in America. It must cost really very little to print it, and the expense of compilation can not be great. It is not a little remarkable that Americans generally should so long be content with dependence upon patent medicine almanacs for this class of information.

Among the appended articles, we note a few which carry more than a passing, special interest—Le Globe Terrestre—Quel est le Climat le plus Favorable au Développement de la Civilisation—L'Astronomie dans l'Antiquité—L'histoire de Panama. Monsieur L. Niesten, a well known astronomer of the Royal Observatory, contributes no less than four articles to this issue of the Annuaire, two of which appear to have been prepared with great care, and are astronomically of much importance. The last transit of Mercury, May 6, 1878, was very fully observed everywhere, and M. Niesten deserves much credit for his well arranged digest of every sort of observation on that occasion. Those who are concerned with general relations on the rapidly multiplying group of small planets will get a deal of information from Niesten's article, Les Astéroides—which is, in fact, a comprehensive history of these bodies. An accompanying map serves to bring out some points which are made clearer by graphical representation. Astronomers and others will have frequent occasion to refer to an article (which it is remarkable should not have long ago been prepared by some one)—Nomenclature des Observatoires Astronomiques Existant, qui ont la Caractère d'Etablissements Publics. About 120 observatories are included in this list, and there are given, as far as known, the year of founding, the connection of the observatory, some brief description of the instruments, and the names of all the directors of each establishment, including the dates of their installation.

THE AMERICAN CHEMICAL SOCIETY.

The June meeting of the American Chemical Society was held Friday evening, the 6th inst., Prof. A. R. Leeds presided. Mr. A. P. Hallock was elected a regular member. The first paper before the Society was by Dr. Chas. A. Doremus, "On the Composition of Elephants Milk." The sample was obtained from the mother of the baby elephant "America," which is now on exhibition in this city. The baby weighed 213 ½ pounds at birth and at the end of a year turned the scales at 900 pounds. Considerable difficulty was experienced in procuring the sample, and but a very small quantity was obtainable. Three analyses were made and the figures are herewith given:

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<th>I. April 5.</th>
<th>II. April 9.</th>
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<td>Sp. Grav.</td>
<td>1.0237</td>
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<td>1.0237</td>
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<tr>
<td>Reaction</td>
<td>Neutral</td>
<td>Slightly alkaline</td>
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<tr>
<td>Quantity</td>
<td>100 cc.</td>
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<tr>
<td>Cream, per cent.</td>
<td>58.</td>
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<tr>
<td>Fat</td>
<td>17.490</td>
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<tr>
<td>Solids in fat</td>
<td>14.817</td>
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<td>Sugar</td>
<td>7.757</td>
<td>7.757</td>
<td>7.757</td>
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<tr>
<td>Ash</td>
<td>0.654</td>
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It will be noticed from these analyses that the milk is peculiarly rich in the nitrogenized materials. The volume of cream compared with that obtained from an Alderney cow is also quite large. Under the microscope the milk globules appeared very uniform in size and were unusually clear. Although it is generally claimed that the fat when burned emits a peculiar odor by means of which it is possible to distinguish the animal from which it has been obtained, yet in the present instance no odor was perceptible from the fat which was separated from the milk. This is the only analysis of elephant's milk on record, and Dr. Doremus is certainly deserving of much credit for the interesting information which he has obtained. His entire paper will be published in the proceedings of the Society. An analysis of the milk of an hippopotamus is added for the sake of comparison:

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<tr>
<td>Water</td>
<td>99.43</td>
<td>99.43</td>
<td>99.43</td>
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<tr>
<td>Solids</td>
<td>4.51</td>
<td>4.51</td>
<td>4.51</td>
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<tr>
<td>Fat</td>
<td>3.694</td>
<td>3.694</td>
<td>3.694</td>
</tr>
<tr>
<td>Sugar</td>
<td>7.797</td>
<td>7.797</td>
<td>7.797</td>
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<tr>
<td>Ash</td>
<td>0.654</td>
<td>0.654</td>
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It will be noticed that the fat is as uniform in size as the milk.
At the last meeting of the "American Chemical Society," Professor A. R. Leeds called attention to the reported adulteration of certain articles of food, and made special reference to the adulteration of sugar and syrups, with glucose.

The result of Dr. Leeds' examination of sugar shows, that it was of excellent quality and almost free from any adulteration, and that he was enabled, after investigations, to "contradict with equal decisiveness, the notion that table syrups are largely, almost universally, adulterated with glucose syrups."

As Dr. Leeds stated that one of the objects of his paper was to correct, what he calls, sensational reports of adulteration, and to place on record his own scientific work as evidence that adulterations to a large extent do not exist, it may be prudent to test the integrity of his work, by comparing it with results achieved by another chemist, having a high reputation as an analyst, who appears to have made investigations covering the same ground, as that instituted by Professor Leeds. We allude to Professor Harvey W. Wiley, whose paper on "Glucose and grape-sugar" appears at an opportune moment. According to Professor Wiley, the manufacture of glucose is conducted on a scale which will result in eleven million bushels of corn being used for that purpose during the present year, and as a bushel of corn will produce about 30 pounds of glucose, it would appear that over three hundred million pounds of glucose will be placed on the market during the year 1881, with every indication that the quantity will be doubled in 1882.

What becomes of all this glucose? Professor Wiley states that some of it is used for brewing beer, taking the place of malt; it is also given as a food for bees; "all soft candies, waxes and taffies, and a large proportion of stick-candies and caramels are made of glucose"; but "a very large proportion of all the glucose made is used for the manufacture of table syrups." • • • "When these syrups are sent into the shops, they are sold to consumers under such altissimand names as Maple Drip, Bon Ton, Upper Ten, Magnolia, Extra Choice, Golden Drip, White Loaf Drip," etc., etc. • • • "Dealers tell me that these syrups, by their cheapness and excellence, have driven all others out of the market. So much is this the case that it is no longer proper to call glucose the 'coming syrup.' It is the syrup which has already come."

"Grape sugar is used chiefly for the adulteration of other sugars. When it is reduced to fine powder, it can be mixed with cane sugar in any proportion, without altering its appearance. Since the grape-sugar costs less than half the price of cane sugar, this adulteration proves immensely profitable."

We do not propose to decide upon the issue thus raised by Professors Leeds and Wiley, but as both admit to have spoken after a full investigation, it is difficult to discover how results so different were arrived at. We believe that Professor Leeds reported correctly on the samples as he found them, but if Professor Wiley is correct, the former must have been very fortunate, or, perhaps, unfortunate, in the selection of his samples.

We are in receipt of a communication, stating that glucose sugar has now an immense sale, and that in the West, nine-tenths of the syrups on the market have but 5 to 15 per cent. of cane sugar.

Possibly in first-class stores in New York City, the sugars and syrups offered for sale are genuine, but it appears folly to shut our eyes to the immense use of glucose and grape-sugar for mixing purposes.

If Professor Leeds wishes his future communications on adulteration to be read with "vivid interest," or his reports to reach what he terms, "a commanding position in the literature of adulterations," he will offer some evidence that Professor Wiley is in error, while a few facts, showing the destination of the 500 tons of glucose and grape-sugar manufactured every day, will be timely and welcome.

We find that the first cost of glucose and grape-sugar is about one cent a pound, and that it is sold direct for three to four cents a pound. The manufacture therefore of glucose is a profitable industry, and one likely to be conducted with spirit and enterprise.

Is glucose wholesome? It may be early to answer this question, as some physicians are opposed to its use, but, as an article of food, it is now generally acknowledged to be a wholesome product, and if carefully and properly made, free from any deleterious substances. We therefore fail to find any reason why this thriving industry should not be conducted openly, and the product sold on its merits, thus escaping the odium which is cast on all counterfeit substances.
The DISCOVERY of NEPTUNE.

The brilliant theoretical discovery of this planet by Leverrier and Adams, will be distinctly remembered by many of our readers. Soon after the publication of the mathematical investigation made by the two astronomers who had won so much glory, Professor Benjamin Pierce, of Harvard College, startled the scientific world by the announcement that after all this discovery was only a happy accident, and that the planet found by Galli, in accordance with the directions of Leverrier, was not the planet "to which geometrical analysis had directed the telescope." This statement by Professor Pierce has, we believe, found but little credence among European astronomers and mathematicians. Among those who were well qualified to judge, and who may be considered as free from national prejudice on this question, we mention Hansen, the well-known theoretical astronomer of Germany, and Jacobi, one of the ablest mathematicians of the same country; both of whom expressed the opinion that Professor Pierce was himself mistaken. In a posthumous book recently published on "Idiacity in the Physical Sciences," edited by his son, Professor J. M. Pierce, the present professor of mathematics in Harvard University, Professor Pierce reiterates his former opinion on the discovery of Neptune. It appears that a few years before his death he had made a careful review of his former investigations, and says, p. 173: "I strictly adhere to the correctness of my early statement." This opinion seems to be shared also by Professor J. M. Pierce, who says, p. 201 of the Appendix: "It is to be regretted that the correction of the error was not received, on the part of the French astronomer, with the magnanimity and fairness which it is always painful not to find associated with high intellectual power."

Intrinsically, the question raised by Professor Pierce is an interesting one, and the whole matter seems to us worthy of a new and careful discussion. It may well be doubted whether the argument used by Professor Pierce, that there is a change in the character of the perturbations near the distance of 35.3, will apply to the method employed by Leverrier and Adams in their discussion of the perturbations of Uranus. This method is so interesting that we invite the attention of students of theoretical astronomy to this question, which seems to us capable of a complete and definitive mathematical solution.

VIVISECTION.

Dr. Darwin in a letter to a friend has expressed his views upon vivisection. He writes:

"I know that Physiology cannot possibly progress except by means of experiments on living animals, and I feel the deepest conviction that he who retards the progress of Physiology commits a crime against mankind. Anyone who remembers, as 1 can, the state of this science half a century ago must admit that it has made immense progress, and is now progressing at an ever-increasing rate. What improvements in medical practice may be directly attributed to physiological research is a question which can be properly discussed only by those physiologists and medical practitioners who have studied the history of these subjects; but so far as I can learn, the benefits are already very great. No one, unless he is grossly ignorant of what Science has done for mankind, can entertain any doubt of the inestimable benefits which will be derived from Physiology, not only by man, but by the lower animals."

PROBABLE BRANCHIAL ORIGIN OF THE THYROID AND THYMUS GLANDS.

By S. V. Cleve, M.D.

There are many reasons for believing that the thyroid and thymus are rudimentary gills, one of the main objections to the view being the structure of these bodies, but in the light of modern biology, structure is almost meaningless in homologizing; besides, the tissues of these parts are not the same in all animals. Owen (Vol. I, p. 556) says that the thymus appears in Vertebrates with the establishment of lungs as the main or exclusive respiratory organ. In Siren and Proteus the thymus is wanting, as in all fishes. Gegenbaur (p. 534) speaks of the thyroid as an organ with unknown physiological relations, and that "in fishes it is placed not far from the point at which it was formed, that is, at the anterior end of the trunk of the branchial anterior and between it and the copula of the hyoid arch. In amphibia near the larynx, and is set on the inner surface of the posterior commissa of the hyoid." Gegenbaur considers it as an organ of use among Tunicata. This latter idea, as well as the one I have advanced, needs verification. I am unwilling to devote more time to the subject until I can ascertain whether some one has not preceded me in announcing the homology, if it be really one. Much light can be thrown upon the disease known as Goitre by clearing up this point,
THE NEW COMET.

The great comet which has so suddenly flashed into the northern sky is one of the most brilliant comets that has appeared for many years. It has a large and impressive nucleus which is surrounded by an envelope, very much like those of the Donati comet of 1858, which was described so well by Professor George P. Bond of the Harvard College Observatory. The dense nuclei of such comets give one the idea of a mass and quantity of matter quite different from that of the ordinary telescopic comets, through which the dimmest stars can be seen. The tail of the present comet is now about twelve or fifteen degrees in length, and altogether this comet presents a very beautiful spectacle at three o'clock in the northeastern morning sky. The motion of the comet is three or four degrees toward the north, and it will soon reach a position where it will be visible during the entire night in the greater part of the United States.

The first duty of the astronomers will be of course to get observations of its positions and to compute the orbit of the comet. Since for this purpose observations on three days are sufficient, we shall soon have a certain knowledge of its motion. The knowledge of the orbit will decide the question whether this is the same comet whose discovery was telegraphed to Europe from Buenos Ayres by Dr. B. A. Gould, on June 1st, and also whether it is identical with the great comet of 1807. The observations of the comet of 1807 were discussed in a very complete manner by Bessel who found its periodic time to be between 1400 and 1500 years, and it will be a curious fact if the true period proves to be only seventy four years.

This great comet also presents a good opportunity for the spectroscopists to examine its chemical nature, and a rare occasion for the study of the physical constitution of comets. No doubt these questions will be well attended to by the astronomers and students of our country.

The question of the formation of a comet's tail, and how the particles of matter are driven out from the nucleus in the direction opposite the sun has not yet been answered in a satisfactory manner, and all the facts that can be gathered from observations of this comet will be extremely valuable. In his discussion of the physical constitution of Halley's comet in its appearance of 1835 Bessel found that a repulsive force from the sun was very decidedly shown by the observations of the tail. Similar results were reached by Professor Pierce of Harvard College, Professor Norton of Yale College and by Dr. Pope in their discussion of the Donati comet of 1858. This is an interesting question and it may have an intimate relation with the theory of a resisting medium in space which has been indicated by the motion of Encke's comet.

We learn that unfortunately the weather at Washington has been unfavorable for several days past; but from the numerous good telescopes scattered over the country, we doubt not that good observations of this interesting comet will be gathered.

THE ADDRESS OF THE PRESIDENT OF THE ROYAL MICROSCOPICAL SOCIETY.

LIONEL S. BEALE, F. R. S.

(Concluded from page 287.)

One may transport oneself in imagination into infinite space, amid the never-ceasing vibrations visible and invisible—"The lucid interspace of world and world, where never creeps a cloud, or moves a wind," and may perhaps all but see combined in one mental image, as they ever course through space, suns and worlds and systems. And although at first the mind is almost lost in the contemplation of the infinite physical vastness presented it, it is nevertheless able to seize in some degree a more than shadowy conception of the exactness and regularity of the eternal movements, and to recognize the never-ceasing operation in the material universe of inflexible, unchanging law.

But he who in imagination can succeed in mentally placing himself amid the atoms in the interatomic spaces of a living particle, will be in the very heart as it were of an infinity of a very different order—infinite movement and change affecting infinitely minute particles, so very near to one another that the matter of one may as it were run into that of the other, and the masses divide and subdivide again. Of all this movement and change of particles how very little of what occurs in a portion of matter not more than the one hundred-thousandth of an inch in diameter can be comprised in one mental image? But beyond all this there is the power of prospective change, acting through years it may be, which is somehow associated with the minute particles of living matter, as well as many complex phenomena of which the mind cannot take cognizance as a whole, but must consider, as it were, one by one in several successive pictures.

Could we peer into the very substance of the living particle itself as it was increasing in size and communicating to non-living matter its wonderful properties, what should we see? What is it that happens at the moment when a little complex organic matter dissolved
OBSERVATIONS UPON THE COMET AT PRINCETON.

The comet has been seen and observed every night since June 25, except on June 30th. Every night, however, except July 21 and 31, the observations have been interfered with by clouds, so that very little continuous thoroughly satisfactory work has been possible.

The light has fallen off rapidly. On the 26th, the comet was for half an hour better seen than at any other time, and the nucleus was judged to be just about equal to Arcturus in brilliancy. On July 21, it was compared pretty carefully with the Pole Star and with α Urs. Majoris by squinting, so that the blurred images of star and comet were brought close alongside. I judged it just equal to Polaris and about \( \frac{1}{3} \) of a magnitude fainter than Dubhe.

The nucleus and coma have presented a very interesting series of telescopic phenomena, in the main such as have been seen in all other large comets. It is noteworthy, however, that immediately behind the nucleus no strongly marked dark shadow-like stripe has been developed, nor, what is perhaps just as common on the contrary, any bright central streamer. On the whole, the central portion of the tail has been a little less brilliant than the edges, even close to the head, but the difference has been slight. On the 25th, the nucleus about 10 P. M. showed 5 projecting jets, much like the pseudopodia of some low animal organism—not well formed, nor distinct, nor symmetrical, their length from two to six times the diameter of the nucleus, those on the front of the nucleus being the longer.

On the 26th, the nucleus was almost entirely surrounded with a nearly complete, well defined, circular envelope about 1' in diameter. In this envelope was a curious oval vacuole, behind the nucleus, but on the receding side of the axis of the tail.

On subsequent evenings no envelopes nearly so complete were noted—only jets of varying length and position, those on the side of the sun being apparently blown back, like flowing hair, by some solar repulsion.

On the 29th there was but one jet on the sunward side, and this was curiously curved toward the preceding side, making the whole look like a comma. (We use preceding rather than Western, because below the the pole where the comet was, the terms Eastern and Western might lead to misapprehension.)

On July 1st the head was curiously asymmetrical. The coma was extended out in the South following direction like a great liberty cap, the axis of the principal jet which divided both ways, in front like hair parted in the middle, being inclined some 50° to the line of this extension.

With the spectroscope a number of observations have been made.

The nucleus has generally given a simply continuous spectrum, extending from below C well above G; but on June 25th and July 1st, it showed distinct banding at points where the bands of the spectrum of the coma crossed it.

This was seen by several observers on the 25th, and by both Mr. McNeill and myself on the 1st.

The spectra of some of the brighter jets had been caught and isolated several times. They were in all cases continuous, without detectable bands of any kind.

The spectrum of the tail was found to be continuous, with a faint superposed band-spectrum, the same as that of the coma. On July 1st and 2d this band-spectrum was distinctly traceable to at least 15' distance from the head of the comet, the continuous spectrum perhaps 5' or 10' further.

The spectrum of the coma consisted of the usual three bands; but both the upper and lower bands, though pretty bright, were very ill defined; so much so, that I could obtain no satisfactory measurements of wave length, farther than to observe on June 25th and 26th, that the lower edges of the upper and lower bands of the so-called 'first' spectrum of Carbon, (\( \lambda \), 5635 and 4740) given by a Bunsen burner, fell apparently near the lower limit of these two bands in the comet spectrum as seen with a one prism spectrum. But these comet-bands did not look at all like the flame bands, the difference of appearance being so great, as somewhat to shake my belief for the time being, in the identity of the two spectra.

The middle band, on the contrary, was perfectly defined at its lower edge, and with the one prism spectroscope distinctly showed three fine lines in the band, and these, so far as could be judged, coincided exactly.
We are indebted to Professor Edward S. Holden for a series of seven interesting drawings of the recently discovered Comet; they are now being engraved and will appear in "SCIENCE" next week.

These drawings were made by Professor Holden from observations made with the 15-inch equatorial of the Washburn Observatory.

We have received a copy of the instructions furnished to the officers in command of the expeditionary force to Lady Franklin Bay, which appear to have given general satisfaction, and probably suffice for all the purposes of the expedition. Still we regret to find that the services of a naturalist have not been considered requisite, and that no provision appears to have been made for collecting specimens and information respecting the Fauna and Flora of the Polar regions. A microscope is not even added to the list of apparatus provided for the use of the expedition.

Mr. Alfred Russell Wallace in his last work, "Island Life," observes that there is an enormous waste of labor and money with comparatively scanty and unimportant results to natural history, of most of the great scientific voyages of the various civilized governments during the present century. All these expeditions combined have done far less than private collectors in making known the products of remote lands and islands. They have brought home, he asserts, fragmentary collections, made in widely scattered localities and these have been usually described in huge folios, whose value is often in inverse proportion to their bulk and cost.

The same species have been collected again and again, often described several times, and, not infrequently stated to be from places they never inhabited. The result of this wretched system, says Mr. Wallace, is, that the productions of some of the most frequently visited and most interesting islands on the globe are still very imperfectly known, while their native plants and animals are being yearly exterminated. The remedy suggested by Mr. Wallace, is that resident naturalists at a very small annual expense, should be appointed, who, he considers, would do more for the advancement of knowledge in this direction, than all the expensive expeditions which have again and again circumnavigated the globe.

We are of course aware that most of the many recent expeditions to the polar regions have been specially organized for the promotion of the physical sciences, but the value of an expert naturalist on such occasions should not be neglected, and wherever permanent stations are established the naturalist may be expected to do good work, and even occasionally interpret natural phenomena which are sometimes inexplicable to the physicist.

The comet has been observed here (with the exception of June 27) on every night since June 23, although clouds have often considerably hindered the work.

In addition to the measurements of position, the light of different parts of the comet has been photometrically determined. This work, very probably, has been undertaken only at this Observatory. The instrument employed for the purpose is one which has already been extensively used here for measuring the light of nebulae. The results of these observations are expressed in stellar magnitudes on Pogson's logarithmic scale, regarding the light of a star of the given magnitude as diffused over a circle 1" in diameter, the brightness of which would then be equal to that of the observed portion of the nebula or comet. On the first five nights of the present month, various parts of the coma and tail have thus been observed. The result, from a provisional reduction, is as follows:

<table>
<thead>
<tr>
<th>Comet</th>
<th>Distance from nucleus</th>
<th>Magnitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>5.9</td>
<td>7.8</td>
</tr>
<tr>
<td>1.0</td>
<td>5.5</td>
<td>9.2</td>
</tr>
<tr>
<td>2.0</td>
<td>5.9</td>
<td>11.2</td>
</tr>
<tr>
<td>3.0</td>
<td>7.0</td>
<td>11.2</td>
</tr>
<tr>
<td>4.0</td>
<td>7.0</td>
<td>11.6</td>
</tr>
</tbody>
</table>

I add the corresponding results, also from provisional reductions, for some other comets and nebulae:

<table>
<thead>
<tr>
<th>Palisa's Comet, 1879 d</th>
<th>Magnitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comet, 1880 d</td>
<td>7</td>
</tr>
<tr>
<td>Webb's Planetary Nebula, Dm. + 41° 49' 00''</td>
<td>4.7</td>
</tr>
<tr>
<td>Brightest part of great nebula in Orion (20 points in which have been observed)</td>
<td>8.0</td>
</tr>
<tr>
<td>Nebula G. C. 14877</td>
<td>11.2</td>
</tr>
<tr>
<td>G. C. 48042</td>
<td>11.3</td>
</tr>
</tbody>
</table>

On June 28th, and on July 1, 3, 5 and 6, the coordinates of a number of points in the border of the comet's tail were observed for the purpose of determining its form.

EDWARD C. PICKERING.

SCIENCE:
A WEEKLY RECORD OF SCIENTIFIC PROGRESS.

JOHN MICHELS, Editor.

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SATURDAY, JULY 23, 1881.

Professor Lewis Swift informs us that he has been receiving letters claiming the Warner Prize, at the rate of seventy per day for some time past; it may be convenient, therefore, if we state the conditions on which Mr. Warner offers the reward for the discovery of comets during the year 1881.

In the first place the comet must be telescopic, which is a bar to all naked eye observers, and the comet must be unexpected. An exception is made to this condition in favor of the comet of 1812, the reappearance of which is expected.

The first discovery of the comet must be made in the United States or Canada. To secure the prize immediate notification must be made by telegraph to Professor Lewis Swift, of Rochester, Director of the Warner Observatory. This telegram must give the time of the discovery, the position, direction and daily rate of motion with sufficient exactness to enable at least one astronomer to find it.

A study of these conditions will prevent useless applications and many disappointments. The first condition, however, which appears to limit claimants to the class who possess telescopes, should, in our opinion, be construed to object to naked eye observations only. A good opera or field binocular glass could be used with good effect in a search for comets. Caroline Herschel used a very simple instrument, and, in the course of her life, discovered no less than eight comets. With a tube and two glasses, such as was commonly used "as a finder," she used to "sweep" for comets, writing down and describing all remarkable appearances.

We direct attention to a series of interesting drawings of comet B, 1881, made by Professor Edward S.

Holden at the Washburn Observatory, with the 15-inch telescope, constructed for the late Professor Watson, which will be found on pages 346 and 347 of this issue. Professor Holden has attempted to delineate the appearance of the comet on six consecutive nights, commencing on the 24th of June, and also on the 8th and 11th of July.

Messrs. S. C. Cassino & Co., of 299 Washington street, Boston, are about to publish an international directory of the names and addresses of all those who are engaged in any of the departments of Science. Such a work can only be arranged in a satisfactory manner with the co-operation of scientific men. We therefore cordially respond to a request from Messrs. Cassino to make known their intentions in this direction, and we call upon all scientists at once to forward their names and addresses to the publisher.

This notice is not only intended for professional scientists, but for the large class of amateurs, who may be collecting, or giving their attention to any scientific specialty.

As the directory is partly prepared, prompt attention is essential to those who would have their names included.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

We remind our readers that the annual meeting of the American Association for the advancement of Science will be held this year at Cincinnati, commencing on the 17th of August next. The executive committee announces that the sessions of the Association will be held in the Music Hall and Exposition Buildings, on Elm street. All the meetings, general and sectional, will be under one roof. Each section will have a room regularly assigned to it, and every necessary facility in the way of tables, blackboards, etc., will be provided. The offices of the Permanent and Local Secretaries, Reporters’ Room, Post Office and Reception Rooms will all be on the first floor. Between the morning and afternoon sessions a daily lunch will be served in the wing of the Exposition Buildings known as Horticultural Hall.

On the first day of the meeting, besides the general session for organization, some of the official addresses will be delivered. In the evening there will be a citizens’ reception.

On the following days the usual routine business will be transacted, papers will be read, and so on. A variety of social entertainments will be provided, and an afternoon is to be devoted to visiting the Zoological Garden.

Members of the Sub-Section of Anthropology, and others who are interested, will have an opportunity to examine the excavations at Madisonville, and to visit other localities of antiquarian interest near Cincinnati. After the adjournment of the Association, excursions will be organized on the Cincinnati Southern Railroad, and also, it is hoped, to the Mammoth Cave.

Beginning on the evening of August 16, and continuing through the meetings of the Association, there will be an exhibition of scientific apparatus, appliances, and collections. This exhibition is to be in charge of the Department of Science and Arts of the Ohio Mechanics’ Institute, and a large amount of valuable material will be shown. Some of the leading dealers in chemicals, ap-
There appears to be an open question between Professor Ormond Stone, of Cincinnati, and Mr. Rock, of Washington, as to whether the nucleus of Comet b, 1881, divided on the night of the 6th instant.

Both astronomers appear to have observed the comet at the same time, but have recorded somewhat different results.

On reference to "Science," July 16th, page 334, will be found a statement of what Mr. Rock saw, as follows:

On the 6th of July the comet was observed by Mr. Rock of the Naval Observatory:

"A bright tongue of light about one revolution long in direction of tail, with a slight node near end and curved."

In explanation of this Mr. Rock said: "I observed the comet at the time of its lower culmination about twenty minutes after midnight. The nucleus did not appear to be divided, but a bright band streamed out in the direction of the tail. This band was about fifteen seconds of the arc in length. Near the end of it was a bright spot, and that portion of the band extending beyond it was curved in the same general direction as the tail, but in a somewhat shorter arc."

And then referring to Professor Stone's report of a division of the nucleus, he adds:

"It is possible that the observer at Cincinnati was not able to distinguish the band of light which I saw uniting the nucleus and the node, and so concluded that he saw two nuclei. When I first observed the comet, on June 28, the coma was apparently homogeneous as it also was on July 2. On June 28, however, there were two spurs of light spreading away from the opposite sides of the head like angel's wings. On July 2, I did not observe these at all or they were very faint. On July 6, I observed the appearance that I have described. It may be that this was the same thing that I saw on June 28, observed from a different point of view. It is not improbably, however, that the nucleus has really divided. Comets appear to have a tendency to do that."

In another part of this issue will be found a letter from Professor Stone, reiterating his former claim of having observed a division of the nucleus of this comet on the night of the 6th instant.

"He states that on the 6th of July, during observations made between 10 p.m. and 3 a.m., he saw a bright red jet projected from the nucleus into the dark region on the side of the nucleus opposite the sun, which was totally different in appearance from those usually seen. There was a dark line separating it from the nucleus. During the first few minutes a decided change took place. The jet seemed to separate and form a nucleus of its own, so that for a time the comet appeared double."

It may assist in a solution of this subject if our readers inspect the continuation of the interesting drawings of this comet, made by Professor Edward S. Holden, to be found on another page of this issue.*

The drawings we published last week showed the appearance of the comet on 24th, 25th, 26th, 27th, 28th and 29th of June, and the nights of the 8th and 11th of July. These presented in this number give views of the comet for the nights of the 13th, 14th, 17th and 18th of July.

The drawing for the 11th of July is interesting as showing "a dark narrow channel between the following side of the nucleus, and the envelopes," but, added Professor Holden, "the nucleus is not double." But the drawing we offer this week for the 18th instant, is quite remarkable as showing a decided division of the nucleus, and Professor Holden remarks in his note to it, "The nucleus is double (it has not been previously)," and those who inspect this drawing will find two nuclei.

The drawings of Professor Holden and the observations of all who have watched this comet, show conclusively that the form of the nucleus changed very rapidly and continuously, and as we have the best evidence that the nucleus divided on the 18th instant, it makes it very probable that a similar phenomenon occurred on the 6th of the same month, especially as Professor Stone is an accomplished observer, and not likely to be mistaken in his description of the optical appearance of a celestial object.

* On account of delay in engraving these drawings, they are reserved until next week's issue.

An experiment illustrating "fatigue" in the sense of hearing (corresponding to fatigue of the retina) has been described by Herr Urbanitschitsch. Two tubes are adapted to the ears, and adjusted, so that a given tuning-fork is heard equally on both sides. Now strike the fork strongly, and let it sound a little through one tube; then deaden it somewhat by touching. The ear on that side fails to catch the weakened sound, but on transferring the fork to the other ear, the sound is heard distinctly. If the weaker tone presented be of different pitch from the stronger, it is heard on both sides equally. The failure of sensitiveness in the other case is very transient.
The crime of Guiteau has directed public attention to the subject of mental diseases; we will therefore endeavor to explain the teachings of some of the most prominent of modern alienists who have recorded the results of their investigations, and classified the various phases of this, the greatest curse of humanity.

The first point of interest to be discovered is, can any line be drawn between partial and absolute insanity; if one faculty of the mind is affected do all succumb?

On this point, as on most others bearing on this subject, there is much difference of opinion; but the most advanced alienists appear to be now satisfied that a partial form of insanity exists, which is termed monomania. The German and French alienists have long since recognized this distinction and invented terms to express it, but it appears to be due to Dr. Edward C. Spitza to have introduced this term with its proper modifications into English psychological literature.

The delusions of the monomaniac are what would be day-dreams in other people, "but which have become fixed realities for the former, owing, it is said, to a faulty cerebral association system, which permits collateral circumstances to act as supports for the patient's erroneous conception."

The general intellectual status of monomaniacs, though rarely of a very high order, is moderately fair, and generally the mental powers are sufficient to keep the delusion under check for the practical purposes of life, and although many are what is termed crotchety, irritable and depressed, yet the sole mental symptoms of the typical cases of this disease consists of the fixed delusions.

Without describing in detail the various features of monomania, let us take an imaginary case of this character, and sketch its leading characteristics. To protect us from any reproach of exaggeration or of drawing a fictitious image, we will take an extract from a paper by Dr. Edward C. Spitza read before the New York Neurological Society, as far back as November 1880.

The monomaniac after experiences incidental to the early stages of the disease at length concludes that he is a person of some importance.

"Some great political movement now takes place, he throws himself into it either in a fixed character that he has already constructed for himself, or with the vague idea that he is an influential personage. He seeks interviews, holds actual conversations with the big men of the day, accepts the common courtesy shown him by those in office as a tribute to his value, is rejected, however, and then judges himself to be the victim of jealousy or of rival cabals, makes intemperate and querulous complaints to higher officials, perhaps makes violent attacks upon them, and finally is incarcerated in a jail."

The writer of this paper had no intention of being prophetic in his utterances, but our readers cannot fail to observe the very close relation the above picture bears to any mental portrait which might be drawn of the assassin Guiteau.

It is curious that all through this train of ideas to which the monomaniac abandons himself there is seen a chain of logic and inferences; there is no gap anywhere. If the inferences of the patient were based upon correctly observed facts and associated with a proper correlation with his actual surroundings, his conclusions would be perfectly correct.

We have therefore in the monomaniac an individual with full reasoning powers, and intellectually the equal of most men. In what respect does his status differ from the same man? The answer is, that he is possessed with a fixed delusion or insane project.

To follow the subject intelligently, let us now enquire what an alienist terms a delusion, and analyze its nature. This can be done profitably, for we are told that such a preliminary investigation is the most direct step for those who would be initiated into the mysteries of the insane mind.

Genuine delusions are divided into two fundamental classes; the first styled Systematized Delusions as contrasted with the second class of Unsystematized Delusions.

It may be here stated, that assuming Guiteau to be a monomaniac, his delusions would be of the first class.

The highest general mental development among constitutional lunatics is found among those who cherish
The Proceedings for the past year of the American Association for the Advancement of Science have been distributed to the members; they do honor to the Society by whom they are issued, and hold forth the brightest hopes for its future.

The friends of the Association will learn with satisfaction that the number of members steadily increase, and that the roll of honor now comprises one thousand five hundred and fifty-five names, a glance at the list showing that it represents the intelligence of the United States.

The very laudable objects of the Association are the advancement of Science, which it endeavors to carry into effect by arranging annual meetings of its members, "to promote intercourse between those who are cultivating Science in different parts of America, its Constitution expressing the desire to give a stronger and more general impulse and more systematic direction to scientific research, and to procure for the labors of scientific men increased facilities and a wider usefulness."

It will thus be seen that the leading feature of the Association is co-operation, the secret of all success and the keystone of human progress. Perhaps in no country in the world does this necessity for co-operation exist to a greater degree than in the United States, with its vast amount of territory and great area.

Men of education, with minds specially adapted for the highest scientific work, are often isolated from their fellow workers, and thousands who are "cultivating" Science are spread over the States and Territories, silently plodding over problems of vital interest or investigating the great scheme of Creation.

Surely an Association which is a bond of union between such a widely dispersed class should be recognized on its merits by those for whose benefit it is established, and we may add, that the only practical sign of appreciation of the advantages offered, is active membership.

The Association at present numbers fifteen hundred members, and has an income of less than six thousand dollars, a sum which is well husbanded and turned to the best advantage by the executive officers of the Association, who are enabled this year to present two handsome volumes to each member, which are alone equivalent in value to the subscription paid.

We desire, however, to see the list of members largely increased, and considering the Association has existed over thirty years, the number should not be less than five thousand, an income would then be at the disposal of the Executive Committee which would enable it to encourage scientific research in a manner worthy of the Association and the cause of human progress which it represents.

We desire also to see the permanent fund of the Association placed on a more substantial footing, and supported by those who can strengthen it from their superabundant wealth, without a financial effort on their part.

We speak within bounds when we assert, that it is a standing scandal and reproach on the men of intelligence of the United States, to find that the single patron of the "American Association for the Advancement of Science" is a woman. Is there no American gentlemen with sufficient chivalry to follow so bright an example? We trust that the meeting of the Association, which will open next week, will not close without at least one response, to the challenge we now make.

ASTRONOMICAL OBSERVATORIES.

By Simon Newcomb.

Among the contributions of public and private munificence to the advance of knowledge, none are more worthy of praise than those which have been devoted to astronomy. Among all the sciences, this is the one which is most completely dependent upon such contributions, because it has the least immediate application to the welfare of the individual. Happily, it is also the science of which the results are best adapted to strike the mind, and it has thus kept a position in public estimation which it could hardly have gained if it had depended for success solely upon its application to the practical problems of life. That the means which have been devoted to its prosecution have not always been expended in a manner which we now see would have been the best, is to be expected from the very nature of the case. Indeed, a large portion of the labor spent in any kind of scientific research is, in a certain sense, wasted, because the very knowledge which shows us how we might have done better has been gained through a long series of fruitless trials. But it is due both to ourselves and the patrons of astronomy that as soon as any knowledge bearing upon the question of
The International Electrical Exhibition at Paris was opened with much éclat on the roth instant by the President of the French Republic.

The brief telegraphic dispatches describing the event, all state that Edison's exhibit was the chief centre of attraction, and that great interest was shown for the forthcoming exhibition of certain novelties which he had sent. These appeared to prove that the energies of the great electrician were far from exhausted on this subject, and that his fertile brain is as active as ever.

We are promised a very detailed report of this exhibition, so defer particulars until it arrives. England and Germany occupy the largest space of the foreign countries represented, America and Belgium coming next in order. All the departments on the day of opening were incomplete, the Americans complaining much of the dilatory behavior of the French workmen, who seemed to have no idea of the value of time.

We presume that the object of exhibitions of this character is to stimulate those engaged in electrical investigations, and to form landmarks in the history of electrical progress. In that light the Exhibition has many advantages, but Edison appears to have suffered from his generous permission to permit all comers to inspect the progress of his inventions. Many misconstrued what they saw, and came to false conclusions, while men of no mental endowment who were mere clever mechanics, assiduously appropriated the ideas of the man of brains, and have since produced barefaced copies. These men have so far proceeded unchecked, but the time appears to have arrived when Edison has decided to enforce with vigor all those patent rights which he has secured after so many years of patient study and unremitting toil, involving the outlay of an immense amount of money.

The seizure of the "Maxim" electric lamps at the Paris International Exhibition appears to have been directed in consequence of such a decision, and we can assure Mr. Edison that the public will heartily sympathize with him in his attempt to enforce his just rights.

We are informed by cable that Sir George Biddell Airy has retired from the office of Astronomer Royal, and his successor appointed.

Sir George was born on the 27th of July, 1801, and was elected a Fellow of Trinity College in 1824. He commenced his career as a scientific teacher in 1826, when he was elected Lucasian Professor. In 1828 he was elected Plumian Professor, and entrusted with the management of the Observatory at Cambridge which had been just then erected and supplied with one of its instruments. On taking charge of the new Observatory he commenced a series of observations, but his able services there will be best remembered by the admirable methods he introduced in the calculations and observations, by which their utility was greatly increased.

Professor Airy had also the satisfaction of superintending the mounting of the Equatorial, the Mural Circle and the Northumberland Telescope (the last entirely from his own plans), at the Cambridge University.

In the autumn of 1835 the office of Astronomer Royal became vacant by the resignation of Mr. John Pond, and at the request of Lord Auckland, Airy received the appointment for this distinguished office, which he has since filled with so much benefit to science and honor to his country, for a period which has covered nearly half a century.

In 1833 he received the gold medal of the Royal Astronomical Society "for his discovery of the long inequality of Venus and the Earth," and again in 1846, for his "Reduction of the Observation of Planets made at the Royal Observatory, Greenwich, from 1750 to 1830."

We have the pleasure of directing the attention of our subscribers to a very interesting work by A. B. Hervey, A.M., on "Sea Mosses," being both a collector's guide and an introduction to the Study of Marine Algae. It is published by S. F. Cassino, of Boston. In another part of this issue will be found an extended extract from this book, giving Mr. Hervey's methods of collecting and preserving specimens, and the article will, doubtless, be read with interest at this season, when so many are at the seashore, with full opportunities for commencing the study of this department of Cryptogamic Botany.
THE CINCINNATI MEETING OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The thirtieth meeting of this Society was held at Cincinnati, on the 17th of August and following days, and adjourned on the 23rd.

The meeting opened with some discouraging features, due principally to the marked absence of many of the most prominent members of the Association. Among the absentees we noticed retiring President Lewis E. Morgan, of Rochester; Professor Spencer F. Baird, Professor O. C. Marsh, of Yale; Professor Asaph Hall, of Washington; Professor W. B. Rogers, of Boston; Professor Burt G. Wilder, of Cornell; Professor Simon Newcomb, of Washington; Professor George F. Barker, of Philadelphia; Professor Alexander Graham Bell, of Washington, and Professor Alexander Agassiz, of Cambridge.

It is agreeable to record that in spite of these defections, which in most cases were unavoidable or due to sickness, the Cincinnati meeting has been in many respects most successful, showing that the "esprit de corps" of the great body of the Association is at a high standard and requires no fostering spirit to maintain its vitality.

The following registration shows the attendance of members at the annual meeting since 1869:

1869--Salem ........................................... 244
1870--Troy ............................................. 188
1871--Indianapolis .................................... 196
1872--Dubuque ......................................... 164
1873--Portland ......................................... 165
1874--Hartford ......................................... 224
1875--Detroit .......................................... 105
1876--Buffalo .......................................... 213
1877--Nashville ....................................... 176
1878--St. Louis ....................................... 134
1879--Saratoga ....................................... 256
1880--Boston ......................................... 997

At the recent Cincinnati meeting the attendance of members was about 550, which compares most favorably with all previous years, excepting the last at Boston, which from various circumstances was a phenomenal year of success.

The growing popularity of the Association, or the increased interest of the masses in scientific matters, is shown by the registration of 400 new names on the roll of the Association, the majority of whom resided in Ohio, Indiana and Kentucky.

An agreeable feature of this meeting was the exhibition of scientific apparatus by those engaged in such manufactures.

Messrs. Beck, Bausch and Lomb, Bullock, Queen & Co., and Sexton for Gundlach showed exhibits, which made it evident that microscopists can command all they desire from the optician, provided the one essential of dollars and cents are within their reach, and even in this respect improvements have been made, which have greatly reduced the expenses of microscopists.

The following gentlemen acted as officers of the association on this occasion:

CINCINNATI, 1881.

President.—George J. Brush, of New Haven, Connecticut.
Vice President, Section A.—William Harkness, of Washington, D. C.
Vice President, Section B.—E. T. Cox, of San Francisco, Cal.
Chairman of Permanent Subsection of Chemistry.—G. C. Caldwell, of Ithaca, N. Y.
Chairman of Permanent Subsection of Microscopy.—A. B. Hervey, of Taunton, Mass.
Chairman of Permanent Subsection of Anthropology.—Garrick Mallery, of Washington, D. C.
Chairman of Permanent Subsection of Entomology.—John G. Morris, of Baltimore, Md.
Permanent Secretary.—F. W. Putnam, of Cambridge, Mass.
General Secretary.—C. V. Riley, of Washington, D. C.
Secretary of Section A.—E. T. Tappan, of Gambier, Ohio.
Secretary of Section B.—Charles S. Minot, of Boston, Mass.
Secretary of Permanent Subsection of Chemistry.—Alfred Springer, Cincinnati, O.
Secretary of Permanent Subsection of Microscopy.—W. H. Seaman, of Washington, D. C.
Secretary of Permanent Subsection of Anthropology.—J. G. Henderson, of Winchester, Ill.
Secretary of Permanent Subsection of Entomology.—B. P.ickman Mann, of Cambridge, Mass.

Nearly two hundred papers, described in the following list, were entered to be read.
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SCIENCE.

TITLES OF PAPERS.

1. Magnetic survey of Missouri.—Francis E. Nipher.

2. On the effect of prolonged stress upon the strain in timber.—R. H. Thornton.

3. Nomenclature of the elements of the seven Electrical Vortices, to whose motions atmospheric storms are principally due, with the processes by which they have been derived, and examples given of the application of the formula by which their positions on the surface of the earth can be computed for any given time.—Thomas B. Snedd.


5. A new system of interest, discounts, etc.—James W. Robinson.

6. The constitution of the “Atom” of science.—Mrs. A. B. Blackwell.

7. Caños, as I have seen them, with some thoughts as to their origin.—Wm. Roots.

8. The unification of geological nomenclature.—Richard Owen.

9. Recent discoveries, measurements, and temperature observations made in Mammoth Cave, Ky.—H. C. Hoye.

10. A remarkable case of retention of heat by the Earth.—H. C. Hoye.

11. Coal dust as an element of danger of mining; shown by the late explosion in the Ablion Mines, in Nova Scotia.—J. C. Dyer.

12. The successful administration of nitrous-oxide for dental and surgical operations.—C. P. Holbrook.

13. An Iso-penicamic acid.—Charles W. Poage, Jr.

14. Development of Sugar in Maltese and Surhahines.—Peter Collier.

15. A revision of the anatomy of the ethmoid bone in the mammalia.—Harrington Allen.

16. The life unit in plants.—Rex H. Holbrook.

17. On Bopyrus manhattensis from the gill-cavity of Palaemonetes vulgaris Stimpson.—Carl C. Giese.

18. The uncivilized mind in the presence of higher phases of civilization.—Olive Ives.

19. The stone images and idols of the mound-builders.—Wm. McAdams.

20. Some remarkable relics from mounds in Illinois.—Wm. McAdams.

21. Stone implement showing glacial marks.—Wm. McAdams.

22. The occurrence of Cretaceous fossils near mouth of Illinois river.—Wm. McAdams.

23. Mammal life of the Pleistocene.—Watson C. Holbrook.

24. Stone implements in the drift.—Watson C. Holbrook.

25. Prehistoric hieroglyphics.—Watson C. Holbrook.


27. Bones of extinct forests upon streams.—David D. Thompson.

28. Alchemy, the cradle of Chemistry. Illustrated by lantern views.—H. Carrington Bolen.

29. The great primordial force.—H. K. Rogers.


32. Relation of reducing power as measured by Fehling’s solution to the rotatory power of commercial glucose and grape sugar.—Second paper.—H. W. Willey.

33. On a new material suitable for stops and stoppers for reagent bottles.—H. W. Willey.

34. The steroscope, and vision by optic divergence.—H. Le Conte, Sec.

35. The nitrogenous constituents of grasses.—C. D. Richeson.


37. On the influence of the structure of the nerves upon the production and conduction of nerve-force.—H. B. Smith.

38. The termites of faunas in the Devonian Rocks of New York.—H. S. Williams.

39. Note on some Fish remains from the Upper Devonian of New York.—H. S. Williams.

40. Notes on specimens of Pliophyton and associated fossils collected by Dr. H. S. Williams, in the Chemung Shales of Ithaca, N. Y.—J. W. Dawson.


42. On Dithionolacrylic and Chlorobromolacrylic Acids.—C. F. Mehey and Rachel Lloyd.

43. On Chlorhropropionionic Acid.—C. F. Mehey and H. C. Hoye.

44. Alhazen’s Problem: its history and bibliography, together with various solutions of it.—Marcus Baker.

45. Is the law of repulsion the Dynamic Law underlying the Science of Chemistry?—Miss Virginia K. Reavis.

46. A sketch of blood during a protracted fast.—Lester Curtis.

47. A contribution to the study of Bacillary Organisms, and commonly found on exposed mucous surfaces, and in the alimentary canal of healthy individuals.—Ge. M. Strecker.

48. Suggestions for improvement in the manufacture of glass, and new methods for the construction of large telescopic lenses.—G. W. Holly.

49. On the electrical resistance and co-efficient of expansion of incandescent platinum.—E. L. Nichols.

50. On recent deep-sea soundings in the Gulf of Mexico and Caribbean Sea, by the U. S. Coast Survey.—J. E. Bross.

51. Symmetrical method of Elimination in Simple Equations, by the use of some of the principles of Determinants.—J. S. Warner.

52. A Chemical Local-telegram alphabet.—William Boyd.

53. An Improved Sonometer.—H. Le Conte, Sec.

54. A new and improved freezing Microtome.—Thomas Taylor.

55. A new and Improved Freezing apparatus for use in Surgical and Dental Practice, being a substitute for the ether spray.—Thomas Taylor.

56. Bacteria and Microcosm, and their relations to plant culture.—Thomas Taylor.

57. Electricity, Magnetism, Gravitation. Their phenomena considered as the manifestation of one force.—S. S. Parsons.

58. The Peru Grit of Ohio.—Edward Orton.

59. The Gold-bearing drift of Indiana.—Geo. Sutton.

60. On the amount of Glacial erosion in Ohio, Indiana and Illinois, with some deductions therefrom.—E. W. Chappie.


63. Some needed reforms in the use of Botanical Terms.—Charles R. Ridler.

64. Digital differentiation.—A. J. Hoye.


66. On the cause of the Arid climates of the Far West.—C. E. Dutton.

67. Evolution and its place in Geology.—Edward S. Edman.

68. Short study of the Features of the Region of Lower Great Lakes, during the Great River Age; or notes on the Origin of the Great Lakes of North America.—J. W. Scovill.

69. On the inhabitants of N. E. Siberia, commonly called Chukrichis and Nanamul.—W. H. Doll.

70. A Lawyer of the Stone Age.—Herbert Howe.

71. Hex caviare, the Black Drink of the Southern Indians.—J. B. K. Henderson.

72. Was the antelope hunted by the Indians on the prairies of Illinois?—J. B. K. Henderson.

73. Agriculture and Agricultural Implements of the Ancient Inhabitants of the Mississippi Valley.—J. B. K. Henderson.

74. The Chief characters of the Chief towns of the Ancient Indians of the Mississippi Valley.—J. B. K. Henderson.

75. Houses of the Ancient Inhabitants of the Mississippi Valley.—John G. Henderson.

76. Comparative Differences in the Iroquois Group of Dialects.—Mrs. Remanita A. Smith.

77. Typical thin sections of the rocks of the cufiferous series in Minnesota.—N. W. Winchell.

78. The limited biological importance of synthetic achievements in Organic Chemistry.—Albert B. Pescott.

79. On a melat cup of the deciduous mandibular canine of the domestic cat, Felis domestica.—Burt G. Willem.

98. Note on a comparison of Newcomb's Tables of Uranus and Neptune, with those of the same planets by Le Verrier.—Dr. P. E. D. F. Eulenburg.


100. Pentachloronitrile formate.—Alfred Springer.

101. On the features of Equivalence to Chemical Elements, shown by electricity and heat.—Samuel J. Wallace.

102. On a sign of logical connection in Equations.—Samuel J. Wallace.

103. On an abbreviation in writing a long series of figures, and its use in calculations.—Samuel J. Wallace.

104. Retarded Development in Insects.—C. V. Riley.

105. New Insects Injurious to American Agriculture.—C. V. Riley.

106. The Egg case of Hydrophilus triangularis.—C. V. Riley.

107. On the Oviposition of Prodolus decipiens.—C. V. Riley.

108. The Cocoon of Gymnus.—C. V. Riley.


110. On the disposition of color-markings of domestic birds.—Wm. H. Brewer.

111. On the ancient Japanese bronze belts.—Edna S. Morse.

112. On changes in Mya and Lunnata since the deposition of the New England Shell-heaps.—Edna S. Morse.


115. Experiments to determine the comparative strength of globes and cylinders of the same diameter and thickness of sides.—S. Marden.

116. On a convenient method of expressing microscopically the relation between English and metric units of length on the same scale.—Wm. A. Rogge and Geo. F. Bellou.

117. Evidence of atomic motion within liquid molecules, as based upon the speed of chemical action.—R. B. Wurder.

118. On a new method of applying water power of small head to effect the direct compression of air to any required high pressure.—H. T. Eddy.


120. Phenomena of growth in plants.—D. P. Penkollssx.

121. On the life duration of the Heterocera (moths).—J. A. Lithuo.

122. On the action of Pilocarpin in changing the color of the human hair.—D. W. Proutiss.

123. On a simple method of measuring faint spectra.—Wm. Harkness.

124. On the methods of determining the solar parallax, with special reference to the coming transit of Venus.—Wm. Harkness.

125. The sources of the nitrogen of plants.—W. O. Atwater.

126. The chemistry of fish and invertebrates.—W. O. Atwater.

127. The quantitative estimation of nitrogen.—W. O. Atwater.

128. The quantitative estimation of Chlorine.—W. O. Atwater.

129. Historic Notes on Cosmic Physiology.—T. Storrs Hunt.

130. Upon the use of the Induction Balance as a means of determining the location of leaden bullets imbedded in the human body.—Alexander Graham Bell.

131. Upon a new form of electric probe.—Alexander Graham Bell.

132. The best method of mounting whole chick embryos.—Charles Sedgwick Minot.

133. Note on whether man is the highest animal.—Charles Sedgwick Minot.

134. Note on the segmentation of the vertebrate body.—Charles Sedgwick Minot.

135. Upon the motion of roots in germinating Indian Corn.—W. J. Irad.

136. Exhibition of some archeological specimens from Missouri.—S. H. Trowbridge.

137. Animal myths of the Iroquois.—Mrs. Erminie A. Smith.


139. On the wavelengths of the principal lines of the Solar Spectrum.—T. C. Mendenhall.

140. How does the bee extend its tongue.—A. J. Cook.

141. The Syrian Bees.—A. J. Cook.

142. Carbofolic acid as a preventive of insect ravages.—A. J. Cook.


146. Notes on experimental Chemistry.—Albert B. Prescott.

147. Additional facts on the fertilization of Yucca.—Thomas Michan.

148. On the Interpretation of Pictographs by the application of Gesture-signs.—W. F. Hoffman.

149. On the great outburst in Comet b of 581, observed at the Cincinnati Observatory.—Ormond Stone.


151. Some new kinds of apparatus for the chemical laboratory.—G. C. Coldwell.

152. Time service, Carleton College Observatory.—W. W. Payne.

153. Note on the theory of the flight of elongated projectiles.—H. T. Eddy.

154. On the mechanical Principles involved in the flight of the boomerang.—H. T. Eddy.

155. On a convenient form of slide case.—Rohr Brown.


157. The liquidation of glass in contact with water at 250° c.—H. Carmichael.


160. On some relations of Birds and Insects—S. A. Foster.

161. A comparison of May and dates with those of the Christian Era.—Cyrus Thomas.


163. Method of determining the value of the Solar Parallax from meridian observations of Mars.—J. R. Eastman.

164. Numbers of conic section orbit relative to perihelion distance.—H. A. N./. /

165. Phonetics of the Kawai language.—Albert S. Gatch.

166. The needle telephone, a new instrument by Dr. Goodman, of Louisville, Ky.—J. Lawrence Smith.

167. Haldenite, a new American gem.—J. Lawrence Smith.

168. Iron with an unusual chemical properties.—J. Lawrence Smith.

169. Determination of Phosphorus in iron.—J. Lawrence Smith.

170. Nodular concrete in meteoric iron, bearing on the origin of the same.—J. Lawrence Smith.

171. An anomalous magnetic property of a specimen of iron.—J. Lawrence Smith.

172. Regulator of filter pumps.—J. Lawrence Smith.

173. Ringing Fences.—S. W. Robinson.


175. On the relations of the growth size and age of animals, Charles S. Minot.

176. Suggestions of co-operation in furthering the study of entomology.—B. Pickman Mann.


178. The Electrophore and electric lighting.—E. B. Elliott.

179. An attachment for burettes avoiding the necessity of using glass stop-corks.—Fr. A. Roeder.

180. On a new form of valves.—Fr. A. Roeder.


182. Note on an experimental determination of the value of —T. C. Mendenhall.

183. Remarks upon and an exhibition of Japanese Magic mirrors.—T. C. Mendenhall.
and settlers if their incursions were tolerated. To answer more especially this latter question, and to make substantial contributions to general knowledge, the United States Government instituted a survey of this interesting region, and unknown country, and to Messrs. Jenney, and Newton, was intrusted its management and direction, under the auspices of the Department of the Interior.

After six months spent in this wild and inhospitable region, members of the survey returned, richly provided means for a more deliberate examination of its character, and scientific aspects in the laboratories and cabinets of the east.

A delay—one of the innumerable hitches incident to congressional apathy or pre-occupancy—in the approaching season for the printing of their report, invited Mr. Newton to revisit the hills in the spring of 1857, to complete his observations, mend or extend his theories, and here he contracled typhoid fever, of which he died—a loss to science, to society and education.

The work begun under his vigorous and intelligent supervision naturally halted, and although of its various parts were long since completed, it is only now that in a compiled form they appear in print.

Mr. Gilbert edited the work and undertook the difficult and thankless task of deciphering, compiling and evolving from the disjunctive fragments of Mr. Newton's papers. The last part devoted to the discussion of the physical and stratigraphical character of these hills, it is not difficult to detect the mind and pen of the author of the "Geology of the Mountain," and whether or not the essay would form an exact reproduction of Mr. Newton's views, it is itself a valuable monograph, instructive and suggestive.

The Black Hills cover an area of 850 square miles, rising from the level and uninhabited wastes about them to an altitude at their highest point of nearly 8,000 feet, thickly covered with dense and primeval forests of pine, and studded with the condensed shawls of far hills all else, and for long marches distinguishes these highlands to the approaching traveller.

The Black Hills, briefly, are an upland of considerable strata, displaying their consecutive beds in symmetrical succession, from a central axis or elevation, disintegrated and sculptured, and moulded by subterranean aqueous erosion. The simplicity and perfection of their stratigraphical structure render them comparatively easy of exploration, and make them a capital example of primary sedimentation, possibly to become classic in future illustrations of geological phenomena.

The formations, as they are crossed from the centre of the group outward to the circumference, and similarly disposed on every side—viz., sloping inward to the centre—are the arkose, Potsdam sandstone, carboniferous shales and limestone, red beds—Trias, Jura—cretaceous and then beyond, upon the plains Tertiary. The central area is a diversified region abounding in park-like expansions, wild and rugged chasms, peaks, isolated pyramids, picturesque gorges, table-lands and a network of embraiding streams pouring outward east and west to swell the waters of the Cheyenne and Belle Fourche rivers. This is the arcuate area or axis upon which flanks resist the higher strata, and in whose gulches and stream beds were found the traces of gold which first brought these hills to scientific notice. This axis lies generally north and south, is slightly arcuate, with its convexity pointing eastward; and is composed of schists, quartzites, gneiss rock, granite, trachytic intrusions and associated metamorphic slates. The granite and quartzites form salient ridges, and the trachyte sharp peaks in the landscape. Next outcropping underneath the carboniferous is the arkose, unconditionally held upon the upturned edges of arkose slates, carrying characteristic fossils and made up of basin conglomerate, sandstone locally altered around trachytic cones to quartzite, and calcareous beds. This rock has undergone extensive removal along with


The report on the Black Hills issued six years after the death of its leading observers, to whom its name at least may fairly be ascribed, comprises the geology, palontology, mineral resources, lithology and related subjects of interest in that mass of rocks whose circular uplift commands the outstretched plains of central Dakota. To the fossile stern aurél may at least be attributed one important service in this connection, as it was a transient disturbance with the Indian settlers, caused by the appearance of gold hunters on their domain, that immediately led to the survey.

The Black Hills had been assigned to the Sioux, and this unauthorized irruption raised the question how far the United States Government might permit a violation of their contract with the Indians, and how much benefit in mineral wealth would accrue to the new explorers.

166. Notice of a fern indigenous to California, but heretofore considered as an introduced hot-house species.—Men. London. Soc.
The attempt to utilize compressed air as a motive power for street cars in cities, appears to have been most unsuccessful. About four years since, a company was organized in New York city for the purpose of building street cars on the pneumatic system, capable of replacing those drawn by horse power, and about the early part of April, 1878, a passenger car propelled by compressed air was running on the Second avenue, New York, between 63d and 93d streets.

The experiment was considered perfectly satisfactory for a first attempt, as the cars performed their work admirably; and the public press and various eminent engineers considered the problem solved. There was, however, an essential element of success that was wanted, which appeared insignificant at the time, but which proved fatal to the whole scheme. This was a failure on the part of the engineers to design machinery which should be constant in its working, requiring little attention from the driver.

It was supposed that in building future composite pneumatic engine cars these defects could be remedied. But when the six cars built on this principle were placed on trial, the same trouble was experienced, and the experiment was abandoned, causing a considerable pecuniary loss to the promoters of the company.

The Pneumatic Tramway Company, undaunted by past losses and failures, have renewed their efforts, and have recently constructed a pneumatic traction engine, which we understand will be immediately placed on trial on one of the New York elevated railroads. The successful working of Electric Railway Engines has probably increased the difficulties of those who are advocating the use of compressed air as a motive power. In the absence of smoke, odor, noise and cinders, both the electric and compressed air systems have many advantages over steam for elevated railroads, and the question of economy will probably decide which system shall be finally accepted. At the present moment all the advantages appear to be in favor of the electric railways for use within city limits, and it is probably a mere matter of time, for all the New York elevated railroads to be running their trains by this system.

THE STATE AND HIGHER EDUCATION.*

By PROFESSOR N. H. WINCHELL.

The incentive to the following address appears to have been certain remarks made officially by President John of Hamline University, who considered that "higher education should not be under the control of the State," and that the design of the State Colleges has been a conspicuous and universally acknowledged failure.

In the first part of the paper Professor Winchell presents an historical sketch of the circumstances, the result of which was "that the State finds itself in the conduct of systematic education."

After tracing the progress of education in Europe he states:

Thus we find that none of the old universities, except when under the control of the government, and sometimes not even then, have been able to impart the curricula in compliance with the demands and spirit of the age. If they have done it, as more lately at Oxford University, it is only after the force of public sentiment has been able to batter down the walls of prejudice and conceit with which they have been surrounded. During this whole conflict throughout Europe the Church, in its various forms, but particularly the Roman church, instead of being the champion and refuge of free thought and free knowledge, has been the most powerful obstacle to its progress, and has persistently opposed every movement to introduce the means for disseminating useful knowledge among the people. The heat of the conflict is passed. The title has set in the right direction. The old universities perceive the triumph of modern science. European governments are unanimously striving for the establishment of modern schools of science on the broadest foundations, and are supplying them with the fullest appliances.

Now let us turn to America, and inquire how this history has been mirrored on our institutions of higher learning.

In the first place the church colleges that arose in this country prior to 1824, or even later, were modeled after the medieval universities of Oxford and Cambridge, so far as they expanded into the dimensions of a university. For the most part they were simply colleges of classical lore, with but one course of study, aiming specifically, at first, to educate young men for the clerical profession. As they were born of the English universities, so they inherited their medieval narrowness and bigotry. As the early church had grappled with Copernicus and Galileo, and had been worsted, so the later church would grapple with everything that bore a resemblance to or intimation of any new fangled notions of nature. Although the world had made wonderful strides in human knowledge, the colleges shut their eyes and ears to the change. The age demanded education in the great industries that characterize modern society, but could get only that of the age of Elizabeth. As modern science and civilization began to buzz about their doors, they drew themselves within their shells, afrighted, like snails. Having none of the elements of the

* Delivered before the Minnesota Academy of Natural Sciences, Jan. 12, 1881.
Residents of New York city who visited Cincinnati on the occasion of the meeting of the American Association for the Advancement of Science, doubtless returned with a better appreciation of the water supply of their own city.

Cincinnati draws its supply of water direct from the Ohio river, at a point within the city limits, and within a few yards of the outlet of a main sewer which discharges its abominations into the already discolored and muddy waters of the river.

Some idea may be formed of the condition of this water, when we state, that a small quantity poured into a washing basin, obscured the view of the bottom of the utensil, so opaque is the water by reason of its muddy impurity, and yet, the river at this time was at its best, tor, undisturbed by rains or floods, it flowed past the city reduced to its lowest limits, and in its highest condition of purity.

Unanimity among the population of a large city on any one point, is not to be expected, but, it was with some surprise we heard expressions of admiration regarding this water, from some Cincinnatians. The majority of the people, however, were disgusted with the water supply of the city, and many were seeking their own remedy by the construction of artesian wells. The public press of Cincinnati, during our visit was loud in its denunciations of the evil, making excellent suggestions for obtaining the water supply from a purer source, and other needed improvements.

Recently the question has been much discussed, as to whether a city should draw its supply from a river, or from lakes and storage reservoirs. Which will give the best results?

This question is beset with many difficulties, and, in our opinion, cannot be determined in such a manner, that any particular decision for future guidance, in all cases, can be delivered. We apprehend that local causes and conditions which vary for every locality, having due weight and being well considered, should decide the question.

Of course absolute purity is not demanded, neither is it essential. The object to be aimed at, and that must be secured at any cost, is such a condition of purity which may be expressed by the term "fitness."

A water that is free from any impurities dangerous to health, of a good color and inodorous, may be considered "fit" for the supply of a city.

The question as to the best source for a supply of water, has of late received much attention from chemists and sanitary engineers. Reviewing the discussions, we express the opinion, that water drawn from a river which is free from sewage contaminations and not subject to discoloration, is preferable to water collected in lakes and storage reservoirs. The storage of water in reservoirs for long periods, without doubt, causes a deterioration in the quality of the water, generating a variety of animal and vegetable forms that are characteristic of stagnant waters, and which are dangerous to health. River water, on the contrary, if not contaminated directly near the source of supply, is usually free from those impurities which are most undesirable.

On this point we refer our readers to "SCIENCE," Vol. I, page 67, where will be found an analysis of the water supply of Newark, N. J., obtained from the river Passaic, contrasted with water used in that city, obtained from driven wells. The result showed that the water from the Passaic river, although contaminated with sewage to a certain extent, and below what may be considered a satisfactory condition, stood at the head of the list in regard to purity and general fitness for sanitary purposes. We believe that recently Professor Leeds, of Hoboken, has made analyses of the same waters, with very similar results.

But, from whatever source water may be obtained, a certain amount of manipulation appears to be essential before it is fit for distribution in a city. In the first place it should be held in a reservoir for 24 hours, to permit the suspended matter to subside; it should go through some simple process of filtration; and, lastly, be pumped to a sufficient elevation to secure a supply of water to the upper part of every house in the city.

The question of the public filtration of water for city use no doubt presents many difficulties, but until such filtration is accomplished by the authorities, every householder should make use of a filter, to cleanse from impurities, the water used for drinking and cooking purposes; for apart from the question of health, the interest of the public in securing pure water is
In a recent Government publication, prepared by Professor F. W. Clarke, S. B., of Cincinnati, we find the following paragraph relating to the purchase of scientific apparatus, which may be studied with profit by the manufacturers:

"Some years ago Congress passed an act authorizing schools and colleges to import apparatus free of duty. This act is not so widely known among teachers as it ought to be, nor do those who know it fully realize the saving in expense which it implies. Goods bought of a local middleman cost their European price, plus a heavy duty and the expense of transportation, with a large profit to the dealer over and above the sum of the foregoing items. A school, by importing its apparatus directly, can save the duties and the local dealer's profit—a retrenchment of from forty to fifty per cent. A hundred dollars thus expended on a direct foreign order will buy as much material as a hundred and fifty laid out at home. A knowledge and an application of these facts will enable many a school to do far more in the way of laboratory work than is considered possible now. To be sure, it is desirable that home trade should be patronized, but not in such a way as to cripple science. The present duties bring in but a trifling revenue to the government and might be abolished without injury to any one. If this were done, our schools and colleges could afford to buy more goods of American dealers; the latter, with larger sales, could ask more reasonable profits; and so both buyer and seller would be benefited."

This paragraph once more revives a question which we trust will not be dismissed until some practical decision has been arrived at. Congress has abolished the duty on scientific apparatus and instruments, in the interest of colleges and other rich corporations, but, demands of the poor student, a tax of fifty per cent, upon every instrument purchased by him.

Such a discrimination in the collection of duties is neither just nor reasonable, and appears to have failed even in achieving any good results in the direction anticipated. On the contrary, it has crippled the business of the American manufacturers, and forced them to charge exorbitant prices on the limited sales they could make under such a system.

We fully concur in the suggestion made by Professor Clarke, that, as these duties bring in but a trifling revenue to the government, they might be abolished, and that without injury to anyone.

We are also glad to find Professor Clarke, while speaking as the representative of the class most benefited by this discriminative legislation, taking such a liberal view, and advocating its entire abolition.

We are unable to offer the view that "the trade" may take on a measure which will bring them in open competition with European manufacturers, possibly they may require to be educated to an appreciation of a course, that will ultimately result in a condition of business, which will be beneficial to their best interest.

With the abolition of the discrimination in favor of colleges, etc., and of all duties on scientific instruments, the first result would be to equalize the prices of such manufactures, irrespective of the place where they are made. Universities and colleges in such a case could afford to buy of the domestic manufacturer and would doubtless do so. The one point that would have to be considered in such an open market, would be that of quality, and the American manufacturer of scientific apparatus has nothing to fear on that head, while with larger sales more reasonable profits could be accepted; thus both buyer and seller would be benefited. We trust that the next Congress will take some action in this matter, and place scientific apparatus and instruments on the free list of the tariff, and thus remove an obnoxious tax on knowledge, and increase the facilities for the acquisition of scientific and technical education among the masses of the people.

We are informed that Dr. T. Sterry Hunt, of Montreal, and Professor James Wall, sailed for Europe on the roth instant, for the purpose of attending the International Geological Congress, to be held at Bologna, Italy, on the 26th of September. We have written to Dr. T. Sterry Hunt, who is both a subscriber and contributor to this journal, to send us a report of this meeting, and have no doubt that we shall be thus enabled to place before our readers a reliable account of the doings of this Congress.

We understand the Edison Light Company has been notified that the French Government, after inspecting all the electric lights in the Paris Electrical Exposition, has selected the Edison Company to light the Grand Opera-house of Paris with the Edison electric light. The Edison Company will ship the necessary electrical machinery to France by the next French steamer, and will light up 800 Edison electric lamps in the opera-house on Oct. 7.
ENCKE'S COMET.

This comet is now visible in telescopes of moderate power, and will increase in brightness until November, when it may be visible to the naked eye. The corrections to the ephemeris, computed by Dr. Backlund, of the Pulkowa Observatory, are as follows:

$$\Delta \alpha = -39^\circ.0 \quad \Delta \delta = -1'.4$$

These corrections may vary a little as the comet approaches the earth, but it can be found without trouble. If we consider the great care and labor that have been given to the calculation of the ephemeris; and the fact that the perturbations by nearly all the principal planets have been computed, as well as the effect of the resisting medium in space, the corrections to the ephemeris seem to be very large. This comet affords another example of what is now most needed in Astronomy, viz., complete and careful theoretical investigations. It will be comparatively easy to obtain a great number of observations of this comet during its present return, while a much smaller number of good observations is sufficient. The attention of astronomers should be given rather to a satisfactory determination of the motion of the comet, since the recent computers of its orbit do not have the success of Encke in predicting its returns.

THE WARNER-ASTRONOMICAL PRIZES.

We recently explained, in an editorial, the conditions on which Mr. H. H. Warner consents to present to each of the discoverers of comets during the year 1881, the sum of two hundred dollars. We also stated that applicants for the prize for Comet $b$, 1881, were presenting their claims at the rate of sixty per diem.

We now learn by a communication from Mr. C. S. Whettenmore, secretary to the Rochester Astronomical Society, that nearly 3000 letters were received claiming priority in the discovery of this comet, all of which have been examined. As a result of such examination, Professor Lewis Swift reports that “no conclusion can be reached that would be scientific and satisfactory.” In other words, the claims of the 3000 applicants are ignored, and the prize of $200 for this, the most important of the three comets, so far discovered in 1881, is withdrawn.

We cannot refrain from expressing our dissatisfaction with this decision, and the methods employed in arriving at it, which we believe to be neither “scientific nor satisfactory.”

Mr. Warner, in a letter to the public dated September 6th, states, that two of the conditions on which he consented to give a prize of $200 to the discoverer of every comet appearing in 1881, were as follows: That it should be “telescopic” and “unexpected.” He now claims that “Comet $b$ was neither telescopic nor unexpected.” Under these circumstances if Mr. Warner had simply announced that Comet $b$ did not come within the meaning of his advertised prize, his course would have been intelligible and satisfactory. But he himself has stated, that in spite of these disqualifying circumstances, he “was anxious, could the first discoverer be found, to make a special reward of $200.” In other words, a decision was arrived at to waive the disqualifications, and to proceed as if they did not exist, and the same letter admits that Professor Lewis Swift “examined” the 3000 applications on their merits. Such being the case, when Professor Swift found that he was unable to arrive at a “scientific and satisfactory conclusion,” he should (under the terms of the contract between Mr. Warner and the public), have instantly referred the matter to Professor Asaph Hall, of Washington, and the other gentleman named as referee.

Under these circumstances we consider that Mr. Warner is under the moral obligation of carrying out his contract in regard to this matter, and insisting on Professor Swift taking the proper steps to arrive at some decision. Probably the mere perusal of the 3000 letters would instantly reduce the number to some half dozen applicants, whose cases could be submitted to Professor Hall, who would probably decide upon their merits within a week.

The second point in Mr. Warner’s letter to which we would draw attention, is that in which he states, that to mitigate his disappointment in not being able to trace the “first discoverer” of Comet $b$, he proposes as a balm to the claimants, and to encourage astronomical study, to offer a prize of $200 to the person who shall prepare the best essay on “Comets: Their Composition, Purpose and Effect upon the Earth.”
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A WEEKLY RECORD OF SCIENTIFIC PROGRESS.

JOHN MICHELS, Editor.

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TO OUR ENGLISH READERS.

We have received from Messrs. Deacon & Co., of 150 Leadenhall street, London, England, a standing order for a large supply of "SCIENCE," which will be forwarded weekly. We shall be obliged if our English readers will make this fact known to their friends.

The death of President James A. Garfield is regretted by the nation as a great national loss; but all friends of progress and those who desire to elevate the indifferent and ignorant to a higher grade of civilization, will mourn his sudden death as a calamity; for he was a living example of the wonderful power of education to raise a man from a humble position in society to a post of high honor and usefulness, developing powers which not only opened up a bright and brilliant career, but brought a peaceful and hopeful serenity to his mind which was evident to all who enjoyed his society.

A NEW COMET.

Mr. F. F. Barnard, of Nashville, Tennessee, announced to the Smithsonian Institute, on the 21st instant, the discovery of a comet by him on the 20th, at two o'clock A. M., Washington mean time, in seven hours forty-six minutes right ascension, and thirteen degrees twenty-eight minutes north declination, with a daily motion of three degrees northeast.

On the 23rd instant Professor Lewis Swift, of Rochester, made the following announcement in regard to this comet:

The position of Barnard's comet, as telegraphed from Washington, is so widely erroneous that nobody would be able to find it. Instead of being in cancer and having been discovered at two o'clock in the morning, it was near zeta virginitis, low down in the Western horizon, and can be seen but a few minutes. It was discovered on the evening of the 19th, and at 7h. 46m., Washington mean time, of the 20th, was in right ascension 13h. 25m. 2s., declination north 3 deg. 47 min., with a daily motion of 3 degrees northeast.

In consequence of smoke I have not been able to find it.

We trust in our next issue to offer some explanation of these contradictory statements.

One of the most interesting and valuable reports that has been issued by the Board of Education at Washington, is that recently printed, which describes the opportunities for instruction in Chemistry and Physics which at present exists in the United States, together with statistical tables relating to this subject.*

The Department was fortunate in securing the services of Professor F. W. Clarke, Professor of Chemistry and Physics in the University of Cincinnati, to draw up this report, based on the mass of facts and figures bearing on this matter, which had been collected in reply to circulars issued by the Commissioner of Education towards the close of the year 1878. Professor Clarke appears to possess both executive and literary ability of a high order, and being himself a chemist and a teacher of science, was clearly in a position to do justice to the excellent intentions of Commissioner Eaton. We congratulate Professor Clarke on his success in compiling the technical part of his report, and we propose, on this occasion, to refer to some of his critical remarks and suggestions, which, in scientific circles, will be considered the most valuable result of this investigation.

Before discussing the condition of scientific instruction in public schools, it may be well to consider first, at what age such instruction shall be commenced, and whether it should be considered as a part of primary education, or be reserved for high schools and universities, where special courses of training in the various branches can be advantageously advanced.

Professor Clarke claims that oral instruction in chemistry and physics can be made intelligible to children of ten years of age. He admits, however, that there is a tendency towards over-cramming the lower schools with a too great variety of subjects, which lead to results which are undesirable. He therefore suggests a compromise, and proposes, that in primary schools a taste for science should be cultivated among children "through the medium of the reading books, which might properly contain some short extracts relating to natural science." This plan Professor Clarke considers would be beneficial, and could not be injurious.

We can find no objection to such a course, provided a suitable reading book be written for the purpose, but before any discussion can be made as to the propriety of teaching the sciences in any form in the primary schools, a more thorough reform in the

*Circulars of Information of the Bureau of Education No. 6. 1881.

A report on the teaching of Chemistry and Physics in the United States, by Frank Wigglesworth Clarke, S. B., Professor of Chemistry and Physics in the University of Cincinnati. Washington, 1881.
TEACHING OF CHEMISTRY AND PHYSICS IN THE UNITED STATES.*

II.

In normal schools, the time which can be assigned to work in chemistry and physics is necessarily limited; it becomes then all-important that it should be of the right sort. As Professor Clarke points out, it is not the purpose of such schools to train specialists in any one department of learning, neither should they attempt to give a broad general education. The sole function of a normal school is to fit students for the profession of teaching.

The Bureau of Education has taken pains to enquire how far the scientific work in normal schools has complied with the plan which was originally formed to preserve them within their original functions.

On this point the report states that:

"An examination of the evidence presented in this report will show a great diversity among the various normal schools with respect to chemistry and physics. By far the larger number of them treat these sciences exactly as they are treated in secondary institutions and the smaller colleges; that is, they teach the elements of both subjects, partly by text books and partly by lectures; a few experiments are exhibited, and laboratory work on the part of the students is entirely ignored. In other words, the practice of these schools with reference to the sciences does not accord with the theory upon which they were originally founded."

A small number of normal schools, however,

"Adopt a more rational policy. Recognizing the fact that their students may be called upon to teach chemistry and physics, they endeavor to train them intelligently in methods of instruction."

Respecting instruction in chemistry and physics in universities, colleges and schools of science, much interesting matter is presented, giving in detail the actual work done in these branches of science at the most important institutions of this character.

The general conclusion drawn by Professor Clarke on the character of scientific instruction in universities and colleges is not favorable to such establishments. He says:

"Many high schools are actually doing more and better work with these sciences than is done in a very considerable number of colleges bearing good reputations."

The low standard of scientific work in universities and colleges is attributed by the report to persistent use "of the old-fashioned plan of a fixed curriculum."

"Clearly these colleges could, if they would, build upon the work of the preparatory schools as a foundation, and, with no more cost of time, carry their pupils much further than they do now. The present subordinate position of scientific studies is undoubtedly due to the continuation in so many localities of the old-fashioned plan of a fixed curriculum. Given a college in which the latter still holds its own and in which the classics and mathematics have been for many years the dominant subjects of study, and we have an institution wherein but little time can be given to any one of the sciences. One term, from a third to half an academic year in length, is all that is usually allowed to chemistry. This is absurdly inadequate as one term in Latin or one term in mathematics, with no previous preparation, would be. By this system the sciences are not only underrated, but smattering is directly encouraged. The student trained in it can have no definite idea of scientific methods, scientific reasoning, or the scientific spirit. Even the professor in charge of the sciences may be himself a smatterer, teaching several branches without ever having received a systematic training in any one of them. Such teachers, who keep ahead of their classes by only a few lessons, are unfortunately very common, and with them the modern laboratory methods are simply impossible."

Professor Clarke may be correct in these general conclusions, but it is agreeable to refer to the many honorable exceptions, colleges where scientific instruction is offered on the most liberal and enlightened basis.

It would be difficult to take exception to the courses of study in Chemistry and Physics at Columbia College, New York City, where the collection of physical apparatus is the finest in the country, and three laboratories provided for the use of students.

The instruction in Physics and Chemistry at the school of mines of this college is thus described in the report:

"Physics.—Professor O. N. Rood; mechanics is taught by Professor William G. Peak. The first year students, in the first term, take up the subject of heat, including the steam engine, and acoustics. In the second term they study optics, electricity and magnetism. The courses are illustrated by experiments and problems and are pre-
ILLUSSIONS.*

In reality this work might have been styled an essay on error, for the author deals, in his clear and masterly way, with other errors of the human judgment than those which are termed illusions in the narrower sense of that term. His essay loses nothing, and gains much by thus occupying a much broader field than the one, furnished by the sensory illusion, would constitute per se. Perhaps the most unfortunate part of the work, is the opening passage: "Common sense, knowing nothing of fine distinctions, is wont to draw a sharp line between the region of illusion and that of sane intelligence. To be the victim of an illusion is, in the popular judgment, to be excluded from the category of rational men. The term at once calls up images of stunted figures with ill-developed brains, half-witted creatures, hardly distinguishable from the admittedly insane. . . . .

The nineteenth century intelligence plumes itself on having got at the bottom of medieval visions and church miracles, and it is wont to commiserate the feeble minds that are still subject to these self-deceptions."

We say this passage is an unfortunate one, and this particularly because of its position in the opening chapter of a book which, as we must particularly emphasize, is throughout one of the clearest and most readable psychological treatises that we have found in the English language; this passage on the other hand, is as full of wrong assumptions, misconstructions, and errors as a single paragraph can well be. The popular mind fails to contend the bearer of an illusion, as it does the bearer of a delusion; the medieval visions were not, even in popular parlor illusions, but hallucinations, and indeed the popular sense in which the term illusion is used, that is, the one employed by poets and classical writers, is anything but a reflection on the bearer of the illusion. The daydream, the poetic illusion, and the constructions of a sanguine temperament, are the objects associated in the lay-mind with that term.

On the fourth page is further evidence that the author has failed to discriminate practically between delusions, hallucinations, and illusions. After stating that aliensists have good reason to limit the word illusion to illusory perceptions, he adds "such illusions of the senses are the most palpable and striking evidences of mental disease." Inasmuch as illusions are common with the same, it is incorrect to lay greater stress on the not very frequent illusions of the insane, than on the marked and characteristic hallucinations and the still more universal delusions of that class.

The author defines an illusion as a species of error which counterfeits the form of immediate, self-evident, or intuitive knowledge whether as a sense perception or otherwise. Further on he discriminates between the illusion and the fallacy, by characterising the former as a falsification of primary or intuitive knowledge, and the latter as a falsification of secondary or inferential knowledge. It must be admitted that the author is happier in his discrimination than in his definition, and an illustration of the difficulty under which definers labor recurs in the peroration of the same chapter, where he says that the illusion is seen to arise through "some exceptional feature in the situation or condition of the individual, which, for the time, breaks the chain of intellectual solidarity which under ordinary circumstances binds the single member to the collective body." The greater portion of this passage would constitute an excellent nucleus for a definition of insanity, but at the same time it seems to us that it fails to cover those common illusions, which involve the visual apparatus, and of which familiar illustrations are furnished in most physiological text books. The dividing line between the delusion, the hallucination, and the illusion, should have been strictly drawn at the outset, by our author. We have offered the following as showing the difference between the hallucination and the illusion: While a hallucination is a subjective perception of an object as a real presence, without a real presence to justify the perception, and a memory is the subjective per-

* * *
THE REVELATIONS OF THE AUTOPSY HELD ON THE BODY OF THE LATE PRESIDENT.

The Medical Record of October 8th contains an account by Dr. Bliss, the late President's attending surgeon, of the life history of his illustrious patient, as well as the post mortem observations recorded at the time of the autopsy, and also at a later period, by those who examined the specimens preserved in the Army Medical Museum.

Inasmuch as the various diagnoses, made during Mr. Garfield's life, as to the location of the bullet, and the injury sustained by various organs, were all of them erroneous, and as the secular and medical journals have already discussed those topics ad nauseam, we shall limit ourselves to a relation of the leading features in the light of the anatomical findings.

For similar reasons, we shall give no space to a discussion of the views expressed by a physician, who, after incurring considerable ridicule at the hands of the medical profession, and much obloquy at the hands of the public, on account of his sensational experiments on dead bodies, and whose claimed results no doubt misled the eminent surgeons at the President's bedside, publishes a post mortem diagnosis of the case in the same issue of the Record. In it he seeks to prove that if the bullet was found in an entirely different locality from the one his experiments induced him to surmise, it would, had it have gone a little further, infallibly have dropped into a similar situation on the opposite side! One of the leading medical journals has no other comment to make on this performance, and, as far as we can learn, that comment expresses the general opinion of the medical profession, than to announce that a leading circus company has engaged the services of Dr. Fauvel D. Weisse to repeat his celebrated experiments in the course of the programme.

We subjoin the essential portions of Dr. Bliss' report:

The depressed cicatrix of the wound made by the pistol-bullet was recognized over the tenth intercostal space, three and one-half inches to the right of the vertebral spines. A deep linear incision (made in part by the operation of July 24, and extended by that of August B) occupied a position closely corresponding to the upper border of the right twelfth rib. It commenced posteriorly about two inches from the vertebral spines, and extended forward a little more than three inches. At the anterior extremity of this incision there was a deep, nearly square abraded surface about an inch across.

On inspection of the abdominal viscera in situ, the transverse colon was observed to lie a little above the line of the umbilicus. It was firmly adherent to the anterior edge of the liver. The greater omentum covered the intestines pretty thoroughly from the transverse colon almost to the pubes. It was still quite fat, and was very much blackened by venous congestion. On both sides its lateral margins were adherent to the abdominal parietes opposite the eleventh and twelfth ribs. On the left side the adhesions were numerous, firm, well organized and probably old.

These adhesions, and the firm ones on the right side, as well as those of the spleen, possibly date back to an attack of chronic dysentery, from which the patient is said to have suffered during the civil war. On the right side there were a few similar adhesions, and a number of more delicate and probably recent ones.

A mass of black, congealed blood covered and concealed the spleen and the left margin of the greater omentum. On raising the omentum it was found that this blood-mass extended through the left lumbar and iliac regions and dipped down into the pelvis, in which there was some clotted blood and rather more than a pint of bloody fluid. The blood-coagula having been turned out and collected, measured very nearly a pint. It was now evident that secondary hemorrhage had been the immediate cause of death, but the point from which the blood had escaped was not at once apparent.

The adhesions between the liver and the transverse colon proved to bound an abscess-cavity between the under-surface of the liver, the transverse colon, and the transverse mesocolon, which involved the gall-bladder, and extended to about the same distance on each side of it, measuring six inches transversely and four inches from before backward. This cavity was lined by a thick pyogenic membrane, which completely replaced the capsule of that part of the undersurface of the liver occupied by the abscess. It contained
prize of $200 to the one who I, after an examination of claims, should decide had first seen it."

Now comes the muddle. Mr. Warner admits that under his conditions no one can claim the prize; and therefore offers a special prize for the one who first saw the Comet. And yet Professor Swift in his letter of explanation says: "the conditions of the original prize were, neither in this nor in any other, to be deviated from." and on this account concludes that "not an astronomer in the world would have awarded it."

What can be said or done with men who are so thoroughly and flagrantly inconsistent? Mr. Warner's course throughout appears to have been thoroughly practical; he saw the difficulty in awarding this particular prize, and met it in a most liberal spirit, and had his intentions been carried out, the thanks of the community would have been the unanimous response.

Passing over Professor Swift's apparent misinterpretation of Mr. Warner's instructions, the question may be asked: could "the one who had first seen it" be named? Waiving the claim of the "1000 persons with affidavits" who claimed to have seen the Comet in the United States before its possible appearance, and the 2000 other clod-hoppers and rustics whose claims appeared to have clouded the judgment of Professor Swift, we offer a few simple facts in regard to the first discoverer of Comet \( \delta \), which would have influenced our judgment if called upon to decide on this matter:—

We believe that the first person in the United States who saw the Comet in question, noted its position, and duly reported the fact to Professor Swift was Mr. Edgar L. Larkin, of New Windsor, Ill. If Mr. Warner, however, prefers to award the prize to the first person who saw the Comet, irrespective of locality, then we are advised that the following facts bear on the subject:—

Dr. Gould's name was mentioned prominently in connection with its discovery, but according to his own statement, his attention was directed to it by his assistant, Mr. Wilson. But prior to this date it had been observed by Cruls, in Brazil, and also by several English astronomers at Melbourne. It now appears that Mr. John Tebbutt, of Windsor, New South Wales, is credited as the first astronomer to get an observation of this Comet; so that if the prize is to be awarded to the first discoverer, Tebbutt appears to be the man.

The assertion in Professor Swift's letter that Mr. Warner, without consultation with any, pays the prize in certain cases, causes us some surprise, as we thought that his previous experiences hardly warranted him to decide on matters astronomical, and that he delegated the task to others.
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SCIENCE AND MEDICINE.

A few words on the relation of the natural sciences to medicine, as one of the greatest aids for the achievement of success, should be welcome reading to all members of the medical profession whose aspirations are above the dead level of mediocrity.

The physician may at first sight desire to stifle all discussion on this point by saying, that the requirements of study involved in acquiring a knowledge of medical practice per se occupy too much of his time to admit of his taking up outside issues, which he considers mere refinements of practice. There are others who take the absurd view that, to add a knowledge of the natural sciences is to become in the highest sense of the word a Chemist, a Physicist, or a Biologist. Seeing that the attainment of a complete knowledge of either of these sciences, is a work of a life time, it is argued, that they are to be shunned as impossibilities.

The path of the would-be scientific medical man is made clear by the encouraging words of one of his own profession, Dr. G. Vivian Poore, M.R.C.P., who says, there is a minimum of knowledge in this respect which is sufficient to endow the physician with a scientific grasp of his art. What is really wanted, is sufficient knowledge to enable a medical man to read these various sciences with intelligible results for himself, when he needs and as often as he desires to consult them, to show him as objectively as possible, those great principles which have already found application in his healing art. This will lead him to think and enable him to act with precision in any great emergency.

Let it be understood that there is no necessity for cramming the head with a mass of details, and that our object is to enrich and not encumber the mind of the medical practitioner.

To those who are ignorant of the advantages of some knowledge of the natural sciences in medical practices, the following observations of Dr. Poore may be read with interest.

"There are those who hold that the student of medicine has but little need of special training in the natural sciences, but such a position I believe to be untenable, and if I have to say one thing more emphatically than another to the first year's students, it is to advise them, not on any account to neglect their purely scientific studies. There are the very foundation of your professional knowledge, and without a solid foundation, no firm or worthy superstructure can be raised. How can a man hope to rightly comprehend that most complicated of all machines, the human body, with its levers, pumps, and elastic canals, unless he be first furnished with the principles of mechanics and hydraulics? Who will say that a proper knowledge of the eye, or of the many optical instruments used in medicine, is attainable without some acquaintance with the laws of light; or that the intricacies of the ear, and the art of auscultation can at all be understood by him, who knows nothing of the laws of sound. The laws of heat must be studied in order to appreciate the difficult problems afforded by the animal temperature, its variations in health and disease, and the means of influencing it by therapeutic agents. Without the principles of chemistry we should be intellectually lost in the human laboratory, and unable to employ chemical agencies in the treatment of disease; and electricity is so correlated with the other physical sciences, and of so much service both in diagnosis and treatment, that its separate study has also become essential. Neither can we altogether neglect geology and meteorology, since conditions of soil and atmosphere are now recognized as important factors in the causation and relief of suffering.

It is scarcely necessary to insist on a knowledge of those sciences which are called "biological." Anatomy and Histology, formerly the mere handmaids of medicine, but now recognized as sciences worthy of independent study, are as necessary to us as is a chart to the navigator; while Physiology, which teaches us the use and mode of action of the anatomical and histological elements, is the medical practitioner.

Zoology and Botany are not so absolutely necessary for us as are the other sciences, but it is evident that they are very necessary as preliminary studies for the biologist, to whom we look for instruction, for without a study of the simple forms and conditions of life a proper understanding of human anatomy and physiology is not attainable, and in so far as they teach us the conditions of existence of the various vegetable and animal parasites which affect the human body, from micrococcii upwards, they are necessary for us as surgeons and physicians. This list of sciences is truly formidable, but I nevertheless assert that there can be no true study of medicine without a knowledge of the principles of all of them; and, for my own part, I have never had any difficulty, as a teacher of clinical medicine, in discriminating easily, by a perusal of their clinical reports, between those students who have, and those who have not, had an insight into the principles of pure science.

Scientific principles are to the physician and surgeon what the sextant and compass are to the navigator. Without them he cannot rise above the rank of a light-hearted man or a fireman, but must be content to remain a mere "pill-monger," or a chirurgeon of a base mechanic sort. With them he may fearlessly launch his bark upon unknown seas, and may have the good fortune to extend the frontiers of science, or discover, as it were, new continents, to give a wider scope to the art which he professes."
The distribution of honors at the French Electrical Exhibition is very gratifying to the pride of the American people, as the American exhibitors have relatively carried off a large share of the prizes.

Edison has maintained the prestige of his country, and asserted the integrity and value of his wonderful series of electrical inventions, by alone receiving a "diploma of honor" for the electric light. This high mark of distinction he shared in other departments with the United States Signal Office, the Smithsonian Institution, the United States Patent Office, and Messrs. Graham & Bell.


That Mr. Edison, with the whole world competing, and with every system represented, should receive from such a critical committee this special recognition and honor, as the inventor of the most perfect system of electrical illumination, appears to decide this point in a decisive manner. The practical application of this system on a scale which will astonish the world, is near at hand. The immense dynamo machines designed for use to illuminate a district in New York City with Mr. Edison's perfected lamps have been placed in position, and the mass of details connected with placing wires and fittings are nearing completion. Soon the word will be given that all is ready, and Mr. Edison will probably enjoy a triumph to which all his previous successes will be insignificant.

Mr. Edison must experience some regret that he was unable to be present at Paris, and in person receive the congratulations which would have been showered upon him, but we understand that he was most worthily represented by Mr. Charles Batcheler and Mr. Otto Moses, whose courtesy and indefatigable exertions have been fully recognized in some of our Parisian exchanges.

An instrument was lately described in a French journal, which was invented for the purpose of detecting oleomargarine as against pure butter.

This instrument discriminated between the specific gravities of the two substances. Shortly after the announcement of the making of this instrument, a report was spread in the daily papers, that the slight difference of density between oleomargarine and butter, was insufficient for this purpose.

A correspondent writes as follows on this subject:

"The report that no difference of density is of any use in distinguishing oleomargarine from butter, is very easily disposed of, as the density of oleomargarine is 0.915 and the density of butter is 0.925. One will float at 15°C in alcohol 532 per cent., and the other in alcohol 50½ per cent. I mean by floating that the butter or oleomargarine will neither rise nor sink, when placed in the alcohol. If placed in the middle it will neither go to the top nor bottom, except very slowly. Of course there are persons who cannot distinguish between 0.915 and 0.925 specific gravities, and who cannot make an observation at a fixed temperature, but it is unreasonable to expect that any process can be satisfactory to such persons."

SCIENTIFIC ASSOCIATIONS IN WASHINGTON.

The three societies at the metropolis, the Philosophical, the Anthropological, and the Biological, all reorganized in October under very favorable auspices. A short account of their proceedings is given below:

PHILOSOPHICAL SOCIETY OF WASHINGTON.—Three papers were read, one on Geology, by G. K. Gilbert, which our correspondent did not hear; a communication on Fog-signals, by Prof. Johnson, of the Light-house Board, and a paper on the Best Methods of Calculating the Solar Parallax, by Professor Harkness, of the National Observatory. Mr. Johnson's remarks were an account of investigations made last summer upon the refractions of sound, in pursuance of the experiments set on foot by Professor Henry. The inquiries were prosecuted mainly in Newport harbor and its vicinity. The facts set forth were of great interest to scientific men and of great practical value to the mariner. Professor Harkness, who is a very ready speaker, gave the Society an explanation of the various methods employed in calculating the distance of the sun and the planets, inclining to prefer the transit observations as yielding the best
These facts induced Mr. Hehner to demand some other and improved method of packing preserved food other than by the use of tin cases.

A remedy appears to hand at a most opportune moment. In the Patent office reports for October 18, last, we find that Mr. Edison has invented a method of preserving articles of food in glass vessels from which the air has been exhausted and a high vacuum produced. The glass vessel is then hermetically closed by sealing off the channel to the air pump, the envelope produced being essentially a homogenous piece of glass. This invention appears to meet the difficulty experienced in the use of tin cans and promises great results in offering a method of preserving fruits and other organic substances in which their original purity and freshness is maintained to a great degree, and the introduction of mineral poisons rendered an impossibility. The specification, as usual, is very brief and we hope to present our readers with a more detailed description of this interesting invention, on a future occasion.

ALCOHOLIC TRANCE.

At a meeting of the New York Medico-Legal Society, held at the Hall of the Academy of Medicine, November 2, Dr. Crothers read a paper on "Alcoholic Trance." The main point of the paper consisted in an attempt to establish the existence of a trance-like condition in inebriates. In this condition they were supposed to commit all sorts of ridiculous, or injurious, or even criminal actions, without a subsequent recollection of what they had done. Dr. Crothers related cases, the like of certain of which no other physician has yet seen or reported, and the like of which it may be quite safe to say no other physician is likely to record in the future. One was that of an engineer who ran a Mississippi steamer an entire trip without knowing it; another of a gentleman who regularly woke out of his "trance" at a railroad station, and was compelled to ask his fellow passengers where he was; a third, a house-painter, who would regularly climb to the top of a house, paint a whole story correctly, come down and "wake up." Other cases were still more complicated, and evidently called into action the visceri muscles of the Doctor's audience. Among the less remarkable instances was one of a hack-driver who became a confirmed drunkard, and several times went to States Prison, finally dying there, after being convicted of stealing horses; and of a solicitor, who had fits of jealousy and suspicion concerning his wife, and made a number of wills in a trance-like state.

Dr. Spitzka stated that he would like to ask the reader of the paper two questions. As far as he could gather, the reports were all obtained from third parties. His first question was whether Dr. Crothers had ever himself seen patients in this alcoholic "trance?"

Dr. Crothers replied that he had.

Dr. Spitzka reiterated that in that case the attendant phenomena had not been described by the Doctor in a convincing manner. His second question was, whether the hack-driver referred to had exhibited any inequality or anomaly of the pupils, the facial folds or tremor of the tongue and hands?

Dr. Crothers replied that he had manifested none of these symptoms, after some hesitation.

Dr. Beard took the floor. His remarks were not of such a nature as to permit the reporter to follow him, but
THE SATELLITES OF MARS.

The outer satellite of Mars was seen here on Nov. 15th, and by an observation of Nov. 20th its position was

WASHINGTON, M. T.
1881. Nov. 20, 13 15. 71° 7'. 45° 6'.

This satellite is therefore near the predicted place. An hour later Phobos seemed to be visible, also near the computed position, but the sky had become a little thick and I could not be certain of seeing this satellite.

The planet will continue to approach the earth until December 21, and the satellites will become brighter. It is possible, therefore, that they may be observed for nearly two months during the present opposition.

WASHINGTON, D. C., Nov. 22, 1881.

A. HALL.

THEORY OF THE MOON'S MOTION.*

About a year ago the Vice-President of the Physical Section of our chief scientific association remarked, in his farewell address: "there are many subjects in astronomy that need investigation, but in most cases the labor required is very great, and the completion of the work would occupy a long time. The lunar theory has been a vexed question for the last two centuries, and may remain so for a long time to come." If persistent, painstaking, and conscientious effort have aught to do with such a matter, we must add to the list of distinguished lunar theorists, including Plana, Delaunay, Hansen, and Delaunay, the name of Stockwell. We cannot say that his researches have yet met with that notice to which they are perhaps rightly entitled. Mr. Stockwell has published a number of monographs on many points connected with the lunar theory during the last six or seven years; and his works show great familiarity with, and expertness in, the involved computations of this sort of astronomical research.

If we may judge from the appearance of the pamphlet before us, Mr. Stockwell has now quite terminated his lunar investigations, and intends to complete the publication of his finished theory of the moon's motion at some early date. In his Introduction he has sketched the early historic development of the question with that explicitness which we should expect rather to have seen in some thorough elementary text-book; strangely, he devotes twice as much space to the ante-Newtonian aspect of the problem as to the most remarkable developments of the mathematical theory which have occurred since his time. He makes no mention of Delaunay, who takes high rank not only among pure lunar theorists, but among the constructors of tables of the moon. His tables are well known to have been the first ever constructed from pure theory.

Though the age of the great lunar investigators is now gone, there are some very surprising results of Mr. Stockwell's "new method of analysis" to which the attention of the few theorists now working at the moon's motion might well be directed. He instances several comparisons of the values of his co-efficients with those obtained by Delaunay in his very refined development; in one case he obtains, by a rapidly-converging series of four terms, a result identically the same with that of Delaunay's series of seven terms; and remarks, "the four terms of my development are more accurate than the seven terms of Delaunay's, since the seventh term of the latter series is thirty times greater than the fourth term of the former." There is nothing new in the fact that the sum of a very small number of terms should come out equal to a very large series, but if theorists can be brought to acknowledge the essential accuracy of the "new method," Mr. Stockwell must no doubt be credited with effecting an enormous advance in mathematical astronomy. Mr. Stockwell has shown satisfactorily to himself the correctness and value of his method, and the facility of its application—he must now address himself to the equally difficult task of making others see it in the same light.

It seems a wholesale assertion on the part of Mr. Stockwell that there are "several terms of considerable magnitude in the theories of La Place, Plana, Pontéculent and Delaunay, which are not functions of the disturbing force;" and we should, at first blush, be inclined to place much confidence in his demonstration that the general integral assumes the indeterminate form in special cases which occur in those theories. It is certainly a most important oversight, and leads us to believe that the lunar theorists who followed La Place would have done much better to have built up theories of their own with entire independence of what anyone else had done. It is a remarkable fact if this discovery has been left for Mr. Stockwell to make. He concludes: "if the computations of the present work are correct, astronomers have carried their approximations to terms of the 5/64,
SUGAR ANALYSIS*

This is an admirable manual of sugar analysis, and will prove a great boon to everyone engaged in sugar work. The résumé of the chemistry of the sugars with which the book opens is of especial value to the student who wishes to get a clear idea of this complicated subject. Perhaps it had been desirable to have had the book delayed a little longer in order to have incorporated the results of the last year's study in sugar analysis, but this objection would obtain equally against any book published at any time. Another valuable feature of the book is its collection of tables referring to all conditions of sugar analysis, viz., specific gravities, solubilities, etc. The author is careful to cite authorities for his statements, and thus anyone wishing to pursue any given topic further can readily do so without being at the trouble of hunting up each theme for himself.

There is, however, a vast mass of French and German literature on certain sugar compounds which might be very appropriately drawn upon in an exhaustive study of the chemistry of sugar, and which is of no use whatever to the analyst. There is much of this in the book before us, and while it detracts nothing from its merit as a help to the analyst, it certainly adds nothing to it.

That portion of the work which is devoted to the description of the optical examination of sugars is to be highly recommended. We have, however, used for three years a Schmidt & Hänisch polariscope, and were therefore a little startled to read "ordinary lamp light, and not the monochromatic light, is required."

We doubt very much whether, in testing the accuracy of the scale of a polariscope, quartz plates of various thicknesses are better than solutions of pure sugar. First of all, the plates themselves would have to be tested, and this would require as much work and trouble as testing the scale directly with sugar solutions. If quartz plates could be secured which were absolutely accurate, of course this objection would not occur.

Among the sources of monochromatic light the author omitted to mention the new double burner of Laurent, which leaves nothing to be desired in the steadiness and intensity of the sodium flame.

There is one statement which the author makes in a note (p. 137) on Clerget's method of analysis that seems calculated to mislead. It is: "It must be remembered that the process is entirely inapplicable when any optically active body is present besides cane or invert sugar, and also if the invert sugar itself exists in an inactive condition as regards polarized light." In point of fact, any optically active body may be present without rendering the process inapplicable, provided it is not affected by the process of inversion. Thus, by Clerget's method we can accurately determine cane sugar in the presence of dextrose, maltose and glucose. In polarization an inverted cane sugar, too, metal tubes should be used, since the temperature is more accurately obtained from an external thermometer than in a glass tube.

The author's directions for estimation of raw sugar and syrups are those which are generally recommended and employed. The description of these methods is full and admirably arranged. In fact, this praise can be bestowed on every part of the work. The only trouble about the methods is that if applied to the ordinary syrups of commerce they will give the most alarming errors.

The great fault of the work, in fact, is found in its failure to give reliable methods for the examination of the mixed sugars and syrups which are on the market to-day.

Perhaps, however, we should not say this is a fault of the book, it is rather a fault of science. To determine cane sugar, invert cane sugar, dextrose, dextrine, and maltose exactly, is a great problem which the author leaves untouched and which demands the careful attention of sugar chemists.

In papers read before the A. A. A. S., at the Boston and Cincinnati meetings, and published in the proceedings for the Boston meeting and in this Journal, Nos. 65 and 66, Prof. Wiley has shown the relation between rotating and reducing power in commercial starch sugars and also a series of determinations of cane sugar in mixed sugars.

Since the polariscope has grown to be the chief instrument in sugar analysis and starch sugars and syrups a common article of commerce and consumption the omission of any reference to those papers is a matter to be regretted.

SHALER AND DAVIS' "GLACIERS."

By W. J. McGee.

I. Introduction.—The extensive superficial modification of the globe accomplished through the agency of water in its three states of aggregation has been rendered possible by certain properties peculiar to this substance, chiefly (1) its powers of assuming the several forms of solid, liquid, and vapor within the narrow range of terrestrial temperature, (2) its enormous capacity for heat, and (3) its power of dissolving other substances.

The temperature of the earth's surface is indeed largely determined by the aqueous vapor contained in the atmosphere; for if it were not for this vapor the solar energy falling upon the earth would be radiated away almost as quickly as received, and could exercise but little influence upon temperature. The narrow range of terrestrial temperature since the beginning of the organic record attests the enormous capacity and marvelous delicacy of this temperature—equalizing agent, for within the limited bounds of the space separating earth and sun, the temperature varies from a hundred thousand degrees above to two hundred and fifty degrees below the Fahrenheit zero; though accidents in this adjustment are attested by the traces of successive ice periods in the geological history of the globe. The influence of liquid water in producing the various phases assumed by the earth's surface, during geological time has long been the subject of study; but it is only within the last forty years that the newly commensurate influence of ice has been detected.

II. The existing glaciers of the earth.—The most accessible of the existing glaciers are those of the Swiss Alps; and the best route for the student to pursue in entering this region is to pass up the valley of the Rhone.

Here, aside from the more obscure evidence of the former great extension of the glaciers, the various works of ice-action became constantly fresher in ascending the river until they disappear beneath the wall of ice constituting the terminal portion of the glacier. At the foot of this ice wall is an irregular mass of stones and earth—the terminal moraine—lying across the valley, cut in twain by the muddy stream emerging from a cavern in the basal portion of the glacier; and the ice itself is glistened by tiny rills and soiled with sand and dirt, and hardened with pebbles and rock fragments, which from time to time roll down its steep front, to the morainal heap below. When the glacier shrinks for several successive seasons, as occurs when the weather is unusually dry and warm, the stream flowing from it becomes a torrent, and the moraine may be separated from the ice front by a belt of striated and polished rock, but sparsely covered with coarse debris; but when the ice advances for a number of years the stream dwindles, and the sheet of earth and stones is pushed forward and crumpled up into a mighty embankment, rising into a range of irregular hillocks. Many such ridges attest the various periods of temporary advance in the history of most of the secularly retreating glaciers. On ascending the ice stream itself, the superficial rock-fragments, pebbles, and earth are found to lie mainly in parallel bands, or medial moraines; and on tracing these to their origin, each is seen to consist of the two lines of matter constantly tumbling down the valley sides or lateral moraines which are brought into contact whenever two glaciers meet and merge into one. Thus the number of branches uniting to form any glacier can be determined from the number of parallel bands on its surface. The ice-stream occupies a crooked and irregular valley, the rate of its motion varying with the declivity, regularity, and width of the channel, just as do those of liquid rivers; though wherever there are considerable irregularities in the channel the strain produces cracks and fissures which gradually widen and form crevasses, or even, where there is a sudden increase in declivity, separates the ice into a mass of irregular pyramidal blocks, or seracs; but when a more uniform stretch of gentle slope is reached the seracs re-unite, and the crevasses close, transforming the fragmentary mass again into a solid,
In an official report of the proceedings of the New York Academy of Sciences, to be found in another column of this issue, Commander Cheyne explains in detail, his proposition for reaching the North Pole in conjunction with Lieut. Schwatka, by means of balloons.

It must be conceded that the project involves great difficulties and dangers, but perhaps not greater than those to be encountered by the ordinary methods, and as new elements of success are made probable, we desire to have the scheme thoroughly discussed on its merits.

The most practical course for Commander Cheyne to adopt, would be to immediately form a committee of Arctic experts, and those who have identified themselves with such projects, when the practicability of his scheme can be affirmed or condemned. Commander Cheyne informs us that he desires the formation of such a committee, and that his plans shall be thoroughly investigated. We, therefore, invite those who are interested in the success of this expedition, to at once signify their intention to co-operate.

Those who have suggestions to make, and can speak from experience, either on the subject of Arctic travel or aeronautic tactics, are invited to express their views.

Commander Cheyne frequently visits our office, and will not doubt attend to any appointment to meet those desiring a personal interview.

The evidence of Dr. Ed. C. Spitzka, at the Guiteau trial, is still incomplete at the date of our writing and we reserve to a later date a full expression of our opinion upon the direct bearing of his evidence on the degree of insanity of the prisoner.

The prosecution appear to have made a mistake in endeavoring to assail the professional character of the witness (which is unimpeachable), instead of closely analyzing the evidence he offered.

No more conscientious and intelligent witness than Dr. Spitzka can enter a witness-box, or one better qualified from experience and study to offer an opinion on the question of insanity; but we shall show that the little band of professed alienists, in dealing with their subject, may be compared to men who have just arrived in a new and partly surveyed territory; roads have been constructed, but where they lead to none can tell; land is reached on which it is dangerous to tread; the ground work of the plan has yet to be sketched, and the wealth beneath the surface has never been probed. The fact is, that the science of the modern alienist is still in embryo, and even its nomenclature undetermined, the facts so far discovered by continental alienists and anatomists, and by such men as Hammond, Wilder, Cleverger and Spitzka in our country, are important and interesting, but they are as yet but the pebbles with which the fabric of the science must be constructed.

Between perfect sanity and insanity there is an immense scale of gradation, and the fact that Dr. Spitzka classifies both Dr. Samuel Johnson and Guiteau under the one head of monomaniacs, shows how wide a range the subject covers, and how subtle are the distinctions to be made.

Of all the numerous topics which are the common field of the physician and the biologist, none is of as great interest, both in its practical bearings and intrinsically, as a fascinating theme, as that of the location of mental faculties in the brain. Year by year scientific inquiry is narrowing down the question of the existence of the mind into the functional realm of those great masses of nerve tissue, which, filling out the cavity of the skull, have already formed an empirical and unconscious recognition by the ancients when they endowed the Goddess Minerva with a higher brow than Venus, and Apollo with a greater facial angle than Raechus.

For a long time observers contented themselves with mere measurement of the volume of the brain; a heavy brain was supposed to be capable of higher mental action than a light brain; the elephant and the whale were contrasted with the alligator and tortoise, and after bitter contests waged in scientific societies, the conclusion was arrived at that only animals approaching each other in size, as well as in zoological position, should be compared to obtain data. The original proposition is sustained by the fact that in weight proportionate to that of the body the elephant exceeds the hippopotamus—the dog, the fox—the chimpanzee, the baboon; the marmoset, the
The glad tidings of the safety of a large proportion of the crew of the Jeanette, and the probability that the missing members of the company will probably be soon heard from, will be a relief to many aching hearts, and welcome to the general public who have taken a great interest in this expedition.

As the success of the expedition has not been referred to in the despatches, the probability is great, that the discovery of the North Pole is still a problem to be solved, but the experience of Captain De Long will doubtless prove very valuable in making future plans for Arctic explorations, and we trust that no time will be lost in obtaining authentic details of the expedition.

From what we know respecting the voyage of the Jeanette, and from other information to date, our opinion is that the route by Smith's Sound, is the most practicable for all who attempt to reach the North Pole, and we still maintain that the plans of Commander Cheyne present a higher prospect for success, than any other scheme which has been announced.

The first step which we advise, is to establish firmly a small colony at St. Patrick's Bay, where coal exists in abundance, and ample protection can be found for stores and shelter for men. This spot is less than 500 miles from the North Pole, and, with such a base of operations firmly established, the coveted prize can surely be won by continued and persistent efforts.

We approve of Commander Cheyne's proposal to utilize balloons, on the ground that no facilities which can be devised by practical scientific men should be neglected, and it is far from impossible that some means of aerial navigation may be invented, which may be at least sufficient for this purpose.

The establishment of the colony at St. Patrick's Bay, should be the immediate plan which should claim attention, without desiring by a rush to accomplish the remaining distance. Time should be given for traversing the 500 miles which intervene before reaching the Pole, and all the devices which science can suggest should in turn be put to the test.

We cannot conclude these remarks without giving a due acknowledgement to Mr. James Gordon Bennett for his liberal outlay in the cause of geographical exploration. Inspired by his generous hand, Stanley braved the horrors of tropical climates and penetrated to the unknown recesses of Africa, and by Mr. Bennett's aid De Long has added new laurels to the American flag, and increased our knowledge of the Arctic regions.

The presence of fossil organisms in meteorites alleged to have been discovered by Dr. Hahn, was fully explained in "Science" (No. 50, June 11, 1881) by Dr. Rachael. Since the appearance of this article I have discussed the subject with many specialists, with the result of finding a general distrust of Dr. Hahn's discovery.

I, therefore, endeavored to obtain a portion of the Knyahinya meteorite which fell in Hungary on the 9th of June, 1866, as many of the most convincing specimens were obtained by Dr. Hahn from it, and by the aid of Messrs. Ward and Howell of the Natural History Museum, Rochester, N. Y., a small fragment of this meteorite recently reached my hands. From this specimen two sections were cut, and ground down to a condition of transparency by a gentleman skilled in such preparations, and are now mounted as microscopical objects.

An examination which I have since made confirms in every respect the correctness of Dr. Hahn's statement, as to what he saw, and it therefore remains only to decide whether the deductions he made were correct. The doubtful forms are very clearly defined and sufficiently large to be examined with precision by a 1-inch objective; one prominent object, which to the uninitiated might be taken for a diminutive clam shell, is found to measure 1.25 by 1.20 of an inch. I was disappointed to find that high powers failed to develop structure which indicated decisively the nature of these forms, and to show the difficulty of arriving at a correct solution, I may state that the two persons to whom I have so far shown the specimens, differed entirely as to their interpretation; the one pronounced them veritable fossils, and the second was equally sure that they were merely interesting forms of crystallization.

I reserve an opinion until the section has been studied with more attention, and comparison made with other specimens now being prepared; in the mean time I shall be pleased to show the section to any person who is interested in this subject, or able by previous study to throw any light on the subject.
As the present number of this journal concludes the second volume of "Science," the moment appears opportune for us to acknowledge our obligations to the many friends of the journal, who, by their contributions of valuable papers, have assisted in placing it in the distinguished position which it now occupies.

The expression of good will and satisfaction which we have received from so many of our subscribers, is encouraging for the future of the journal, for we must confess that our plans for the editorial management have been but partly developed; if we have deserved such recognition in the past, we look forward for a wide extension of our circulation in the future, when the improvements and additions which we contemplate shall be carried out. Arrangements are in progress to increase the number of pages of "Science" from twelve to sixteen, the four extra pages to be devoted to applied and practical science; in this division the most recent application of scientific principles to the arts and manufactures will find a place, and novel inventions of real scientific merit will be fully described.

Suggestions from our readers respecting any improvement or addition which will increase the efficiency of the journal, will be always welcome, and receive consideration, and we ask our subscribers to introduce "Science" to their friends, and to forward us names of those who in their opinion would desire to receive a sample copy.

We are gratified to find that heads of schools and other representatives of the intelligent classes are sending in their subscriptions, and recognizing "Science" as one of the highest educational journals in this country. The United States Commissioner of Education at Washington has expressed his high approval of the journal in this respect, and we hope to find it in the hands of all men interested in the education of others.

Our subscription list now includes Principals of Schools, Professors in Colleges and Universities, Pastors, Physicians, Manufacturing Houses; and we claim that no person of average intelligence should fail to read "Science," for he will find it a valuable and useful weekly journal, and when bound, a standard work of reference for all time.

An esteemed contemporary calls for a scientific journal, “such as the great body of intelligent people will admit with confidence to their homes." "Science" certainly fills this role. The editorial conduct of this journal has been based on a policy to admit the widest discussion of all current scientific subjects, but no editorial bias has been given to any particular set of views. The editor has not himself indulged in policies, nor permitted the discussion of religious questions, believing that the ground covered by investigations of all branches of the sciences, is sufficient for one journal to cultivate, and that aimless attacks on religious belief are foreign to the purpose of a scientific journal, and inconsistent in a country where religious liberty is guaranteed to all.

At the moment of going to press, a copy of Mr. S. F. Cassino's International Scientists' Directory came to hand. We have, therefore, only time to take a glance at the book, which is a handsome work of 400 pages, containing the names, addresses, special department of study, etc., of those engaged in scientific investigations in America, Europe, Asia, Africa and Oceania.

About 18,000 names and addresses are given, and the general arrangement of the work is all that can be desired. The Directory will be welcome to all engaged in scientific work, and we trust that it will be strongly patronized, and thus enable Mr. Cassino to continue his good work, which is still far from complete; although so many names are given in this directory, it clearly represents only a fraction of the whole list of scientists, as such well known names as Professor R. O. Doremus and Professor J. W. Draper, are omitted.

We have no doubt that Mr. Cassino has done his best to make his Directory complete, and we congratulate him upon his success, and it simply rests with scientific men to aid him in making future editions perfect.

On receipt of two dollars we will mail a copy of the International Scientists' Directory to any address in the United States or within the postal union.