THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

BY H. C. HOVEY.

Twenty-five years ago this scientific body met in Montreal, where it now has met again. Of the members who were present at the former meeting only three remain. The city that then had but 50,000 inhabitants now has 150,000. The American Association for the Advancement of Science was originated in Philadelphia in 1848, but held no meetings from 1860 to 1866 on account of the war, which explains the fact that this is but the thirty-first annual meeting.

The opening ceremonies this year, August 21, were quite impressive. After the new President, Dr. J. W. Dawson, had taken the chair, prayer was offered by his Lordship the Bishop of Montreal. Addresses were made by the Mayor of the city, wearing the "collar of office;" by Dr. T. Sterry Hunt, Dr. Thorburn, of Ottawa, and others. It had been hoped that the Marquis of Lorne might have been present, but he was prevented.

The attendance was unusually large. The list of scientific papers entered was 256, most of which received attention. The custom is allowed, however, of letting favorite speakers run over the time allotted to them, thus crowding out others having an equal claim to be heard. For instance, one paper, to which fifteen minutes were assigned in the programme, occupied, with very rapid delivery, fifty-five minutes, not including subsequent discussion. This member must have known that his paper could not be read in fifteen minutes. I should add that in this instance the contribution was valuable and worth hearing throughout. But in most cases the quality would be improved by condensation, and papers should not greatly exceed the time indicated on the programme.

The American Association for the Advancement of Science is divided into nine sections for the special consideration of as many branches of science as possible, and these sections meet separately after the general sessions. A great amount of work is thus accomplished; and while, perhaps, some of the papers read are crude or visionary, the majority are the fruit of long toil and wide research.

The first place, among addresses before the whole body, belongs to the address of the retiring President, Prof. G. J. Brush, of Yale College. It was delivered in Queen's Hall, which was crowded with hearers. The subject, "The Progress of American Mineralogy," led the speaker over an extended range of observation. The main points were as follows. The distinct beginning of the science was in an association, formed in 1798 in New York City, as the "American Mineralogical Society." Only two minerals new to science had before this been found here, namely, labradorite and strontia. The study of mineralogy was carried on by aid of European collections. Four men were especial leaders in active search for minerals peculiar to American rocks. Dr. Archibald Bruce founded, in 1810, the *American Mineralogical Journal*, and described in it the first discoveries made in this country, and described by an American, namely, the *native magnesia* of Hoboken, and the *red zinc* oxide of Sussex Co., N. J. In 1805, Col. George Gibbs, of Rhode Island, brought back with him from Europe the most valuable collection of minerals ever brought to this country. He then devoted his great wealth to extensive journeys and unselfish research to unfold the resources of his native land, generously aiding others in the same direction. Another was Prof. Parker Cleaveland, whose treatise on Mineralogy and Geology (1816) met a pressing need, felt by all classes of students, for a distinctly American text-book. The fourth name was that of Prof. Benj. Silliman, who raised the funds to purchase the splendid cabinet of Col. Gibbs, which has probably done more to stimulate research and create an interest in mineralogy than any other one agency. This was added to minor collections previously made in his travels in this country and in Europe. Silliman also established, in 1818, the *American Journal of Science*, to which he furnished many original contributions. For more than fifty years he was a professor in Yale College; and when he resigned he was happy in having Prof. J. D. Dana as his successor, who had already made himself eminent as a mineralogist.

Prof. Brush traced the results of the work done by these pioneers, whose individual enthusiasm and enterprise really upheld the science, to which they were devoted, during the first twenty-five years of this century. Besides the four men to whom pre-eminence was given, others were named, whose long journeys on horseback, by canal-boats, and in other primitive ways in the interests of science, were such as to command our admiration. The public mind at length caught their enthusiasm, and government came to the aid of science. The first State Geological Survey was made by North Carolina, in 1824: the example was followed in 1830, by Massachusetts, and then by other States, until now the whole territory of the United States and Canada either has been, or is being, surveyed. It cannot be attempted, however, to follow the admirable sketch of work now being done by living mineralogists, nor to reproduce the highly suggestive remarks on the relation of this science to chemistry and kindred sciences. Evidently a broader foundation is now needed for it than in earlier days, and there must be co-operation between special investigators. There is an interdependence between mineralogy, geology, chemistry, and physics, such as warrants the continued existence of an association that shall make sure that every new fact and law observed shall be used for the common advancement of all the sciences.

The Vice Presidents of the several Sections opened work in their respective rooms by addresses. In Section A, (Astronomy and Mathemathics) the subject of the opening address by Mr. Harkness was "The Transits of Venus." In Section B (Physics), Prof. Mendenhall spoke on "Methods of Teaching Physical Laws." In Section C (Chemistry), the address by Dr. H. C. Bolton reviewed the history of chemical literature. In Section D (Mechanical Science), Prof. Trowbridge spoke on the "Importance of Experimental Research" in this era of applied science. Prof. E. T. Cox laid before Section E (Geography and Geology) some results of his observations along the Pacific slope. Prof. W. H. Dall reviewed the progress of American conchology, in Section F (Biology). Section H (Anthropology) was opened by an address by Prof. Daniel Wilson, read by Prof. Otis T. Mason, on the "Physical Characteristics of Native Tribes of Canada." Section I—a new section of Economic Science and Statistics—was opened by an address by Mr. Elliott, chiefly devoted to explaining the special scope and province of Economic Science. All these addresses were of a most interesting character.

It would be gratifying to give a full account of all the papers read in the various sections from day to day; but, considering that there were about 250 of them in all, it cannot be expected that they should even be given in a condensed form. The very list of titles is formidable to the eye and one wonders how even the devotees of science can be induced to listen to so much learning in the sultry days of August. The attendance, however, was good in every room, from first to last, and the interest did not seem to flag.

Recognizing the fact that another might mention other articles of equal merit with those that attracted the writer's notice, I may mention a few of the noteworthy contributions, without specifying in each case the section before which it was laid.

An important paper was read in the section of Mechanical Science, by Mr. Joseph L'Etoile, of Ottawa, on "Atmospheric Currents, Electricity, and Gases, as related to Practical Aerial Navigation by Balloons." He held that such navigation of the air is perfectly feasible, but that many improvements in balloons are needed as to their form and general construction; some of these he pointed out. He proposed that the balloon should take the shape of a fish, and be provided with a propeller, a rudder, an air compartment, gas and air pumps, electric battery, electric motor, safety valve, ropes, and ballast. Each improvement was particularly described, and it was shown that the balloonist might have a vehicle as safe and controllable as any other machine, with certain advantages of a remarkable nature.

Prof. W. A. Rodgers offered a communication concerning the problem of "Fine Rulings, with reference to the Limit of Naked Eye Visibility and Microscopic Resolution." The finest lines ever reached are those of Nobert's bands, namely, 113,000 to the inch. No one has been able to go with certainty beyond this limit, although Mr. Fasoldt, of Albany, claims to have ruled one million lines to the inch. Conceding this to have been done, it is not conclusive as to their visibility. In the discussion that followed it was shown that when ruled lines are filled with graphite, and the surface covered with a film of moisture, they become for a moment easily visible, even though their width is but one one hundred-thousandth part of an inch.

Prof. C. A. Young gave a description of the new twenty-three-inch equatorial recently erected in the Halsted Observatory, at Princeton, N. J., and which is regarded as the most nearly perfect telescope in this country, if not in the world.

A singular discussion arose in consequence of a paper read by Prof. De Volson Wood, of Hoboken, on "A Correction in Newton's 'Principia' in regard to the Time of the Approach of Two Spheres." Newton says that if two spheres of the same material as the earth, and each one foot in diameter, be placed 12¼ inches from each other between their centers, in void space, they will be a month's time in coming together by their mutual attractions; whereas the experiments of Prof. Wood showed the time required to be less than 5¼ minutes. Dr. Haughton at once challenged the quotation, saying that it was incredible that so accurate a writer as Sir Isaac Newton should have fallen into such an error. A spirited discussion followed, that led to the production of the Jesuits' edition of the famous Principia, with numerous foot-notes. Dr. Haughton claimed that the second volume, from which Prof. Wood had quoted, while a great literary curiosity, was not genuine, because it referred to matters that were unknown in Newton's time. Prof. Wood, in defense, asserted that the error he had corrected was found also in the larger edition of Newton's works, page 527, in his "Treatise of the System of the World," and he took it for granted that it was genuine.

Dr. Haughton read a paper on "Darwin's Theory of the Evolution of the Earth-Moon System, in its Bearing on the Duration of Geological Time." Concurring in Darwin's published calculations, he differed from his physical conceptions. The eighteenth century astronomers believed in the perpetual motion of the planetary system, but now we know that perpetual motion is as impossible among planetary bodies as it is at the surface of the earth. It used to be held that the planets passed through a liquid to a solid condition, and that the earth now consists of a solid crust resting on a fluid mass. But Sir Wm. Thomson has proved that the present condition of the earth, as a whole, is more rigid than glass or steel. From the most probable hypothesis as to the rings of Saturn being composed of discrete meteoric stones; from the low specific gravity of Jupiter and other outer planets; from recent researches as to meteoric showers and comets; and from investigations into the true nature of asteroids, as well as from other considerations, it is probable that when the earth and moon separated from the solar nebula, they did so as a swarm of solid meteoric stones, each having the temperature of interstellar space, *i. e.*, about 460° F. below the freezing point of water. The earth and moon were pushed apart by tidal friction; and the algebraic calculations by which this may be proved fit equally well the hypothesis of a viscous earth or that of a rigid earth with a liquid ocean. Sir William Hamilton's theory, that one hundred million years ago the earth was as hot as melted steel, differs greatly from Dr. Haughton's theory that its component particles were intensely cold, and that volcanoes were but as pustules on the surface. His paper was discussed by Profs. Chase, Young, and others, eliciting much interest.

Dr. George F. Barker's observations on secondary batteries, in which he directed attention to the cheapest possible method of producing electricity for the purpose of illumination, were regarded as having a practical bearing of very great value, and explained the way of facilitating the reversal of electro-motive power in secondary batteries at a minimum of cost.

Prof. W. H. Brewer drew attention in a paper on the "Apparent Size of Magnified Objects," to a series of experiments he had made with many persons as to the relative size of objects as seen by the microscope and the naked eye. A magnified image having a theoretical value of 4·66 inches, appeared to one observer to be six inches, to another twelve inches, and to another (an experienced draughtsman), *five* feet in length. The practical conclusion was that, while much depended on a healthy condition of the eye, much was attainable by education, it being evident that an eye educated to use the microscope would be less liable to error than one that had never been trained.

Mr. W. Le Conte Stevens, who has made the subject of stereoscopy a study, read a paper describing the results attained by the use of the electric spark in binocular vision. When the relation between the visual lines was such as to imply no unusual muscular strain, it was found possible to interpret the binocular retinal image by the aid of a single spark.

Prof. A. Graham Bell's paper on a newly devised apparatus for the detection of bullets in wounds was listened to with especial interest, on account of its failure to show the true location of the ball lodged in the body of the late President Garfield. Prof. Bell explained his improvements, by which he was confident of more exact results on any future occasion of a similar nature.

In the section of Geography and Geology, highly important papers were read on a variety of interesting topics; some of which will be noticed further on.

Prominent among foreign visitors present was the celebrated Dr. W. B. Carpenter, who delivered an interesting address in Queen's Hall, on the "Temperature of the Deep Sea." He stated that previous to his own investigations due allowance had not been made for the enormous pressure on the bulbs of thermometers at great depths, by which the mercury would be forced up into the tubes and record fallacious indications. His experiments led to the construction of the Miller-Casella thermometer, capable of bearing a pressure of five tons to the square inch, without affecting the temperature recorded. With this improved instrument his deep sea observations were made. The generally received impression had been that the sea had a universal temperature below a certain depth, of 39 degrees Fahr. But Dr. Carpenter found the temperature of the deep basin of the North Atlantic to be 35 degrees, while in the Färöe Channel, within a hundred miles of Scotland, it fell to 29½ degrees. This proved that, in the Färonese Channel, there was a tongue of the Arctic current. In the Mediterranean Sea, while the surface temperature was 60 degrees, the great mass of water below, down to the depth of 2,500 fathoms, was unvaryingly 55 degrees. The reason of this temperature, 20 degrees higher than the mass of the Atlantic, was found in the fact that the Mediterranean was walled off by a ridge at the Straits of Gibraltar, by which the colder currents were shut off. A similar phenomenon was presented in certain partly inclosed seas in the Pacific Ocean. The Polar currents, however, swept without interruption through the great body of oceanic waters, obeying laws that could be easily demonstrated in the lecture-room, by applying a block of ice at one end of a tank, and a plate of hot iron at the other, the currents being indicated by coloring the water. The Arctic and Antarctic underflows meet and rise almost to the surface near the Equator in a very cold current, so that, while the surface may have a temperature of 78 degrees, it falls to 35 degrees only about 300 feet below. Receding from the Equator this submarine temperature gradually rises, as the cold currents fall again toward the bottom of the sea.

In connection with this play of currents, Dr. Carpenter explained the Gulf Stream, which carries into the mid-Atlantic an enormous body of warm water, not losing its velocity till it encounters the polar currents. The venerable physicist occasionally relieved the severity of his learning by bits of pleasantry that were very well relished by the hearers; as for instance, when he expressed apprehension that some ingenious Yankee might divert the Gulf Stream by cutting through the Isthmus of Panama, by which pro cess Great Britain might possibly be rendered a howling wilderness. We were implored not thus to bring ruin on the British Isles.

One of the most thoroughly discussed papers presented before the Geological Section was that by Professor Carril Lewis, on "The Terminal Moraine across Pennsylvania." The southern limit of the great ice sheet that once wrapped a large part of North America is marked by a terminal moraine. It is claimed that this deposit has been traced from Cape Cod, where it begins, across Rhode Island, Long Island, and New Jersey, into New York State. It has also been traced across Ohio, Indiana, Illinois, Wisconsin, Minnesota, and Dakota, to the Saskatchewan region of the Dominion. Professor Lewis claims to have filled the gap in this long chain by his discoveries in Pennsylvania. He traced the moraine for 400 miles, across the great divide between the Atlantic and the Gulf of Mexico, where it exists at the height of 2,480 feet above the sea. Where it enters the State of Ohio it has descended to the height of 800 feet above the sea level. The line between the areas of glacial action and those where the ice had not been were so sharply defined that you could stand with one foot on the striated rock and the other on rock that had not been glaciated. All along this line of demarkation were found crystalline bowlders and masses of labradorite that must have come down from the Adirondacks and highlands of Ontario. Dr. Dawson and several other geologists of note took part in the discussion of this important paper.

Prof. F. W. Putnam read papers in the Anthropological Section on "The Exploration of Mounds in Ohio and Tennessee," in which flints were found, as well as fragments of pottery and numerous animal remains. The remains of a log cabin had also been discovered belonging to the "Stone Grave Period" in Tennessee. The first indication of the building was a piece of charcoal found in digging. This led to the unearthing of a mass of charcoal so fresh as to be plainly the remains of some burnt building. The clay between the logs was well preserved, and even the marks of fingers could still be seen. The antiquity of the structure was shown by the fragments of pottery found amid the ashes.

Prof. Putnam also read a paper to show that copper implements and ornaments had been in use from the beginning of the so-called Neolithic Period. None of these were cast, but all were hammered out from pieces of native copper. Mr. R. P. Hoy held that the Mound-builders were the immediate ancestors of our modern Indians. Some of the mounds are of very recent date, as is evinced by the brass kettles, iron tomahawks, beads, and other modern articles found in them.

A valuable paper, read by Mr. Horatio Hale, traced Indian migration by linguistic peculiarities. Curious resemblances between the Indian and the Basque languages lead to the conclusion that the ancestors of our Indian tribes were emigrants from Europe. It is also probable, as Mr. Hale thinks, that the inhabitants of modern Europe are people of a mixed race, forming a transition in mental and physical traits between the eastern Aryans and the aboriginal Americans.

Among the most entertaining papers read before Section H were those presented by Mrs. Erminie Smith and Miss Alice Fletcher, who have for a long time actually lived among the Indians and been adopted into their tribes, in order to gain information as to their home-life, manners and customs, beliefs and superstitions, and any other peculiarities of interest to science.

Among the concluding papers in Section E was one by the writer on "Subterranean Map Making," particularly with reference to American caverns. A map of Mammoth Cave, Kentucky, was exhibited, being the completion of the diagram only partially shown at the Cincinnati meeting last year, and also a new map of Luray Cave, Virginia, made from a careful survey by the proprietors last winter. This was followed by a paper on the "Caves of Staffa and their Relation to the Ancient Civilization of Iona," by Mr. F. C. Whitehouse, of New York, who advanced the original idea that Fingal's Cave, and other grottoes in its vicinity, were artificial productions, instead of being caused by erosion. While there was a difference of opinion as to the validity of Mr. Whitehouse's conclusions, all who heard him were interested in the explanations he offered, and regret was expressed that more time might not have been allowed for the discussion of his novel views of this famous locality.

Minneapolis was chosen as the place for the next meeting. Prof. C. A. Young, of Princeton, was elected President, and the following were elected as Vice-Presidents: W. A. Rogers, H. A. Rowland, E. W. Morley, DeVolson Wood, C. H. Hitchcock, W. J. Beale, J. D. Cox, O. T. Mason, and F. B. Hough. The general Secretary is J. R. Eastman, with Alfred Springer as assistant. Treasurer, William Lilly.

In general the Montreal meeting, which came to an end August 30, may be regarded as one of the most interesting and successful ever held by the American Association for the Advancement of Science The number registered as in attendance was 937, of whom 324 were new members. The citizens took an interest in the public meetings, though hardly to so great a degree as they did at Boston and Cincinnati. The social element was, however, unusually prominent, and added much to the pleasure of the occasion, without really interfering with graver matters of scientific research. President Dawson give his reception on the occasion of the formal opening of the new Peter Redpath Museum. As the closing feature of this entertainment there was an exhibition of a large number of fine magic lantern views of cave scenery, which had been put at the disposal of your correspondent for that purpose by the managers of the Mammoth and Luray Caves.

A word may be added as to the special displays of minerals and fossils, which is rather less than in former years. Prof. Ward has some remarkable novelties from his recent visit to New Zealand, the most noteworthy being a case of brilliant bird-skins, some of which are extremely rare; also some peculiarly fine glass sponges.

Prof. D. A. Bassett has on exhibition, in an adjoining room, a collection of carboniferous crinoids from Crawfordsville, Ind. The specimens are very perfect, and the skill shown in working them out is unusual, leaving them in bass relief on the native limestone in which they were found. Groups of crinoids are thus seen on single blocks. One slab, about three feet square, contains eighty crinoids still lying in their original position as petrified. Other blocks contain ten or twenty each, the ornate heads and long, slender stems intertwined. These beautiful specimens were not on sale, but were exhibited as objects of scientific interest.

The local Committee, of which Dr. T. Sterry Hunt was chairman, managed their multiform duties with skill and efficiency. Mention should especially be made of the various delightful excursions that were planned to Quebec, Ottawa, Lake Memphremagog, and also of the visit to the Montreal Harbor, the celebrated Victoria Bridge, and the shops of the Grand Trunk Railroad.

It was announced in the Montreal papers that the British Association for the Advancement of Science would meet there in 1884, and that the American Association would probably meet with them. While such an international meeting would be highly gratifying to many persons, it may be safely said, in view of the rules of those scientific bodies mentioned, that nothing definite has been determined, and that any announcement must be premature beyond the mere fact that the subject is under discussion.

Harmony Mills, Cohoes, N. Y.

A strike of eighteen weeks' duration was ended at the Harmony Mills, Cohoes, August 28. The strike began April 24. The following figures give an idea of the forces in conflict, the losses suffered, and the results:

The number of employes, including every grade, is nearly 4,000, and the pay-roll every four weeks will average $70,000. The weavers are the most important, and of the laborers they number 1,200, and operate five looms each. Their daily wages will average $1.10, and their total loss during the "stayout" reaches $116,000, besides $12,000 to overseers and section hands. There are 113 pairs of mules, and the loss to the overseers, mule-spinners, and spinning-room hands amounts to $34,940. In the carding-rooms there are 560 employed, on whom a loss in wages of $44,000 is entailed. The spinning department is operated by children, and their addition to the general loss will exceed $25,200. Spoolers and warpers would have earned $18,000, and the dressers and all other departments, including laborers, would have been credited with $16,500. The total loss in wages amounts to $267,240. These figures are under the ten per cent reduction. In round figures the strike has cost $270,000. On the day the mills shut down there were 380,000 pieces of cloth in the market at Fall River, which were selling at 3⅞ cents a yard. One week ago the stock on hand at that point had been increased 350,000 pieces, and the price had declined, while cotton was 1⅜ cents a pound higher. It is estimated that, at the present state of the market, a net gain to the Harmony Mills of $65,000 has been made, which more than balances the loss by the stoppage. The operatives are in arrears $15,000 for rent, and thousands of dollars for provisions, clothes, and other necessaries. The Harmony Mills suffer a direct loss of taxes, insurance, and water power amounting to $45,000. The production is 6,500,000 yards, or 120,000 pieces, every four weeks.

The Harmony Mills are six in number and of the following dimensions: No. 1, four stories, 550 feet long, 70 feet wide; No. 2, three stories, 600 feet long, 75 feet wide; No. 3, five stories, and including the extension 1,185 feet long, 70 feet wide, with a wing 125 x 56 feet and five stories high; No. 4, five stories, 200 feet long, 50 feet wide; No. 5, five stories, 500 feet long, 50 feet wide; No. 6, known as the "Ogden Mills," four stories, 500 feet long, 50 feet wide.

Mr. John Pender and Submarine Telegraphy.

Mr. John Pender, M.P., one of the earliest promoters of ocean telegraphy and now controller of a large part of the world's cable systems, arrived in this city August 30. Mr. Pender has been directly interested in the laying of almost every important ocean cable throughout the world. Describing the combined cable systems under his direction, he said:

"We have outside of the eight Atlantic cables a through system direct to India, touching at the following points: It proceeds from Porthcurno, in Cornwall, to Vigo, Lisbon, Gibraltar, Malta, Alexandria, Suez, Aden, Bombay. A duplicate cable system starts from Marseilles across to Algiers, and thence to Malta and Alexandria. A further system connects the whole of the Greek Islands with the Levant, Constantinople, Cypress, and Odessa. Another line starts from Madras, goes to Rangoon in one direction, and thence to Penang. A duplicate line also starts from Madras, goes to Penang, Malacca, and Singapore. From Singapore one of the main systems proceeds to Saigon, Cochin China, and Hong Kong, connecting the latter place with a system in connection with Shanghai and Japan. There is also a cable from Hong Kong to Manila. The second main system proceeds from Singapore to Australia, touching at Java on the way, and connects Australia with New Zealand. Another system proceeds from Aden to the Cape of Good Hope, touching *en route* at Zanzibar, Mozambique, Delagoa Bay, Durban, and the Cape. Our system in the Brazils connects that country with Europe. These cables are submerged in depths varying from a few fathoms to nearly three miles. On one occasion a message was sent from London to San Francisco in less than two minutes."

How to Cool an Apartment.

A simple way of cooling the air of a room is described in the New Orleans *Picayune* of a recent date. The composing room of the *Picayune* is situated in the upper story of its publication house, just under the roof, and in summer is extremely hot. This season an inspiration seems to have come to one of the oppressed occupants, and in accordance with it a vertical wooden box was constructed in the corner of the room, with openings at the floor and ceiling, and furnished with a pipe for supplying water at the top, and a pan and drain at the bottom for receiving the flow and carrying it safely away. The supply pipe was bent over the upper end of the shaft, and fitted with a rose like that of a watering pot, so as to deliver a shower of spray instead of a solid stream. On connecting it with the service pipe, the movement of the water was found to cause an active circulation of the air in that part of the room, which was drawn in at the upper opening of the shaft and issued again, cool and fresh, at the floor level. The most surprising thing about the experiment seems to have been the effect of the water in cooling the air to a degree much below its own temperature. With Mississippi water, which when drawn from the service pipe indicated a temperature of 84°, the air of the room, in which the thermometer at the beginning of the trial stood at 96°, was cooled in passing through the length of the shaft to 74°, or about 20° below the temperature at which it entered, and 10° below that of the water which was used to cool it. Of course the absorption of heat by the evaporation of a portion of the water accounts for its refrigerating effect, but the result seems to have been so easily and inexpensively attained that the experiment would be well worth repeating in other cases.

Notable Characteristics of American Minerals.

In his address as retiring president of the American Association Professor Brush mentioned several notable characteristics of American minerals, among them the grand scale upon which crystallization has taken place—common mica in sheets a yard across, feldspar where a single cleavage plane measured ten feet, prisms of beryl four feet long—and so in general much larger crystals than those obtained from European localities. Another noteworthy fact is the occurrence, in abundance, of some of the rarer elements as constituents of the minerals found.

For example, among the rare earths, glucina, zirconia, etc., lithium occurs in our lithia micas, and spodumene, containing from five to eight per cent of lithia, occurs by the ton in at least one locality. Among rare metals which form metallic acids, columbium, the first metal new to science discovered in America, is found from Maine to Georgia. Many other examples were given, including the rare metal tellurium, which is found in Colorado in one locality, where masses of twenty-five pounds have been taken out. Yet only a small portion of the United States has been thoroughly explored, and we are far behind Europe in the variety of minerals obtained from our mines. The careful inspection of quarries and mines is much to be desired, rich sources for minerals, where valuable material is in danger of being buried out of sight. If our trained mineralogists would oftener go into the field, and if our wealthy amateurs would aid in exploring the American localities as freely as they engage in importing costly specimens from Europe, they would do much to foster science.

Improvements at Red House Observatory.

Mr. William R. Brooks has just mounted at his private observatory—Red House Observatory, Phelps, N. Y.—a new reflecting telescope of 9¼ inches aperture, of his own construction. It is made on the Newtonian principle, and of short focus. It is designed mainly for comet seeking, a branch of astronomical work to which Mr. Brooks is devoting special attention. The telescope is mounted as an alt-azimuth instrument. The light-grasping and defining powers of the telescope are excellent. Six eyepieces belong to the instrument, giving a large range of magnifying powers. The comet eyepiece is a positive, giving a clear field of 1½ degrees and a power of 30 diameters.

Storm and Freshet Signals.

Our correspondent, "F. G. S.," suggests that life and property might be saved in the northwest by a system of gun signals warning people of the approach of hurricanes, floods, and the like. The direction and degree of the danger might be indicated by the number or rapidity of the discharges. This, of course, in sparse communities and in regions unprovided with telegraphs. Systems of gun signals might be agreed upon and operated profitably by settlements in river valleys subject to sudden overflow. It may be doubted whether gun reports would not be drowned by the roar and thunder of the severer tornadoes; and yet, supplemented with telegraphs, they might prove very useful.