

American Association for the Advancement of Science.—No. 5.—(Concluded.)

ECLIPSE OF THE SUN IN MAY 26, 1854.—Professors S. Alexander, of Princeton, and J. Henry, of the Smithsonian Institute, were observers of this phenomenon at Ogdensburg, N. Y. Some account of these observations have been published already. Prof. Alexander said at the time of the first internal contact, when the cusps were approaching, each detached a drop which the advancing cusp soon caught up. Next came a view of the outline of the moon, seen by light extending from cusp to cusp. Then came a twilight quite bright near the edge of the moon; then came the edge of the sun, a slender broken line, like the mercury in a thermometer tube when the column is broken. Daguerreotypes of the sun, then taken, and others since taken, have a double image. It appears that the rays causing the secondary image underwent two reflections. And it results that the image from unreflected rays is negative or dark, while the secondary image was bright. May it not be that some such means may sketch the immediate vicinity of the sun? "London smoke" glass seems to take off the glare from a landscape so as to give great beauty to a photographic sketch.

Professor Henry said it is now settled that this red light comes from the edge of the sun, and can be seen only by the aid of peculiar colored light. But using a large Fresnel lens, and throwing the image two inches in diameter on wood, it took fire, and behold! in the smoke I saw the red flames of the sun as seen seventeen years before! And, strange to say, they were only visible in the glass which showed the red flame in the sun. When the eye becomes tired by gazing on bright white light, the flame of a candle is invisible through all other screens but that kind; in that it is crimson. It is probably a subjective color existing in the eye, and is the result of white light.

SALT MARSH SODS USEFUL.—Lieut. Hunt has made salt marsh sods serve a useful purpose at Fort Adams, the big fortification at Newport, where he is superintending some works.

The coarse sedgy grass found along the seaboard, especially on the New England coast, is the quality that was used. The sods are applied at Fort Adams for facing the breast-high slope of over 1,000 feet of battery crest. It has heretofore been found impossible to find any grass sodding which will stand on these slopes. After careful observation, there seems to be every reason to hope that these will perfectly meet the demands of this construction. On Fort Adams alone there is an extent of over two miles of such crest, whence its importance is apparent.

The same material was used for building a parapet of a fort at Gloucester, Mass., during the war of 1812.

ON WINDS.—Capt. Wilkes read a paper on this subject, and he approached it with diffidence. His views are original, and contrary to some opinions considered "established."

There is found to be a belt of heated water running around the world. The equator of heat lies mostly north of the equator, dipping only once south of the equator for a few degrees in the center of the Pacific. Temperature is the great destroyer of the equilibrium of the atmosphere. Franklin first discovered that a north-west storm began at the south-west. Trade winds have no connection with the rotary motion of the earth. Under the equator we find winds blowing from the west. Take the world over, there is more west wind than from the east. The south-east trade winds are entirely different from those of the north. Trade winds never blow home to the land—calms or monsoons intervene. In the Pacific the trade winds are much more irregular than in the Atlantic. The heated belt of water, the heated deserts, and the heated mass of water in the center of the Pacific, are the causes of trade winds. All of them rush toward the heated areas. The circulation of the atmosphere is not between the equator and the poles, but between the upper and lower regions of the atmosphere. When the trade winds pass the Andes they make a leap of 300 or 400 miles before touching the sea again, and in that space are the monsoons. When the sun is vertical the trade winds are fitful and squally, and not regular as the monsoons are. The

and the sea breezes are the illustration of all winds, and even of storms. Cold air will go to the warm, and never the warm to the cold. No return current was noted at the top of Mannahoa. The earth does not slip away from its atmosphere, as meteorologists suppose. This is shown by the ascent of aeronauts. Here he proved to the satisfaction of all doubters that the winds are not caused by the inertia of the atmosphere, letting the earth slip past it, which, if it made the wind, would make it blow 1,000 miles an hour. There are no rain-bearing winds. Vapor percolates or filters through the atmosphere, and travels against the wind. On a point of the western coast of South America in the rainy season it rains just five hours each day, and then clears off; and it takes the sun just about the same time to cross the Atlantic, and it seems to bring its daily supply of rain with it.

IRON.—J. D. Whitney gave the following interesting account of iron deposits. He said that there were scattered over the earth deposits of iron of peculiar character and extraordinary purity, and that the mode of their occurrence was also peculiar; they belonged to certain systems of rocks and were found only in those systems. The principal localities in which this iron occurred were Scandinavia, Northern New York, Lake Superior, and Missouri. In Sweden there was a single bed 700 feet in width by four or five miles in length. The deposits in Northern New York were not so extensive, but the Cleveland Iron Mountain in the Lake Superior country, rose to the height of 1,039 feet above the lake, with a breadth of 1,000 feet, and was entirely composed of iron ore. Along its summit were numerous knobs 30 to 100 feet in height, which were perfectly pure. There were numerous other mountains in Missouri which furnished equally pure ores. The ores thus found were almost always of two kinds, specular and magnetic. The specular predominated in Sweden, Superior, and Missouri, while the magnetic prevailed in Northern New York. In Superior the iron beds lay between trap and talcose slate; in Missouri porphyry was near; in New York it seemed to have been sedimentarily deposited in lenticular masses, and afterward subjected to metamorphic action; these all in azoic rocks. As the azoic periods were more violent in their action than later periods, it was probable that what was thrown up during those periods came from a deeper portion of the earth, and we might hence infer that there were great deposits of pure iron deep down in the earth.

WEIGHTS AND MEASURES.—Prof. Bache, of the Committee on Weights and Measures, said that the world seemed to be growing riper and riper for the adoption of a uniform system. At the Exhibition in England this took a definite form, and an association was now being formed in England for the purpose of producing such uniformity. While we were distributing our weights according to the British system, they were taking steps toward a better one. There was also a committee on this uniformity at the Paris Exhibition. He would present the following resolution:

Resolved, That the Committee on Weights, Measures, and Coinage be authorized to communicate with other associations or public bodies, or with individuals, in regard to the attainment of permanent uniformity in weights, measures, and coinage.

COAL AND FOSSIL FISHES.—Prof. Hall said that in the shales of the Hamilton group there were large accumulations of bituminous matter. He said also that he was convinced that about three-fourths of the Missouri and Illinois coal fields marked by Owen would have to be wiped off the map, and its place supplied by Silurian with its Pentamerus, obolus, and other characteristic fossils. He had seen Lower Silurian and Upper Silurian fossils over large areas of Owen's coalfields. He supposed most of that coal to be outlayers resting in basins, and having no connection with each other.

Prof. Agassiz said that he might not for years have an opportunity of making known the results of his comparison of fossil fishes. The general result in regard to the coal measures was, that there were two very different kinds of fishes, one represented by the very metamorphic fragments now on the table, and

identical in its character with that which Dr. Newberry had found in Ohio, and that of Glasgow, the other in Southern Illinois, whence Dr. Cassidy had sent him a number of fossils, were ten or twelve fishes, as many as were generally found in a water basin after fishing for one season. This fish found was identical in its character with that of Bristol in England. The two were as different as the fauna of the Baltic and Mediterranean and the Red Sea.

REMARKS.—A greater number of papers were read at this meeting than at any previous one. We have only presented the leading features of some which we thought possessed most interest for our readers. Prof. Agassiz appeared to be the ruling spirit at the meeting; he exhibited a profound knowledge of almost every subject discussed, and it is flattering to him and our country, that he has refused the liberal offers from the Edinburgh University in Scotland to fill the chair occupied by the late Prof. Forbes, preferring to reside where he has such a new and wide field for future investigations. Our readers will have observed that most of the papers presented are more speculative than useful in their character, and it is to be regretted that too little attention is given to practical science.

The Committee appointed on reforming our weights and measures, we hope, will effect something; but when we consider how long the subject has been before the Association we are inclined to place it on the list of fogies. There seems, also, to be a kind of family aristocracy among some of its members, for at the meeting held at Cleveland, two years since, a paper was read by J. Brainard on the chemical formation of quartz pebbles, which was ordered to be printed but countermanded at the next meeting in Washington, while its author was absent. In fact, Mr. Brainard was snubbed, we think, in rather an arrogant manner by the old Dons, such as Prof. Bache, who should have a little more tender regard for the feelings of the younger aspirants (though they may be wrong) for scientific renown.

Prof. Dana, the retiring President, delivered a profound address on the Science of Geology, which will be published in the Transactions. The next meeting will be held at Albany, N. Y., in September, 1856.

Improvement in Government Firearms.

There is at Springfield, Mass., a very large and important establishment, carried on by the U. S. Government, for the manufacture of firearms. A large proportion of all that are made for the public service, come from there. The *Springfield Republican*, in describing a variety of improvements that are now taking place in the workshops and other buildings connected with the establishment, says that a new model has been fixed upon for United States muskets, and that in future all the Government firearms will be made agreeable to the improved pattern.

The improvement consists in substituting rifle muskets, for those of the ordinary construction. The Ordnance Department instituted, some time since, an extended series of experiments at Springfield, under the direction of Lieut. James G. Benton, assisted by the gunsmiths and machinists of the works; the results demonstrated important advantages in favor of the rifle barrel.

The great superiority of the new model or rifle musket, lies in its unerring accuracy, the far greater distance it will send its ball, its more severe execution, and the lighter charge of powder required. The following is a description of it, as compared with the former musket:—

A change from the smooth bore to the rifle; the length of the barrel is reduced from 42 to 40 inches; the exterior reduced, and the caliber from 0.60 to 0.58 of an inch. The barrel to have three decreasing grooves, with a front and rear sight brazed on, graduated from one to one thousand yards. The bayonet, ramrod, mountings, and stock are much improved from the old model, and the weight of the new arm completed is about 9 3-4 pounds, which is one-quarter of a pound lighter than the old model. The lock is changed to a front action swivel lock with the Maynard attachment, which will contain 60 primers. The lock will also answer for the common service cap if necessary. The ball is an elongated, hollow, pointed ball

weighing 497 grains, which is about 60 grains heavier than the present round ball. The new model rifle requires but 60 grains of powder, which is 50 grains less than the present service charge of the smooth bore musket, 110 grains. Besides the musket, thus described, models of a fine rifle pistol, with 10 and 12 inch rifled barrels, of the same caliber as the rifle musket, 0.58 of an inch, have been prepared, with a false butt, which, by means of a hook and spring, can be instantly attached to the pistol, thereby making it a rifle carbine, which will fire with accuracy 500 yards. When detached from the pistol, the butt is suspended by means of a belt and swivel ring. This will be a very important improvement for the cavalry service. The pistol lock also embraces the Maynard primer.

The models, gauges, and alterations for the rifle musket, pistol, and carbine, necessary to adapt the machines and tools, are now in vigorous prosecution. Within the present month, three new engine lathes, an universal milling machine, a shaping machine and a tilt hammer, have been added, and two stock turning machines are in progress, which, with others will, in the course of the present year, make complete the operations connected with the full introduction of the manufacture of the new arms.

It has been found practicable to alter the barrels of the old muskets to the rifle style. Some of them have been so changed, and it is not improbable that all now on hand at the Armory,—some 255,000—will ultimately receive the improvement.

Maynard's Primer consists of a ribbon, on which a series of explosive wafers are arranged in a single row. At each rise of the hammer the ribbon moves and carries a wafer over the nipple, where it is discharged by a pull of the trigger. It is a very simple, convenient, and effectual apparatus. Guns fitted for this primer may be used either with it or with common percussion caps, as desired,—it involves no change of the nipple. We presume the invention has or will prove a fortune to the patentee, now that it has come to be officially adopted by our Government. The patent was granted to Mr. Edward Maynard, of Washington, D. C., Sept. 27th, 1845.

Railroad Accidents in England.

"We observe in the late English papers," says the *N. Y. Sun*, "accounts of no less than three serious railroad accidents in that country, occurring within two or three days of each other, and it is perhaps worthy of remark, in view of the comments of some of our newspapers on the late railroad accident at Burlington, that two of these cases, collisions too, happened on lines which have a double track of rails. In the first accident an express train ran off the rails, and the carriages were all precipitated down an embankment, where they mostly laid wheels upward. Several of the passengers were injured, but the marvel is how any of them escaped destruction.

In the second accident, the engine gave way, when another train approaching in the same direction ran into it. A scene of fearful confusion ensued. Sixteen persons were more or less injured.

In the third accident, a heavy excursion train, conveying about 1,000 persons, was overtaken and run into by a freight train. None of the carriages were broken, but several passengers were severely bruised."

[No satisfactory explanation is given of the origin of the first accident. The last two appear to have been the result of want of power in the brakes. With the proverbial caution and systematic arrangement of flag-men adopted on English roads, we think that the back trains must have been duly notified of their proximity to the cars in front.

Lighting Streets by Electricity.

The town of Deal, Eng., is shortly to be lighted by the Electric Light. A trial was lately made there preparatory to lighting the town generally with it. It was perfectly successful, and gave great satisfaction to the inhabitants. It is said to have a most transcendent and vivid appearance, and is a vast improvement upon the gas lights.

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