American Association for the Advancement of Science.—No. 4.

GEOLOGY OF CALIFORNIA—W. B. Blake read a paper on this subject. The rocks of the chains of California mountains are chiefly of granite, gneiss, mica slate, including beds of white limestone and quartz rock. It was generally found that the central or higher part of the Sierra Nevada were of compact granite, but even this was not free from a structural arrangement of the minerals. None of the paleozoic or older stratified rocks were seen—they are either absent or have been metamorphosed. The only stratified formations are those of the tertiary age and the more recent deposits.—The tertiary strata flank the granite elevations, and rest horizontally upon the upturned edges of the slates.

The principal point where tertiary strata are developed and characterized by fossils, is at Posé Creek, near the Tejon Pass. Numerous shark's teeth were also obtained from this formation at an elevation of near 1,700 feet above the sea.

The alluvial formations of California cover a broad area. The Sacramento and San Joaquin rivers form extended interior deltas, and the Tulare lakes are bordered by wide plains of barren clay, evidently of lacustrine origin.—The gulf of California probably extended to the head of the valley, 171 miles north of its present limits.

The rocks underlying the city of San Francisco are a compact sandstone lying in thick beds with slates. About midway between the city and the Pacific was a hill of serpentine which he considered intrusive. When the sandstone was exposed to the air it was much discolored; it really had a dark bluish green color. It was suitable for building only where the walls were not exposed to moisture; where they were, it became brown and soft. Mr. Blake was not able to obtain any fossils in the quarries about San Francisco. On the beach, however, were pebbles which he considered to be from a marine outbreak of the sandstone, containing fossils, one of which he exhibited.

Prof. Agassiz held that the fossil which Mr. Blake had shown indicated tertiary age as distinctly as any fossil ever indicated tertiary age. It was a scutella, a genus that had existed from the eocene down to the present day. Now, there were some geological features in this deposit of the utmost interest. The first was that tertiary rocks of such metamorphic character as this were not known in any other locality in the United States.

NEBRASKA, ITS GEOLOGY—Prof. J. Hall read an interesting paper on this subject. The shortest term to express the character of Nebraska was to say that it was a perfect desert, incapable of supporting men or animals except in a migratory condition. The buffaloes came in the spring with the grass and went away in midsummer when it was gone, and the Indians followed them. There was almost no wood; few shrubby willows, and a cotton wood a foot in diameter was always known as the big cotton wood. Pure water was rarely met with. There were occasionally some springs in the baculite formation which commenced 75 miles west of the Missouri. The deep clay beneath was almost impassable: in the spring it was all mud, and in the Summer the clay cracked so as to draw out the roots of vegetation and destroy it. Along the bottoms was occasionally a little good soil, but it was not valuable. This clayey soil was dark but not with organic matter. In the neighborhood of the mouth of the Platte the carboniferous formation terminated. Passing up the Missouri, it is found that the carboniferous passed into cretaceous. At their junction was a sandstone which might perhaps be older than the cretaceous. Upon it lay a bluff calcareous rock, which would mark like chalk, containing scales and jaws of fishes.

Mr. Edward Daniels gave a detailed description of the geological formations of Wisconsin. In the course of it he mentioned a limestone so bituminous that when employed in building the bitumen fried out.

President Hitchcock exhibited the jaw of a fossil shark which he had just received from the coal fields of Illinois. The specimen was about a foot long, recurved like a saber, and on its edge were set in sockets seven teeth with serrated edges. President Hitchcock said that it occurred about three inches above a bed of coal three or four feet in thickness, making it certain that it was in the coal measures.

Prof. Agassiz said that this was one of the most interesting specimens he had ever seen. The idea of a shark was at once suggested, and yet it could not be a shark.

THE ZODIACAL LIGHT—Rev. Mr. Jones read a paper on this subject. From his own examinations while on the Japan Expedition as Chaplain, he came to the conclusion that it was a ring of nebulous matter extending round the earth. He said, "If the zodiacal light comes from a nebular ring around our earth, and within the orbit of the moon, may not the shooting stars, and even the aerolites, have their origin there? Observations show that there is a constant commotion within the ring. May not the nebulous matter half-agglomerated here and there, be shot by these commotions beyond its sphere, and caught by the attraction of the earth, be drawn down, till, striking our atmosphere, they glance in any casual direction, and, taking fire, become consumed, thus giving us the shooting stars!

And may not this nebulous matter, still further solidified, and with a similar fate, afford us the aerolites.

ON THE ASTEROIDS—Prof. S. Alexander, of Princeton, read a paper on this subject, characterized by much ingenuity, but entirely speculative. He had arrived at the conclusion that between Mars and Jupiter there once revolved a planet with an equatorial diameter of 70,000 miles, and a polar diameter of only 8 miles, thus being shaped like a wafer. Having a great velocity on its axis, it burst as some grindstones do, and its fragments formed the asteroids. This theory of the asteroids is brought in to support that of the Plutonists and nebular hypothesists.

INTERMARRIAGES WITH BLOOD RELATIONS—The following is the substance of a paper read by the Rev. C. Brooks on this important subject:—"Stern, yet benignant laws, unknown to us, underlie the great agencies of reproduction. We can only approach to a knowledge of them by facts developed by them. In the offspring of near relations there seems often to be an arrest of normal developement of body or mind. Mr. Brooks produced a long and not very agreeable list of examples, many from his own observation on Martha's Vineyard, where they can persuade few strangers to settle. These prove nothing, as they contain no statistics, and the statistics he used are not new. He comes to the following conclusions, which probably are correct. The laws of breed are the same in man as in other animals; that an unusual number of imbeciles are found in the families of those who have married first cousins; and that few, if any children, born of cousins exceed their parents in bodily strength or mental power. He thinks that further investigations and statistics are wanting, and commends the matter to those who have to do with Islanders, Indians, Gipsies, and Jews.

PHILOSOPHY OF SENSIBLE HEAT—Prof. Hart read a paper on this subject, and attributed heat developed by friction and that by chemical decomposition, such as by combustion, to electricity. He said, "the phenomena of the thermo-electric battery, of the galvanic battery and electrical machine, and a thousand other exhibitions of heat and electricity, notwithstanding there are certain incontrovertible differences—but little greater, however, than those which distinguish electricity from magnetism, are now universally regarded as one.

We know that steam is water, plus some 800 deg. of heat; that vapor of water is likewise HO+a portion of this same something; and yet physicists admit that this latter is a product of the agency of positive electricity, and that it requires the continuous effort of this force to keep it in the vapor form. Accordingly, as a result necessary, we have a fall of rain whenever so much vaporizing force shall have been lost as was originally added to give it the vapor form. Here, then, is a case in which force entered HO in the form of heat, infused by the sun's rays and various heat-producing causes, and came out in the form of the lightning-flash, and the rays which ever come streaming down to the earth.

[To be concluded next week with a review of the whole.]

Cleaning Straw Hats.

Straw hats—such as leghorns, tuscans, dunstables, &c.—when they become soiled, are cleaned as follows: They are first steeped for half an hour in a tub of clean warm water, in which there has been dissolved a little soda ash. This softens the grease, which has been given out to the hats from the hair, and prepares them for the soaping. Each hat is then placed on a smooth board over a tub, rubbed with bar soap, and then scrubbed with a hard hair brush until all the oil, grease, and dirt are taken out. They are then rinsed in two tubsfull of warm water, and left to drip in a basket for about ten minutes, after this they are placed in a clean tub containing dissolved oxalic acid, about 1 deg. in strength. They are sunk in this liquor and left to steep for half an hour, then taken out, and hung up to dry in the air, or a moderately warm room. Before being quite dry, they are removed and subjected to an atmosphere of sulphurous gas in a close box. A few pieces of roll brimstone are placed on the top of some red hot coals in an iron pot, which is set on the bottom of the box, and the lid is closed tightly down. They are subjected to this gas for about six hours, then taken out, sponged well with a strong solution of white parchment size, hung up until they become partially dry, and are then blocked and pressed ready to be trimmed. When straw comes in contact with an alkaline solution like soda or soap suds, it assumes a deep yellow color; the oxalic acid partially removes this, and also any iron stains which may be on straw hats. The sulphurous gas is called "bleaching the straw," but some straw hat cleaners never submit their hats to this part of the process; and their hats look about as well as those who pursue it. It is an offensive process; the gas is exceedingly disagreeable, and if it can be dispensed with it is wisdom to do so. Some use lemon juice as a substitute for oxalic acid, but it is more expensive and not quite so efficacious. Some have used sour milk as a bleaching agent for straw, but it is scarcely possible to wash it out, and it should therefore never be used; vinegar, if rendered colorless by being passed through ground charcoal, is much better. The foregoing process for cleaning straw hats is that pursued by some of the most experienced straw hat bleachers in our country. Care must be taken to remove every particle of grease from each hat, before it is submitted to the acid. Those straw hats which require altering in shape, have their fronts separated from their crowns before being washed; they are much easier handled than entire hats. Ladies who use colored oil for the hair, soon render their hats unfit to wear, as the oil is generally colored with madder or alkanet root, which stains the straw with a permanent color.

Oat Meal and the Intellect.

FOOD FOR TEACHERS.—At the Annual Meeting of the American Association for the Advancement of Education, recently held in this city, Prof. Haldeman advocated the use of highly phosphorized food for teachers, they having much expenditure of brain. He said "the reason why the Scotch were so intellectually acute and active must be attributed to the use of *oatmeal* in their youth. Oats contain more phosphorous than any other vegetable." He also recommended eggs as excellent food for teachers, in order to increase their intellectual capacities. But the mental acuteness and general intellectual strength which characterize the people of the above-named country cannot be due to the phosphorous of their oatmeal, which is their common breakfast food, for it so happens that wheat contains more of it than oats. The quantity of soluble phosphates in wheat, according to Prof. Johnston—himself a Scotchman—is more than one per cent. greater than in oats. In his work on Agricultural Chemistry, pages 503 and 510, the composition of wheat and oats is given in tables.—Oatmeal is, no doubt, very excellent food for man and beast, and so is Indian corn meal, but neither of them will confer intellectual acuteness upon any man. Dull teachers or dull men cannot be made philosophers either by the use of eggs or oats. We must look to some other cause than oatmeal for the metaphysical mind of the North Britons. That cause is, no doubt, to be found in their education, Common Schools having been in existence in that country for two centuries, and the strict *family* training of children by catechisms being similar to that which used to prevail in New England, and various other parts of our country. The Welsh, the Norwegians, and Irish use oatmeal extensively for food.

Zinc.

By the analysis of the most ancient coins, and of metallic vessels taken from the excavations at Herculaneum, it is found that they contain a portion of zinc; yet, to the moderns, zinc is a new metal. Less than a century ago, zinc was not considered as a metal at all.—Homberg, a philosopher who wrote about that period, says: "zinc is a compound of iron and tin;" thus implying that it had no individual existence, but that it was a compound. Such, however, is not found to be the case by modern chemists. Indifferent as we are to a "bit of zinc," there are few substances that have rendered more service, or been more instrumental to the cause of science and the progress of knowledge than this metal. Considered in relation to its own qualities, it possesses rare interest. Certain combinations of this metal with copper, under the euphonious names of *tombac, brass, pinchbeck,* have been used in the arts, especially in China, from time immemorial. In the Celestial Empire, zinc in great purity is used for current coin. This money has frequently Tartar characters on one side, and Chinese characters on the reverse. Certain combinations of zinc, and called white vitriol (*i. e.* sulphate of zinc,) and another flowers of zinc (oxyd of zinc,) are of great importance in medicine. The mechanical uses of metallic zinc are very numerous, giving rise to regular trades for the fabrication of zinc ware. The white oxyd of zinc is coming daily into use as a harmless substitute for the poisonous white lead in painting. Iron chains and wire exposed to the air or water, are all now dipped into melted zinc before they are put to use.—This operation, which is called galvanizing, entirely prevents the iron from rusting. There are many other uses of zinc, but which we cannot detail here. The great service, however, which zinc has rendered to man is in the galvanic battery. Without electricity many arts would cease to exist, yet, for practical and commercial purposes, we could not generate electricity without zinc. What steam owes to coal electricity owes to zinc. Whenever steam is used, coal is consumed; whenever electricity is used, zinc is consumed. Thus we find that electro-plating and the wonders of telegraphic communication are indirectly indebted to zinc; and by the use of the telegraph we are enabled to answer Job (xxxviii., 35) in the affirmative, who 2000 years ago asked: "Canst thou send lightnings, that they may go and say unto thee, 'Here we are!'" SEPTIMUS PIESSE.

Reducing the Cost of Tunneling for Railways.

Mr. Charles McCally, a Civil Engineer of the North-western Virginia Railway, in a communication to the *Railroad Record*, throws out some suggestions upon the policy of changing the form of locomotives and cars, so that a large reduction may be made in the size of tunnels, and consequently in the cost of opening them. He thinks that "the cost of constructing roads through such rough countries as north-western Virginia, where there is much tunneling and bridging, may be diminished twenty per cent." He says: "Suppose we bring the smoke stack down to a hight of ten feet, and the cars to a hight of nine feet; this would leave enough vertical space in the cars for the accommodation of passengers, and two and a half feet for them to be above the rail. It would require an entire change of form, simply, of locomotives. The principle would remain precisely the same. The engine, to bring all of this working apparatus in so little space with respect to hight, would of course require space, with regard to length, in the same proportion, so that the power of the engine would not be diminished. This change would interfere with the comforts of the traveling public to a very small extent; but what consideration is that when we reflect that by using the same capital we would have used without the change, we have twenty per cent. more railways; that our country, upon the same principle, is benefited twenty per cent. more than it would have been."