much interest in Great Britain, and it occurred to Mr. James Gordon Bennett, proprietor of the New York *Herald*, who was in England at this time, that it would not be a bad idea to dispatch one of his reporters to Zanzibar, and if possible send him on ahead of the relief party to interview Dr. Livingstone, and bring back news of the celebrated traveller in advance of other newspapers. No sooner thought of than done. A reporter was selected in the person of a young American rover, named Henry M. Stanley, who at once started for Zanzibar, where he engaged guides and men to accompany him, and then pushed on through the forest for Ujiji, which place they reached after some difficulties, and here they found Dr. Livingstone, waiting for long expected supplies.

The reporter was enabled to relieve the Doctor's immediate necessities; and after procuring from him letters giving an outline of his discoveries, with messages for friends at home, the enterprising Stanley posted back to the sea coast, then on to England with the great news, first directing further supplies to be sent from Zanzibar to Dr. Livingstone, who will proceed with his explorations. Stanley's recent arrival in England produced, as might have been expected, an immense sensation. His pluck in walking six hundred miles through the woods and mires, under a broiling sun, to interview Livingstone, and the enterprise of the New York *Herald* in sending him, have formed the subject of many columns of laudation in the various British papers.

At the meeting of the British Association, Mr. Stanley, by special invitation, gave an account of his African march before a very large and distinguished audience, composed of the members of the Association and their invited guests, among whom the nobility were strongly represented. The Ex-Emperor Napoleon, Eugénie and son were among the most interested auditors.

In the discussion which followed, some of the geographers pointed out the improbability of certain deductions made by Livingstone in respect to the sources of the Nile, while other places, reported by Stanley as the discoveries of Livingstone, were declared to have been visited by other travellers, among them Dr. Schweinfurth, the celebrated German *savant*. One of the reports says that Stanley "did not content himself with refuting Dr. Beke or Sir Henry Rawlinson; he abused them in a rhetorical way for differing from his friend Dr. Livingstone. Every one was glad to see the brave and absent and ancient explorer have so stout a champion present at the meeting. The Doctor must have charmed and inspired Stanley, or Stanley, with the generous heroism of youth and sympathy for common danger and suffering, resolutely liked the Doctor, and took his part against all adversaries and critics. Sometimes he answered by a dramatic grimace alone, and anon by a thundering denunciation of those who sat at home and criticized maps to contradict those who, by travel and peril and patience, have penetrated the dangerous lands and seen for themselves. When he referred to Schweinfurth, he exclaimed, 'I never heard the name of that German Doctor before. Ladies and gentlemen, there never was an Englishman who discovered anything, lake or land, river or mountain, or went anywhere, but immediately arises some red haired German and says he has been there before.' This thrust at the Germans delighted the Imperial party beyond measure. The Emperor shook with merriment. The Empress contrived to understand it, and for the first time was convulsed with laughter, in which her son also joined."

From the letters brought home by Stanley from Dr. Livingstone, it appears that he has been principally engaged during the past three years in tracing out the watershed of the Nile, and thinks that he has now nearly finished the business. He has discovered some very remarkable regions, full of great fountains, streams, and lakes. "I have ascertained," he says, "that the watershed of the Nile is a broad upland, between 10° and 12° south latitude, and from 4,000 to 5,000 feet above the level of the sea. Mountains stand on it at various points, which, though not apparently very high, are between 6,000 and 7,000 feet of actual altitude. The watershed is over 700 miles in length from east to west. The springs that rise on it are almost innumerable."

THE OPENING OF THE AMERICAN INSTITUTE FAIR.

The forty-first Annual Exposition of the American Institute was formally opened at the building of the association on the corner of 63d street and Third avenue, in this city, on the morning of the 4th ultimo. The exercises consisted of music by the orchestra, and an address delivered by Hon. F. A. P. Barnard, the President of the Institute, in which the prominent position and rapid progress of the United States in industrial matters, and the value of the efforts of the American Institute in forwarding and fostering native talent, were especially dwelt upon. The speaker considered that the productive power of manufacturing industry has more than doubled since the foundation of the Institute, and has increased tenfold since the Declaration of Independence. The relation of the industrial arts to civilization, the progress of modern industry, and the influence of science upon improvements, were learnedly discussed. In speaking on the last mentioned topic, the latest discoveries and inventions in dyeing, weaving, printing, ice making, explosives, intercommunication, and transportation were cited as examples. An earnest advocacy of international exhibitions in general, and an appeal in behalf of the coming Vienna Exposition in particular, concluded the oration.

As is usual on every opening day, the internal arrangements of the building were in a state of disorganization, and workmen were still busy in the different departments, completing the alterations necessary to accommodate the increased demands for space. Very few articles were in position, though exhibitors are now sending and arranging their goods with all possible dispatch. The applications for space, we learn, are more numerous than ever before, so that the Exposition bids fair to be far superior to that of last year. The managers are using every endeavor to finish the preparations for the reception of visitors, and they state that everything will be in place in a few days.

The department of engines and machinery, at the time of writing, is quite unprepared. All the boilers but two have been placed, and most of the shafting has been hung. We notice a rotary engine and a portable saw mill among the novelties. In the large hall, a vast variety of articles is present, which, in their present confused condition, it is impossible to particularize. In the art gallery, an elaborate display of photographs, drawings, etc., is expected. The department of the dwelling, which is rather more advanced than the other portions of the fair, contains several unique improvements in household furniture and appliances, which we shall notice in detail hereafter. In the center of the main floor is a huge soda water fountain surmounted by a colossal statue, which will doubtless prove an object of considerable attraction. The interior of the building is quite tastefully decorated, and will be brilliantly illuminated.

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The twenty-first session of the American Association for the Advancement of Science has recently been held at Dubuque, Iowa. Several of our most eminent scientists were unfortunately absent, so that, as compared with those of last year, the transactions of the meeting present much fewer points of interest.

We regret to notice that the proceedings were not conducted with that gravity and dignity which we might expect from a learned body strictly devoted to the investigation of scientific subjects. The much vexed subject of temperance and the political discussion, into which the resolutions relative to the disposition of the Chinese indemnity fund seem to have drifted, were entirely out of the province of the meeting, and have only served as a text for the inane ridicule in which certain of our daily journals seem to revel, whenever they perceive anything at all extraordinary in the, to them, incomprehensible proceedings of scientific associations.

The session terminated with the usual excursions of the members to the interesting localities in the vicinity of Dubuque. The place of meeting next year, on the third Wednesday of August, will be Portland, Me. The officers elected for 1873 are Professor Joseph Lovering, of Harvard University, President; Professor A. H. Worthen, State Geologist of Illinois, Vice President; Professor F. W. Putnam, of Salem, Mass., Permanent Secretary; Professor C. A. White, General Secretary, and W. S. Vaux of Philadelphia, Treasurer.

We shall give from time to time brief condensations of the most interesting and valuable of the papers read.

A NEW SPECIES OF FOSSIL ELEPHANT.

J. W. Foster, LL. D., of Chicago, pronounces a fossil tooth, which has been found near Terre Haute, Indiana, to be that of an elephant, but of a particular species of the animal which differs specifically from any yet discovered. He states that not only is the tooth admirably adapted to the three fold work of crushing, grinding, and triturating the food as it passes in the various stages of mastication through the mouth, but that there seem to be high ridges of enamel and deep valleys of cement in it, which lend peculiar efficiency to its work, the arrangement of the teeth and jaws being like a curiously devised hopper with an upper and a nether millstone, in which the coarsest fibrous materials could be reduced to a pulpy mass. The characteristics of the teeth of all known species of elephants, fossil or surviving, brought into comparison with the tooth in question, exhibit striking differences—which are held to be sufficient to constitute the new species of *Elephas Mississippiensis*, whose hight did not probably exceed six feet, being diminutive in comparison with the gigantic *Elephas Primigenius*; but nevertheless equally a mammal of the post-pliocene epoch, deserving of the closest study by American palæontologists.

POSITIONS FOR ASTRONOMICAL OBSERVATIONS.

Astronomical observations should be made from high elevations. Professor Young reports the whole number of lines in the chromosphere seen from Sherman, a lofty station on the Rocky Mountains, as 150, which is three times as great a number as have been observed before. In these localities, it is said, the atmosphere is steadier, and it is considered as owing to this fact that a star has been recognized at these high altitudes as having a companion or being a double star, not previously known as such.

An observer on the Pacific coast reports to Professor Pierce that he can see the companion of the star *Polaris* from a high point on the Sierra Nevada. It is well known that this is a test of great nicety, requiring the utmost purity of atmosphere. Telescopes will hereafter be placed higher than ever before—in Europe, probably on the Alps.

THE LOCOMOTION OF ANIMALS.

One of the most interesting papers read was prepared and delivered by Professor E. S. Morse, of Cambridge. The subject was the locomotion of animals, and the lecture, intended not merely for scientific consideration, was admirably adapted to popular comprehension by the graphic drawings made by the Professor on the black board during his discourse.

Microscopic animals were first treated. These move rapidly through the water by means of little oars or *ciliæ*. There are creatures which are destitute of shape and yet can form any part of themselves into stomach and digestive organs, or can temporarily assume forms which give them means of locomotion. Others throw out arms and seize their food, but yet have no specific shape when at rest.

Belonging to a higher order are the jelly fish. These strange creatures which, while in the water are perhaps as large as a wash tub, if dried scarcely weigh an ounce. They do not move by means of muscles, but by cells independent of each other, which, by contraction and expansion, answer the purpose of paddles.

The star fish is among the most curious of ocean forms, having his mouth in the center of his body, his eyes at the end of his arms, and a series of suckers, constituting locomotive appendages, thrown out from beneath the animal in the water. If the star fish wishes to travel, he attaches these suckers to whatever is ahead on the ocean bed before him and pulls himself forward. The common fresh water mussel has large muscles which give motion to a long foot which it wedges into the sand, and then, by contracting the foot, draws the shell after it. As they work along the shore, these fresh water mussels make grooves in the sand by which they can be tracked; in fact, wherever such a groove is, a mussel can usually be found at the end of it. There is another fresh water shell fish which darts out its foot with great rapidity and as suddenly contracts it, and by this propulsion swims through the water. The shell that pincushions are made of—the scollop—is that of an animal which swims by opening and closing its shells, forcing the water out from between them. The cuttle fish has two broad fins behind and a series of long arms in front. It draws in water as most shell fish do, but, unlike others, pumps it out in front so that it swims backward, though it has also, by other means, the power of swimming forward.

Worms move by means of little bristles which stick out from the sides of the body, and are used to hold part of the body while the rest expands, or while part expands the rest contracts, and thus the worm is drawn forward in sections. This is the case with the common angle worm. Among the crustaceans, the lobster either crawls forward with his legs or jumps backward by strokes with his tail. The eyes mounted on the end of long feelers can look over the shoulder of the animal while he is jumping backward.

In commenting upon lepidopterous and hymenopterous insects, the lecturer stated that, as with birds, if the wings are small, they move rapidly; if large, slowly. The grasshopper was referred to as having a variety of modes of locomotion; and the cheese mite or "skipper," it was stated, hopped by coiling his head and tail together in a ring and pulling them suddenly apart with a snap. After illustrating the movements of the fish and frog, those of the snake were explained. Its locomotion is obtained by means of scales, which are thrust against the ground by motions of the ribs, actuated by powerful muscles. It results that if a snake, though capable of the most rapid movement on the ground, be put on a smooth surface like that of glass or varnished wood, he will wriggle with great efforts, but make no forward progress.

The variety of functions performed by the muscles of the birds and the singular shapes of their bills, adapted to their various modes of feeding, were next illustrated. The arms are to become the organs of flight, and the bones are bridged, and trussed, and modified so as to give the requisite power. Below the heel and bones are extended and anchylosed so as to furnish the requisite prehensile strength. The tendons naturally close the toes when the weight of the body rests so as to bend the leg; thus the bird rests securely on its perch. Hence, also, the fowl always shuts its toes as it lifts them, because bending the leg draws the tendons. The modification of the arm in the bat still leaves it an organ of flight.

In the lower vertebrates we have simple fins; going up step by step the functions of the arm by degrees escape the need of use for locomotion. The higher the grade of animals, the greater the power of the arm for other purposes than that of locomotion. The monkey uses the arm and hand for a great variety of other purposes, such as for feeding itself, and the female monkey holds its young to its breast by means of its arms. At last with man the arm becomes a cephalic appendage, and is no longer used for purposes of locomotion, unless, indeed, he drives a hand car. Step by step among the lower animals we may trace the improvement of organ and of function until we reach its highest development in a species where only the lower limbs are employed to carry the body, and the upper become exclusively the servants of the brain.

TABLE OF VELOCITIES.

We publish in another column a list of one hundred and thirty velocities, interesting to engineers and mechanics, compiled by Dr. E. Hartig, Professor at the Royal Polytechnic School at Dresden, and translated for our journal by Dr. Adolph Ott. Information is given regarding the velocity of parts of almost every kind of machine, of mechanical tools, of water and air under varied circumstances, of vessels, of grain in elevators, of the flight of birds, of the transmission of sensation through the nerves, of railroad trains, of sound, of light, and finally of the electric current. The lowest velocity given is that of the burning of Beckford's fuse, which is consumed at the rate of ·39 inches per second; the highest is that of the discharging current of a Leyden jar in copper wire 1·7 millimeters in thickness, by which the inconceivable speed of $288,004\frac{8}{10}$ miles is obtained in the same space of time. The table is worthy of careful perusal and preservation, as it contains many curious and interesting facts obtained by comparisons of the data given. Thus the highest velocity of the express trains on German railways (about 50·3 miles per hour) is greater than that of a strong wind. The velocity of the transmission of irritation in our sensa