tions can be traced everywhere by this universal demand for salt.

Mr. R. G. Haliburton discussed the survival of dwarf races, by many regarded as myths, even as recently as 1875. But their existence in various parts of the world has been proved. The speaker discovered, in 1888, a diminutive race on the border of Honduras, whose height was about four feet, whose occupation was making Panama hats, whose weapons were poisoned arrows shot from blowpipes. Blancaneaux was the only white man who had ever lived among them, and he gave them a high character, contrary to the statements made by the soldiers of Guatemala. Dwarfs are represented in Yucatan sculpture. Some of the lake islands of Uruguay are said to be inhabited by pygmies.

Among the many papers worthy of notice were those of Hon. G. G. Hubbard on "The Geography of China, Corea and Japan;" on "Graduate and Post-graduate Degrees," by Dr. R.H. Thurston, of Cornell University; on "The Education of Engineers," by Prof. F. O. Marvin, of the University of Kansas; on "The Seat of Consciousness," by Dr. Paul Carus, the editor of the Open Court and The Monist; on "Various Phenomena of Lightning," by Messrs. McAdie, Rolliston, and Hodges; "Concerning Certain Features of California Geology," by Prof. J. P. Smith, of the Stanford University; on the "Water Resources of the United States," by Maj. J. W. Powell; and on "European Water Supplies," by Prof. W. P. Mason.

NIAGARA AND THE GREAT LAKES.

For the last fifteen years our geologists have given attention to certain problems connected with the drainage of the chain of great American lakes, and incidentally with the probable age of the gorge of Niagara. A week was devoted to them at the Buffalo meeting of the A. A. A. S., including an exploration of Niagara River by a party of thirty geologists. The conclusion then arrived at was that while the lower lakes may have always been drained through the valley of the St. Lawrence, the upper lakes had probably found an outlet at one time by way of the Mississippi valley; and that the whole chain might do so again, should there ever be a barrier, natural or artificial, across the inlet of the Niagara near Buffalo. It was thought that a dam 25 feet high might bring about this result and cause a grander river than any now on the continent to flow out from Lake Michigan near the city of Chicago. As to the age of the Niagara gorge, the conclusion was that 7,500 years met all requirements; while a few deemed 3,500 sufficient. As the age of Niagara has been regarded as a kind of geological yardstick for measuring off the age of the human race, importance was attached to the foregoing conclusions. Geologists, however, have since then been making further study of the problems indicated. And while some of them adhere to the ground just stated, others materially modify their opinions. This fact gave special interest to three papers read at the Brooklyn meeting of A. A. A. S.

1. ON THE GEOLOGICAL SURVEY OF THE GREAT LAKES.

In this paper Prof. J. W. Spencer stated the case and reported progress. The story of these remarkable lakes tells of a former high continental elevation. The present bottom of Ontario is 491 feet below sea level; of Huron, 168 feet; of Michigan, 282 feet; and of Superior, 400 feet. If these were once erosion valleys, they must have been at an altitude such as to allow their drainage to flow down to the sea. In keeping with this theory we find that the lower St. Lawrence River is a submerged channel, increasing from a depth of 1,200 feet to 1,800 feet, and with deep tributary canyons. The submerged escarpments of the existing lake basins were described, proving buried valleys that connected them. The glaciation of the region was not in the line of these escarpments, nor do their vertical walls show signs of having been shaped by glacial action. Between the Georgian Bay and Lake Ontario lies a deeply buried valley, as found by a series of borings, through which the ancient Laurentian River must have flowed. There was a southern branch crossing the Michigan peninsula and the Huron basin, to which the name Huronian River is given. Through the Erie basin flowed a now submerged river, named the Erigan, which crossed to the great canyon at the head of Lake Ontario—the Niagara River not then being in existence. These ancient valleys were broader than the modern streams, which have made for themselves new channels, instead of reopening the old ones filled with drift.

In certain instances, indeed, the river drainage has been actually reversed. This was shown by the studies of Dr. Newberry, T. Sterry Hunt, and Mr. J. F. Carll. The theory is confirmed by recent investigations. The Susquehanna and its tributaries flowed into Lake Ontario, while the Ohio River, above Pittsburg, flowed into the Erie basin. All this system of ancient drainage was obstructed by drift, and also by the warping of the earth's surface, as shown by deserted beaches, terraces, and sea cliffs, some of which have been followed for hundreds of miles. The open water within these contracting beaches has been named by Prof. Spencer "Warren Water," which may be regarded as the mother of all the lakes, and which at one time must have covered 200,000 square miles. When the level fell 150 feet the three highest lakes were inclosed in what might be called "Algonquin Water," while Lakes Erie and Ontario were within the "Lundy Water." A further subsidence of 300 feet brought the waters to what is termed the Iroquois level, after which episodes of movement and repose formed the modern lakes.

2. DRAINAGE OF THE LAKES INTO THE MISSISSIPPI.

The highest deserted strand near Chicago is 45 feet above the lake level. According to the canal survey, the divide is 25 miles south west of Chicago, and is only 8 feet above the lake. From measurements of the sets of deserted beaches the depth to which they are depressed can be calculated. The indications are that the subsiding waters (Warren, Algonquin and Huronian) were drained through the Ottawa valley for about 24,000 years. This outlet was closed by the rim being raised so as to turn the overflow into the Erie basin, whose outlet was also affected by the same uplift, so as to drain all the upper lakes into the Mississippi valley. The subsiding of the waters lowered the lake level sufficiently to turn the volume through the Niagara. But as the terrestrial uplift of the Niagara region is about one foot and a quarter a century, it follows that, if this rate shall continue, the drainage of the upper lakes will, in about 5,000 years, be diverted back again into the valley of the Mississippi.

3. HISTORY AND DURATION OF NIAGARA FALLS.

The Niagara River came into existence, according to Spencer, upon the dismemberment of the "Lundy Water," and for 1,000 years drained the Erie basin without a cascade. As the Ontario basin slowly sunk, the falls were made, until the total descent was 420 feet, there being at one time three cascades, and afterward one grand united fall. Finally the Ontario waters began to rise again and reduced the height of the falls, at first to 365 feet and then to 320 feet. Mr. Spencer computes the entire age of Niagara River at about 32,000 years. This computation is based on the rate of recession and the amount of work done in each of the episodes, as discovered in working out the history of the lakes. In 1842 Prof. James Hall made the first instrumental survey of the falls; the Coast Survey made the next, in 1875; a third was made in 1886, by Prof. R. S. Woodward; and in 1890 the last was made by Dr. A. S. Kibbe. From these four surveys the mean elongation of the gorge is 4·17 feet a year. Hitherto most of the conjectures as to the age of Niagara have been based on the rate of recession alone. In 1790 Ellicot calculated it as 55,000 years; Lyell, in 1841, lowered the estimate to 35,000; in 1886, after three surveys, Woodward reduced it to 12,000; and later still, Gilbert showed that the duration of the falls should be only about 7,000 years—though he is said to have since modified his opinions.

Spencer's method differs from others, in that he takes into consideration the changing episodes of the river as well as the rate of recession through said episodes. He denies that the buried valley of St. David, hitherto regarded as an extension of the preglacial river from the Whirlpool on, is such, and affirms it to be a branch of a buried valley outside the Niagara canyon, and much shallower than it. The rate of the modern recession has been determined under changing conditions of erosion, so that each episode has to be treated separately. First episode: Waterfall 200 feet high, volume 3-11 of the modern discharge, and gorge 11,000 feet long to the terrace of Foster's Flats; duration, 17,200 years. Second episode: River falling 420 feet in three cascades; (a) discharging only Erie waters through chasm 3,000 feet long; duration, 6,000 years; (b) drainage of all the upper lakes through chasm 7,000 feet long; duration, 4,000 years. (c) Volume as before, also descent, but in one cascade, length of narrows 4,000 feet; duration, 800 years. (d) Volume as now, and level of lower lake as at present; first stage, a local rapid, as at Johnson's Ridge, with total fall of 365 feet, work perpendicularly hard; length of gorge, 5,500 feet; duration, 1,500 years; second stage, as at present, work easy; length of canyon, 6,000 feet; descent of water, 320 feet; rate of recession, 3·175 feet a year; duration, about 1,500 years.

Thus Spencer computes the age of the Falls to be 31,000 years, with 1,000 years added as the age of the river before the nativity of the Falls. He thinks the turning of the Huronian waters into the Niagara was about 8,000 years ago. He finds the amount of work done in each episode by the position of the terraces and the changing effects of erosion. The modern recession is computed from four surveys extending over 48 years, but the rate is excessive, on account of favoring conditions. The history of the great lakes must be taken into the account—as already described; and also the rate of terrestrial uplift in the Niagara region. The end of the Falls seems destined to be effected, not by erosion of the rocks, but by terrestrial deformation that shall turn the drainage of all the upper lakes back into the Mississippi, an event which it is calculated will take place in 5,000 years, which would be before the cataract would have had time to cut its way back to Buffalo.

It should be stated, in conclusion, that Mr. Spencer's theories were but briefly discussed by the Association, and some of those who would probably take issue with them most vigorously were absent.

COTTON SEED OIL PRESSES WANTED.

We print in another column a letter from the Hon. James Z. George, United States Senator from Mississippi, in which he calls attention to the need of new improvements in presses for expressing the oil from cotton seeds. What is wanted is a press of moderate capacity and simple construction, which can be conveniently operated upon any ordinary cotton plantation. The advantages of such a machine are very forcibly presented by Senator George. He thinks, moreover, the inventor would be likely to reap a satisfactory reward; and as a further encouragement offers the use of appliances, power, and labor at his plantation. Nothing could be more liberal; and we have no doubt some of our ingenious readers will be able to study out and produce the desired mechanism.

Close of the Meetings of the American Association.

The American Association for the Advancement of Science closed its sessions, which have been held in Brooklyn, August 22. The next meeting will be held in San Francisco. The following officers were elected for the ensuing year:

President, E. W. Morley, Cleveland, O.; Vice-Presidents—mathematics and astronomy, E. S. Holden, Lick Observatory, Mount Hamilton, Cal.; physics, W. Le Conte Stevens, Troy, N. Y.; chemistry, William McMurie, Brooklyn; mechanical science and engineering, William Kent, Passaic, N. J.; geology and geography, J. Hotchkiss, Staunton, Va.; zoology, D. S. Jordan, Palo Alto, Cal.; botany, J. C. Arthur, Lafayette, Ind.; anthropology, F. H. Cushing, Washington, D. C.; economic science and statistics, B. E. Fernow, Washington, D. C.; Permanent Secretary, F. W. Putnam, Cambridge, Mass.; General Secretary, James Lewis Howe, Louisville, Ky.; Secretary of the Council, Charles R. Barnes, Morison, Wis.; Secretaries of the Sections—mathematics and astronomy, E. H. Moore, Chicago, Ill.; physics, E. Merritt, Ithaca, N. Y.; chemistry, William P. Mason, Troy, N. Y.; mechanical science and engineering, H. S. Jacoby, Ithaca, N. Y.; geology and geography, J. Perrin Smith, Palo Alto, Cal.; zoology, S. A. Forbes, Champaign, Ill.; botany, B. T. Galloway, Washington, D. C.; anthropology, William Aniter Newcombe McGee, Washington, D. C.; economic science and statistics, E. A. Rose, Palo Alto, Cal.; Treasurer, R. S. Woodward, New York.

Remarkable Cycling.

The recent twenty-four hours cycling race for the Cuca Cup, England, resulted in a decisive victory for F. W. Shorland, of the North Road Club. Shorland having been successful in 1892 and 1893, thus secures the cup, which is valued at 100 guineas, outright. So great was the excitement aroused by the contest, that when the race started at eight o'clock on Friday evening about 10,000 spectators were present, and of these about 6,000 remained on the Herne Hill ground throughout the night. From the very commencement of the race Shorland rode at a great pace, breaking records from eleven to fifteen miles, an extraordinary thing to do in a long distance ride, and following this up by beating all previous English records from 101 miles, and all world's records from the thirteenth hour to the finish of the race. His total was 460 miles 1,296 yards. At the conclusion of the race the crowd swarmed all over the track, and so great was the desire to get near and congratulate the winner, that it required the services of a number of police constables to escort him safely to his dressing tent. Shorland's only rest was one of nine minutes, when he had been riding about twelve hours.

Trials of a Dynamite Gun.

One of the fifteen inch dynamite guns was tested at Sandy Hook, August 16. The gun is fifty feet long. After firing three dummies, two shells loaded with 300 pounds of high explosives were fired so as to drop in the main ship channel. A slight noise like a whistle was the only sound made in firing. When the projectiles struck the water, a dash of spray was visible, a moment afterward the shell exploded, throwing up water and sand to the height of four hundred feet. The concussion of the explosion could be plainly felt on shore and on vessels in the vicinity. Sandy Hook is being provided with gun lifts and breech-loading mortars, which in addition to the dynamite guns would make it well nigh impossible for a hostile vessel to enter the harbor. All ships provided that they are of any considerable draft must necessarily pass within three miles of Sandy Hook and therefore directly under the guns located at this point.