to electrolyse a solution of chloride of sodium, and to produce thereby chlorine and caustic soda, I am not aware that up to this day any quantity of caustic soda made by electrolysis has been put on to the market.

Only two electrolytic works producing chlorine on a really large scale are in operation to-day. Both electrolyse chloride of potassium, producing as a bye-product caustic potash, which is of very much higher value than caustic soda, and of which a larger quantity is obtained for the same amount of current expended. These works are situated in the neighbourhood of Stassfurt, the important centre of the chloride of potassium manufacture. The details of the plant they employ are kept secret, but it is known that they use cells with porous diaphragms of special construction, for which great durability is claimed. There are at this moment a considerable number of smaller works in existence, or in course of erection in various countries, intended to carry into practice the production of chlorine by electrolysis by numerous methods, differing mainly in the details of the cells to be used; but some of them also involving what may be called new principles. The most interesting of these are the processes in which mercury is used alternately as kathode and anode, and salt as electrolyte. They aim at obtaining in the first instance chlorine and an amalgam of sodium, and subsequently converting the latter into caustic soda by contact with water, which certainly has the advantage of producing a very pure solution of caustic soda. Mr. Hamilton Castner has carried out this idea most successfully by a very beautiful decomposing cell, which is divided into various compartments, and so arranged that by slightly rocking the cell the mercury charged with sodium in one compartment passes into another, where it gives up the sodium to water, and then returns to the first compartment, to be recharged with sodium. His process has been at work on a small scale for some time at Oldbury near Birmingham, and works for carrying it out on a large scale are now being erected on the banks of the Mersey, and also in Germany and America.

Entirely different from the foregoing, but still belonging to our subject, are methods which propose to electrolyse the chlorides of heavy metals (zinc, lead, copper, &c.) obtained in metallurgical operations or specially prepared for the purpose, among which the processes of Dr. Carl Hoepfner deserve special attention. They eliminate from the electrolyte immediately both the products of electrolysis, chlorine on one side and zinc and copper on the other, and thus avoid all secondary reactions, which have been the great difficulty in the electrolysis of alkaline chlorides.

All these processes have, however, still to stand the test of time before a final opinion can be arrived at as to the effect they will have upon the manufacture of chlorine, the history of which we have been following, and this must be my excuse for not going into further details. I have endeavoured to give you a brief history of the past of the manufacture of chlorine, but I will to-day not attempt to deal with its future! Yet I cannot leave my subject without stating the remarkable fact that every one of these processes which I have described to you is still at work to this day, even those of Scheele and Berthollet, all finding a sphere of usefulness under the widely varying conditions under which the manufacture of chlorine is carried on in different parts of the world.

Let me express a hope that a hundred years hence the same will be said of the processes now emerging and the processes still to spring out of the inventor's mind. Rapid and varied as has been the development of this manufacture, I cannot suppose that its progress is near its end, and that nature has revealed to us all her secrets as to how to procure chlorine with the least expenditure of trouble and energy. I do not believe that industrial chemistry will in future be diverted from this Section and have to wander to Section A under the ægis of applied electricity. I do not believe that the easiest way of effecting chemical changes will ultimately be found in transforming heat and chemical affinity into electricity, tearing up chemical compounds by this powerful medium, and then to recombine their constituents in such form as we may require them. I am sure there is plenty of scope for the manufacturing chemist to solve the problems before him by purely chemical means, of some of which we may as little dream to-day as a few years ago it could have been imagined that nickel would be extracted from its ores by means of carbon-monoxide.

At a meeting of this Association which brings before us an entirely new form of energy, the Röntgen rays, which have enabled us to see through doors and walls and to look inside the human body; which brings before us a new form of matter, represented by Argon and Helium, which, as their discoverers, Lord Rayleigh and Prof. Ramsay, have now abundantly proved, are certainly elementary bodies, inasmuch as they cannot be split up further, but are not chemical elements, as they possess no chemical affinity and do not enter into combinations—at a meeting at which such astounding and unexpected secrets of nature are revealed to us, who would call in doubt that, notwithstanding the immense progress pure and applied science have made during this century, new and greater and farther-reaching discoveries are still in store for ages to come?

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

THE action of the nominating Committee of the American Association (see NATURE of September 10), in recommending a merely formal meeting next year at Toronto, on the day preceding that of the British Association, evoked a storm of opposition in the general session, and a vote was passed requiring the Council to arrange for a regular meeting and fix the time and place.

The Council subsequently fixed on August 9, 1897, as the time, and Detroit as the place, providing for a recess to Toronto before the final adjournment, in order to welcome the British Association.

Of the various Sections, popular interest evidently centred in that of Social and Economic Science, as was evinced by the very large attendance, and by the attention devoted to its proceedings by the daily press of Buffalo. The first paper read before this section, on "The Monetary Standard," taking strong ground for the gold standard, was read by Wm. H. Hale. Edward Atkinson sent a paper entitled "What is True Money?"; also one entitled "Crime against Labour." Other papers were: "The Competition of the Sexes and its Results," by Lawrence Irwell; "Fashion—a Study," by S. E. Warren; "Citizenship, its Privileges and Duties," "Relics of Ancient Barbarism," and "Practical Studies in Horticulture, Art and Music," by S. F. Kneeland; "An Inheritance for the Waifs," by C. F. Taylor; "The Proposed Sociological Institution," by James A. Skilton; "The Value of Social Settlement," and "The Wages Fund Theory," by A. B. Keeler; "Better Distribution of Forecasts," by John A. Miller; "The Tin-plate Experiment," by A. P. Winston, and "Suicide Legislation," by W. L. O'Neill.

Thirty-five papers were read in the Anthropological Section, including contributions from Brinton, Boas, McGee, Fletcher, Beauchamp, Wright, Mercer, and others. Especial interest was felt in the paper of Secretary F. W. Putnam, on the researches made in the ancient city of Coapan, located in Honduras, just over the border from Guatemala.

Prof. Putnam was the first to go beneath the surface. He began in Yucatan, and soon found that buildings now on the surface were of recent date; but underneath were indications of remote antiquity. City has been built over city, in one place as many as five having been superposed, showing as many successive occupations.

The two Biological Sections had twenty-three papers in zoology and forty-two in botany. Among the well known contributors were L. O. Howard, E. D. Cope, L. M. Underwood, T. N. Gill, D. S. Kellicott, C. E. Bessey, J. M. Coulton, and N. L. Britton, The Botanical Club also held several meetings, and the botanists devoted all day Friday to an excursion by lake to Point Abino.

The Geological Section was enriched by all the papers from the Geological Society of America, which held merely a business meeting, an arrangement now adopted for the first time, but so successfully that it will be extended next year to the Chemical Society, and ultimately to other affiliated societies. Thirty-four papers were read to the geologists, among prominent contributors being B. K. Emerson, Warren Upham, I. C. White, E. W. Claypole, G. K. Gilbert, and J. W. Spencer. H. O. Hovey, who has made a speciality of cave explorations, gave interesting accounts of new discoveries in Mammoth Cave and elsewhere. The feature of this Section was the commemorative exercises on Wednesday afternoon, referring to the sixtieth anniversary of the work of Prof. James Hall in connection with the survey of New York State. Addresses and papers were given by Prof. Emerson, Prof. Joseph Le Conte, W. J. McGee,

John M. Clarke, and others. Three of those present at that gathering had attended the meeting of the American Association for the Advancement of Science at Albany in 1856, at which Prof. Hall presided, and which was the largest scientific gathering up to that time held in America. They were Joseph Le Conte, Thomas H. Feary, and Wm. H. Hale.

The proximity of Niagara, and the new applications of power, gave special interest to the Section of Mechanical Science and Engineering, and twenty-two papers were read. Henry T. Eddy, Thomas Gray, J. E. Denton, D. S. Jacobus, and Octave Chanute were among the contributors. A most important paper was read by Elmer L. Corthell, entitled "Some Notes, Physical and Commercial, upon the Delta of the Mississippi River." Mr. Corthell has made a special study of the Mississippi for many years. He points out certain measures where he pronounces necessary to preserve navigation of the delta. The United States has already expended thirty-eight million dollars in the improvement of the Mississippi.

The Chemical Section was crowded with papers, about seventy being read. Among the contributors were A. A. Noyes, A. B. Prescott, H. W. Wiley, R. B. Warder, F. W. Clarke, T. H. Norton, C. B. Dudley, W. P. Mason, J. L. Howe, C. F. Mabery, H. A. Weber, E. W. Hilyard, A. R. Leeds, Wm. McMurtrie, L. L. Van Slyke, and E. A. de Schweinitz. The papers were mostly technical, and were arranged in groups according to the subjects. The programme of the American Chemical Society, which met in the preceding week, was also a long one, indicating an unusual interest in chemistry. At the meeting Prof. Dennis stated that he had found potassium platinocyanide, $K_2Pt(CN)_4$, by far the best material for painting fluorescent screens for X-ray investigation.

Physics also aroused much interest, and it was remarked that the Section had never had a better programme. Of the thirty-two papers presented, Wm. A. Rogers read five. In one of these he maintained that X-ray pictures could be obtained by the use of static electricity, and he exhibited several pictures taken in that manner. Among others, papers were read by Ernest Merritt, Edward L. Nichols, and Alexander Macfarlane.

The Section of Mathematics and Astronomy was the lightest of all, having only ten papers and no presidential address, Mr. Wm. E. Story being absent in consequence of sickness in his family. Alexander Macfarlane was elected vice-president in his place. G. W. Hough contributed a paper on motion of the great red spot and equatorial belt of the planet Jupiter from 1879 to 1896, and L. A. Bauer one on component fields of the earth's magnetism.

The evening addresses before the Association were by J. W. Spencer, on "Niagara as a time-piece," and by E. D. Cope, on "The results of cave explorations in the United States, and their bearing on the antiquity of man." Spencer's last estimate of the age of Niagara is 31,500 years. In about 5000 years he predicts that the elevation of the north-east will suffice to turn the drainage of the great lakes into the Mississippi River. Prof. Cope gave an exhaustive review of cave explorations.

Contributions to the monument to Pasteur were solicited from the Association, but funds were not available, except from Mrs. Esther Herrman, a patron of the Association, who contributed 100 dollars for that purpose. Grants for research were only made to the extent of 200 dollars, for the same reason; and were allocated as follows:—To the Marine Biological Laboratory, Woods Holl, Mass., for a table (appointment to be made by the vice-presidents for Sections F and G and the director of the laboratory), 100 dollars; to Francis E. Phillips, for investigations on the properties of natural gas, 50 dollars; to L. A. Bauer for investigations on terrestrial magnetism in connection with the magnetic survey of Maryland, 50 dollars.

The President and Vice-Presidents of the next meeting are:—President, Wolcott Gibbs. Vice-Presidents: (A) Mathematics and Astronomy, W. W. Beman; (B) Physics, Carl Barus; (C) Chemistry, W. P. Mason; (D) Mechanical Science and Engineering, John Galbraith; (E) Geology and Geography, I. C. White; (F) Zoology, G. Brown Goode; (G) Botany, George F. Atkinson; (H) Anthropology, W. J. McGee; (I) Social and Economic Science, Richard T. Colburn.

An unusually large number of Fellows were elected, among whom must be mentioned Wolcott Gibbs, he having been elected honorary fellow in order to qualify for the presidency of the Association, of which he had not been a member for nearly thirty years.

The matter of the approaching jubilee (in 1898) of the Association was discussed, but no definite decision was arrived at. As the probable place of meeting that year, Secretary Putnam suggested Boston, a city already memorable in the annals of the Association as the place where the largest meeting of members—not counting foreign guests—was held.

THE RECENT CYCLONE IN PARIS.

THERE seems to be very little doubt that Paris on Thursday last was visited by a tornado, the first time within the memory of man. It was accompanied by that mysterious circular motion that is special to this class of storm, and extended over a very small area, beginning at the Place St. Sulpice and ending at the Boulevard de la Villette, a distance of nearly two miles. It, however, caused considerable damage, resulting in, it is said, seven deaths and many severe injuries. On the day in question there had been since noon a succession of showers, and it was towards the last of these—about 3 p.m.—that the tornado showed itself. M. Angot, head of the Meteorological Bureau, was at the Pont Royal, about to take a boat, when he noticed small dark clouds, very low down, apparently moving against the wind, which was not at all high, the velocity not being more than five or six yards a second. He soon, however, perceived that the clouds had a rapid circular motion, not horizontal, but oblique. When making these observations he judged the distance of the storm to be about a mile, and its diameter about 170 yards. At the Tour St. Jacques, the meteorologist there states that the storm lasted less than a minute. Some black clouds passed swiftly overhead, and there was one flash of lightning. The barometer suddenly fell from 748 mm. to 742 mm., a drop of 6 mm.; a fact unprecedented for years, but almost immediately afterwards rose again. Advancing from this point towards the north-east, branches and, in some cases, whole trees fell on the roadways, and boats on the river were torn from their moorings and dashed on the quays. Omnibuses were upset, cabs thrown about, and stalls overturned. So strong was the force of the wind that the Palais de Justice had its windows broken and was partly unroofed. The roofs of the Opéra Comique, the Châtelet, the Tribunal of Commerce, and the Préfecture of Police were considerably damaged, and in some cases partly removed. Owing to the great damage done to the numerous windows of every house, the streets were strewn with enormous quantities of glass broken into small pieces. Some curious instances are related. A kiosk in front of the Ambigu, in which were seated two policemen, was carried, together with the policemen, to the other side of the street; the kiosk was completely wrecked, but the policemen were unhurt though shaken. The heavy rain which continued during the storm did considerable damage, filling up cellars, &c., and flooding the river Bièvre. It was owing, perhaps, to this rain, which had cleared the streets of people, that the number of accidents was not greater than was recorded.

We have received the following further details from a correspondent in Paris:—

"The storm which we experienced took meteorologists quite by surprise, and it was found impossible to follow the track of the cyclone out of Paris. It appears that it developed at the Place St. Sulpice, and disappeared at La Villette, seven kilometres in the north-north-east direction.

"The path of destruction was limited to about one hundred yards, but omnibuses were overturned, boats on the Seine wrecked, five persons killed, seventy wounded, and about 100 trees uprooted. One of the most extraordinary places of devastation was the Square de la Tour Saint Jacques, where the Central Municipal Observatory is established. The branches of trees accumulated by the wind were so numerous that I was obliged to use ladders for visiting the observers, who were practically prisoners in the observatory. Most interesting observations were taken from the top of the Eiffel Tower; these will be discussed in the forthcoming International Congress of Meteorology."

In a later communication our correspondent says:—

"A singular observation was registered on the barometer at 2h. 40m. p.m. on the 10th, when the storm raged in Paris. A rise of 1 mm. of mercury was registered, but of such a short duration that it was hardly possible to detect the two separate strokes for the greater part of the variation. (It may here be