(3) Professor Arthur S. Hathaway: 'A new way of presenting the principles of the calculus.'
(4) Professor H. Maschke: 'Some general theorems concerning linear substitution-groups of finite order.'
(5) Professor E. H. Moore: 'Concerning Klein's groups of n! (n—1)-ary collineations.'
(6) Professor E. H. Moore: 'The decomposition of a modular system connected with the doubly generalized Fermat theorem.'
(7) Professor H. B. Newson: 'Normal forms of projective transformation (second communication).'
(8) Professor H. B. Newson: 'A new solution of the Riemann-Helmholtz problem.'
(9) Professor H. B. Newson: 'What constitutes a continuous group?'
(10) Professor James B. Shaw: 'Some quaternion integrals and their related classes of functions.'
(11) Dr. H. F. Stecker: 'Non-Euclidean images of plane cubics on rotation surfaces of constant negative curvature.'
(12) Professor Henry S. White: 'Note on certain relations among fundamental covariants of a ternary cubic.'
(13) Professor J. W. A. Young: 'The teaching of mathematics in the higher schools of Prussia.'

F. N. Cole,
Secretary.

Columbia University.

GENERAL MEETING OF THE AMERICAN CHEMICAL SOCIETY.

The eighteenth general meeting of the American Chemical Society was held in New York on the 27th and 28th of December, and was in every respect a most successful and notable gathering.

The opening session was held at the rooms of the Chemists' Club, 108 West 55th Street, with an attendance of about one hundred and fifty members and visitors.

Dr. McMurtrie welcomed the visitors and then introduced Mr. Randolph Guggenheimer, President of the Council, who welcomed the Society to the city. Professor Alexander S. Webb, of the College of the City of New York, welcomed the Society to the educational and scientific institutions of the city. President C. E. Munroe responded in behalf of the Society, after which the following papers were read:

'A New Method for the Separation of Arsenic, Antimony, Selenium and Tellurium from one another and from other Metals,' A. E. Knorr; 'Separation of Impurities in the Electrolytic Refining of Copper,' by P. de P. Ricketts; 'The Preparation of Metallic Tellurium,' Victor Lehner.

The meeting was then adjourned to take a special train to the New Jersey Zinc and Iron Company's works at Newark, N. J., where a luncheon was served, and the process of manufacture of zinc oxide was shown. Parties were also made up to visit the Wetherill Concentrator Works, Murphy Varnish Company, Lister's Agricultural Chemical Works and others.

In the evening a business session was held at the club rooms, at which reports were received from standing committees and the retiring President made his address. M. Raoul Pictet gave an interesting discourse on the 'Retardation of Chemical Activities at Low Temperatures.' His subject was illustrated by a lantern projection showing a piece of metallic sodium held on a steel needle and both immersed in hydrochloric acid which had been cooled to the lowest temperature obtainable by means of solidified carbon dioxide. There was no reaction between acid and sodium or the iron until a considerable rise of temperature had taken place.

The second day's session was held at Havemeyer Hall, Columbia University, at which the following papers were read:

'Measurement of Turbidity in Water,' W. P. Mason; 'The Assay of Nux Vomica,' E. R. Squibb; 'The Potato and Cassava Starch Industries in the United States,' H. W. Wiley; 'Notes on the Estimation of Carbohydrates,' Traphagen and Cobleigh; 'The Action of Iodine on the Fatty Amines,' J. F. Norris; 'On the Constitution of Some Canadian Baryto-Celestites, C. W. Volney;

'Laboratory Notes,' A. C. Langmuir; 'Flame Colorations by Bromides and Chlorides of Nickel and Cobalt,' A. S. Cushman; 'Classen's Reaction as an Aid to Determination of Constitution of Terpene Ketones,' M. C. Burt; 'Sixth Annual Report of Committee on Atomic Weight,' F. W. Clarke.

A luncheon was provided by the New York Section, which was served in the Industrial Laboratory, after which visits to various manufacturing establishments and a demonstration of the properties of liquid air at the College of the City of New York occupied the rest of the day, and a dinner at the Waldorf-Astoria in the evening closed the official program of a meeting which had been successful beyond the expectations of the most sanguine of those who had worked for it.

The attendance was not less than one hundred and fifty at any of the sessions, and among them a number of ladies, who also graced the dinner with their presence.

DURAND WOODMAN.
Secretary

SCIENTIFIC BOOKS.

The Collected Mathematical Papers of ARTHUR CAYLEY. 4to. 13 Vols., each $6.25. Supplementary Vol., containing Titles of Papers and Index. New York, Macmillan Co. $2.50.

This republication by the Cambridge University Press of Cayley's papers, in collected form, is the most fitting monument of his splendid fame.

He must ever rank as one of the greatest mathematicians of all time. Cayley exceedingly appreciated this action of the Syndics of the Press, and seven of the large quarto volumes appeared under his own editorship.

As to what these thirteen volumes contain it seems vain to attempt even a summary. They cover the whole range of pure mathematics, algebra, analysis, mathematical astronomy, dynamics, and in particular groups, quadratic forms, quantics, etc., etc.

Though abreast of Sylvester as an analyst, he was, what Sylvester was not, also a geometer. Again and again we find the pure geometric methods of Poncelet and Chasles, though, perhaps, not full assimilation of that greater one than they who has now absorbed them—von Staudt.

Cayley not only made additions to every important subject of pure mathematics, but whole new subjects, now of the most importance, owe their existence to him. It is said that he is actually now the author most frequently quoted in the living world of mathematicians. His name is, perhaps, most closely linked with the word *invariant*, due to his great brother-in-arms, Sylvester.

Boole, in 1841, had shown the invariance of all discriminants and given a method of deducing some other such functions. This paper of Boole's suggested to Cayley the more general question, to find 'all the derivatives of any number of functions which have the property of preserving their form unaltered after any linear transformation of the variables.' His first results, relating to what we now call invariants, he published in 1845. A second set of results, relating to what Sylvester called covariants, he published in 1846. Not until four or five years later did Sylvester take up this matter, but then came such a burst of genius that after his series of publications, in 1851–4, the giant theory of Invariants and Covariants was in the world completely equipped.

The check came when Cayley, in his second Memoir on Quantics, came to the erroneous conclusion that the number of the asyzygetic invariants of binary quantics beyond the sixth order was infinite, 'thereby,' as Sylvester says, 'arresting for many years the progress of the triumphal car which he had played a principal part in setting in motion.'

The passages supposed to prove this are marked '*incorrect*' in the *Collected Mathematical Papers*. But this error was not corrected until 1869 [Crelle, Vol. 69, pp. 323–354] by Gordan in his Memoir [dated 8th June, 1868]: "Beweis dass jede Covariante und Invariante einer binaeren Form eine ganze Function mit numerischen Coefficienten einer endlichen Anzahl solcher Formen ist."

Cayley at once returned to the question, found