PROCEEDINGS
OF THE
LONDON MATHEMATICAL SOCIETY.

VOL. XXI.

TWENTY-SIXTH SESSION, 1889—1890.

November 14th, 1889.

ANNUAL GENERAL MEETING, held at 22 Albemarle Street, W.

Sir JAMES COCKLE, F.R.S., Vice-President, in the Chair.

Messrs. W. Hoover, M.A., Ph.D., Professor of Mathematics and Astronomy, Ohio University, Athens, Ohio, U.S.A., and C. H. Thompson, B.A., Lecturer in Mathematics at St. David's College, Lampeter, were elected Members of the Society.

The Treasurer (Mr. A. B. Kempe) read his Report. Its reception was moved by S. Roberts, F.R.S., seconded by Major O'Callaghan, R.A., and carried.

At the request of the Chairman, Mr. G. Heppel, M.A., consented to act as Auditor.

From the Report of the Secretaries, it appeared that the total number of ordinary members since the General Meeting, held November 8th, 1888, had increased from 190 to 198—of whom 84 are compounders.

The Society had lost three members by death, viz.: Mr. W. J. Ibbetson, elected Dec. 11th, 1884; Mr. W. H. Mitchell, elected Jan. 13th, 1881; and Mr. E. Temperley, elected March 11th, 1880.

The following communications had been made:—

On Cyclotomic Functions—§ 1, Groups of Totitives of n ; § 2, Periods of n^{th} Roots of Unity: Prof. Lloyd Tanner.

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On a Theory of Rational Symmetric Functions: Captain P. A. Macmahon, R.A.

The Factors and Summation of $1^r + 2^r + \dots + n^r$: Rev. J. J. Milne.

Raabe's Bernoullians: Mr. J. D. H. Dickson.

Certain Algebraical Results deduced from the Geometry of the Quadrangle and Tetrahedron: Dr. Wolstenholme.

On a certain Atomic Hypothesis: Prof. K. Pearson.

On Deep-Water Waves resulting from a Limited Original Disturbance: Prof. W. Burnside.

A Geometrical Note: Mr. H. M. Taylor.

The Equilibrium of a Thin Elastic Spherical Bowl: Mr. A. E. H. Love.

A Method of Transformation with the aid of Congruences of a Particular Type: Mr. J. Brill.

Notes and Illustrations on a former Paper, "On a Method in the Analysis of Ternary Forms": Mr. J. J. Walker.

Results of Ternary Quadric Operators on Products of Forms of any Orders: Mr. J. J. Walker.

On a Theorem in Combinations: Mr. R. W. D. Christie.

On the Diophantine Equation $y^2 + y'^2 = \text{Square}$: Prof. Cayley.

Sur la transformation des équations algébriques: Signor Brioschi.

On Projective Cyclic Concomitants, or Surface Differential Invariants: Mr. E. B. Elliott.

On Secondary Invariants: Prof. L. J. Rogers.

Remarks upon Algebraical Symmetry, with particular reference to the Theory of Operations, and the Theory of Distributions: Major Macmahon, R.A.

Notes on Plane Curves: (iv.) Involution—Condition of a Cubic and its Hessian; (v.) Figure of a certain Cubic and its Hessian: Mr. J. J. Walker.

On Play à outrance: Major Macmahon, R.A.

Some Results in the Elementary Theory of Numbers: Mr. C. Leudesdorf.

The Characteristics of an Asymmetric Optical Instrument: Dr. J. Larmor.

A new Angular and Trigonometrical Notation, with Applications: Mr. H. MacColl.

On the Free Vibrations of an Infinite Plate of Homogeneous Isotropic Elastic Matter: Lord Rayleigh.

Ueber die constanten Factoren der Thetareihen im allgemeinen Falle $p = 3$: Prof. F. Klein.

On the Generalised Equations of Elasticity, and their application to the Theory of Light: Prof. K. Pearson.

On the Reduction of a Complex Quadratic Surd to a Periodic Continued Fraction: Prof. G. B. Mathews.

Construction du Centre de Courbure de la développée de la Courbe de Contour apparent d'une Surface que l'on projette orthogonalement sur un Plan: Prof. Mannheim.

On the Solution in Integers of Equations of the Form $x^3 + y^3 + Az^3 = 0$: Mr. S. Roberts.

On the Concomitants of K -ary Quantics: Mr. W. J. C. Sharp.

On the Motion of an Elastic Solid strained by Extraneous Forces: Signor Betti.

Note on the G -function in an Elliptic Transformation Annihilator: Mr. J. Griffiths.

On Cyclotomic Functions—§ iii. The Cyclotomics belonging to the f -nomial periods of the p^{th} Roots of Unity, where p is a prime number: Prof. Lloyd Tanner.

On the Complete Elliptic Integrals K, E, G, I : Dr. Kleiber.

The Square of Euler's Series: Dr. Glaisher.

A Theorem in the Calculus of Linear Partial Differential Operations: Major Macmahon, R.A.

On Crystalline Reflection and Refraction: Mr. A. B. Basset.

On some Rings of Circles connected with a Triangle, and the Circles (Schoute's system) that cut them at equal angles: Mr. W. W. Taylor.

The Figures of the Pippian and Quippian of a Class of Plano Cubics: Mr. J. J. Walker.

Generalization of Buffon's Problem: Dr. Sylvester.

On the small Wave-motions of a Heterogeneous Fluid under Gravity: Prof. W. Burnside.

On the Uniform Deformation in Two Dimensions of a Cylindrical Shell of Finite Thickness, with application to the General Theory of Deformation of Thin Shells: Lord Rayleigh.

The same journals had been subscribed for as in the preceding Session.

The first two volumes of the "Œuvres Complètes de Christiaan Huygens," and the first volume of the "Collected Papers" of Prof. Cayley, F.R.S., had been received.

The following addition had been made to the list of exchanges, viz., with the editors of the "Prace matematyczno-fizyczne," Warsaw.

The meeting next proceeded to the election of the new Council.

The Scrutators (Messrs. Heppel and W. J. Curran Sharp) having examined the balloting lists, declared the following gentlemen duly elected:—J. J. Walker, F.R.S., President; Sir James Cockle, Knt., F.R.S., E. B. Elliott, M.A., A. G. Greenhill, F.R.S., Vice-Presidents; A. B. Kempe, F.R.S., Treasurer; M. Jenkins, M.A., R. Tucker, M.A., Secretaries. Other Members of the Council:—A. B. Basset, F.R.S., Professor W. Burnside, M.A., Professor Cayley, Sc.D., F.R.S., J. W. L. Glaisher, Sc.D., F.R.S., J. Hammond, M.A., Joseph Larmor, D.Sc., C. Leudesdorf, M.A., Major P. A. Macmahon, R.A., Samuel Roberts, F.R.S.

The following communications were made:—

Isoscelian Hexagrams: Mr. R. Tucker.

On Euler's ϕ -function: Mr. H. F. Baker and Major P. A. Macmahon, R.A.

On the Extension and Flexure of a Thin Elastic Plane Plate: Mr. A. B. Basset.

The following presents were received :—

- "Proceedings of the Royal Society," Vol. XLVI., No. 283.
- "Proceedings of the Physical Society of London," Vol. x., Part II.
- "Proceedings of the Cambridge Philosophical Society," Vol. VI., Part VI.
- "Educational Times," for November, 1889.
- "Annales de l'École Polytechnique de Delft," Tome v., 1 and 2 Livraisons.
- "Bulletin des Sciences Mathématiques," Tome XIII., Oct. and Nov., 1889.
- "Bulletin de la Société Mathématique de France," Tome XVII., No. 4.
- "Bollettino delle Pubblicazioni Italiane ricevute per Diritto di Stampa," Nos. 91 and 92.
- "Atti della Reale Accademia dei Lincei—Rendiconti," Vol. v., Fasc. 1, 2, 3, 4.
- "Memorias de la Sociedad Científica—'Antonio Alzate,'" Tomo II., No. 11.
- "Archives Néerlandaises des Sciences Exactes et Naturelles," Tome XXIII., 5^{me} Livraison.
- "Nieuw Archief voor Wiskunde," Deel XVI., Stuk I.
- "Vierteljahrsschrift der Naturforschenden Gesellschaft in Zürich," Jahr. XXXIV., Heft 2.
- "Società Reale di Napoli—Atti della Reale Accademia delle Scienze Fisiche e Matematiche," Vol. III.
- "Mathematische und Naturwissenschaftliche Berichte aus Ungarn," Band v. (Juni 1886—Juni 1887.)
- "Vierde Rapport van de Huygens-Commissie," 8vo pamphlet; Amsterdam, 1889.
- "Beiblätter zu den Annalen der Physik und Chemie," Band XIII., Stück 10, 1889.

*Isoscelian Hexagrams.** By R. TUCKER, M.A.

[Read Nov. 14th, 1889.]

I. *Positive Hexagrams.*†

1. At the point L in BC (Fig. i.), make the $\angle BLN' = B$, $\angle CLM' = C$; then make $\angle M'NA = A$, $\angle BNL' = B$, $\angle L'MC = C$, and join MN' . Now $\angle M'LN' = A = \angle M'NA$, therefore L, N', N, M' are concyclic; also $\angle CLM' = C = \angle CML'$, therefore L, L', M, M' are concyclic; and $\angle AM'N = 180^\circ - 2A = \angle ML'N$, $\therefore L, M, M', N$ are concyclic;

* Cf. *Proc.*, Vol. XIX., p. 163.

† When λ corresponds to the point of departure of a positive isoscelian, I call the figure a positive hexagram; and when to that of a negative isoscelian, a negative hexagram.