1926-27: Forty fifth session

5. 11. 26.

Session 1926-27

Forty - Fifth Session

Minutes of Meeting held on Friday, 5th November, 1926, in the Mathematical Institute of the University of Edinburgh, at 7 p.m., Professor H. W. Turnbull, Vice President, in the chair.

The following papers were read :—

1. A Theorem on the Integral of Stieltjes, by Mr J Hyslop Ph.D.

2. Symbolic Algebra and Rational Curves on Quadrics, by Professor H. F. Baker LL.D., F.R.S. (Communicated by Prof. Turnbull)

3. Note on the Line of Striction, by Dr H. W. Richmond, F.R.S. (Communicated by Prof. Turnbull)

4. An Addition Theorem for the Mathieu Functions, by Mr J. M. Whittaker, M.A. (Read by Title)

The following list of Office - Bearers, nominated by the Committee was elected unanimously :—

President: Professor H. W. Turnbull, M.A., F.R.S.E.

Vice-President: Mr W. Saddler, M.A., F.R.S.E.

Hon. Secretary: Mr E. T. Copson, M.A., F.R.S.E.

Hon. Treasurer: Mr E. M. Horsburgh, M.A., D.Sc., F.R.S.E.

Hon. Librarian: Mr D. Gibb, M.A., B.Sc., F.R.S.E.

Meeting: 5th November 1926

Editors of } Mr T. M. MacRobert D.Sc., F.R.S.E.
Proceedings } Professor Turnbull

Editor of Notes. Mr A. C. Aitken D.Sc., F.R.S.E.

Committee :— Mr W. Arthur M.A., Mr G. S. Eastwood B.Sc.,
Mr J. Hyslop Ph.D., Mr J. B. Lockhart M.A.,
Mr Archibald Milne D.Sc., Mr K. K. Weatherhead M.A., F.F.A.,
Professor E. T. Whittaker LL.D., F.R.S.

Owing to the unavoidable absence of Dr Horsburgh,
the presentation of the Treasurer's accounts were postponed
to the next meeting. Dr A. C. Aitken and Dr Marion C Gray
were appointed to audit these accounts.

The Chairman remarked upon the great losses
suffered by the Society since the last meeting
in the death of two members, Sir Peter Scott Lang
and Mr Peter Ramsay. The former, the Emeritus
Professor of Mathematics of St Andrews University, had been a member from its
earliest days, and had joined the Society in the Fifth
Session (1886-87). Mr Peter Ramsay had done a
great deal of hard work in the interests of the
Society as a member of Committee, as Honorary
Secretary, as President and as Editor of the
Mathematical Notes. Many of the present members
had been his pupils at George Watson's College,
Edinburgh.

Professor H. W. Turnbull nominated
as Honorary Members, Professor H. J. Baker LL.D, F.R.S,
of Cambridge and Professor G. D. Birkhoff Ph. D.,
of Harvard. He stated that they had done
a good deal in making the St Andrews
Colloquium a success. The nomination was
seconded by Professor E. J Whittaker.

The following were nominated for Ordinary
Membership of the Society :—
Miss J. R. Arneil M.A., 28 Stewarton Drive, Cambuslang.
Mr George Brown M.A., 10 Janefield Place, Beith.
Mr J. Carmichael B.Sc., The University, St. Andrews.
Major A. H. R. Goldie M.A., F.R.S.E., 6 Drumsheugh Gardens,
                            Edinburgh.
Mr W. G. Guthrie M.A., The University, St Andrews.
Mr A. Ingles B.Sc., The High School, Dundee.
Miss M. C. McColl M.A., 12 Victoria Crescent, Glasgow, W.2.
Miss G. E. MacDonald M.A., 3 Wendover Crescent,
                            Mount Florida, Glasgow.
Miss S. McGregor M.A., High School for Girls, Glasgow.
Miss E. J. Meiklejohn M.A., The University, Edinburgh.
Professor A. S. Merrill, The University of Montana, U.S.A.
Mr W. F. Sheppard Sc.D., The University, Edinburgh
George A. Gibson Mr George Thomson M.A., Avondale, Clyde St, Carluke. .
Miss J. M. Younger M.A., Hutcheson's Grammar School for Girls, Glasgow

1.26. Minutes of Meeting held on Friday, 3rd December, 1926, at Glasgow, Professor G. A. Gibson, LL.D., in the chair.

The following papers were read :—

1. On the Concept of Frequency of Light, by Prof. E. T. Whittaker.

2. Difference Equations and Asymptotic Expansions, by Dr John Dougall.

3. Two models for teaching solid geometry in schools (with demonstrations) by Mr A. H. Miller.

4. On some Legendre Function Formulae, by Dr T. M. MacRobert.
   (Read by title.)

In the unavoidable absence of the Honorary Treasurer, Dr E. M. Horsburgh, the Treasurer's report for the session 1925-26 was read by the Hon. Secretary. The Balance Sheet was of a very satisfactory character. The Cash Account shewed a credit balance of £26. 11. 5. The chief feature of the report was that, in his ten years of office, the Treasurer had succeeded in his aim of building up an invested Capital Reserve of £400. On the motion of the Chairman, the Society passed a very hearty vote of thanks to Dr Horsburgh for his services.

Professor H. F. Baker LL.D., F.R.S., and Professor G. D. Birkhoff Ph.D., were elected Honorary Members of the Society.

The following ladies and gentlemen, nominated at the last

Meeting: 3rd December 1926

meeting, were elected Ordinary Members of the Society :—

Miss I. R. Arneil, Mr G. Brown, Mr J. Carmichael, Major A. H. R. Goldie, Mr W. G. Guthrie, Mr A. Inglis, Miss M. C. McColl, Miss G. E. MacDonald, Miss L. McGregor, Miss E. F. Meiklejohn, Professor A. S. Merrill, Dr W. F. Sheppard, Mr G. Thomson, Miss J. M. Younger.

The following were nominated for Ordinary Membership of the Society :—

Mr J. Bates, M.A., Ayr Academy.

Mr J. Cassels, M.A., B.Sc., Ayr Academy.

Mr W. M. Inverarity, M.A., B.Sc., 11 Ravenshall Rd., Glasgow W.1

Professor H. W. Lloyd, M.A., The Training College, Belfast.

Mr James Robertson, M.A., B.Sc., Glasgow Provincial Training College.

On the motion of Professor Whittaker, the Society thanked Professor and Mrs Gibson for their hospitality.

W. Turnbull

14.1.27

Minutes of Meeting held on Friday, 14th January, 1927 at 7 p.m., in the Mathematical Institute of Edinburgh University, Professor H. W. Turnbull, President, in the Chair. (During the reading of the first paper, Mr W. Saddler, Vice-President, presided).

The following papers were communicated to the Society :—

Meeting: 14th January 1927

5

1. Note on Double Binary Perpetuants, by Prof. H. W. Turnbull.
2. On Determinants of Symmetric Functions, by Dr A. C. Aitken.
3. On the Correlation of Aggregates, by Mr J. M. Whittaker.
4. Some Geometrical Models, by Mr J. Mackie.
5. The Cardinal Function of Interpolation Theory, by Mr J. M. Whittaker.
   (By Title)
6. Note on the Integral Equations for the Same Functions,
   (By Title)   by Mr E. T. Copson.

The following gentlemen, nominated at the last meeting, were elected Ordinary Members of the Society :—
Mr J. Bates, Mr J. Cassels, Mr W. M. Inverarity, Prof. H. W. Lloyd, Mr J. Robertson.

Mr A. F. Buchan B.Sc., Mathematical Master at Gillespie's School, Edinburgh, was nominated for Ordinary Membership.

The President gave notice with reference to Rule 2, of a motion that ' A member may compound for his Annual Subscription by the payment of Six Guineas, subject to a reduction of £1.1s after ten years' membership and a further reduction of £1.1s for each succeeding five years' membership.'   W. Saddler.

6

4.2.27.   Minutes of Meeting held on Friday, 4th February, 1927
at 7.5 p.m. in the Mathematical Institute of
Edinburgh University, Mr W. Saddler, Vice-President
in the Chair.

The following papers were communicated to the
Society :—

1. Permutations and Allied Topics   by Dr A. C. Aitken.
2. Note on the Intilinear Correspondence.   by Mr W. Saddler.
3. Interpolation with Least Mean Square of Error
                                                     by Dr W F Sheppard.
4. A Class of Solutions of Einstein's Gravitational Equations
   (By title)   by Mr J. Ghosh.
5. On the Meaning of an Equation in Dual Coordinates
6. On the Uninodal Quartic Curve
   (By title)
                                                     by Dr H. W. Richmond F.R.S
7. Note on Partial Fractions (By title)   by Prof. Turnbull.
8. On the Maxima and Minima of Functions of Two Variables.
   (By title)
                                                     by Dr J. M'Whan

Mr A. F. Buchan was elected an Ordinary Member.
The motion amending Rule 2, of which notice was
H.W.Turnbull given at the January meeting, was passed nem. con.

3.27.

Minutes of Meeting held on Friday, 4th March, 1927 at 7 p.m. in the Mathematical Institute of the University of Edinburgh, Professor H. W. Turnbull, President, in the chair

The following papers were read by title :—

1. The Solution of the Problem of Cauchy by means of integrals involving complex variables, by Mr C. A. Stewart.

2. Apolar Triads on a Cubic Curve, by Mr W. Saddler.

3. A Special Pencil of Binary Quartics,
by Prof. R. Vaidyanathaswami

Dr MacRobert took the chair whilst Prof. Turnbull gave an extremely interesting lecture on Determinants. He discussed in particular their connection with Partial Fractions, and made some interesting applications of a little known theorem due to Sylvester.

Dr Aitken, in commenting on the paper, shewed the great advantage of using an umbral notation for determinants.

On the motion of Dr MacRobert, the Society thanked Professor Turnbull for his paper.

H W Turnbull.

Meeting: 4th March 1927

6. 5. 27.

Minutes of Meeting held on Friday, 6th May, 1927 at 6.30 p.m. in the Mathematical Class room, the University, Glasgow, the President, Prof. H. W. Turnbull, in the Chair. The members of the Euclidean Society were also present.

Professor E. J. Whittaker F.R.S. gave a lecture on "Definitions, Axioms and Existence-Theorems in Euclid," which aroused great interest in a large audience. It was followed by a discussion in which Dr J. M. Cherry, Dr Burgess, Mr J. P. Black, Professor Gibson and the President took part.

Miss Edith Young M.A., B.Sc., of Mossgiel, Surbet, Stirlingshire, was nominated for ordinary membership of the Society.

On the motion of Mr J. B. Lockhart, Professor and Mrs Gibson were thanked for their hospitality to members of the Society.

HW Turnbull

Meeting: 6th May

4.6.27.

Minutes of Meeting held on ~~Friday~~ Saturday, 4th June, 1927 at 4 p.m. in the Mathematical Lecture Room, United College, St Andrews, the President, Prof. H. W. Turnbull, in the Chair.

The following papers were communicated to the Society :-

1. The Differentiation of a Matrix, by Prof. H. W. Turnbull.
2. The Latent Roots of Matrices, by Dr A. C. Aitken.
3. Apolar Triads on a Cubic Curve, by Mr W. Saddler.
4. A Special Pencil of Binary Quartics, by Prof. R. Vaidyanathaswami.
5. Infinitesimal Analysis of an Arc in n-space, by Mr R. N. Sen.

The last two papers were read by title.

Miss Edith Young was elected an ordinary member of the Society.

On the motion of Prof. Whittaker, Prof. and Mrs Turnbull were thanked for their hospitality to members of the Society.

HW Turnbull

Meeting: 4th June 1927

St Andrews Mathematical Colloquium, 1926

Under the auspices of the Edinburgh Mathematical Society, a Mathematical Colloquium will be held in St Andrews from **August 3rd to 13th, 1926.**

The following Courses of Lectures have been arranged:—

A—The Significance of Dynamics for Scientific Thought

By GEORGE D. BIRKHOFF, Ph.D.,
Professor of Mathematics in Harvard University, U.S.A.

B—Recent Developments in Algebraic Geometry

By H. W. RICHMOND, LL.D., F.R.S.,
Fellow of King's College, Cambridge.

An important extension of Geometry made during the last fifty years is the study of Geometry of more than three dimensions. As a logical method of approach to this, it will first be shewn how greatly Plane Geometry is dependent upon that of space; and then how much the latter is simplified in places by the notion of a Four-Dimensional Geometry.

C—Recent Developments in Applied Mathematics

By S. BRODETSKY, D.Sc.,
Professor of Applied Mathematics in the University of Leeds.

D—The History of Mathematics in Scotland

By G. A. GIBSON, M.A., LL.D., F.R.S.E.,
Professor of Mathematics in the University of Glasgow.

Economic condition of Scotland; the Founding of three Universities in the Fifteenth Century; range of Mathematics and its position in the curriculum. The effect of the Reformation. The Founding of Edinburgh University. Conditions in the Seventeenth Century. Advances in the Eighteenth Century. The Founding of the Royal Society of Edinburgh.

In the course, the work of Napier, Gregory, Simson, Maclaurin, Stirling, Matthew Stewart, etc., will be considered.

E—An Introduction to the Invariant Theory.

By H. W. TURNBULL, M.A., F.R.S.E.,
Fereday Fellow of St John's College, Oxford, Professor of Mathematics in the United College, University of St Andrews.

History of the concept "invariant." Growth of Algebraic method; interplay of Algebra and Geometry in construction of symbolic methods. Bearings on Geometry, Physics and the theory of numbers. The "Chemico-Algebraic" theory. Present day developments.

F—Informal Talks will, it is expected, be given by Professor E. T. WHITTAKER, F.R.S., and others.

Colloquium:

St Andrews Mathematical Colloquium, August 1926.

Lectures.

The following courses of lectures have been arranged:—

Professor G. D. Birkhoff (Harvard) on "The Significance of Dynamics for Scientific Thought."

Dr H. W. Richmond F.R.S. (Cambridge) on "Algebraic Geometry."

Professor S. Brodetsky (Leeds) on "Gravitation."

Professor G. A. Gibson (Glasgow) on "The History of Mathematics in Scotland."

Professor H. W. Turnbull (St. Andrews) on "The Invariant Theory."

All lectures will be delivered in the <u>University Hall</u>, and not in the United College, as previously announced. The provisional time table is as follows:—

	Aug. 4 Wednesday	5 Thursday	6 Friday	7 Saturday	9 Monday	10 Tuesday	11 Wednesday	12 Thursday
10-11 a.m	Birkhoff	Brodetsky	Richmond	Turnbull	Brodetsky	Richmond	Turnbull	Brodetsky
11.30-12.30	Richmond	Turnbull	Brodetsky	Richmond	Turnbull	Brodetsky	Richmond	Turnbull.
2-3 p.m.	Birkhoff	—	Gibson	—	Gibson.	—	—	—

The opening address of the Colloquium will be given at 8.30 p.m on Tuesday, August 3.

<u>The University Hall</u> is at a distance of half a mile from the Railway Station, and is situated at the corner of Kennedy Gardens and Carnegie Gardens; it is plainly marked on the Town plan in the Official Guide to St Andrews. The postal address is "The University Hall, St. Andrews, Fife."

Those who are residing in the Hall should arrive, if possible, on the afternoon of August 3, and should see the Honorary Secretary as soon as they reach the Hall.

The hours of meals are :— Breakfast 8.30 a.m, Lunch 1 p.m., Tea 4.30 p.m., Dinner 7.30 p.m.
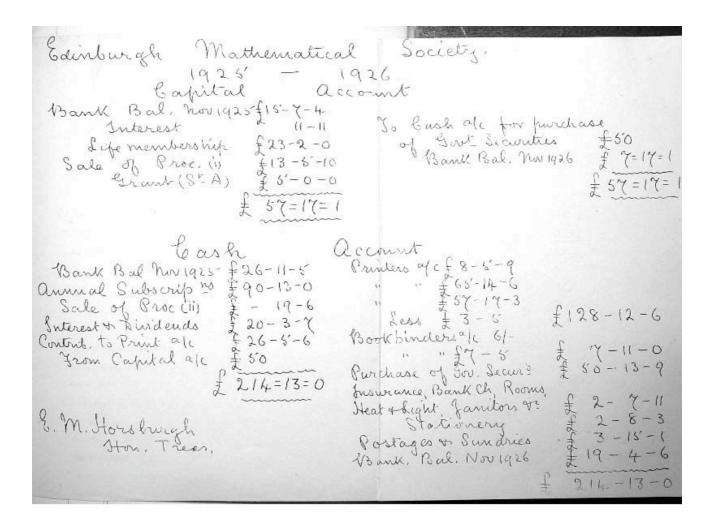
Colloquium report

The St Andrews Colloquium, August, 1926.

The Society held a Summer School at the University Hall, St Andrews, from August 3rd to 13th. It was attended by approximately eighty people, from the leading British Universities and also from Australia, the United States, Russia, Egypt and India.

On the evening of the 3rd, Professor Whittaker gave the opening address. He remarked upon the success of the two previous colloquia (1913 and 1914) which the Society had held. He considered that they were especially important in that they brought together the two branches of the mathematical profession, the academic and the scholastic. He hoped that the 1926 Colloquium would not be less successful than the previous ones. Professor Turnbull welcomed the members of the Colloquium on behalf of the Principal and Senatus of the University of St Andrews. He said that he had a singular advantage in that he had had experience of both sides of the mathematical profession.

On the 4th, Professor G. D. Birkhoff gave two lectures on "The Significance of Dynamics for Scientific Thought." He discussed some recent work on the

theory of orbits, and possible applications to the theory of spectra. He also dealt with the philosophical aspects of dynamics.

Professor G A Gibson gave two lectures on the 6th and 9th on the History of Mathematics in Scotland.

Courses of five lectures were given by Dr H. W Richmond on 'Recent Advances in Geometry,' Professor S. Brodetsky on 'Gravitation,' Professor H. W Turnbull on 'The Invariant Theory.'

On the evening of the 9th, Professor H. F. Baker gave an informal talk on "The Passing of Metrical Geometry." He emphasised the great beauty and simplicity introduced into geometry by the use of projective rather than metrical ideas.

On the evening of the 11th, Professor E. T Whittaker gave an informal talk on "Hilbert's World-Function." He traced the gradual development of the attempt to explain all physics by means of a single variational principle, beginning with the optical principle of least time, through the work of Hamilton on least action, up to the most recent work of Hilbert.

On the evening of the twelfth, a vigorous discussion, led by Professor H. F. Baker, was held on the teaching of geometry in schools. The general trend of the discussion was that some attempt at a logical development of geometry is necessary, though the use of practical work in the early stages was advantageous. The suggestion that analytical geometry might profitably be discussed in schools and synthetic geometry left to the University was considered inadvisable and impracticable. This, was the last meeting of the Colloquium, which dispersed on the morning of the 13th.

The Officers were :—

President : Dr John Dougall, M.A., D.Sc., F.R.S.E.
Hon. Secretary : Mr E. T. Copson, M.A., F.R.S.E
Hon Treasurer : Mr W. Saddler, M.A., F.R.S.E
Committee : Professor E. T. Whittaker, F.R.S.
Professor H. W. Turnbull, M.A., F.R.S.E.
Professor J. E. A. Steggall, M.A., F.R.S.E
Mr G. Lawson, M.A.
Mr J. F. P. Bisacre, M.A., O.B.E.
Auditors : Dr R. K. Butchart B.Sc., Ph.D., F.R.S.E.
Miss M. C. Simpson M.A., B.Sc.

Edinburgh Mathematical Society.
1925 — 1926
Capital Account

Bank Bal. Nov 1925 £15-7-4
Interest 11-11
Life membership £23-2-0
Sale of Proc. (i) £13-8-10
Grant (St A) £5-0-0
£ 57=17=1

To Cash a/c for purchase
of Govt Securities £50
Bank Bal. Nov 1926 £ 7=17=1
£ 57=17=1

Cash Account

Bank Bal Nov 1925 £26-11-5
Annual Subscripno £90-13-0
Sale of Proc (ii) — 19-6
Interest & Dividends 20-3-7
Contrib. to Print a/c £26-5-6
From Capital a/c £50
£ 214=13=0

Printers a/c £8-5-9
" " £65-14-6
" " £57-17-3
Less £ 3-5
Book binders a/c 6/-
" " £7-5
Purchase of Gov. Secur?
Insurance, Bank Ch, Rooms,
Heat & Light, Janitors &c
Stationery
Postages & Sundries
Bank. Bal. Nov 1926

£128-12-6
£ 7-11-0
£ 50-13-9
£ 2-7-11
£ 2-8-3
£ 3-15-1
£ 19-4-6
£ 214-13-0

E. M. Horsburgh
Hon. Treas,

Financial statement: 1925-26

EDINBURGH MATHEMATICAL SOCIETY.

FORTY-FIFTH SESSION, 1926-27.

THE Second Ordinary Meeting for the Session will be held on **Friday, 3rd December,** at 6.30 p.m., in the **Mathematical Class Room, The University, Glasgow.**

BUSINESS:

1. On the Concept of Frequency of Light - Prof. E. T. WHITTAKER, F.R.S.
2. Difference Equations and Asymptotic Expansions - - - - - Dr JOHN DOUGALL.
3. On some Legendre Function Formulæ - Dr T. M. MACROBERT.
4. Mathematical Notes - - -

Professor and Mrs Gibson "At Home" 10 The University, Glasgow, from 5.30 to 6.30 p.m.

Office Bearers for the Session 1926-27.

President . . . Professor H. W. TURNBULL, M.A., F.R.S.E.

Vice President . W. SADDLER, M.A., F.R.S.E.

Hon. Secretary . E. T. COPSON, M.A., F.R.S.E.

Hon. Treasurer . E. M. HORSBURGH, M.A., D.Sc., Assoc. M.Inst. C.E.

Hon. Librarian . DAVID GIBB, M.A., B.Sc., F.R.S.E.

Editors of Proceedings { T. M. MACROBERT, M.A., D.Sc., F.R.S.E.
Prof. H. W. TURNBULL, M.A., F.R.S.E.

Editor of Mathematical Notes—A. C. AITKEN, M.A., D.Sc., F.R.S.E.

Committee.

WILLIAM ARTHUR, M.A., F.R.S.E.
G. S. EASTWOOD, B.Sc., F.R.S.E.
J. HYSLOP, M.A., Ph.D.
J. B. LOCKHART, M.A.
ARCHIBALD MILNE, M.A., D.Sc., F.R.S.E.
K. K. WEATHERHEAD, M.A., F.F.A.
Professor E. T. WHITTAKER, LL.D., F.R.S.

The Subscription of **Ten Shillings** for the current Session is now due, and is payable to the Hon. Treasurer.

E. M. HORSBURGH, M.A., D.Sc.,
11 GRANVILLE TERRACE, EDINBURGH.

E. T. COPSON, *Hon. Secy.*,
16 Chambers Street, Edinburgh.

Committee Meeting at 6.10 p.m.

Office bearers 1926-27