

June 8, 1871.

The Annual Meeting for the election of Fellows was held this day.

Sir PHILIP GREY-EGERTON, Bart., Vice-President, followed by Mr. W. SPOTTISWOODE, Treasurer and Vice-President, in the Chair.

The Statutes relating to the election of Fellows having been read, Dr. Allman and Mr. W. H. L. Russell were, with the consent of the Society, nominated Scrutators to assist the Secretaries in examining the lists.

The votes of the Fellows present having been collected, the following Candidates were declared to be duly elected into the Society:—

William Henry Besant, M.A.
William Budd, M.D.
George William Callender, F.R.C.S.
William Carruthers, Esq.
Robert Etheridge, F.R.S.E.
Frederick Guthrie, B.A.
John Herschel, Capt. R.E.
Alexander Moncrieff, Capt. M.A.

Richard Quain, M.D.
Carl Schorlemmer, Esq.
Edward Thomas, Esq.
Edward Burnet Tylor, Esq.
Cromwell Fleetwood Varley, C.E.
Arthur Viscount Walden, P.Z.S.
John Wood, F.R.C.S.

Thanks were voted to the Scrutators.

June 15, 1871.

General Sir EDWARD SABINE, K.C.B., President, in the Chair.

Mr. W. H. Besant, Mr. G. W. Callender, Mr. W. Carruthers, Mr. R. Etheridge, Prof. F. Guthrie, Right Hon. R. Lowe, Capt. A. Moncrieff, Dr. R. Quain, Mr. E. Thomas, Viscount Walden, and Mr. J. Wood, were admitted into the Society.

The following communications were read:—

- I. "On the Fossil Mammals of Australia.—Part V. Genus *Nototherium*, Ow." By Prof. R. OWEN, F.R.S. Received May 8, 1871.

(Abstract.)

The genus of large extinct Marsupial herbivore which forms the subject of the present paper was founded on specimens transmitted (in 1842) to the author by the Surveyor-General of Australia, Sir Thomas Mitchell, C.B. They consisted of mutilated fossil mandibles and teeth. Subsequent specimens confirmed the distinction of *Nototherium* from *Diprotodon*, and more especially exemplified a singular and extreme modification of the cranium of the former genus. A detailed description is given of this part

from specimens of portions of the skull in the British Museum, and from a cast and photographs of the entire cranium in the Australian Museum at Sydney, New South Wales. The descriptions of the mandible, and of the dentition in both upper and lower jaws, are taken from actual specimens in the British Museum, in the Museum of Natural History at Worcester, and in the Museum at Adelaide, S. Australia, all of which have been confided to the author for this purpose. The results of comparisons of these fossils of *Nototherium* with the answerable parts in *Diprotodon*, *Macropus*, *Phascolarctos*, and *Phascolomys* are detailed.

Characters of three species, *Nototherium Mitchelli*, *N. inerme*, and *N. Victoriae*, are defined chiefly from modifications of the mandible and mandibular molars. A table of the localities where fossils of *Nototherium* have been found, with the dates of discovery and names of the finders or donors, is appended. The paper is illustrated by subjects for nine quarto Plates.

II. "On Cyclides and Sphero-Quartics." By JOHN CASEY, LL.D., M.R.I.A. Communicated by Prof. CAYLEY, F.R.S. Received May 11, 1871.

(Abstract.)

The curves and surfaces considered in this paper are, I believe, some of the most fertile in properties in the whole range of geometry. For the purpose of giving a full and comprehensive discussion, I have divided the paper into several chapters. The following is an outline of the method of investigation pursued, together with a statement of some of the results arrived at.

If we take the most general equation of the second degree in $(\alpha, \beta, \gamma, \delta)$, where these variables denote spheres instead of planes,

$$(a \ b \ c \ d \ l \ m \ n \ p \ q \ r) \chi(\alpha, \beta, \gamma, \delta)^2 = 0,$$

we get the most general form in which the equation of a quartic cyclide can be written. Setting out with this equation, I have proved that a quartic cyclide is the envelope of a variable sphere, whose centre moves on a given quadric, and which cuts orthogonally the Jacobian of the spheres of reference $(\alpha, \beta, \gamma, \delta)$.

The Jacobian of $(\alpha, \beta, \gamma, \delta)$ can be written in a form identical with that of the imaginary circle at infinity in the system of quadriplanar coordinates. The square of the Jacobian can be expressed by an equation of the second degree in $\alpha, \beta, \gamma, \delta$. This equation assumes a very simple form when $\alpha, \beta, \gamma, \delta$ are mutually orthogonal. By means of it I have shown that every quartic cyclide can be written in the canonical form,

$$a\alpha^2 + b\beta^2 + c\gamma^2 + d\delta^2 + e\epsilon^2 = 0,$$

where $\alpha, \beta, \gamma, \delta, \epsilon$ are five spheres mutually orthogonal. These are spheres of inversion of the cyclide, and by incorporating constants their equations are connected by an identical relation, $\alpha^2 + \beta^2 + \gamma^2 + \delta^2 + \epsilon^2 = 0$.