

rolling surface of the Breccia, from which the Pebble beds have been removed for road metalling, can be seen.

My personal belief is that the red clays are Carboniferous, and the breccia bed Permian.

C. J. GILBERT.

“STAGHURST,” BERKHAMSTED.

March 21, 1918.

#### A NOTE ON ISOSTASY.

SIR,—I am much indebted to Mr. Anderson for calling attention to the oversight in my calculation. His re-calculation is perfectly right. Consequently, instead of 1,100 feet as the possible thickness of sediment accumulated in a sea of 100 fathom depth, we have 1,872 feet; or in the improbable case of a density as low as 2·7 for the supporting column, as much as 3,000 feet. These figures are still far removed from those great thicknesses of shallow-water deposit for which isostasy has been claimed as an adequate explanation.

A. MORLEY DAVIES.

IMPERIAL COLLEGE, S.W. 7.

April 13, 1918.

### OBITUARY.

#### GEORGE JENNINGS HINDE,

PH.D. (MUNICH), F.R.S., F.G.S., V.P. PAL. Soc.

BORN MARCH 24, 1839.

DIED MARCH 18, 1918.

(WITH A PORTRAIT, PLATE X.)

As a worker gleans in a cornfield after the crop has been harvested, I have endeavoured to collect some records of my friend George Hinde, whose life's work terminated in March last. He was a Norwich boy, like myself, and went to the Grammar School there, but being my junior by seven years we never met until many years later, our paths in early life lying wide apart.

George Hinde was the third son of Ephraim Hinde and grandson of the founder of the firm of Ephraim Hinde & Son, Paramatta manufacturers in that city. His father lived near his Norwich factory, but in 1847 bought a farm at Catton, where he and his family resided. George's mother died when he was 13 years old, and at 16 his father sent him to learn farming in Suffolk with a Mr. Spelman, where, being a studious lad, he spent his leisure hours in acquiring Latin, French, algebra, physics, and chemistry. About this time he heard a lecture by the Rev. Mr. Blowers on “Hugh Miller”, which greatly interested him, and he bought and read Hugh Miller's books, and thus his mind was first directed to the study of geology.

When 18 years of age he commenced to farm his own land at Bawburgh, near Costessy, Norwich. Early in 1862 he attended a series of lectures in Norwich by William Pengelly, F.R.S.; these further stimulated his desire to take up geology, which later on became the leading ambition of his life. In the same year he paid

a visit to the British Museum, and from my wife's relationship to his family he claimed me as a "cousin", and so we continued to the end. This visit to the "Geological Department" seems to have acted as a loadstone which attracted him to the Museum in later years. He particularly mentions in his diary the impression made upon him by our geological talk.

In the autumn of that year he gave up his farm and sailed for Buenos Aires, and took up sheep farming; but save for a note in his diary of a geological walking tour, he does not appear to have had much spare time for scientific pursuits in South America. After some years ranching in Argentina Hinde returned home, but very soon after set out for North America, where he devoted seven years entirely to geological research, during which time his travels extended from Nova Scotia on the east to Nebraska on the west, and from Lake Superior to the Gulf of Mexico.

For a time he settled in Canada, entering himself as a student in geology under Professor H. Alleyne Nicholson, F.R.S., in Toronto University, with whom he published his first paper in 1875, "On the Fossils of the Clinton, Niagara, and Guelph Formations of Ontario" (*Canadian Journal*, xiv). He also wrote papers on "The Glacial and Interglacial Strata of Scarboro' Heights, Ontario" and "On the Occurrence of Boulders of the Calciferous Formation near Toronto". Later on he made the interesting discovery of "Conodonts" and Annelid jaws in the Cambro-Silurian of Canada and the United States.

Returning to England in 1874, he was elected a Fellow of the Geological Society of London.

He also pursued his search for Conodonts and Annelid jaws in the Silurian strata of the West of England and the Sub-Carboniferous rocks of Scotland; he found these in many localities identical with those he had obtained in North America, which he subsequently figured and described in the *Quarterly Journal* for 1879, 1880, and 1882.

This work and the renewal of his early study of the Chalk Sponges occupied him until 1878, when he visited Sweden, Gotland, and Denmark and travelled across Europe to Palestine.

During 1879-80 he studied under Professor Kari von Zittel in the University of Munich, and upon receiving the degree of "Doctor of Philosophy" he presented for his inaugural dissertation a paper on the "Fossil Sponge-spicules found in a flint from the Upper Chalk at Horstead in Norfolk" (Munich, 1880).

Dr. George Hinde was married in 1881 to Edith Octavia, daughter of James Clark, of Street, Somerset, of the Society of Friends.

In February, 1882, he was awarded the Wollaston Fund for his researches in fossil Invertebrata of North America and the Glacial phenomena of Canada. He was also elected a Member of Council of the Geological Society, on which he served for nearly twenty years, being made a Vice-President in 1893.

After the removal of the Geological Collections from the British Museum at Bloomsbury to the new Natural History Museum in Cromwell Road, the Trustees authorized Dr. Hinde to prepare a Catalogue of the Fossil Sponges in the Geological Department. This

was completed between 1881 and 1883, and forms an important work of reference, admirably illustrated by Miss Suft and Mrs. Herschell (4to; pp. viii + 248, with 38 plates).

After the death of my colleague Professor John Morris, in 1885, Dr. Hinde became an Assistant Editor of the *GEOLOGICAL MAGAZINE*, an office he held for thirty-two years to the great advantage of this journal, to which he also contributed numerous articles.

He joined the Palæontographical Society in 1886 and commenced a monograph on the British Fossil Sponges, completed in 1912. He also contributed with Professor T. Rupert Jones, F.R.S., a monograph on Cretaceous Entomostraca (1889-90). Dr. Hinde was elected on the Council in 1897, and Treasurer in 1904, an office he held for ten years. On retiring from it he was made a Vice-President in succession to Sir A. Geikie (1916).

During the meeting of the International Geological Congress in London in 1887, Dr. Hinde rendered important services on the Committee by preparing a temporary museum in the Library of the London University, and also by his knowledge of languages in acting as geological guide and interpreter to the numerous distinguished foreigners present, to many of whom he was already personally known during his extensive travels.

When the bye-laws of the Geological Society underwent revision in 1889, the question of the admission of women as "Fellows" came up for discussion. Dr. Hinde took a very active part in its support; but although Sir Joseph Prestwich and many others maintained that the time had come when, women having proved by their work their eligibility for Fellowship, the privileges of the Society should be extended to them, the proposal was defeated by a majority of four out of sixty-two Fellows voting.<sup>1</sup>

Dr. Hinde spent many years in active field-work, followed by strenuous work in the laboratory in the preparation of rock-sections for the microscope, and then, after much study of existing literature, came a steady flow of scientific papers, continued for nearly forty years.

In addition to the two important monographs on Fossil Sponges already referred to, the subjoined list shows some twenty additional separate papers on that class of organisms.

That on the *Receptaculitidæ* (including *Ischadites*, *Sphærospongia*, *Acanthoconia*, and *Receptaculites*) from the Silurian and Devonian strata of England, Belgium, Silesia, Bohemia, Gotland, Canada, and the United States, is an admirable piece of patient investigation in solving the nature of an obscure group of fossil organisms long in dispute. Hinde proved them to belong to a genus of siliceous Hexactinellid sponges, of which he defined their relations and figured their structures with elaborate detail (see *Q.J.G.S.*, 1884).

Another example of careful and laborious work is his memoir on the *Porosphaera*, a group of small but very abundant globular

<sup>1</sup> The author of this memoir, when President in 1895, discussed the same subject; but although strongly advocated by many of the Fellows it still remains in abeyance.

bead-like (often perforated) organisms from the Chalk, of which (aided by Dr. Arthur Rowe) he collected no fewer than 2,900 specimens. After examination of their minute structure under the microscope he showed them to belong to a group of Lithonine Calcisponges, of which he described and figured six species (see Journ. Roy. Micr. Soc., 1903).

By the investigation of chert rocks of Lower Palæozoic age from every part of the world Hinde demonstrated their geological importance and truly organic origin, built up of millions of microscopic siliceous skeletons, often of exquisite forms, of Radiolaria. He devoted twenty papers to their description: those from the Cherts of the Dutch East Indies he collaborated with Dr. G. A. F. Molengraaff, and those of Devon, Cornwall, and Somerset, with Mr. Howard Fox, F.G.S., of Falmouth.



Of the class Annelida, the naked wandering marine worms, without hard parts (save very minute toothed jaws and spines), were formerly known only by their *tracks* upon the Palæozoic rocks; but jaws of Annelids were found by Hinde in Cambro-Silurian formations in America, Britain, Sweden, etc., often mixed, as in the Ludlow "Bone-bed", with parts of various other microscopic organisms, such as the teeth of cartilaginous fishes, *Myxine*, etc.), Crustacean remains, etc. He separated many of these and figured them, and also the Annelid jaws,<sup>1</sup> for the first time since their discovery by Dr. Pander in Russia in 1854.<sup>2</sup>

In connexion with the Royal Society he communicated a paper on "Beds of Sponge-remains in the Lower and Upper Greensand Formation of the South of England", published in the *Phil. Trans.*, 1886 (pp. 403-53). He also reported to the Royal Society's Committee on Coral Reefs the result of his investigation of the organisms obtained by him from the cores extracted from the

<sup>1</sup> The author determined seven genera of Annelids, and enumerated fifty-five different forms.

<sup>2</sup> Professor Owen, Dr. Harley, and H. Woodward also drew attention to them; see "Conodonts", Murchison's *Siluria*, 5th ed., 1872, pp. 134, 356, 542, 544.

borings in a coral-reef on the Funafuti Atoll (see *Phil. Trans.* for 1904).

George Hinde was elected a Fellow of the Royal Society in 1896. In the year following the Council of the Geological Society awarded him the Lyell Medal. In presenting it the President, Dr. Henry Hicks, referred to the large experience gained by Dr. Hinde with Professor Nicholson in Toronto, and continued later under Professor K. von Zittel in Munich, which had resulted in the valuable work he had since performed that had placed him in the foremost rank of those devoted to the study of minute structures of fossil organisms.

In 1910 the Royal Geological Society of Cornwall conferred upon Dr. Hinde the William Bolitho Gold Medal "for his valuable contributions to the Geology and Palæontology of Cornwall" (partly in conjunction with Mr. Howard Fox, F.G.S., of Falmouth).

Such are the gleanings I have gathered from the scientific work of my friend George Hinde. He was essentially a keen investigator of Nature, an accurate observer, and a strenuous, untiring worker who never lost interest in his researches. He was naturally of a silent and retiring disposition—having lived much alone in his early life—a man who formed few intimacies, but had the gift of ardent loyalty to those he made his friends.

He spent much of his time latterly in his quiet home at Croydon, with his books, microscope, and specimens. After some months of ill-health, carefully tended by his devoted wife, George Hinde passed peacefully away on March 18, 1918. He leaves a family of three sons and two daughters.

HENRY WOODWARD.

LIST OF DR. HINDE'S PAPERS AND MEMOIRS.

1877. "The Glacial and Interglacial Strata of Scarborough Heights, Ontario": Canadian Journal, xv, pp. 388-413.  
 "The Occurrence, near Toronto, of boulders of the Calciferous Formation": *ibid.*, p. 644.
1879. "A new genus of Favosite Coral (*Syringolites huronensis*), from the Niagara Formation, Manitoulin Island": *GEOL. MAG.*, Dec. II, Vol. VI, pp. 244-6.  
 "On Conodonts from the Chazy and Cincinnati Group of the Cambro-Silurian, etc., in Canada and the United States": *Quart. Journ. Geol. Soc.*, xxxv, pp. 351-69.  
 "Annelid Jaws from the Cambro-Silurian, Silurian, and Devonian Formations in Canada": *ibid.*, pp. 370-89.
1880. "Fossil Sponge-spicules from the Upper Chalk, found in the Interior of a single Flint-stone, from Horstead in Norfolk" (*Inaugural Dissertation*): Munich.  
 "Annelid Jaws from the Wenlock and Ludlow Formations of the West of England": *Quart. Journ. Geol. Soc.*, xxxvi, pp. 368-78.
1882. "Annelid Remains from the Silurian Strata of the Isle of Gotland": *Bih. k. Vet. Akad. Handl.*, Stockholm, vii.  
 "Notes on Fossil Calcspongiae": *Ann. Mag. Nat. Hist.*, x, pp. 185-205.
1883. *Catalogue of the Fossil Sponges in the British Museum (Natural History)*. 4to; pp. viii + 248, with 38 plates.
1884. "Structure and Affinities of the Family of the Receptaculitidæ": *Quart. Journ. Geol. Soc.*, xl, pp. 795-849.  
 "Some Fossil Calcspongies from the Well-boring at Richmond, Surrey": *ibid.*, pp. 778-83.

1885. "A new species of Crinoids with Articulate Spines": *Ann. Mag. Nat. Hist.*, xv, pp. 157-73.
1886. "Beds of Sponge-remains in the Lower and Upper Greensand of the South of England": *Phil. Trans. Roy. Soc.*, clxxvi, pp. 403-53.
- "Sponge-spicules from the Deposits of St. Erth": *Quart. Journ. Geol. Soc.*, xlii, p. 214.
- "*Hystericinus*, Hinde, versus *Arthroacantha*, Williams; a question of Nomenclature": *Ann. Mag. Nat. Hist.*, xvii, pp. 271-5.
- "Note on *Eophyton* (?) *explanatum*, Hicks, and on *Hyalostelia fasciculatus*, M'Coy, sp.": *GEOL. MAG.*, Dec. III, Vol. III, pp. 337-40.
- 1886-1912. *The Fossil Sponges*. *Palæont. Soc. Mon.*, pp. 264.
1887. "On the genus *Hindia*, Duncan, and the name of its typical species": *Ann. Mag. Nat. Hist.*, xix, pp. 67-79.
- "The Organic Origin of the Chert in the Carboniferous Limestone Series of Ireland": *GEOL. MAG.*, Dec. III, Vol. IV, pp. 435-46.
- "Character of the Beds of Chert in the Carboniferous Limestone of Yorkshire": *Nature*, xxxv, p. 582.
1888. "New Species of *Uruguayia*, Carter, with remarks on the Genus": *Ann. Mag. Nat. Hist.*, xx, pp. 1-12.
- "Note on the Spicules described by Billings in connection with the Structure of *Archæocyathus minganensis*": *GEOL. MAG.*, Dec. III, Vol. V, pp. 226-8.
- "The Chert and Siliceous Schists of the Permo-Carboniferous Strata of Spitzbergen": *ibid.*, pp. 241-51.
- "The History and Characters of the genus *Septastræa*, D'Orbigny (1849)": *Quart. Journ. Geol. Soc.*, xliv, pp. 200-27.
- "Notes on Sponges from the Quebec Group at Métis and from the Utica Shale": *Canad. Rec. Sci.*, iii, pp. 59-68.
1889. "On *Archæocyathus*, Billings, and on other genera allied to or associated with it, from the Cambrian Strata of North America, etc.": *Quart. Journ. Geol. Soc.*, xlv, pp. 125-48.
- "On some Fossil Siliceous Sponges from the Quebec Group of Little Métis, Canada": *ibid.*, Proc. p. 24.
- "On a true Leuconid Calcsponge from the Middle Lias of Northamptonshire": *Ann. Mag. Nat. Hist.*, iv, pp. 352-8.
- "Fragments of Siliceous Rock from the Boulder Clay of the 'Roode Klif' (Friesland)": *Bull. Soc. Belge Géol., Bruxelles (Mém.)*, pp. 254-8.
- "A new genus of Siliceous Sponges from the Trenton Formation of Ottawa": *Canad. Rec. Sci.*, iii, pp. 395-8.
1890. "On a new genus of Siliceous Sponges from the Lower Calcareous Grit of Yorkshire": *Quart. Journ. Geol. Soc.*, xlvi, pp. 54-61.
- "Radiolaria from the Lower Palæozoic Rocks of the South of Scotland": *Ann. Mag. Nat. Hist.*, vi, pp. 40-59.
- "Some Ordovician Radiolarian Chert from the Southern Uplands of Scotland": *Quart. Journ. Geol. Soc.*, xlvi, Proc. p. 111.
- "Radiolarian Chert in the Ballantrae Series of the South of Scotland": *GEOL. MAG.*, Dec. III, Vol. VII, p. 144.
- "Palæontology of Western Australia." 2. Corals and Polyzoa: *ibid.*, pp. 194-204.
1891. "A new Fossil Sponge from the Utica Shale Formation at Ottawa, Canada": *ibid.*, VIII, pp. 22-4.
1892. "Microscopic Structure of the so-called Malm or Firestone Rock of Merstham and Godstone, Surrey": *Proc. Croydon Mier. Club*, iii, pp. 124-31, 133.
- "Discovery of Chert containing Radiolaria, etc., in the Palæozoic Rocks": *ibid.*, p. 253.
1893. "*Palæosaccus dawsoni*, Hinde, a new genus and species of Hexactinellid sponge from the Quebec Group, Little Métis, Quebec": *GEOL. MAG.*, Dec. III, Vol. X, pp. 56-9.

1893. "Radiolaria in the Mullion Island Chert": *Quart. Journ. Geol. Soc.*, xlix, pp. 215-18.  
 "Radiolarian Rock from Fanny Bay, Port Darwin, Australia": *ibid.*, pp. 221-6.  
 "Microscopic Structure of some of the Organic Rocks from the New Hebrides": *ibid.*, pp. 230-1.  
 "On Specimens of *Archaeocyathina* from South Australia": *Proc. Geol. Soc.* in vol. xlix, p. 8.
1894. "A new Fossil Sponge from the Eocene of the East Slope of the Ural": *Bull. Com. Géol. St. Pétersb.*, xii, pp. 253-7.  
 "Radiolarian Chert from Angel Island, etc., California": *Bull. Dept. Geol. Univ. California*, i, pp. 235-40.
1896. "Descriptions of new Fossils from the Carboniferous Limestone": *Quart. Journ. Geol. Soc.*, lii, pp. 438-51.
1897. "Additional Notes on the Radiolarian Rocks in the Lower Culm-Measures of Dartmoor": *Trans. Devon Assoc.*, xxix, pp. 518-23.  
 "Radiolarian Chert from the Island of Billiton": *Jaarb. Mijnw. Nederl. Ind.*, xxvi, pp. 223-7.  
 "Eminent Living Geologists: Dr. G. M. Dawson": *GEOL. MAG.*, Dec. IV, Vol. IV, pp. 193-5.
1899. "Radiolaria in the Devonian Rocks of New South Wales": *Quart. Journ. Geol. Soc.*, lv, pp. 38-63.  
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1900. "Gravels of Croydon and its Neighbourhood": *Proc. Croydon Micr. Club*, iv, pp. 219-33.  
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 "Structure and Affinities of the genus *Porosphaera*, Steinmann": *Journ. Roy. Micr. Soc.*, pp. 1-25.  
 "The Bone-bed in the Upper Ludlow Formation": *Proc. Geol. Assoc.*, xviii, pp. 443-6.
1905. "Note on Fragments of Chert from North China": *GEOL. MAG.*, Dec. V, Vol. II, pp. 255-6.
1908. "Radiolaria from Triassic and other Rocks of the Dutch East Indian Archipelago": *Jaarb. Mijnw. Nederl. Ind.*, xxxvii, pp. 694-736.  
 "A new Sponge from the Chalk at Goring-on-Thames": *Proc. Geol. Assoc.*, xx, pp. 420-1.
1910. "Fossil Sponge-spicules in a Rock from the Deep Lead (?) at Princess Royal Township, Norseman District": *Bull. Geol. Surv. Western Australia*, No. 36, pp. 7-24.
1913. "On *Solenopora garwoodi*, sp. nov., from the Lower Carboniferous in the North-West of England": *GEOL. MAG.*, Dec. V, Vol. X, pp. 289-92.
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1892. — & HORACE B. WOODWARD. "Excursion to Faringdon and Abingdon": *Proc. Geol. Assoc.*, xii, pp. 327-33.  
 — & W. MURTON HOLMES. "On the Sponge-remains in the Lower Tertiary Strata near Oamaru, Otago, New Zealand": *Journ. Linn. Soc. (Zool.)*, xxiv, pp. 177-262.

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1897. ——— "Additional Notes on the Radiolarian Rocks in the Lower Culm Measures to the East and North-East of Dartmoor": *ibid.*, xxix, pp. 518-23.
- & W. WHITAKER. "Excursion to Redhill and Merstham (New Railway)": *Proc. Geol. Assoc.*, xv, pp. 113-15.
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1898. A. E. SALTER & GEORGE JENNINGS HINDE. "Excursion to Upper Warlingham and Worms Heath": *Proc. Geol. Assoc.*, xv, pp. 458-9. H. W.

#### MISCELLANEOUS.

BRITISH MUSEUM (NATURAL HISTORY).—At the end of March Mr. Richard Hall retired after thirty-eight years of service as preparer of fossils in the Geological Department of the British Museum. In early life he became a highly skilled mason, and was engaged on many and varied important works, including the Prince Consort's tomb at Frogmore, some parts of the House of Commons, and buildings on the estate of the Duke of Wellington between Grenada and Malaga in Spain. Among his close associates for a time was the late Henry Broadhurst, afterwards M.P. Entering the British Museum in 1880 his abilities enabled him soon to adapt himself to the new special work, and he acquired remarkable proficiency in the art of preparing vertebrate skeletons. Under the direction of the late Mr. William Davies, his first great success was the chiselling of the skeleton of *Hyperodapedon gordonii* from the Triassic sandstone of Elgin, which was described by Professor Huxley in 1887. Afterwards, especially under the direction of the late Professor H. G. Seeley, he began to extricate the skeletons of *Pariasaurus* and *Cynognathus* from an almost intractable matrix, and his work on these and other reptiles from the Karoo Formation of South Africa led to great progress in the more exact study of the Triassic reptilian fauna. *Dicynodon halli* was named after him to commemorate his services. Mr. Hall also prepared many other important specimens which are now conspicuous in the public galleries of the Museum, and among them may be mentioned the skeleton of *Ichthyosaurus platyodon* from Stockton, Warwickshire, *Pteranodon* and *Portheus* from the Chalk of Kansas, *Dinichthys* and similar fishes from the Devonian of Ohio, and the great collection of Mammalian bones from the Pliocene of Pikermi, Greece. He has won the appreciation and esteem both of students and colleagues, and retires with the best wishes of all who have been associated with him.