

THE
GEOLOGICAL MAGAZINE.

NEW SERIES. DECADE V. VOL. IX.

No. V.—MAY, 1912.

ORIGINAL ARTICLES.

I.—EMINENT LIVING GEOLOGISTS.

WILLIAM CARRUTHERS, Hon. Phil. Dr. et A.M. (Upsala), F.R.S., F.L.S.,
F.G.S., F.R.M.S., F.R. Phys. Soc. et Bot. Soc. Edinb., Corr. Memb.
Acad. N. Sci. Philad., etc.

(WITH A PORTRAIT,¹ PLATE X.)

IF we review the progress of any one of the natural sciences we shall find it is but the outcome of the genius and labours of many individual workers, who have devoted themselves for years to some particular branch of discovery or research. Taking palæobotany as an illustration, we may cite the name of William Carruthers as a striking example of an individual worker in that field, who, during more than a quarter of a century, specially devoted himself to the investigation and description of fossil plants, and has thus added largely to a knowledge of this section of the science of palæontology.

Born at Moffat, Dumfriesshire, on May 29, 1830, William Carruthers received his early education at Moffat Academy. Thence he proceeded, in 1845, to the University of Edinburgh. During two periods his regular course of studies was interrupted that he might hold tutorial posts, so that his University career was not completed until the spring of 1854. In the autumn of that year he was entered at New College, Edinburgh, with a view to study for the ministry of the Presbyterian Church. Here, under the teaching of Dr. John Fleming, the Professor of Natural Science, a man of conspicuous attainments as a naturalist, the inclination which Carruthers had already shown for science was strongly developed.

Acting under the advice and encouragement of Professor Fleming, who was then an old man, he devoted his energies to science with a view to becoming his colleague and successor. He accordingly studied in the University under Goodsir, Allman, and Balfour; but in 1858, before Carruthers' curriculum was finished, Professor Fleming died, and it was of course out of the question to appoint a student to the chair. It is interesting to note that forty-five years later Mr. Carruthers filled the chair for a year during a vacancy caused by the resignation of Professor Duns.

¹ This portrait, with some extracts from the text (by "S. W. C."), is reproduced from the Journal of the Royal Agricultural Society of England, vol. lxx, pp. 1-12, 1909, by kind permission of the Council.

His first position after leaving New College was that of Lecturer on Botany in the New Veterinary College, Edinburgh. A few months later he became Assistant to the Secretary of the Royal Society of Edinburgh, and in this capacity made the acquaintance of Dr. Robert Chambers, the publisher, which led later to his contributing the geological articles to the first edition of *Chambers' Encyclopædia*. William Carruthers' earliest scientific paper, recorded in the Royal Society's Catalogue, was a geological one on the Graptolites found in the rocks of his native county (Dumfriesshire), published in the Transactions of the Royal Physical Society of Edinburgh.

In 1859 he was offered, through Professor J. Hutton Balfour, the post of Assistant in the Department of Botany in the British Museum, and took up his duties there in August of that year, the staff of the Department at that time consisting of his chief (Mr. John Joseph Bennett) and himself. He thus definitely abandoned the Church as a profession, and devoted himself to science, but it was from no lack of sympathy with the Church, for throughout his life his great hobby has been Church history and theological literature.

In 1870 he was earnestly invited by Professor Asa Gray, the famous American botanist, to join him at Cambridge, Mass., with a view to his designating him as his successor. Mr. Carruthers was much drawn by this offer, but eventually decided not to give up his post in the Museum; indeed, in 1871 Mr. Bennett retired and Mr. Carruthers succeeded him as Keeper of Botany.

His first important studies in geology led him to undertake the careful investigation of the Graptolites of the Moffat Shales, and for some years he devoted his special attention to this group of organisms, in which Professor Lapworth, H. A. Nicholson, John Hopkinson, and others also laboured.

In the British Museum he had under his immediate charge a large and valuable series of fossil plants, mostly showing structure, being a part of the collection of the celebrated botanist Robert Brown, the first Keeper of the Botanical Department (1827), who died in London, June 10, 1858, the year before Carruthers entered the Museum. He also made good use of the fossil plants preserved in the Geological Department, to which he had free access. His first important paper related to the fructification of *Lepidodendron*, material for which he found in the Robert Brown Collection and in the Geological Department. He not only described the fossil spore-bearing cones of (a) *Lepidostrobus Brownii* and *L. ornatus*, and of (b) *Flemingites gracilis*, but he further showed that the presence of these shed spores was characteristic of, and made up entirely, a number of beds of coal as the 'splint-coal', the Fordel-coal, the 'parrot', the 'cherry', and cannel coals, as first noticed by Witham, Fleming, Prestwich, Morris, and other early observers, and he was thus able to connect them with the spore-bearing cones of *Lepidodendron*, which he figured in detail and accurately described (GEOL. MAG., 1865, pp. 433-40, Pl. XII).

Apart from the purely systematic and descriptive papers on palæobotanical subjects, of which a list is given at the end of this notice, one of the most valuable and instructive contributions to fossil

botany, from a student's and intellectual observer's point of view, was given by Mr. Carruthers in his historic lecture at the Royal Institution on Friday, April 16, 1869, on "The Cryptogamic Forests of the Coal Period", printed in this Magazine (*GEOL. MAG.*, Vol. VI, pp. 289-300, 1869).

In it we have a clear and concise description of the vegetation of certainly the most wonderful period of plant-development known in the past ages of our earth, and the author points to the remarkable fact that the vast stores of carbonized plant-remains on which human progress, arts, manufactures, and commerce now depend, were derived from the accumulated growth, not of the highly specialized forms of plant-life which chiefly characterize our present flora, but from humble vascular Cryptogams, Ferns, Equisetaceæ, Lycopodiaceæ, and 'Pill-worts' (Marsiliaceæ), many of which (as the 'Club-mosses' and 'Horse-tails') attained to giant growths and formed veritable forests, which for ages incalculable must have flourished (homotaxially, if not synchronously) over nearly the whole earth.

This chapter of the past, written by such an expert as Mr. Carruthers, needs but to be repeated by similar *Évangels* for every other geological stage to make our earth's past history a veritable fairy tale of delightful literature for all.

From 1871 to 1880—when the removal of the Natural History Collections to Cromwell Road took place—the restricted space occupied by the exhibited Botanical Series and the Herbarium itself, at Bloomsbury, precluded the possibility of any great expansion or proper display, and the very life of the Department itself was threatened also by a powerful attempt to capture the Museum Collection and transfer it to Kew. But Mr. Carruthers' evidence before the Royal Commission on Scientific Instruction made so clear a case for the existence of the botanical collections as a part of the great Natural History Collections, in our National Museum in London, as to fully justify and firmly secure its continuance.

When the removal to South Kensington was effected in 1880, adequate space was allotted to the Botanical Department, and the work of re-arranging both the public exhibits and the collections for the use of students owed much to Mr. Carruthers' talent for organization.

In labelling and illustrating the specimens in the public collections, moreover, he was one of the pioneers of the system of giving adequate explanations on the labels, thus making the collections far more interesting and instructive to the public.

The removal to South Kensington necessitated the creation of a Departmental Library, for which a special grant was made. This task occupied Mr. Carruthers for some years, resulting in the formation of what has now become the finest botanical library in the world.

In 1870 the Linnean Society published Mr. Carruthers' very important monograph "On the Fossil Cycadean Stems from the Secondary Rocks of Britain" (*Trans. Linn. Soc.*, vol. xxvi, pp. 675-708, with ten plates, 1870, 4to). In this work one realizes the advantage of the author having an accurate knowledge of recent plants, both structural and physiological, thus giving to his published opinions on

the plant-remains found embedded in the various strata a far greater value and scientific importance.

In 1871 William Carruthers obtained the honour of election to the Royal Society, on the Council of which he served (1877–9). In 1871 he was appointed Consulting Botanist to the Royal Agricultural Society of England, a post which he held with distinction for thirty-nine years.

In 1884 he attended the meeting of the British Association in Montreal and took a long trip in America (in company with the late Mr. Charles de Laune Faunce de Laune and Mr. F. S. W. Cornwallis), in the course of which he secured interesting specimens for his Department, and got into closer touch with museums and herbaria on the American continent. He and his fellow-travellers also gathered much valuable experience in agricultural botany on this expedition.

In 1886 he was President of the Biological Section of the British Association, at its Birmingham meeting, and there delivered an address on the persistence of specific characters in plants, which presented so difficult a problem to the supporters of the Darwinian theory that it remains unanswered to this day.

From 1886 to 1890 Mr. Carruthers was chosen to be President of the Linnean Society, in which period its centenary celebrations fell; and for organizing and carrying through these important commemorations he received the Society's thanks. The Linnean Medal was then founded, and he had the pleasure of presenting the first medals to Sir Richard Owen and Sir Joseph Hooker. In 1907 Mr. Carruthers was sent by this Society to Sweden as its representative at the bicentenary commemorations of the birth of Linné, and at that time the ancient University of Upsala conferred on him the honorary degrees of M.A. and Ph.D. He had also been elected President of the Geologists' Association 1875–7, and of the Royal Microscopical Society 1900–1. He retired from the Keepership of Botany in the British Museum (Nat. Hist.), under the age clause, in 1895, when the scientific staff consisted of the keeper and five assistants.

The number of papers published by Mr. Carruthers upon recent botanical subjects (especially in connexion with Economic Botany for the Royal Agricultural Society) amounts to considerably over 100. Those enumerated in the annexed list relate to palæontological and geological subjects only.

His care in attention to detail, without losing sight of salient points, his power of lucid exposition of a subject, and his willingness to satisfy any genuine desire for knowledge have made him a most useful officer both to the British Museum and the Royal Agricultural Society of England.

Speaking of William Carruthers' personal character the writer has ever found him, during forty years association, a most consistent and true friend and a staunch and faithful colleague. Like many of his countrymen from across the Tweed he was a good fighter, and when he had made up his mind that his cause was a just one he was very tenacious in maintaining his ground. Had he lived in the old days he would certainly have been a good fighting Covenanter. His list of honours is a long one, but are they not all duly recorded in the Year Book of the Royal Society for 1912, p. 8?

In 1865 he married Jane Couch, eldest daughter of William L. Moffatt, Architect, Edinburgh, and has two sons and a daughter. His second son, John Bennett, followed his father's footsteps, and took up Economic Botany. After acting as assistant in his father's laboratory and giving special attention to the diseases of plants, he went to Ceylon at the request of the planters to investigate a malady destroying the Cacao trees. Thereafter he entered the Colonial Service and did excellent pioneer work in Ceylon, the Federated Malay States, and Trinidad, where he died in 1910 at the early age of 41. The elder son, Samuel William, who has an honours M.D. of Edinburgh, is in practice at Norwood, and his daughter has her home in the same suburb.

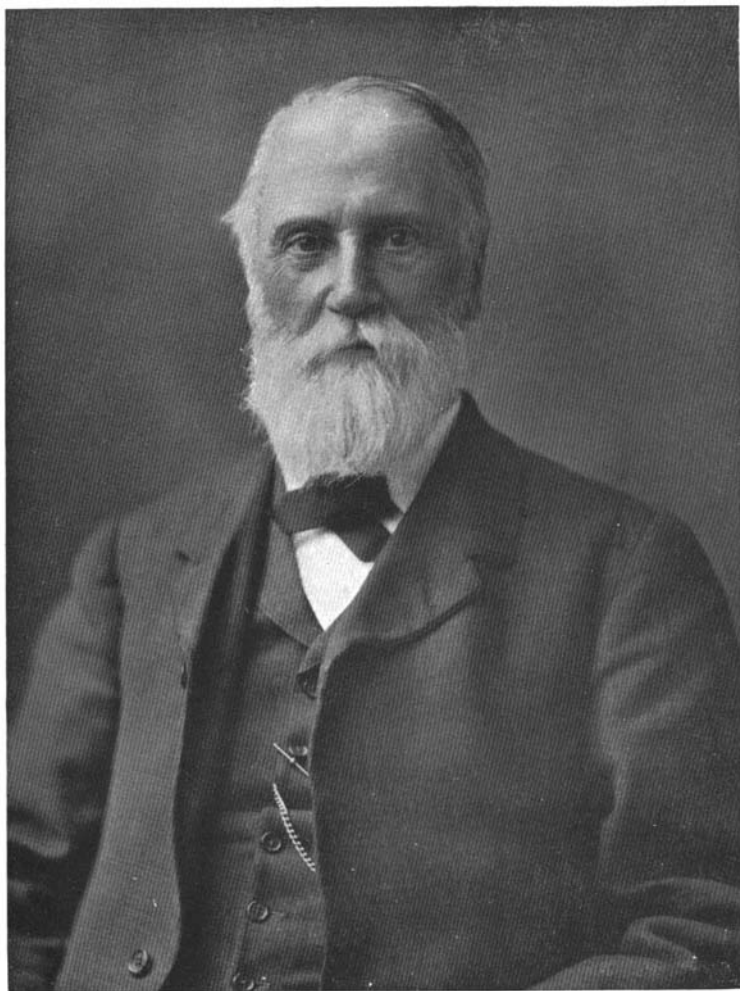
He is now enjoying with his family near him, at Central Hill, Norwood, the repose of a long, useful, and honourable life.

LIST OF CONTRIBUTIONS TO PALEONTOLOGY, ETC., BY DR. WILLIAM
CARRUTHERS, F.R.S.

1858. "Dumfriesshire Graptolites, with descriptions of three new species": Proc. Phys. Soc. Edinburgh, vol. i, pp. 466-70; [republished in] Ann. Mag. Nat. Hist., vol. iii, pp. 23-6, 1859.
1862. "The Geology of Moffat": Proc. Phys. Soc. Edinburgh, vol. ii, pp. 383-90; Edinburgh New Phil. Journ., vol. xvi, pp. 33-40.
- "On a section at Junction Road, Leith": Quart. Journ. Geol. Soc., vol. xviii, pp. 450-3.
1865. "On an undescribed Cone from the Carboniferous beds of Airdree, Lanarkshire: *Flemingites gracilis*": GEOL. MAG., Vol. II, pp. 433-40, Pl. XII.
- "On *Caulopteris punctata*, Goepp., a tree-fern from the Upper Greensand of Shaftesbury in Dorsetshire": ibid., pp. 484-7.
1866. "On the Vegetation of the Coal Period": ibid., Vol. III, pp. 229-30.
- "On Araucarian Cones from the Secondary beds of Britain": ibid., pp. 249-52.
- "On some fossil Coniferous fruits": ibid., pp. 534-46.
- "On the structure and affinities of *Lepidodendron* and *Calamites*": Trans. Bot. Soc. Edinburgh, vol. viii, pp. 495-507; Journ. Bot., vol. iv, pp. 337-48.
1867. "On Gymnospermatus fruits from the Secondary rocks of Britain": Journ. Bot., vol. v, pp. 1-21.
- "On *Calamites* and fossil *Equisetaceæ*": ibid., p. 304.
- "On the structure of the fruit of *Calamites*": ibid., pp. 349-56.
- "Note on the systematic position of Graptolites and on their supposed ovaria-vesicles": GEOL. MAG., Vol. IV, pp. 70-2, 187, 336.
- "On some Cycadean fruits from the Secondary rocks of Britain": ibid., pp. 101-6.
- "On an Aroideous fruit from the Stonesfield Slate": ibid., pp. 146-7.
- "On *Cycadoidea Yatesii*, a fossil Cycadean stem from the Potton Sands, Bedfordshire": ibid., pp. 199-201.
- Appendix D, on Graptolites, in Sir R. I. Murchison, *Siluria* [London].
- "Graptolites, their structure and systematic position": *Intellectual Observer*, vol. xi, pp. 283-92, 365-74.
- "On British Fossil Cycadeæ": Journ. Bot., vol. v, pp. 302-4; Rep. Brit. Assoc. Adv. Sci. (Dundee, 1867) [1868], p. 80.
- "Enumeration of British Graptolites": ibid., p. 57.
- "On the fruit of a *Pandanus* from the Great Oolite": Journ. Bot., vol. v, p. 304. [Abstract of paper read before Dundee Meeting, Brit. Assoc.]

1868. "A Revision of the British Graptolites, with descriptions of the new species and notes on their affinities": *GEOL. MAG.*, Vol. V, pp. 64-74, 125-33.
 "British Fossil Pandanæ": *ibid.*, pp. 153-6.
 "Classification of Graptolites": *ibid.*, pp. 199-200 [letter to Editor].
1869. "On some undescribed Coniferous fruits from the Secondary rocks of Britain": *ibid.*, Vol. VI, pp. 1-7.
 "On *Beania*, a new genus of Cycadean fruit, from the Yorkshire Oolites": *ibid.*, pp. 97-9.
 "On the plant remains from the Brazilian coal beds, with remarks on the genus *Flemingites*": *ibid.*, pp. 151-6.
 "On the plant remains found in the Cretaceous and Tertiary strata of N. America": *Journ. Bot.*, vol. vii, 82-5.
 "On the genus *Knorria*, Sternberg": *ibid.*, pp. 153-5.
 "On the structure and affinities of *Sigillaria* and allied genera": *Quart. Journ. Geol. Soc.*, vol. xxv, pp. 248-54, pl. x; *Phil. Mag.*, vol. xxxviii, p. 402.
 "Age of the Rocks of Alaska Territory": *GEOL. MAG.*, Vol. VI, p. 239 [letter to Editor].
 "The Cryptogamic forests of the Coal Period": *ibid.*, pp. 289-300; *Proc. Royal Institution*, vol. v, pp. 511-22.
- 1869-70. "On the structure of the stems of the Arborescent Lycopodiaceæ of the Coal Measures": *Monthly Micros. Journ.*, vol. ii (1869), pp. 177-81, 225-7; vol. iii (1870), pp. 144-54.
 "On Reptilian Eggs from Secondary Strata"; "On Slickensides": Notice of papers read at Exeter Meeting (1869), *Brit. Assoc. Adv. Sci.*, Rep. p. 86 [1870].
1870. "Review of the contributions to Fossil Botany published in Britain in 1869": *GEOL. MAG.*, Vol. VII, pp. 181-4.
 "On the Petrified Forests near Cairo": *ibid.*, pp. 306-10, Pl. XIV.
 "On the structure of a fern stem from the Lower Eocene of Herne Bay, and its allies, recent and fossil": *Q.J.G.S.*, vol. xxvi, pp. 349-53, pls. xxiv, xxv; *Phil. Mag.*, vol. xl, pp. 225, 226.
 "On the nature of the scars in the stems of *Ulodendron*, *Bothrodendron*, and *Megaphyllum*, with a synopsis of the species found in Britain": *Monthly Micros. Journ.*, vol. iii, pp. 144 et seq.
 "On fossil Cycadean stems from the Secondary rocks of Britain": *Trans. Linn. Soc.*, vol. xxvi, pp. 675-708, with ten plates, 4to.
 "On the history and affinities of the British Coniferæ": *Rep. Brit. Assoc. Adv. Sci. (Liverpool, 1870)* [1871], p. 71.
 "On the Sporangia of Ferns from the Coal-measures": *ibid.*
 "Remarks on the fossils from the railway section at Hoyton": *ibid.*, pp. 71-2.
 "Note on an *Antholithes* discovered by C. W. Peach": *ibid.*, p. 72. [Abstract.]
1871. "On the vegetable contents of masses of limestone occurring in Trappean rocks in Fifeshire, and the conditions under which they are preserved": *Rep. Brit. Assoc. Adv. Sci.* (1871), pp. 94-5.
 "Review and Synopsis of the contributions to Fossil Botany published in Britain in 1870": *GEOL. MAG.*, Vol. VIII, pp. 218-20.
 "On two undescribed Coniferous fruits from the Secondary rocks of Britain: *Pinites hexagonus*, *Sequoiites ovalis*": *ibid.*, pp. 540-4.
 "On some vegetable structures recently discovered in the Lower Coal-beds at Halifax, 1870": *Rep. Croydon Micros. Club*, vol. i, pp. 26-7.
 "On some supposed Vegetable Fossils": *Q.J.G.S.*, vol. xxvii, pp. 443-8, pl. xix.
1872. "On the leaf-bearing species of *Lepidodendron*": *Monthly Micros. Journ.*, vol. vii, pp. 50-4.

- "On the history, histological structure, and affinities of *Nematophycus Loganii*, Carr. (*Prototaxites Loganii*, Dawson), an alga of Devonian age": *ibid.*, vol. viii, pp. 160-72, pls. xxxi-ii.
- "On *Traquairia*, a Radiolarian Rhizopod from the Coal-measures": Rep. Brit. Assoc. Adv. Sci., 1872, p. 126; Quart. Journ. Micros. Sci., vol. xii, pp. 397-8.
- "Note on some supposed fragments of a *Eurypterus*": in Dr. H. Woodward's *British Fossil Crustacea—Merostomata* (Mon. Pal. Soc.), pp. 168-71.
- "Notes on some Fossil Plants from Queensland, Australia": Q.J.G.S., vol. xxviii, pp. 350-60. Appendix II in R. Daintree, *Notes on the Geology of the Colony of Queensland*.
- "Notes on some Fossil Plants": GEOL. MAG., Vol. IX, pp. 49-59, Pl. II.
- "Review of the contributions to Fossil Botany published in Britain in 1871": *ibid.*, pp. 369-73.
- 1872-3. "On the Tree Ferns of the Coal Measures, and their affinities with existing forms": Rep. Brit. Assoc. Adv. Sci., 1872 [1873], pp. 98-9; GEOL. MAG., Vol. IX, pp. 465-7; Journ. Bot., vol. vii, pp. 279-81, 1872; Q.J.G.S., vol. xxix, pp. 380-1.
1873. "On *Halonina* of Lindley & Hutton and *Cyclocladia* of Goldenburg": GEOL. MAG., Vol. X, pp. 146-52, Pl. VII.
- "Review of the contributions to Fossil Botany published in Britain in 1872": *ibid.*, pp. 461-5.
- "*Nematophycus* or *Prototaxites*?" : Monthly Micros. Journ., vol. x, pp. 208-10.
- "On the Tree Ferns of the Coal Measures, and their relations to other living and fossil forms": Q.J.G.S., vol. xxix, p. 380. [Abstract.]
- "On some Lycopodiaceous plants from the Old Red Sandstone of the North of Scotland": Journ. Bot., vol. ii, pp. 321-7.
1876. "On the Flora of the London Clay of Sheppey": Proc. Geol. Assoc., vol. iv, pp. 318-19.
- "Note on the Flora of the Gault, with description of a new pine cone, *Pinites Pricei*": *ibid.*, pp. 278-81.
- 1876-8. ["Fossil Plants"] Presidential Address to Geologists' Association, November 1875: *ibid.*, vol. v, 1876-8, pp. 1-16.
- ["Evolution of Plant Life"] Presidential Address to the Geologists' Association, November, 1876: *ibid.*, pp. 17-35; GEOL. MAG., 1876, pp. 560-5.
1877. "Description of a new species of *Araucarites* from the Coralline Oolite of Malton" [in Blake & Hudlestone]: Q.J.G.S., vol. xxxiii, p. 402.
1878. "Descriptions of Tertiary Plant-remains from Bracklesham and Worthing, Sussex"; "The Plant-remains of the Upper and Lower Cretaceous (Neocomian) Formations in England": in F. Dixon, *The Geology of Sussex*, new [second] edition, 1878.
1879. "Note on Mr. Lee's specimens of fossil wood from Griqualand": GEOL. MAG., Vol. VI, p. 286 [letter to Editor].
1880. "On a collection of Fossils from the Bowen River Coal-field, etc.": [in Etheridge] Proc. R. Phys. Soc. Edinburgh, vol. v, p. 325.
1882. "Contributions to the Palæobotany of Sweden": GEOL. MAG., Vol. IX, pp. 22-4.
1883. "On the foliage of *Sigillaria Serlii*, Brongn.": *ibid.*, Vol. X, pp. 49-50.
1884. "Coal, and the Plants which form it": Ann. Rep. Dulwich Coll. Sci. Soc., 1883-4, pp. 39-41.
1885. "Notes on Fossil Roots in the Sarsen Stones in Wiltshire": GEOL. MAG., Ser. III, Vol. II, pp. 361-2.



William Carruthers