

The Kidston Collection of fossil plants, with an account of the life and work of Robert Kidston

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Robert Kidston, FRS, FRSE LLD 1852-1924.
Kidston in his house at Clarendon Place,
Stirling.

The life and work of Robert Kidston

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The life and work of Robert Kidston

Introduction

Robert Kidston was born on 29th June, 1852, at Bishopston House, Renfrewshire. Shortly after his birth, the family removed to Stirling, which became his permanent home. He was educated at the High School and, following the death of his parents, lived with his sisters until 1898 when he married Agnes, daughter of Major Oliphant, of Over Kinedar, Fife. As a young man he entered the service of the Glasgow Savings Bank and during that period attended botanical lectures; some of these were delivered by the late Professor W. C. Williamson and no doubt directed Kidston's mind to the study of fossil botany.

The failure of the Glasgow Bank, in 1878, abruptly terminated his business career, and Kidston, who was possessed of sufficient private means, henceforward followed his predilection as a naturalist. In 1879 and the following year he attended the classes in Botany, given by Hutton Balfour, at the University of Edinburgh, obtaining First Class certificates and a medal in Practical Botany. At this time his interests were fairly equally divided between recent and fossil botany : on the one hand he studied, in company with his friend Colonel J. S. Stirling of Gargunnoch, the flora of Stirlingshire and on the other, he investigated the fossil plants occurring in the quarries and pits near his home. The former work resulted in the publication, jointly with Colonel Stirling, of a series of ten papers on the Flora of Stirlingshire.

Although, with the passage of time, Kidston devoted more and more attention to fossil floras, he retained an interest in living plants and was a keen gardener, justly proud of his rock garden. His knowledge of plant localities in Stirlingshire proved of practical service to the country during the Great War, when he organised and led a corps of collectors to obtain bog-moss for use in surgical dressings. Kidston attached himself to the Established Church of Scotland and served as a magistrate for Stirlingshire. He occupied his leisure with such hobbies as curling, fishing, sketching and photography, and frequently visited the Continent.

In June 1924 Kidston travelled south to see two collections of fossil plants, one made by the writer at the University of Bristol and the other by the late David Davies, of Gilfach Goch, South Wales. He left Bristol for South Wales apparently in the best of health, but soon after his arrival at Gilfach Goch became seriously ill and died on 13th July, 1924, at the age of 72, leaving a widow and two daughters.

This account is based on the obituary notices, written after Kidston's death, by Professor A. C.

Seward, F.R.S. (*Geol. Mag.*, lxi, 1924, pp. 477-479), Professor W. H. Lang, F.R.S. (*Proc. Roy. Soc.*, B, xcvi, 1925, pp. xiv-xxii), Professor F. O. Bower, F.R.S. (*Proc. Roy. Soc. Edinb.*, xlv, 1923-4, pp. 248-252), Dr. D. H. Scott, F.R.S. (*Nature*, cxiv, 1924, pp. 321-322) and Mr. C. P. Chatwin (*Naturalist* for 1924, pp. 364-366).

Scientific work

First Period (1880 to 1904)

Kidston's scientific work falls into three periods, each characterised by predominant interests. His first paper, published when he was 28 years of age, consisted of notes on the geological specimens in the Smith Institute, Stirling. At this time the Geological Survey had no official Palaeobotanist, Sir Joseph D. Hooker having resigned the appointment he held as Botanist in 1847. About the year 1880, Dr. B. N. Peach, then Acting Palaeontologist to the Geological Survey of Scotland, began to refer to Kidston all the Palaeozoic plants collected during the survey of that part of the United Kingdom, and this practice was followed a few years later by the Palaeontologist at the London office for England and Wales. Kidston thus came to act as honorary Palaeobotanist to the Survey and this association determined the first important phase of his life-work, one in which he was interested mainly in floristic, systematic and stratigraphical problems, based on plant remains preserved in the incrustated condition. Over a period of nearly a quarter of a century he published an average of no less than four papers a year.

Many of these papers were devoted to descriptions of Palaeozoic plants submitted to him. In 1884 he recorded from the Calciferous Sandstone Series of Scotland, *Lycopodites stockii*, a herbaceous Lycopod showing remarkable resemblances to certain recent species. The following year he published a monograph on *Ulodendron* and proved that this genus, hitherto regarded as a distinct group, included stems belonging to *Lepidodendron*, *Bothrodendron* and *Sigillaria*. In 1886 Kidston gave an account of the British species belonging to the problematical genus *Palaeoxyris* and a detailed study of the Pteridosperm *Dactylothea plumosa*. His description of *Lepidophloios*, which appeared in 1893, remains the authoritative account of those fossils. Kidston was indebted to the judicious collecting of W. Hemingway, then of Barnsley, for numerous plants, chiefly from Yorkshire, and these included the fructifications that enabled him to publish the first complete description of a Sigillarian cone and to confirm Goldenberg's view that *Sigillaria* was most nearly related to *Isoetes* among recent plants. He also dealt with the fossil floras of a number of coalfields—those of Lanarkshire, Ayrshire, Canonbie, Dumfriesshire, Cumberland, Northumberland, Yorkshire, Lancashire, North and South Staffordshire, the Wyre Forest, Bristol and Somerset and South Wales. For the specimens on which these accounts were based Kidston was indebted not only to the Officers of the Geological Survey and particularly to A. Macconochie and J. Rhodes, but also to R. Dunlop of Airdrie, the Rev. D. Landsborough and A. Sinclair of Kilmarnock, G. Wild of Ashton-under-Lyne, J. Neild of Oldham, P. Whalley of Colne, Wheelton Hind, F. Barke and J. Ward of North Staffordshire, J. McMurtrie of Radstock and W. O'Connor of Aberdare. Among the localities from which he described specimens may be mentioned the now famous Teilia Quarry, near Prestatyn, Flintshire, where he showed that the flora, of Lower Carboniferous type, was more nearly akin to that of the Calciferous Sandstone Series than to that of the Carboniferous Limestone Series of Scotland and Northumberland.

By this time Kidston's work had received general recognition and he was entrusted with the preparation of a catalogue of the Palaeozoic plants preserved in the British Museum; this appeared in 1886 and was described as "an indispensable authority on the classification of these fossils." The book remained a valuable work of reference for many years and was rendered out of date only by the author's own subsequent labours. His help was also sought by other institutions; he catalogued the

Palaeozoic plants in the Science and Art Museum, Dublin, in 1888 and described the Coal Measure plants forming the Ravenhead Collection at the Free Library and Museum, Liverpool, in 1889.

Kidston was now in a position to summarize his results. In the course of his Vice-Presidential Address to the Royal Physical Society of Edinburgh in 1894, he showed (1) that the Lower and Upper Carboniferous floras are virtually distinct, (2) that the two divisions of the Lower Carboniferous in Scotland, namely the Calciferous Sandstone Series and the Carboniferous Limestone Series, can be readily recognised by their floral contents, and (3) that the Upper Carboniferous can be divided into four palaeobotanical divisions—the Lower Coal Measures, Middle Coal Measures, Transition Series and Upper Coal Measures.

The great bulk of Kidston's published work consists of descriptions of collections from one or more localities; he rarely wrote less technical accounts of whole floras. Fortunately, in 1901 and 1902 he gave a favourable reply to the request of the Council of the Yorkshire Geological and Polytechnic Society that he should prepare an account of the Carboniferous flora. This publication, illustrated by 28 plates and numerous text-figures, still forms an excellent non-technical introduction to the study of Carboniferous plant incrustations.

Second Period (1904 to 1922)

The results of the second period of Kidston's work are embodied in more than 50 scientific papers and memoirs. He was now concerned chiefly with structural and morphological problems, and, in order to equip himself more thoroughly for anatomical investigations, he paid regular visits to the Botanical Department of the University of Glasgow where he worked in conjunction with Professors D. T. Gwynne-Vaughan and F. O. Bower. This step not only achieved its immediate object but eventually resulted in Kidston's collaboration with Gwynne-Vaughan at Edinburgh University, and subsequently with Professor W. H. Lang, of the Victoria University, Manchester.

Kidston had already, in his earlier years, published an anatomical study of a petrified stem of *Lepidodendron*; he now resumed structural investigations with the collaboration of Professor Gwynne-Vaughan and in 1905 gave an account of *Sigillaria elegans*. This was of importance as the first detailed study of a ribbed *Sigillaria*. He described, in 1907, two other ribbed *Sigillarias*, *S. mamillaris* and *S. scutellata*, thus providing further structural details of plants hitherto known only by their external features. In the same year he described *Lepidodendron pettycurense* from the Calciferous Sandstone Series of Pettycur, Fife, an example of the older type of Lepidodendroid structure—with a solid primary xylem—possessing secondary wood. Other plants investigated from the famous Pettycur beds were primitive ferns: the new species *Dineuron ellipticum* and *Botryopteris antiqua* were established in 1908, the former being based on a single transverse section of a petiole representing the only evidence that the plant existed in this area, and the second consisting of petrified stems and petioles which evidently belonged to a plant with a 'scrambling' habit. Two years later he published a note on the petiole of the fern *Zygopteris grayi*.

Meanwhile, Kidston had received from New Zealand a remarkable button-shaped pebble, evidently the petrified top of the stem of a large fern, and, finding that the external features of similar forms had already been described, he obtained petrified stems and microscope-sections from Prof. Zalessky. In the investigation of these and other sections he collaborated with Gwynne-Vaughan, and together they produced the classic memoirs on the fossil Osmundaceae, published in five parts from 1907 to 1914. On purely anatomical evidence the line of the Royal Ferns of to-day was convincingly traced back to Permo-Carboniferous times. Certain of the fossil stems of Mesozoic and Cainozoic age (*Osmundites*) had essentially the same structure as the living Royal Ferns, but the Permo-Carboniferous forms (*Zalesskya* and *Thamnopteris*), while showing a clear affinity to the Osmundaceae, possessed distinctive features. The authors expressed the opinion that the

Osmundaceae and Botryopterideae arose from a common ancestral stock and showed that the former had significant points of resemblance to the living Ophioglossaceae. This work led to new views being formulated on the origin of the stele in woody plants and particularly on the origin of the pith. In 1911 Kidston and Gwynne-Vaughan described a fern stem (*Tern/fiskya*), from the Wealden of Russia, which had a remarkable structure. The massive stock was of a compound nature, consisting of several branches due to the repeated division of a single stem, embedded in a ground-work of interwoven adventitious roots. No exact parallel to such an arrangement is known among either recent or fossil plants. Kidston and GwynneVaughan now began a joint account of the Lower Carboniferous flora of Berwickshire, but only the first part was published : it consisted of the description, which appeared in 1912, of the Pteridosperm stem named *Stenomyelon tuedianum*. The history of this genus is interesting. Kidston had seen a microscope-preparation in the collection of the late C. W. Peach which was labelled as having been found " near Berwick." From the nature of the matrix he concluded that the specimen came from the neighbourhood of Norham Bridge, on the Tweed. He searched the locality for further fossils until, in 1901, in company with Mr. A. Macconochie of the Geological Survey of Scotland, he found a block of similar material which had been taken from a cutting in the road at Norham Bridge. This yielded the beautiful specimen on which the account of *S. tuedianum* was mainly based. The species differs so markedly from any known plant that Kidston and Gwynne-Vaughan were unable to suggest affinities for the plant. Scott later showed that it had some resemblances to the Calamopityeae, though it was more primitive than any member of that group.

Shortly after the death of Gwynne-Vaughan in 1915, Professor W. H. Lang visited Stirling and discussed with Kidston the possibility of continuing the investigation of the Lower Carboniferous petrified plants. It was decided, however, to defer this work and to describe the silicified plants found by Mackie in the Rhynie Chert Bed, of Devonian age. The two papers at first projected were expanded to five which appeared from 1917 to 1921 : three new genera, namely, *Rhynia*, *Hornea* and *Asteroxylon*, were established, and they were so distinctive that a new class of vascular Cryptogams, the Psilophytales, had to be founded to include them. *Rhynia* and *Hornea* were algaoid in external morphology, but the anatomy of the aerial stem was that of a very simple Pteridophyte; yet, unlike other Pteridophytes, they had neither roots nor leaves and the sporangia occupied a terminal position at the ends of branches. The sporangia of *Hornea* had a columella, a feature of the Bryophytes and hitherto unknown in Pteridophytes. *Asteroxylon*, related to these two genera, was a more complex plant and bore leaves. Of this, the most important contribution made to our knowledge of Devonian plants, Scott observed, " Never was a great discovery more completely and wisely expounded."

Many years previously Kidston had described various plants from the Old Red Sandstone—*Archaeopteris* in 1888, *Arthrostigma* in 1893 and *Cryptoxylon* in 1897—and briefly discussed the floras as a whole. Now that the Rhynie plants were so fully known, he and Professor Lang projected a joint account of the Devonian flora of Great Britain : in 1923 they described the new genus *Hicklingia* and re-described *Palaeopitys milleri*, the famous tree discovered by Hugh Miller; in the following year they published detailed accounts of *Nematophyton forfareense* and *Pachytheca*. The full description of the flora, necessarily deferred when, in 1922, Kidston gave all his time to his Monograph on the fossil plants of the Carboniferous rocks of Great Britain, has been left to Professor Lang.

The morphological aspect of Kidston's researches at this time was no less important. When the second phase of his work opened in 1904 he had already paid special attention to the fructifications of the ferns and fern-like plants of the Palaeozoic rocks, having, for example, described those of *Sphenopteris tenella*, *S. microcarpa*, *Zeilleria delicatula*, *Hymenophyllites quadridactylites* and *Archaeopteris hibernica*. These studies proved timely, for the fact that many of the Carboniferous

fern-like leaves did not bear sporangia was thought remarkable, and towards the close of the last century a suspicion arose that some did not belong to ferns but to a higher group of plants which must be classed as primitive Gymnosperms. The first evidence available was anatomical—the petioles known as *Mylopteris* were shown by Grand 'Eury in 1877 to have a type of structure similar to that of the petioles which bore the supposed fern-fronds called *Neuropteris*, *Alethopteris* and *Odontopteris*, while Schenk showed that the *Mylopteris* type of petiole was given off from the stems of *Medullosa*. As *Medullosa* had anatomical features suggesting affinities with both the ferns and the cycads, Potonie, in 1899, suggested the name Cycadofilices for the new group, a name which has given place to that of Pteridospermeae, indicating that these plants, with fern-like leaves, bore seeds.

In 1903 Oliver and Scott published anatomical evidence that the Sphenopterid fern-like leaves of *Lyginopteris (Lyginodendron) oldhamia* bore the seed *Lagenostoma lomaxi*; before the full account of this indirect, yet virtually conclusive, evidence could be published, Kidston provided proof—he figured three incrustations, collected by Mr. H. W. Hughes of Dudley, of *Neuropteris heterophylla* with a seed attached to each. He also expressed the opinion, which, however, has not been generally accepted, that the reproductive organs he had described 17 years before as attached to an example of the same species represented its pollen-bearing organs. Two years later Kidston published figures and descriptions of the microsporangia of a Lyginopterid and, in the words of Scott, showed a rare soundness of judgment in discussing the affinities of the newly discovered group." White in America, Grand 'Eury in France, Gothan in Germany, Jongmans in Holland and Kidston in Britain subsequently extended the known bounds of the Pteridosperms still further at the expense of those of the ferns until many of the Carboniferous plants with fern-like leaves are either definitely known, or more or less strongly suspected, to belong to the higher group. When, in 1923, Kidston reviewed the situation in the introductory pages of his Memoir on the Fossil Plants of the Carboniferous rocks of Great Britain, he mentioned two groups, as based on incrustations, which he regarded as ferns; first, those bearing sporangia with a distinct annulus (*e.g.*, *Oligocarpia*, *Corynepteris* and *Senftenbergia*) and, second, certain of the exannulate sporangia-bearing types, the Cyatheites-Pecopterids. The following year—that of his death—found him suspending judgment on the position of the Cyatheites-Pecopterids. Though the bulk of the evidence points to their having been true ferns, Kidston's general conclusion on these matters remains : " Pteridosperms were plentiful in Carboniferous times, especially in the Lower Carboniferous, though probably in both divisions they were more numerous than the ferns."

Kidston found time between his anatomical and morphological studies to continue the systematic and stratigraphical work of earlier years. In 1905 he observed that the terms Lower Coal Measures, Middle Coal Measures, Transition Series and Upper Coal Measures were unsatisfactory, as they were liable to both local and general signification, and proposed their replacement by the terms Lanarkian, Westphalian, Staffordian and Radstockian Series respectively. He divided the Radstockian Series into three parts, the Keele, Farrington and Radstock Groups, described the floras of Walcot Gibson's lithological divisions of the Staffordian Series of North Staffordshire, and showed that the Millstone Grit at different levels and in different localities may be of different geological age, some of the beds belonging to the Lower and others to the Upper Carboniferous. He published lists of fossils from various boreholes and pit sinkings. His account of the flora of the South Staffordshire Coalfield, which appeared in 1914, was largely based on the collecting of Mr. H. W. Hughes and included several discoveries of importance : in it he figured additional, and more perfect, examples of *Neuropteris heterophylla* bearing seeds and the very different pollen-bearing organs of another Neuropterid, *N. carpentieri*. This was followed by lists of species from boreholes and localities in Kent, Somerset, Gloucester and South Wales and accounts of the floras of Coalfields. In describing the flora of the Wyre Forest, Kidston was associated with the work of T. C. Cantrill and E. E. L. Dixon, and he described the second known species of a remarkable Calamarian

fructification as *Cingularia cantrilli*.

In 1916 Kidston gave a brief resume of the value of fossil plants in stratigraphy in the Geological Survey Memoir 'The Economic Geology of the Central Coalfield of Scotland.'

So highly was Kidston's work appreciated on the Continent that he was asked to arrange the plants in the Brussels Museum, and in 1911 he published a full account, in French, of the Belgian Carboniferous flora. The work, comprising 282 pages and 24 plates, included descriptions of new genera and species. A few years later he and Dr. W. J. Jongmans collaborated in a monograph of the *Calamites* of Western Europe : this important work was published by the Dutch Government; the Atlas, of 158 superb plates, in 1915, and the text in 1917.

Third Period (1922 to 1924)

As early as 1901, Sir J. J. H. Teall, then Director of the Geological Survey, had invited Kidston to prepare a Monograph on the British Carboniferous floras : this was to be the chief work of his life, placing on record his unrivalled floristic and stratigraphical knowledge. In March 1902, the proposal assumed a more definite form, and special collections were made, in England and Wales by J. Pringle under the direction of Sir Aubrey Strahan, and in Scotland by D. Tait. It was not until 1920, however, when Sir John Flett had succeeded to the Directorship, that the arrangements for the publication of the Monograph were completed.

The work was to be issued in from six to ten parts, to occupy some 600 to 800 pages and to be illustrated by 300 plates. The manuscript of the first part was received in June 1921 and in the following year Kidston put aside all other research in order to proceed with the Monograph. The first four parts appeared in 1923, while two others, completed in manuscript just before his death, were seen through the press by Mr. C. P. Chatwin in 1924 and 1925. The six parts, representing the whole of the manuscript completed by Kidston, forms the second volume of the Palaeontological Series of the Memoirs of the Geological Survey. They consist of 681 pages of text and 153 colotype plates and deal with most of the ferns and Pteridosperms—the Sphenopterids, Pecopterids and Mariopterids. The Lycopodiales, Sphenophyllales and Equisetales remain to be described.

Personal characteristics

Kidston's great output of published work of the highest quality gives proof of an exceptionally industrious disposition; he worked, with the strictest regularity, from morning till nearly midnight, and his energies were made to yield the maximum of results on account of his remarkable passion for order and method. His specimens were labelled with scrupulous care, and the notes he made upon them were carefully arranged and indexed.

Determined that his comparative isolation in Stirling should not militate against his work by way of lack of literature, he set out to accumulate all the necessary books and papers, many of them out-of-print, rare or otherwise difficult to obtain. In this way he turned the original disadvantage to one of gain. An excellent draughtsman, Kidston illustrated his earlier publications by his own drawings; later he made a special study of photography and the plates which accompanied his descriptions are of unsurpassed merit.

Professor Seward wrote, " Kidston was transparently honest with himself as with his fellow workers; though on occasion dogmatic, he was always open to conviction. It was a pleasure and an education to argue with him." He was remarkably modest, kind and helpful, treating younger workers as his equals and inspiring all who enjoyed his society. " In my own case," wrote Professor Lang, " and I am sure in Gwynne-Vaughan's also, the most important and valued influence in our mature scientific

lives was the privilege of working with Kidston."

While accumulating plant-incrustations, microscope slides and palaeobotanical literature with the utmost assiduity, Kidston had always in mind the ultimate goal of amassing collections that should be of permanent value. He was, moreover, most generous; his collections were always at the disposal of fellow-workers.

Professor Lang, whose association gave him opportunities for knowing Kidston more intimately than any other scientist, concluded his account of his friend as follows : " In his work, and indeed in many other respects, Kidston remained young. He approached every question with real and vivid interest, held closely to the facts and drew his inspiration direct from them, distrusting merely speculative theories. His keenness in the discovery of something new, and in the piecing together of facts thus brought out, was a perpetual stimulus to all who came in contact with him at work. While he did not lightly change opinions he had formed, and required proof from the specimens for this, he was always ready to look for the evidence against his own views. He liked the most direct discussion in eliciting the truth on a matter, and he had a very keen sense of humour to which he gave full play in his work. This came out strongly in joint investigations, and the uncompromising arguments that took place in the study at Stirling and the healthy atmosphere of banter on the work that reigned there, were not only enjoyable but to the good of the final result. Kidston was the most modest of men, always ready to learn and especially encouraging to beginners at his subject. Indeed he responded to sincerity in every form, for he was himself absolutely genuine and big enough to be quite simple. And his keenness, sagacity and kindly humour were not for his work only, but for the whole of life. He was a wise counsellor and a delightful companion and inspired liking and love in all who knew him. For behind and above all was the charm of a personality which was even greater than his knowledge and insight."

Honours and distinctions

Kidston was a joint Secretary of the Stirling Natural History and Archaeological Society from its foundation in 1878; in that year he was also a member of the Royal Physical Society of Edinburgh. In 1883 he became a Fellow of the Geological Society of London and in 1886 was elected Fellow of the Royal Society of Edinburgh, in which he eventually held important offices. He was awarded the Murchison fund of the Geological Society in 1887 and three years later the Royal Society of Edinburgh gave him its Neill medal. The Royal Society of London elected him a Fellow in 1902, and in 1916 he received the Murchison medal from the Geological Society.

Since he had not taken a full University curriculum, Kidston did not graduate as a young man; but the Honorary Degree of LL.D. of Glasgow was conferred on him in 1908 and that of D.Sc. of Manchester in 1921. His work was well recognized abroad, where he was made an Honorary Member of several learned Societies.

Professor Bower observed, " Scotland is pre-eminently a country that throws up at intervals men whose devotion and ability float them almost automatically into the foremost rank of their time. In science, and particularly in geology, this has happened repeatedly. Sometimes they come from the working classes, as did Hugh Miller; others sprang from the landed community, as did Lyell and Murchison. Kidston shared with these last the advantage of a competence that left him free to follow his scientific bent. Each pursued his science for the sheer love of it. They all belong to that glorious band of British amateurs who have so often led the science of their time, and have left their impress for ever on its history."

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