

Marie Charlotte Carmichael Stopes FLS¹

(15 October 1880 – 2 October 1958)

In a list of “Our favourite Britons” (Cooper 2002), Marie Stopes stood at number 100, where she was described as “Palaeobotanist; pioneer and advocate of birth control; Scottish born Edinburgh (1880-1958)”. With some fifty papers and books on fossil plants (mostly as sole author), Stopes published over seventy other works, chiefly books and pamphlets on sociology (*e.g.* contraception), but also poetry, plays, one travelogue and a film script. Stopes was superlative: first woman to obtain a joint B.Sc. (Hons) in University of London after two years; first female Ph.D. in botany at University of Munich; youngest D.Sc. in UK; first female lecturer in science at Victoria University, Manchester; first female western scientist to visit Japan; first woman to set up a birth-control clinic in the British Empire.



Fig. 1: Marie Charlotte Carmichael Stopes, ca. 1905, perhaps when she was a doctoral student at Munich, Germany. The glass slide on her microscope stage is larger than the usual 5cm x 2cm, but typical of coal-ball sections prepared at that time before the peel technique was applied to permineralized specimens. Her light source is a gas mantle, seen on the left. The spheroidal flask of water may have served to condense this light, but it does not appear to have been used for such a purpose when this photograph was taken (photograph in property of Hugh Person).

At aged 13 she moved to Norwood, London SE27; aside from a year's doctoral research in Munich and two in Japan, she lived mostly in Hampstead, London NW3, plus lodgings in Manchester, finally at Norbury Park near Leatherhead, Surrey. Biographers point to her parents for influences on her character and she described herself as “a child of the British Association” [for Advancement of Science]; her parents met in 1876 at its Annual Meeting. Henry Stopes, engineer and architect, was an amateur palaeoanthropologist and Marie helped him work on flints and Plio-

Pleistocene fossils (Stopes 1912b); he died a week after Marie graduated in 1902. Her mother, née Charlotte Carmichael, was a Shakespeare scholar and suffragist. Charlotte encouraged Marie's education and instilled women's rights in her. At North London Collegiate School for Girls, Marie's headmistress encouraged Marie to study chemistry. In 1900 Marie applied to UCL, being accepted for B.Sc. in botany with zoology. She was taught by ecologist AG Tansley (Boulter 2017), palaeobotanist DH Scott (Andrews 1980) and anatomist FW Oliver, whom Rose (1992) called "Marie's fatherly mentor". Tansley instilled in her the value of fieldwork; three of her early papers are on living plant ecology (Stopes 1903, 1907, Stopes & Hewitt 1909). Stopes hastened graduation by registering also at Birkbeck College, London, studying geology in evenings; she achieved first class honours (plus a Gold Medal) in botany, a third in geology. Funding for what would have been her third undergraduate year (*i.e.* 1902-03) was used to research Carboniferous plants, supervised at UCL by Oliver and by Scott, Honorary Keeper of the Jodrell Laboratory, Kew. That year saw a major advance in palaeobotany (Pearson 2005, Falcon-Lang 2008c): recognition of seed ferns (pteridosperms) by Oliver and Scott in 1903. Stopes observed cupular glands found on the ovule *Lagenostoma lomaxii* Oliver & Scott and stems of *Lyginopteris oldhamia* (Binney) H.Potonié; she drew five figures for Plate 10 in Oliver & Scott (1904). This, plus three papers she published in 1903 (references in Chaloner 2005) earned her funding to research gymnosperm ovules and seeds at Munich's Botanical Institute under Radelkofer and Göbel. She telescoped time needed for her Ph.D., defending and publishing her doctoral thesis in 1904. Fig.1 shows Stopes using a flask of water as a condenser to operate her light microscope around this time. FE Weiss FLS, Professor of botany at Manchester, made her Assistant Lecturer & Demonstrator in Botany, a post she held 1904-1907. In these industrious years, Stopes got the London D.Sc., clarified archegonial physiology in gymnosperms (Stopes 1905), introduced Capt. RF Scott (of the Antarctic) to palaeobotany, lectured to the 1905 International Botanical Congress at Vienna and visited Lancashire coal mines to research (with DMS Watson) permineralizations of Carboniferous plants called coal balls (Stopes 1906a,b).

Around 1905, Stopes began work on Mesozoic plants; she visited Lignier at Caen, France (Rose 1992) and found Jurassic plants at Brora, Scotland (Stopes 1907, Falcon-Lang 2008a). In July 1907 she quit Manchester to work with Prof. K. Fujii on Japanese permineralized plants relating to that perennial issue in palaeobotany, Darwin's "abominable mystery" of the origin of angiosperms. They collected a monocotyledonous fruit and other plants of Upper Cretaceous age, plus fossil insects (Rose 1992). Her fossil insects, Dept. of Earth Sciences, Natural History Museum, London; I13771-4 from Shiobara are Tertiary (Stopes 1910c).

In May 1909 Stopes was re-appointed at Manchester as Lecturer in Fossil Botany. She wrote up the Japanese fossils, published a textbook (Stopes 1910a) and attended conferences in Canada and USA. She used plant impressions to age the "Fern Ledges" fossil flora of St John, New Brunswick, as Carboniferous. In America Stopes made useful contacts (Chaloner 1995) and, some forty years later, she claimed:

"I did myself find Coal Balls in America, and before Noë, but like so many things I have [done], I never published about them." (Andrews 1980).

Whilst Noë (1923) reported 1922 for their recognition, Walton (1959) and Chesters (1963) support the Stopes claim for 1911; Andrews (1947) gives 1894 for their US discovery.

An offer in May 1910 of a fellowship with research facilities at UCL led Stopes to leave her

Manchester post November 1910; Watson (2005) reported on both jobs Stopes held at Manchester. She took up additional offers of work: she lectured on palaeobotany to female students at Bedford College, London, (Audus 2001) and catalogued Mesozoic plants at the British Museum (Natural History)[BM] to support the 3 graduates then in its Geology Dept. (Stopes 1913,1916). Stearn (1981) states Stopes got on well with Keeper of Geology, Sir A.S. Woodward, and his wife; their tablecloth embroidered with Stopes's signature is framed and displayed at BM. Her inaugural UCL lecture, August 1913, looked to the history and future of palaeobotany; demand for coal rose to its peak during the First World War and Stopes emphasized its applied aspects (Lessing 1959). She called for international cooperation between fossil botanists, *e.g.* to share and record new or revised names of plant fossils; in a pre-digital age, her idea for universal card indices of names was prescient (Stopes 1914). Stopes supported the collection of over 15,000 specimens of Coal Measures plant fossils from S.Wales, now held at the National Museum of Wales, Cardiff, UK (Thomas 1986). She remained at UCL until 1920, but her work at BM and wartime employment at a coal laboratory of the Dept. of Scientific & Industrial Research resulted in two major aspects of her scientific career.

Stopes described five British permineralized angiosperm woods, then all considered of Lower Cretaceous age (Stopes 1910b, 1912a). Her assertion that some of them were:

“... like quite highly placed Angiosperms in all their details.”

was challenged by Thomas (1959) and Chaloner (2005) explains some of their ages are queried. Of these, Crawley (2001) considered *Aptiana radiata* Stopes Lower Cretaceous, three others as Tertiary and her *Woburnia porosa* of uncertain age, under its junior synonym *Dipterocarpoxyton porosum* (Stopes) Kräusel. Stratigraphical definitions have changed since 1912 and Scott (2018) overstated uncertainties of provenance and age for her museum specimens.

The first and last palaeobotanical papers by Stopes (1903, 1951) dealt with plants in Carboniferous coal; she began work with coal chemist R.V. Wheeler in 1916 and this continued after the War. Scott (2018) explains they examined coals as petrologists scrutinize rocks in thin section. Stopes (1935) coined coal terms: “maceral” for the physicochemically distinct components of coals and she defined four categories: clarain, durain, fusain and vitrain (Stopes 1951).

Stopes did not rank in the first tranche of women to become FLS in December 1904 (Gage & Stearn 1988), but she was elected on 18 March 1909 and admitted on 1 April that year. Her sponsors were: F.W. Oliver, F.E. Weiss (later PLS), E.A.N. Arber (Palaeozoic plant researcher at Cambridge), F.E. Fritsch (phycologist and subsequent PLS) and E.N. Thomas. Stopes published one of her papers in a Linnean Society journal: her account of the permineralized Cretaceous bennettitalean stem she named *Bennettites scottii*; now *Cycadeoidea scottii* (Stopes) Wieland. This type material she described was notable as a new species but also as a rare instance of a fossil plant stem with both leaves and pollen organs in attachment. However, Dr Thomas PLS (1959) stated that she “took a real interest in the Society until a short time before her death.” As Chaloner (1985) recalled, Stopes refused to accept that charcoal was preserved as fusain. Chaloner (2005) recalled:

“One of her last public appearances, when she spoke before a scientific audience, was at a Linnean Society meeting in 1957 in which T.M. Harris defended the fire origin of fusain. He wrote ‘...she opposed my revival of the old fire theory with vigour and in a pleasant voice. If I could have talked it over [with her] I doubt if we would have got far, because we were thirty years out of

phase...' (see Chaloner 1995)."

Chaloner told me (pers.com.) Stopes visited him at UCL in 1957/8; she was interested to see plant fossils that she had used herself to teach botany there some forty years earlier. These, plus letters, photographs and notes for teaching and research are at BM, S. Kensington (Cleevely 1983); further Stopes letters are at the Linnean Society Library.

Over sixty years since her death, how does posterity assess the biological career of Marie Stopes? Her 4 textbooks (Stopes 1906c, 1910a, 1911, 1919) popularized botany; her publications on contraception and sexual equality (plus her fictions) outnumber her palaeobotanical papers. Biographers and obituarists of Stopes speak volumes on her life too: Andrews (1980), Anon. (1958), Begbie (1927), Brett (1958), Chaloner (1958, 1995, 2005, 2008), Desmond (1977), Eaton & Warnick (1977), Falcon-Lang (2008b,d,e), Falcon-Lang & Miller (2007), Fraser & Cleal (2007), Haines (2001), L.A. Hall (2004), R. Hall (1977), Lessing (1959), Maude (1924), Pontolillo (1996), Rose (1992), Thomas (1959), J. Timson (1980), Tomkeyer & Yoblov (1959), DMS Watson (1959), J Watson (2005). A 1935 survey of American academics ranked *Married Love* (Stopes 1918) below *Das Kapital* but above *Mein Kampf* in their 25 most influential books of 1885-1935 (Hall 1977). What led to her fall in ratings from 1935 to 2002? Falcon-Lang (2008a) criticized palaeobotanical predictions by Stopes that she termed "geoprophesy" (Maude 1924). Boulter (2017) praised her work in fossil botany, but commented on her support of eugenics; Stopes was by influenced genetic ideas and philosophies of the Malthusian League and Eugenics Society. This produced tumult not only in her public life but in her domestic affairs too. The Second World War and today's political correctness cast critical light upon that moral stance. However, one should consider wider aspects of her personal, emotional and professional life to avoid unfair criticism of great advances Stopes made at a time when women in academia were rarities and in geology "almost an impropriety" (Chaloner 1959).

Amongst contemporaneous female palaeobotanists, Eleanor Reid FLS and Margaret Benson FLS published less than Stopes, with narrower stratigraphic interests. The outputs of Emily Dix and the Belgian Suzanne Leclercq bear closer comparison to Stopes, but their foci were essentially Palaeozoic. Stopes & Watson (1908) remains in bibliographies and her coal maceral terms are still in use. Notwithstanding her critics, Stopes (1912a) stimulated research worldwide on Lower Cretaceous angiosperms. One wonders how many of today's palaeobotanists will have their papers referenced to the same extent as those by Stopes a century after their publication.

¹FLS - Fellow of the Linnean Society of London

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NOTE: This biography is based on a longer article that makes more reference to Stopes as one of the earliest female Fellows of the Linnean Society of London and includes a previously unpublished photograph of her in 1911: Pearson, H.L. 2023. Marie Charlotte Carmichael Stopes (15 October 1880- 2 October 1958). *The Linnean, London; Special Issue no. 10*: 37-42.

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