Far-flung female (and fossil bone hunting) Fellows: an autoethnographical approach

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Abstract: Geologists roam worldwide; no less for women who took up fellowship of the ‘Geol. Soc.’. Since 1919, women Fellows of the Geological Society have lived and worked across the globe conducting fieldwork and research. Based on the author’s interests and in part considering her 50 years as a Fellow, a selection of women Fellows is considered, many of whom affected her geological life, such as Phoebe Walder and Peigi Wallace. This autoethnographical approach encompasses women from the colonies who joined as soon as they were able; the legendary Dorothy Hill of Queensland was one of the first, with other notable Australians being Nell Ludbrook and June Phillips Ross. Others worked across the former Gondwana, such as Pamela Robinson, who pioneered much research in vertebrate palaeontology on the Indian subcontinent. Important British geologists and vertebrate palaeontologists include Dorothea Bate, Sonia Cole, Elinor Gardner and Eileen Hendriks, who wrote key geological texts in the earlier twentieth century. More contemporary women did work for UNESCO, the International Union of Geological Sciences and in the oil industry. During the later twentieth century and early twenty-first centuries, female Fellows have worked across the world in greater numbers in all aspects of geoscience, from the Arctic to the Antarctic.

It took 112 years for the first women to be admitted to the Geological Society of London (e.g. Burek 2009). Women fellowship was discussed on 26 March 1919 in a special meeting and, with five votes against (Herris Davies 2007), the first FGS women were elected. This decision, so long in coming, was forced in part by the 1918 Representation of the People Act, which gave votes for (many) women in the UK, and the Sex Disqualification (Removal) Act of 1919, which removed legal barriers to the admission of women by bodies governed by charter (Burek 2009).

When Burek and Higgs held the first meeting in 2005 to honour the role of women in geosciences (Burek and Higgs 2007), I was rather dismayed that there were relatively few members present, and the President did not appear to welcome us and celebrate alongside. This disappointed me and as I had already begun to investigate women geologists, especially in Australia (e.g. Turner 2007a), I decided to gather more on women Fellows that I knew and who had influenced me. Firstly, I searched compilations such as Cleevly (1983) and Sarjeant (1978–87), and then began on the Geological Society proceedings, lists and annual reports (e.g. Geological Society 1979, 1983, 1992).

In 1919, we again met to celebrate 100 years since women had been allowed to become Fellows (Burek and Higgs 2019; Darmon 2019) and I travelled from Australia to talk about some of the FGS women who had worked around the world. Sadly again, there were few Fellows present. What does this signal to the younger women who might wish to join and become Fellows? Well, I think this represents the same signal that existed for the first 100 years or so when women were not allowed, first, to attend meetings and then were disbarred from Fellowship, despite their growing contributions to the geosciences (see here and other chapters in this volume). In recent decades, however, the Geological Society has increasingly recognized their women members with articles in Geoscientist. Former Editor Ted Nield encouraged women to write and he himself has written articles devoted to women Fellows. In 2007, in the bicentennial year, women Fellows were 1705 out of a total 9370 and so represented about 23%. In the women Fellows’ centennial year, the May issue was devoted to the 100 years’ celebration and increases in that percentage continue (Anon. 2004; Boulton and Fisher 2017; Whitchurch ed. 2019).

In my own 55 years of membership, I have met many interesting FGSs, men and women, some of whom I mention here. This chapter brings forth the lives of some of those who have taught and mentored me, and whose work and lives have inspired not only me.

Autobiography of a Fellow

I have been attending the Geological Society of London since 1965 when I became a Junior Associate while still an undergraduate at Reading University (Fig. 1). I was introduced to geology at high school and then taught in my first year by Professor Percival...
‘Perce’ Allen (1917–2008), who was Professor and Head of the Department of Geology at Reading from 1952 and became an Emeritus Professor on his retirement in 1982. I was first taken to a Geological Society meeting by Lambert Beverly Halstead (aka Tarlo: 1933–91). On 11 March 1970, I was elected as a Fellow of the Geological Society (*Proceeding of the Geological Society, London*, Fig. 1. Susan Turner PhD, FGS, FLS, 50 years a Fellow in 2020: (a) First-year science student at Reading University in the Sedimentology Research Laboratory, November 1964 (photograph taken by the late Dr Hakuya Okada); (b) admission as Junior Associate 1965; (c) Reading University third-year geology excursion to Connemara, April 1967, led by Prof. Perce Allen, with the late Bruce Sellwood, the late Andrew Hill, lecturer John Thompson and Susan Turner (photograph courtesy Michael Hutton).
1664, 251), and have always proudly placed the letters FGS after my name.

In the years I was in England I tried to get to meetings regularly and remember seeing the blackballing system in operation; when I was at Reading University (1964–mid-1971) that was often but when I went to work in Newcastle at the Hancock (now Great Northern) Museum, from August 1971, that was less so. I gave my first talk in the old parliamentary style room in June 1972 (Turner 1973) when Newcastle Professor of Geology, Thomas Stanley Westoll (1912–95) was Geological Society president. In the 1970s I also saw a young Steve J. Gould (1941–2002) give a talk on Caribbean fossil snails there.

However, in the 1965–80 time span I only remember seeing about 10 other women at the Geological Society during those years until I left for Australia (see the 1960s below). Notable in the profession were Julia Anne Elizabeth Bruce Hub- bard (Anon. 2015), Nancy Kirk (Wyatt 2007), Peigi Wallace (Nield et al. 2002) and, of course, Janet Vida Watson, the first female President of the Geological Society (see more below). Others made contributions to vertebrate palaeontology (my main speciality), such as Doris Kermack, Frances Mussett and Pamela Robinson (see below).

I have, by dint of being a geologist and palaeon- tologist, travelled the world in search of fossils both in the rocks and in museum drawers – in my case specializing in jawless fishes, the Thelodonti of Ordovician–late Devonian times and later discovering early sharks. This has led me to work in many countries tracking down fossils and even if I have not been to a country, I have described vertebrates from other places (e.g. Antarcitca and Bolivia). This research began in the Welsh Borderlands in 1967 and brought me into the fold of the Ludlow Research Group (e.g. Walmsley 1975) in the late 1960s, thanks to Fellows Jim Lawson (1922–2000), the late Charles Holland (1923–2019), later President of the Geological Society, and Richard ‘Dick’ Aldridge (1945–2014), all of whom supported my geological efforts. In addition, I was encouraged into UNESCO and International Union of Geological Sciences (IUGS) work early on (e.g. Martinsson 1977) thanks to Anders Martinsson (1930–83) and Art Boucot (1924–2017), co-leaders of the IGCP Project Ecosratigraphy IGCP 53. Such work has given me contact with many amazing geologists, women and men, across the world.

Women and the early Geological Society of London

Rarely do women scientists get obituaries (e.g. Falk 2000) but by becoming Fellows of the Geological Society, they did begin to get them – but still many are missing (e.g. see Table 1). Myself and others have been attempting to right this and I shall try to redress the balance for some of the former female Fellows here. Because of my own speciality in vertebrate palaeontology, I am featuring women in that subdiscipline. Also, because I made the decision to go and live a very long way away in Australia, I have considered women fellows who have operated in or came from far-flung places.

What really happened in the nineteenth century? British geology was, at first, relatively open to men and women – they took part (e.g. Kölbl-Ebert 2002). Women attended lectures such as those by Roderick Murchison both inside (on the Geology of Russia Manchester 1842: at least 55 women present, see Fig. 2) and out (e.g. 1849 at Wrens Nest Dark Cavern, with many women among the 15 000 present according to the Illustrated London News (22 September 1849, p. 9).

Male members of the Geological Society did try to gain access for women, especially when they began participating and presenting papers (Burek 2009). Henry Woodward (1832–1921), father of talented daughters (e.g. Turner et al. 2010), tried to get women in on several occasions – 1895 and 1906; William Whitaker (1836–1925) tried to get women into the Geological Society in 1900. In 1901, Archibald Geikie (1835–1924) did get two women into an ordinary meeting. Eventually, in 1904, women could be guests of members at Ordinary and Annual general meetings. Finally, post-World War I and with the vote, as Burek and Higgs (2007), Burek (2009), Herries Davies (2007) and others (this volume) have brought to light, in 1919 the first women were able to join.

Early twentieth century

Of the first Fellows inducted on 21 May 1919 (W.C.S. 1915; Burek 2009), Gertrude Lilian Elles along with Newnham student Ida Slater (Sendino et al. 2018; Sendino 2019) (Fig. 3a) resonate with me because of my doctoral and ongoing research. They researched the higher Silurian deposits of the Welsh Borderland in the Ludlow neighbourhood, from the Aymestry Limestone to their summit (Elles and Slater 1906). In this classic paper they defined the Dayia Shales as the uppermost Aymestry Group; only recently I found new Silurian fish in this deposit (Turner et al. 2017). More on the Silurian Lower Ludlow Beds was given by their Newnham College colleague Ethel Mary Reader Wood (Elles/Mrs Shakespear), who became FGS in 1920 but resigned in 1942 (Burek 2009). These women studied the top Silurian Ludlow with its bonebeds. This is important to me because the Ludlow Bonebed was the topic of my special honours project given to...
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<th>Name</th>
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me by my supervisors Roland Goldring (1928–2005) and Halstead at Reading University in 1967, and it is still part of my current research that anchors me back to my homeland and family roots in Shropshire and the Midlands.

Elles and Shakespear did gain recognition and Geological Society obituaries (Sarjeant 1978–87 (1979–84, Supp. II), p. 953; Cleevly 1983, p. 315). In 1906–07, Slater was awarded the Daniel Pidgeon Fund in 1907 (Burek 2009; Sendino et al. 2018; Sendino 2019). She then ceased working completely after marriage in 1912 (Begum 2019) and, whether by choice or by tradition, this was a sad loss to geology. Another Newnham College graduate and FGS, Frances Elizabeth Somerville Alexander (née Caldwell) also began her geological career working on the Aymestry Limestone and, as part of a fascinating life, sorted out much of Singapore’s geology (Harris 2017).

Another woman from the 1919 intake resonates with me: American Rachel Workman, Lady MacRobert (Fig. 3c), was one of the most far-flung of the first women Fellows. Born in Worcester, Massachusetts to an influential family and an adventurous mother, Rachel was despatched to England to be educated at Cheltenham Ladies’ College (Pauly 2012). Rachel then attended Royal Holloway College, University of London, with a year at Edinburgh University, graduating in 1911 with a Second Class Honours degree in Geology. She continued her scientific studies at Imperial College, at the Royal School of Mines, in London from 1909 until 1912, where she caused quite a stir as the first woman to attend (Burek 2009). There she researched into petrology and mineralogy in Scotland and Norway, undertaking a post-graduate course at the Christiania Mineralogisk Institutet, Sweden, leading to a respectable academic output (Ogilvie and Harvey 2000; Burek and Higgs 2007; Burek 2009).

Following a trip to India, Rachel met and in 1911 married Sir Alexander MacRobert, a wealthy self-made Scottish millionaire and then baronet in 1922. Rachel did reluctantly travel again to India to attend ceremonial events like the 1911 Delhi Durbar – this represents another link for me because my grandfather was on parade there and my grandmother attended. The MacRoberts had three children, Alasdair, the eldest was born in July 1912; Roderic in May 1915; and the youngest, Iain, in April 1917. With her husband in India, Rachel was left to care for the children alone. Despite this, she managed to continue her scientific investigations, undertaking research in the Scottish borders. Her husband devoted most of his time continuing to build his conglomerate in India and, although Rachel would not eventually live there, while in India she continued her geological research at the Kolar Gold Fields, which are now a National Geological Monument.

I feel a particular affinity with Rachel because, like her, I am a bereaved mother. Tragically, she lost all

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Fig. 2. Lost potential for early Fellowship: women attending Murchison’s Russia Lecture in Manchester in 1842 (from public domain).
three sons – the eldest in a flying accident in 1938, and the other two were Royal Air Force airmen who died in action during World War II. She decided to donate in their memory a Short Stirling bomber named ‘MacRobert’s Reply’ and four Hawker Hurricanes. In 1943 she created the MacRobert Trust, a charity that continues to support the RAF among other institutions. An active geology researcher, Rachel attended the International Geological Congress in 1910 and 1913. In 1913, at the
Annual General Meeting of the Geological Society, an attempt was made to eject her because she was a woman; it did not succeed (Burek 2009). Rachel was able to speak seven languages, which she used in her expeditions and research – a feat that I greatly admire and have tried to emulate, at least learning to be polite during my work in many countries and especially when representing UNESCO, as when I have worked in Iran and China, including Heilongjiang and Inner Mongolia (e.g. Turner 2013).

I made note of MacRobert at the May 2019 meeting because of her time in India – although she did not seem to enjoy it! – and because my family had a long history in British India from the mid-1800s when two great grandfathers entered military service until the return of my grandmother and grandfather, mother, and uncle in 1914, and other relations post the 1947 break-up of the Raj. I have long wanted to visit (my first school prize at 7 years old was about India: Kiddell-Monroe 1948) but, as yet, have only been through two Indian airports. Nevertheless, I am working on Triassic xenacanth sharks that survived the Permian–Triassic boundary both in Australia and India (Turner et al. 2019); sadly, my visit to the IGC 2020 Delhi conference to pursue this research was cancelled due to COVID-19.

Another of the 1920s cohort of women Fellows is Eleanor Violet Colebrook BA, BSc, FGS (no photo found; see Table 1), who had a Third Class degree in Geology in 1923 from University College Cardiff. Her earlier (1907?) BA was in Pedagogy from Datchelor Training College, Mary Datchelor Girls’ School, The Gove, Camberwell, London, and so presumably she might have been a teacher. Colebrook was into her 40s when she joined the Geological Society in 1924 (listed in Proceedings of the Geological Society, London 1925) and I have found no other record of geological activity. She lived at Palmyra, Beach Road, Jersey in the Channel Isles, which were regarded as ‘overseas’, and remained a member at least until the 1970s, although presumably by that time she was retired. Colebrook was still listed as a member after her death! (Geological Society 1972, 1977; see https://www.theislandwiki.org/index.php/Colebrook). Again, there is no obituary to help us.

More ‘far-flung’ was Mrs Hilda Kathleen Hawkes (née Cargill) of Rickmansworth, Hertfordshire. She became one of the very few Honorary or ‘Senior’ women Fellows in the Geological Society. Hawkes was a geology student at Bedford College and gained her MSc. She became a Fellow in 1925 just before marriage to her teacher Leonard (1891–1981). They worked together in Iceland and wrote two papers (Cargill et al. 1928; Hawkes and Hawkes 1933); their son followed in his parents’ footsteps and became a FGS in 1960. Hilda and their co-worker Julia Ledeboer (also known as Davico) collaborated on a climb of Kilimanjaro in 1931 (Dunham 1982).

Phoebe Walder at Reading University

I was taught crystallography briefly in my first term in 1964 by the redoubtable Miss Phoebe Selina Walder (Fig. 4a), then Senior Lecturer in Geology at Reading University. She also was a leader on our first-year field trip to the Isle of Wight at Easter 1965 (Fig. 4b). Miss Walder, as she was always styled, was an early Reading University Geology graduate, gaining her Second Class BSc degree in 1922 under Herbert Leader Hawkins (1887–1968, FGS; Professor of Geology at the University from 1920 to 1952, and President of the Geological Society 1941–43: Allen 1970). She became a key member of staff who taught mineralogy, undertook research on sedimentary petrology and maintained the

![Fig. 4. Phoebe Walder: (a) Miss Walder (left) with Professor H.B. Bassett, Professor H.L. Hawkins and Dr Erith (?) enjoying lunch on a field trip in Yorkshire in March 1947 (Reading University Magazine); (b) Isle of Wight field trip at Easter 1965, talking to Eric Bumpstead, with first-year students Andrew P. Hill FGS (1946–2016), Mick Hutton and Bruce Sellwood FGS (1946–2007) (photograph by Susan Turner).](http://sp.lyellcollection.org/)
collections in the former Geology Museum. Walder did not join the Geological Society until 1941 and became a Fellow in 1943, and, as far as I can maintain, she resigned perhaps after she retired (1969); she appears in the 1972 and 1977 Geological Society lists with speciality codes k and q – mineralogy and sedimentology. I have found no obituary for Miss Walder and so wish to offer a short memorial to her.

Phoebe Selina Walder was born on 3 November 1899 in West Barning, at Ifield, Nurstead within Cobham Parish, Kent to Frederick William Walder and her mother Louisa. Two years later a sister, Dorothy Louisa, was born. She went to university in 1919, a rare young girl among many young men, some returning from war. On 31 October 2017, New Zealand geologist Keith Lewis asked via Academia.com:

I am trying to verify where Phoebe studied as an undergraduate as I think I remember her story about her studying during WW1 when lecturers began their lectures with ‘Gentlemen, … ’ but when only Phoebe and an invalided male student remained, one began, with a sigh, ‘Sir, …’.

He was writing a series of articles for the Geological (recently Geosciences) Society of New Zealand Journal of the Historical Studies Group and wanted to use the story as an anecdote of the times.

By 1929, aged 30, Phoebe Walder was appointed Demonstrator in Sedimentary Petrology and Museum Assistant in Geology at Reading by Hawkins. She published her first paper (Walder 1937), and by then was a member of the Geologists’ Association. She lived first opposite the old campus in Bath Road, and then by 1939, aged 40, had become a Lecturer and moved to nearby Tokers Green, where she remained living until her final days with her sister, Dorothy, who died in July 1983. Phoebe Walder lived on until 30 October 1992, when she died at Goring-on-Thames (Oxfordshire).

During the years of World War II, Phoebe Walder was one of the few Geology staff members. One who remembered her as a friend was Joan Sylvester Bradley (née Campbell, 1917–2002: Siveter 2002), who had secured a lectureship in Geography at Reading University after she took a first in Geography from Oxford in 1938. Phoebe acted as match-maker when asked by one of her former pupils, Peter Sylvester-Bradley (1917–78: the first F.W. Bennett Professor of Geology at the University of Leicester; Hudson 1980), to ‘suggest a wife’ for him. Joan and Peter, he in naval attire, married in Reading on 10 August 1945. Peter was somewhat notorious for his attire, with strange colour combinations at conferences when Joan was not with him, and it was not discovered until after his Finals at Reading (Third Class BSc) that he was totally colour-blind and so could not see the colours of minerals and thin sections in Phoebe’s practicals.

As well as joining the Geological Society in 1941, Walder became a member of the Geologists’ Association, and her publications (e.g. Walder 1941) were placed there, one of interest to me on a Downtonian sandstone. Her research concentrated on the Quaternary river gravels of the Thames Basin (Walder 1967). This led to her being involved in the 1953 ‘Diamonds in the Thames affair’ (see Craig and Jones 1982, p. 117); Percy Allen apparently implicated her in the notorious Reading University student ‘Rags’ hoax, which clearly would not have done her geological reputation any good. But he was widely acknowledged as having missed out on his FRS that year.

As one of her last official duties, Miss Walder helped to organize the 90th birthday party for Emeritus Professor Hawkins in the geology laboratory on the Old Reading campus in June 1967. This jolly event allowed us final year students to shake his hand. I was to go on to curate the Hawkins echinoderm collection in the geology museum over the next 4 years but what happened to it on the demise of the Geology Department? Some, I hope, survived either in the national collection or in the ongoing Zoological Museum.

Another student who remembers Miss Walder is Peter Perkins who went to Reading University aged 21 after his National Service, gaining an Honours Special BSc in Geology in 1961. He returned to Reading for the Diploma of Education course and started teaching in Birmingham in 1963:

There have been three strands that have continued through most of my career, apart from teaching, and two in particular owe a lot to the influence of the University of Reading. I became very interested in Geology as a youngster and was able to study it at ‘A’ level. I’m thankful that I was offered a place without interview – I was ‘serving Her Majesty’ in Cyprus at the time. I am grateful to the Geology Department for their inspiration and have fond memories of Phoebe Walder, Roland Goldring and Prof Allen (Perkins 2006, p. 18).

Peigi Wallace

As noted above, I came to the Geological Society as an undergraduate and the woman who helped ease me into the male-dominated terrane was ‘Peigi’ Wallace (Turner 2009a). At my first meeting in 1965, Gwendoine Margaret Wallace, who had just become an FGS the year before on 22 April, was the first woman I met. From first sight, Devon-born Peigi Wallace struck me as small, blond and dynamic. She began her geological studies (1959–60) at the Sir John Cass College but as that college did not offer BSc Special Honours in Geology, she moved to King’s College, London (Nield et al. 2002). We were introduced by my then tutor, Bev Halstead
and she helped to initiate me into the ways of the Geological Society: ‘I’ll show you where the ladies’ toilet is – it took me six months to find it!’, she said. Sure enough, in those less enlightened days, it was tucked away, a little cubbyhole in a corridor behind the library and no first timer would have found it easily without such guidance. Peigi always seemed to find a new slant – whether it was Devonian biostratigraphy or wider aspects of sedimentology or palaeontology. With mentor and friend Derek Ager (1923–93), Professor of Geology at Swansea University, her imaginative work on modelling brachiopod internal skeletal apparatuses (including joint experimentation in a bath) was presented one winter’s afternoon in the Geological Society’s old Meeting Room (Wallace and Ager 1966). They showed something of which few students were made adequately aware – that geology can be fun! Rarely had so much laughter been heard in the august rooms with the former presidents looking on from their portraits. We all enjoyed regular social and inspirational times at the Geological Society and other meetings, such as the annual Palaeontological Association conferences.

Wallace lectured at Imperial College, London (1966–86), field training and teaching palaeontology to a generation. Her main talent as a teacher derived from her work as a palaeoecologist – she was able to make fossils come alive. She worked in northern France (Wallace 1969b) and the Cantabrian Mountains of northern Spain, mostly with Ager. In her Geological Society presentation, she piqued much interest in Devonian geology of the Ferques Inlier, Pas de Calais in the Boulonnais by using a wine bottle as the scale for each slide, the bottle emptying as the lecture went on! In this and other lectures, at the 1972 International Geological Congress (Montreal), Peigi showed off her wine connoisseurship and she became a pioneer in making people think of the importance of the geology behind the wines (Nield et al. 2002). Peigi was also the first to look at the history of women in fellowship; in 1967 the total number of women was still only just over 100 out of a total membership of 3000 (Wallace 1969a).

Following her marriage (in 1984) to Professor Robert Shackleton FRS, they shared many overseas trips, mostly to Africa and parts of Asia. Peigi with her independent and forceful nature provided us few women students in the 1960s with a role model as an innovative field geologist and inspiring palaeobiologist.

**Vertebrate palaeontologists**

Because of my own interests and current work, I am interested in the history of women in vertebrate palaeontology and investigate here a few of those who became Fellows. Right from the earliest history of women Fellowship, there have been prominent vertebrate palaeontologists and those who contributed to the discipline. Here I mention some of the twentieth-century examples, some of whom I was privileged to meet.

Miss Harriett Mary Hutton (1873–1937) joined the Geological Society and became one of the early FGSs in 1925, and after her death received a short but affectionate obituary by the British Museum (Natural History: BMNH) vertebrate palaeontologist and later biographer of Mary Anning, William Dickinson Lang (W.D.L. 1938). Mary Hutton first collected fossils with her mother, prominent nineteenth-century collector Harriett Sophia Holland (c. 1835–1908: Mrs Crompton Hutton; see Turner et al. 2010, fig. 3: the name ‘Hunt’ in error). Lang noted (W.D.L. 1938) that despite a family resemblance, they did not claim relationship with pioneer geologist James Hutton. Mary was an enthusiastic geologist despite frailty and later rheumatism, specializing in collecting Jurassic Inferior Oolite fossils from Gloucestershire, firstly in the Stroud area and later from the interesting Dursley tufa or ‘puff-stone’, a building stone used by the Romans. She was always generous with information and specimens, and donated fossils including reptile remains to Gloucester Museum, as well as to Stroud, Cheltenham and the BMNH (Torrens 1978; Cleef 1983, p. 159; Turner et al. 2010). Her fossils also came to Reading University via Hawkins (W.D.L. 1938; Torrens 1978), to the same geology collection that I curated from 1971 to 1980, now in part subsumed into the zoological collection (see their Facebook page).

When we met in 2005 to celebrate women in geology at the Geological Society, Karolyn Shindler had recently produced her excellent biography of British palaeontologist and pioneer of archaeozoology Dorothea ‘Dorothy’ Minola Alice Bate (1878–1951) (Shindler 2004). Bate became an FGS in 1940 right after the award in March of the Wollaston Fund (£30 = around £1690 today) when it was realized that she wasn’t a Geological Society member. She was an independent woman who managed to survive on little pay in the male bastion of the BMNH by garnering allies. Bate travelled and collected fossil vertebrates from the Mediterranean islands, especially Crete, Cyprus, Malta and Sardinia, and the Middle East. Work by Bate and Elinor Wight Gardner (see below) – their discoveries of ancient elephants, giant tortoises and early horses – remain a real insight into the Pliocene environment of the Bethlehem region. In her last years, Bate forayed into eastern Africa at the invitations of the Leakeys. Working with Gardner and Dorothy Garrod, and training young Gertrude Caton-Thompson, she may have been one of the first women to use 4WD for fieldwork (Shindler 2004; Berta and Turner 2020). Bate was involved in most of Garrod’s
projects including Gibraltar (e.g. Garrod and Bate 1937; Garrod 1942). She also contributed opinions on fossil mammals to other fellows (e.g. Tomlinson 1941). In old age, she became a Christian Scientist and eschewed medical treatment, with increasing pain and final death from cancer. Remaining a Fellow until the end, she did receive a formal obituary from the Society (W.N.E. 1951).

Eileen Mary Lind Hendriks, like me, was born in Birmingham, UK, in Hagley Road, Edgbaston on 3 November 1887; this is not only just a few kilometres from where I was born in Kings Heath and where relations of mine lived but also she was born on the same day as my grandmother. Mather and Bennett (2020) have dealt with her trials of trying to gain permanent employment with the British Geological Survey but I learnt first of Hendriks through my researches on fossil fish. Hendriks is well known for working on her beloved Cornish rocks (M.R.H. 1983) and one aspect of her work interests me. Doyen of Palaeozoic fish workers Arthur Smith Woodward (e.g. Turner and Long 2016) named one of the two Devonian fossils after her, *Machaeracanthus hendriksae*, adding a taxonomic note to one of her papers (Hendriks 1937; Woodward 1937). Woodward had thought the fin spine could be as old as upper Lower Devonian, which based on more recent work is reasonable (e.g. Süd-kamp and Burrow 2007). Her finds of the fish and plants in 1925 necessitated a major update to the geological age of the rocks from Ordovician to Devonian (Flett and Hill 1946; Hendriks et al. 1971). This major age change is something that also resonates, as my fossil fish finds in Australia have similarly often prompted a change of date from Ordovician or Permian to Devonian (e.g. Turner 1997). Her 1937 paper was actually communicated by Professor W.T. Gordon, DSc FGS on 18 December 1935 (was she not able to read it through my researches on fossil fish? and later President of the Geological Society (1918–20) (Savage 1994; Milner 2004) – a useful attribute. On the few occasions I met her at meetings she seemed rather dour and even her obituarist, R.J.G. ‘Bob’ Savage (1994), noted her steely nature. But then, I was probably tarred with my supervisor’s brush as Halstead (Tarlo) and Pamela Robinson had not got on (Sarjeant 1995); however, this does make her my academic ‘grandmother’!

Robinson’s early university education began in Germany in 1938 with a summer term at Hamburg University where she studied Botany, Zoology and Chemistry but with threat of war, she returned home (Milner 2004). Taking up war work in 1939, she spent 2 years at the British Woollen Industries Research Association in Leeds. While there she attended evening lectures given by Dr Dorothy Rayner, by then a palaeontology lecturer at Leeds University (Boylan 2020). This important British vertebrate palaeontologist swayed Pamela towards geology and vertebrate palaeontology. Rayner is another important twentieth-century FGS who joined in 1939 but, because she resigned in 1983, did not gain a Geological Society obituary; Varker (2004) wrote a brief memorial. Boylan (2020) has unravelled much more and so I will just note the story we heard when students that Dorothy was once engaged to Stanley Westoll (source probably the late Colin Patterson) when they were both students of David Meredith Seares Watson (1876–1973; better known as ‘DMS’) at University College London (UCL) (Turner 1995; Patterson and Fortey 1999). When Rayner gained a moiety of the Lyell Fund for her outstanding work on Mesoozoic fishes (*Quarterly Journal of the Geological Society, London* 1949, 105, p. ix), at the same time Westoll was elected a Fellow (*Quarterly Journal of the Geological Society, London* 1949, 105, p. iv). They would have been a golden couple.

After the war, Pamela worked at the Geological Society Library from February 1946 to April 1947. Her probationary appointment for the first 3 months had been at £300 per annum (GS Report D187: around £12 647 today). The Council were happy with her work, according to her staff file she was ‘highly regarded’ (Geological Society Archives). In the October at the comparatively late age of 28, Pamela enrolled for an undergraduate degree course in geology at UCL but delayed because of contracting jaundice in 1948. Eventually she graduated with a BSc in Geology with First Class Honours in June 1951 and was awarded a UCL Research Scholarship to enable postgraduate research in the Zoology
Department. She had hoped for DMS as her mentor but he had just retired and so the head of the department, Peter Medawar (1915–87), became her formal supervisor. DMS still had a room and was happy to talk with anyone with a specimen or question: she always respectfully addressed him as ‘Professor’ (Barry Hughes pers. comm.).

Her thesis work was inspired by that of Walter Kühne (1911–91), who had done pioneering work on Mesozoic fissure vertebrates, notably Oligokyphus, when he was a prisoner-of-war interned on Isle of Man (e.g. Köhring 1991). In 1954, aged 35, Pamela received the Geological Society Gloyne Fund. She made annual visits to the Mendips and south Gloucestershire caves (by bus and on foot), checking quarries for fissure deposits (report in the Geological Society Archives). This led to a major contribution to our understanding of the fauna from vertebrate-bearing fissure sediments the Mendip Hills and Gloucestershire, and their formation (Robinson 1955, 1957). Building on earlier work, she developed a classification of fissure deposits that stood the test of time (Savage 1994).

From this time Pamela was based at UCL throughout her career, first as Assistant Lecturer in the Zoology Department from 1955. In 1957 she gained her PhD degree on the gliding reptile Kuehniasaurus from the Triassic fissures of the Emmborough Quarry in Somerset. A 10 page ‘abstract’ of her thesis was published in the Proceedings of the Geological Society, London in 1962. The process of thesis production and her reluctance to publish all was the source of contention between Pam and student Tarlo (see Halstead above), who had wanted to work on Triassic ‘lizards’ but was given plesiosaurs; he later prepared his thesis as published papers, against her wishes. He had strong recommendations on theses and always encouraged his students to publish their doctoral work (e.g. Sarjeant 1995).

The next phase of her life came through the influence of J.B.S. Haldane FRS (1892–1964), later Weldon Professor of Biometry at UCL, who had been a friend since her undergraduate days. In 1957, when Haldane was in India, based on his referral, Pamela was invited to set up and establish a Geological Department at ISI, Calcutta (ISI, Kolkata) at the invitation of the Head of the ISI, Professor M. Mahalanobis FRS (1893–1972), Nehru’s advisor on the statistics of India’s first ‘Five Year Plan’ (Rao 1973). That year marked the first of her many visits to India in a 17 year research programme in vertebrate palaeontology and Gondwana stratigraphy in collaboration with her Indian colleagues, which laid the path for vertebrate palaeontology to take off on the Indian subcontinent. Over that time, she helped build the GSU Museum, mentored and supervised students, and hosted important visitors, such as the Minister of Education for India, delegations from the UN Technical Assistance Board, British and Australian High Commissions, and IGC Conference attendees and colleagues such as the Colberts and Westoll (Fig. 5). She supervised several Indian (male) research students, and encouraged them to belong to the Geological Society and publish (e.g. Jain et al. 1964), including Sohan Lal Jain, Sudhir Basumallick, Sankar Chattergee, Asru Chowdhury, Tapan Kumar Roy Chowdhury, T.S. Cutty and Pranab Mazumdar; at UCL, students were Barry Hughes, Stephen Rewcastle and Tarlo.

In 1964–5 using a Columbo Plan assignment with GSI, teams were sent to map and scour Indian Gondwana sequences. This led to her participating in a new IUGS series of conferences and in 1967 she attended the First Symposium on Gondwana Stratigraphy in South America, leading to her benchmark review on Indian Gondwana formations (Robinson 1969), which became an essential reference on Late Permian–Jurassic continental faunas. Her change of emphasis at this time was prompted by the new ideas of plate tectonics. Her research changed again in the 1970s with a growing interest in palaeoenvironment and palaeoclimatic modelling (Milner and Hughes 1995; Milner 2004).

In 1966 Pamela was promoted to Reader in Palaeozoology. She had met American vertebrate palaeontology ‘royalty’ in India, the Colberts, in 1964 and they met again at the Second Symposium on Gondwana Stratigraphy and Palaeontology in July 1970 (Robinson 1971), where she also met Alfred Sherwood Romer. We were all to meet in Newcastle upon Tyne in 1972 when geophysicist Don Tarling and physics professor Keith Runcorn (1922–95) held a major NATO conference to explore the Continental Drift hypothesis. There Pamela explored the theme of palaeoclimatology based on her Gondwanan researches (Robinson 1973). These connections undoubtedly assisted in her next assignment in the autumn semester (October–December) of 1972, when she was Alexander Agassiz Visiting Professor at Harvard University working alongside Romer at the Museum of Comparative Zoology. The following year, she was awarded the Wollaston Fund of the Geological Society, largely in recognition of her work in promoting and establishing vertebrate palaeontology in India. At the same time, Romer came to London to receive the Wollaston Medal when Westoll was President – a rare trifecta for vertebrate palaeontology! In the same year both she and Janet Watson were elected to the Geological Society Council, again a major leap forward for women.

By the mid-1970s, Robinson had mostly finished with India but, as a fitting memorial to her work, the ISI Geological Museum is still going after 55 years.
Their website proclaims the main attraction is an almost complete fossil skeleton of an early Jurassic ('47 feet'-long) sauropod – Asia’s first-ever mounted dinosaur in a museum (see Fig. 5c).

Despite her impeccable international profile (see Milner and Hughes 1995; Milner 2004) and her credentials as a Geological Society Council Member and medal winner, and her many years of service to the university and international community, as she reached 60 she had achieved no promotion nor professorial appointment. Instead, in 1982, perhaps with increasing disillusion over her various projects and the deaths of Mahalanobis and her mother, she took early retirement, gave up research and shunned society, preferring self-imposed solitude devoted mainly to Indian philosophy and gardening. I am sure many will understand this, because gender inequality for older age groups continues (Popp et al. 2019).

Likewise, Pamela’s early teacher Dorothy Rayner, despite her long years of service and her gaining Geological Society funds and medal, only attained a senior lectureship and never got to be professor.

**Australasian and Honorary Fellows**

Honorary Fellowship began at the second meeting of the Geological Society in 1807, when it was decided to appoint no less than 42 ‘honorary members’; interesting choice given that there were only 13 members of the Society at the time. Honorary members ‘of scholarly distinction’ were to bring prestige to the Society and also act as links to scientific progress in their own areas. Later, ‘foreign members’ were appointed, with aim of extending the Geological Society network regarding geological progress and happenings on a global scale (e.g. Herries Davies 2007). Most are now from other countries, with four from the UK; Honorary Fellows are recognized for achievements and potential, not only in science but as ambassadors for geological science and its promotion to the wider public. As yet, few women have ‘made the grade’.

Dorothy Hill CBE, FRS, FGS (Fig. 3b) was one. Longstanding as an Honorary ‘Commonwealth’ Fellow, Hill gained a rare Lyell Medal (see Geological Society Circular 115, 26 March 1964, third page, unpaginated) in recognition of her palaeontological
and stratigraphical work; Dorothy Hill was made an Honorary Fellow in January 1967. Why did she succeed where others did not? ‘Dotty’, as many knew her, was born and educated in Brisbane. Following her First Class Honours BSc in Geology from the University of Queensland in 1928, she set sail for England on a 2-week journey to Britain (Jell 1997; Turner 2007a). In Cambridge, based at Newnham College, her thesis work was supervised by graptolite workers Gertrude Elles and Oliver Bulman, who showed her how the combination of morphological and palaeontological analysis could yield refined stratigraphic results beyond anything she might have expected (Hill 1932). Elles and Bulman encouraged her to work on a group from well-controlled stratigraphic sequences, which would yield general interpretations, and so Hill’s work consisted of an interpretation of her Australian Palaeozoic coral faunas from sequences not yet properly mapped and where there were no other useful fossils. This was frontier palaeontology, and her 1932 PhD work was well appreciated because that year she was awarded the Old Students’ Research Fellowship of Newnham College, and in 1934 won the Geological Society’s Daniel Pidgeon Fund. She joined the Geological Society soon after and represented Queensland at the 100th anniversary of the Geological Survey, along with a sterling cast of women – Mrs F.D. Adams, Miss E. Behrens, Mme Bertrand, Miss Margaret Crossfield [sic] FGS, Mrs Dewey, Mrs Dines, Lady Flett, Miss Enid Flett, Dr Eugenie Karpinsky, Mrs H.C. Richards (her former professor’s wife from Brisbane), Mrs W. Lloyd, Miss M. Healey, Mlle P. Thoreau, Mrs Wray, Fr Cloos, Miss R.N. Yeates, Miss Mary Angus, Mrs Saxton, Lady Maud Smith Woodward, Mrs V.A. Eyles, Mrs Hendriks, Miss E.M.L. Hendriks FGS, Mrs Pocock, Miss H.M. Ainsley, Miss M.E. Read, Miss E.M. Guppy, Mrs Guppy, Mrs S.W. Hester, Mrs Shannon, Miss G.M. Bauer, Miss Biss and others on the field trips (Flett 1937).

When she returned home, Hill understood the need to improve geological mapping work in Australia, and used a variety of organisms for correlation so that northern hemisphere standards could be reached. Most European work on corals had been carried out on well-mapped sections but in the 1930s, little such biostratigraphic work had been done in Australia (Scrutton 1999). Therefore, Hill appreciated how much field interpretation was needed to make her work, particularly on corals, more effective. She emphasized this in teaching students about classical areas of study, and during her lifetime she built up and created the most important geological library in the southern hemisphere (Ruggin and Jell 1983; Campbell and Jell 1998; Turner 1998, 2007a, 2008).

Dorothy Hill loved the life in England and joined the Sedgwick Club and travelled widely with her Newnham friends in Britain (see Turner 2007a, fig. 12; Freshney 2019). Her compatriot Betty Ripper (Turner 1998) remembered her when she arrived to begin her doctoral studies in the 1933 autumn term:

I was enrolled as an anti student (i.e. non-resident student) of Newnham College, where G.L. Elles was a Director of Studies. Other mentors were Dr O.M.B. Bulman, and the museum curator A.G. Brighton. The Sedgwick Museum in those days was (& perhaps still is) frequented by many interesting personalities, including noted explorers like N.E. O’dell and Vivien Fuchs, often encountered in the attic where we researchers had our little cubby-holes, separated by improvised walls of packing cases, files, microscope boxes, etc. … no doubt all much tidier now. My immediate neighbour was Dorothy Hill … Dorothy and I were quite buddies in the Sedgwick, and even had a rather hairy field trip together in Wales! (Ripper, pers. comm. June 1999).

Hill was the only female Honorary Member of the Geological Society until 1980 when Frances Mary Case (1898–1990), Lady Fermor of Sidmouth Devon, was inducted for the benefaction in honour of her late husband, former Director of the Geological Survey of India and Vice-President of the Geological Society. The bequest established the Fermor Fund that provides for lectures (has any woman been invited to give one?) as well as a prize and awards (one at least in 2012 to Sally Anne Gibson, University of Cambridge). Only one other woman, Dr Eva Elizabeth Paproth, German Devonian palaeontologist and longstanding member of the IUGS Subcommission on Devonian Stratigraphy, was made an Honorary Member of the Geological Society in 1992.

Another great Australian who became an FGS in 1950 was geologist and palaeontologist ‘Nelly’ Hooper Ludbrook (née Woods). Nell Ludbrook, like Dorothy Hill, had to come to Britain for her doctoral studies, specializing in Tertiary Mollusca. Nell Woods enrolled in the University of Adelaide in 1926, taking her BA in 1928 and a teaching degree. She had not studied enough prerequisite science subjects to enrol in a BSc but she went on to study geology and mathematics, and appealed to Dr Cecil Thomas Madigan (1889–1947) to give her a research project in geology. She worked on the mollusc collection of Sir Joseph Verco for many years while working as a teacher and pursuing her MA. Her work on molluscs was rewarded with the Tate Memorial Medal and an MA from the University of Adelaide in 1931. In 1935, Nell married Dr Wallis Verco Ludbrook, whom she had met at university where he was studying for his BSc, and they moved to Canberra. In 1950, while her husband was away for work, ‘Nelly’ (as she was often called) travelled to England to study molluscs at Imperial College and the BMNH. Sadly, Wallis died in 1951 but Nell was encouraged by her family to remain in England
and undertake her PhD, which she received from the University of London in 1952 for her research into Pliocene molluscs of the Adelaide plains.

Ludbrook returned home and her geological exploits were centred in South Australia. She gave long service to the South Australia Department of Mines from 1952 until 1967, at which point she had attained the position of Senior Palaeontologist, specializing in the palaeontology and biostratigraphy of the Eromanga and other South Australian basins. She also became the first female President of the Geological Society of Australia in 1968 (see Alley 1996; Turner 2007a). Ludbrook was appointed Member of the Order of the British Empire (MBE) in 1981 for her service to science. She received the Sir Joseph Verco Medal from the Royal Society in 1963. The Geological Survey of South Australia has named their fossil collection ‘The Ludbrook Library’ in her honour. She remained in the Geological Society (1972 and 1977 lists) until retirement; there was no Geological Society obituary.

My final Australian was, perhaps, the most far-flung as she left Australia to be a professor in western USA. June Rosa Pitt Phillips Ross was another of the internationally acclaimed Australian women who had trained at the University of Sydney in the 1950s, gaining her BSc, PhD and DSc (Turner 2007a). She joined the Geological Society and remained at least until the early 1970s (Geological Society list: Table 1). June was awarded an 1851 Royal Commission Fellowship to Cambridge and an American Association of University Women to study in the USA; she chose the latter and went to study at Yale Peabody Museum. There, aged 28, she met Charles Ross, her husband-to-be and collaborator of 52 years on bryozoans and Ordovician sea levels in Laurentia (Ross 2012). Her decision to go to the USA probably contributed to her much-improved track record compared to her contemporary female Fellows. She became Professor of Biology at Western Washington University for 37 years, Chair of Department and Emeritus Professor in 2004 (Ross 2012).

Africa and the Middle East

Most important of the women Fellows who worked to unravel the geology and prehistory of Africa was another ‘Brummy’ (born in Birmingham) and Newnham College woman, Elinor Wight Gardner. She took a Natural Science Tripos in 1916 and then spent time at Stellenbosch University in South Africa as a Lecturer in Geology (1917–19), later gaining a position at Bedford College (1926–30). From 1925 to 1938, Gardner played an important role as geologist and palaeontologist for several expeditions to the Middle East, working with Dorothy Bate, Gertrude Caton-Thompson and Dorothy Garrod, and traveller and historian Freya Stark (Ogilvie and Harvey 2000; Hill 2016). Gardner joined the Geological Society and, with Caton-Thompson, was awarded a moiety (£25) of the Gloyne Fund for the inaugural first archaeological and geosurvey of North Fayum, Egypt; she presented a demonstration of geological specimens on her return (see Gardner 1929). From 1930 on, she participated in pioneering interdisciplinary research in Africa with work on prehistoric sites at Kharga Oasis, acknowledging help from Miss F. Purser and Miss Mackinnon Wood (Gardner 1935). Going on to direct two seasons (1935 and 1936) of excavations, she worked with Bate on Pleistocene deposits with vertebrate remains at Bethlehem, now Palestine (Shindler 2004). Gardner also worked in Anatolia, the Levant, Haifa and Yemen (Ogilvie and Harvey 2000).

During my time I have met other women who worked on fossil vertebrates in Africa, both Sonia Mary Cole (née Syers) and Mary Leakey (the last occasion when she spoke at the Geological Society in Janet Watson’s new lecture room). Both were Fellows (see Leakey 1982). Cole and I first met in 1972 at a Bedford College meeting on ‘Man in Africa’ (Bishop 1978). I did finally go to visit Kenya in 1976, and went to sites that both had known and worked on – Olorgesailie and GilGil in the Rift Valley. Both British-born, they spent much of their working lives unravelling the geology and prehistory of East Africa (e.g. Wood 1997). After her children began to grow, Cole wrote books on the geology...
and prehistory of East Africa; Mary Leakey invited her to write about Louis after his death, which resulted in *Leakey’s Luck* (Cole 1975).

While searching through past Geological Society journals, I found one good sign, albeit a sexist one by today’s reckoning, in a copy of the *Quarterly Journal of the Geological Society, London* from 1952 (Fig. 6). Women being encouraged to work in Africa for a decent wage – I wonder who got the job?

**Canada and the Arctic**

My own work led me to Canadian fossils early on (e.g. Turner 1970; Turner and Dixon 1971) and I have continued to work on Canadian early vertebrates from the Ordovician to the Carboniferous, often with colleagues in the Geological Survey (e.g. Turner et al. 2004). In 1991, with the aid of the Geological Society J.B. Tyrrell Fund (Joseph Burr Tyrrell 1858–1957), I was able to make my first visit to Canada to collect and study Silurian vertebrates from southern New Brunswick, which I had studied at a distance (Turner 1986). This allowed my first visit to the very special New Brunswick Museum in St John founded in 1842 and a chance to discuss the age of the Meguma terrane rocks in the area with local geologists. Therefore, it has been good to learn about female Fellows in Canada and one who died recently, Diana Mary (or May) Lally Loranger (Fig. 7), particularly comes to mind. Diane, as she preferred, is notable in the history of Arctic geology, and was an international consultant on palaeontology and a self-employed owner of Paleo Services Ltd of Calgary when she joined the Geological Society. She appears in the lists in 1972, 1977 and 1992 (see Tables 2–4). She was a post-World War I child born in Edmonton, Canada.
### Table 2. Far-flung (overseas) women based on the 1977 Fellows address list (Geological Society 1977); women in 15 out of 90 countries (excluding the British Isles = 16.67%)

<table>
<thead>
<tr>
<th>Country</th>
<th>No./total ratio</th>
<th>Percentage (%)</th>
<th>Honorary status</th>
<th>Surnames</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>9/193</td>
<td>4.67</td>
<td>Hill*</td>
<td>Bond, Chappel*, James, Lapworth, Ludbrook*, Milne, Robinson, Rosenberg*</td>
</tr>
<tr>
<td>Borneo</td>
<td>1</td>
<td>100</td>
<td></td>
<td>Adams</td>
</tr>
<tr>
<td>Canada</td>
<td>3/149</td>
<td>2</td>
<td></td>
<td>Boucher, Loranger*, Rast</td>
</tr>
<tr>
<td>Channel Islands</td>
<td>1/6</td>
<td>16.7</td>
<td></td>
<td>Colebrook*</td>
</tr>
<tr>
<td>France</td>
<td>3 or 4/45</td>
<td>6.67–8.9</td>
<td></td>
<td>Delany*</td>
</tr>
<tr>
<td>Ghana</td>
<td>1/3</td>
<td>33.3</td>
<td></td>
<td>Hunter, Jones</td>
</tr>
<tr>
<td>Greece</td>
<td>3/25</td>
<td>12</td>
<td></td>
<td>Malavetas</td>
</tr>
<tr>
<td>Iran</td>
<td>1/15</td>
<td>6.67</td>
<td></td>
<td>Barker</td>
</tr>
<tr>
<td>Italy</td>
<td>1/24</td>
<td>4.2</td>
<td></td>
<td>Comess</td>
</tr>
<tr>
<td>Kenya</td>
<td>1/4</td>
<td>25</td>
<td></td>
<td>Kamal</td>
</tr>
<tr>
<td>New Zealand</td>
<td>2/24</td>
<td>4.2</td>
<td></td>
<td>Hyden, Wright</td>
</tr>
<tr>
<td>Poland</td>
<td>2/64</td>
<td>3.1</td>
<td></td>
<td>One Junior Associate = Tomasi</td>
</tr>
<tr>
<td>Portugal</td>
<td>1/9</td>
<td>11</td>
<td></td>
<td>Neiva*</td>
</tr>
<tr>
<td>South Africa</td>
<td>3/70</td>
<td>4.3</td>
<td></td>
<td>Jessop?, Knowles, Trevelyan-Jones</td>
</tr>
<tr>
<td>USA</td>
<td>16–20/289</td>
<td>5.5–6.9</td>
<td></td>
<td>Burek, Grew, Hamil, Stuart-Alexander</td>
</tr>
</tbody>
</table>

*Also in 1972.

### Table 3. Far-flung (overseas) women based on the 1983 Fellows address list (Geological Society 1983); women in 15 out of 87 countries (excluding British Isles = 17.3%)

<table>
<thead>
<tr>
<th>Country</th>
<th>No./total ratio</th>
<th>Percentage (%)</th>
<th>Honorary status</th>
<th>Surnames</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia, including Tasmania</td>
<td>14/224</td>
<td>6.25</td>
<td>Hill*</td>
<td>Chappel*, Collins, Denholm, Kelly, Leaver, Ludbrook*, Mayes, Oreskes, Rosenberg*, Turner, Wells, Whitfield, Willis</td>
</tr>
<tr>
<td>Canada</td>
<td>8/178</td>
<td>4.5</td>
<td></td>
<td>Adams, Brown, Carr, Dunn, Horan, Loranger*, Malik, Spooner maximum</td>
</tr>
<tr>
<td>France</td>
<td>1 or 2/35</td>
<td>5.7</td>
<td></td>
<td>Battiau-Queney, Delany</td>
</tr>
<tr>
<td>Germany</td>
<td>1/19</td>
<td>5.3</td>
<td></td>
<td>Smith</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>3/203</td>
<td>1.5</td>
<td></td>
<td>Easterbrook, Pearson, Yang</td>
</tr>
<tr>
<td>Ireland</td>
<td>1/50</td>
<td>2</td>
<td></td>
<td>Cooper, Purcell</td>
</tr>
<tr>
<td>The Netherlands</td>
<td>1/51</td>
<td>1.96</td>
<td></td>
<td>Evans</td>
</tr>
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<td>New Zealand</td>
<td>2/21</td>
<td>9.5</td>
<td></td>
<td>Pearce, Wright</td>
</tr>
<tr>
<td>Norway</td>
<td>2/34</td>
<td>5.88</td>
<td></td>
<td>Costa, Dewhirst</td>
</tr>
<tr>
<td>Oman</td>
<td>2/11</td>
<td>18.2</td>
<td></td>
<td>Gibb, Green</td>
</tr>
<tr>
<td>Poland</td>
<td>2/64</td>
<td>3.1</td>
<td></td>
<td>One Junior Associate = Tomasi</td>
</tr>
<tr>
<td>Portugal</td>
<td>1/7</td>
<td>14.3</td>
<td></td>
<td>Neiva*</td>
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<tr>
<td>Sri Lanka</td>
<td>1/4</td>
<td>25</td>
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<td>Nash</td>
</tr>
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<td>Switzerland</td>
<td>1/22</td>
<td>4.55</td>
<td></td>
<td>Mange-Rajetzky</td>
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<tr>
<td>USA</td>
<td>12/240</td>
<td>5</td>
<td></td>
<td>Burke, Carroll, Danielli, Firby-Durham, Hamil, Harwood, Knowlton, Miller, Moore, Schreiber, Sykes?, Wintsch</td>
</tr>
</tbody>
</table>

*Also in 1972.
and studied geology at the University of Manitoba, being the first woman to gain a BSc in Science, albeit with some opposition from the Dean (Gries 2017). In the 1940s she had emerged from the ranks; having begun work as a field geologist for Royalite, working in the Turner Valley oilfield – Loranger made use of foraminifera, an important biostratigraphic tool with much early work done by women (e.g. Turner 2009b; Gries 2017). An independent and athletic woman, she outdistanced many men in the field, and travelled and lectured widely in Europe (Gries 2017). Loranger published in the mid-late 1950s on biostratigraphy and microfossils of Lower Cretaceous sediments of Alberta and the Northwest Territories (e.g. Loranger and McGill 1959). Through her hard work and publications, she gained her PhD; and through her knowledge of the Alberta oil sands, Loranger rose to a supervisory position and into the directorate of Imperial Oil Ltd by 1950 (Gries 2017; Taylor 2019). There was a death notice by name only in Geoscientist, 15, issue 12 in December 2005, which I put on Facebook on 8 February 2018.

**UNESCO–IUGS work**

As noted above, I admire those women who have contributed to the work on UNESCO and the IUGS. Such work constitutes service to our profession and comes with little monetary reward. Instead, there is often the chance to work in Paris and be sent on missions around the globe, and so is recommended to any young geologist.

Janet Vida Watson, ‘great’ geologist and daughter of vertebrate palaeontologist D.M.S. Watson was the first female President of the Geological Society.
in 1982. Janet has been rightly lauded as one of the major role models (Park 2009; Köbl-Ebert and Turner 2017; Simmonds 2018; Easterbrook 2019). She became a Junior Associate on 17 October 1945 and was elected FGS in 1948. That she was also a participant in much UNESCO–IUGS work, including the IGCP (then named the International Geological Correlation Programme) (Turner 2006), is not noted in her obituaries. Janet’s work for UNESCO included organizing IGCP archives, as well as considering the human benefits of the programme (Reinemund and Watson 1983). Simmonds (2018) noted her increasing interest in applied geology as demonstrated by her book Geology and Man (Watson 1983). She served as British representative on the IGCP Board. Here, again, she was a role model to me, both as a Reading graduate (1943) and for her IGCP work, when I was elected to join the Board in 2000, where I served for the next 7 years representing Australia, including 1 year as Rapporteur, as one of the first Global Geoparks panel of assessors (e.g. Turner 2013) and becoming an historian of IGCP, when I learnt of her important roles (e.g. Turner 2006).

Swiss geologist Miss Frances Margaret Delany (or Delaney) (Dipl. Geol. Zürich) also put her geological energies into UNESCO and IUGS work. I became aware of her when I was reporting to IUGS while diving close to the British Antarctic Survey’s Rothera research station (Derbyshire 2003). Brown was typical of young scientists who choose to spend 2½ years in the Antarctic; she was single, had no children, and was resourceful and dedicated to her work. She was born and brought up in Southwater, Sussex, developing an interest in geology at school. Kirsty studied Geology at Royal Holloway College, north London, gaining her BSc and then an MSc in Oceanography at Southampton University. She gained professional diver qualifications and had dived off Greenland on an Imperial College’s expedition (Shearman 1998: Kirsty Brown in the credits, p. 8), and then was field assistant in Greenland for the Cambridge Arctic Shelf Programme. After another working trip to Greenland for an oil company, Kirsty went to visit New Zealand and Australia, and decided to do a PhD at Adelaide University. As a research scientist in Canberra, she dived both in temperate and tropical waters off Australia. She joined the British Antarctic Survey in the summer of 2002 on a 30 month contract. Adelaide University awarded her a rare posthumous doctorate. As a memorial, a small island just west of Lagoon Island and east of Léonie Island, in Ryder Bay on the Antarctic Peninsula, is now named Kirsty Island.

Upstream

Many women Fellows did find work in the oil and gas field, and that still applies (e.g. Gries 2017; Ponton 2019). In recent years I got lured into upstream matters and wrote a little about the oil industry (e.g. Turner 2007b; Hao et al. 2013). This brought me into contact with another far-flung female – Jane Elizabeth Mary Whaley (Fig. 8) of Gloucestershire, who joined the Geological Society in January 1978. Jane is now Editor in Chief of the GEO ExPro magazine. She is promoting the work of women geologists, as when she gave the keynote address at the Promoting Gender Diversity at the World Oil and Gas Conference run by the Global Women in Petroleum and Energy Club (Whaley 2018). After graduating with a BSc in October 1977, she was one of the few women, if not the only woman, working offshore on seismic boats in the North Sea (pers. comm. June 2019). Her first job as a geologist doing rig, platform and pipeline site surveys was with Decca Survey. As she noted (Whaley 2018):

Quite why they decided to even interview me when until then they had only employed men, I am not sure, but it may have had something to do with the fact that the letter replying to my application began ‘Dear Mr. Whaley … .’
Fig. 8. Upstream field work: Jane Whaley from her days on a North Sea oil rig (photograph courtesy of Jane Whaley).

After several years with Decca Survey and then Comap Geosurveys, working in the North Sea, Gulf of Mexico and the Arabian Gulf, as well as the inevitable stints onshore in Houston, it was time for a change. In 1982, following her husband’s work, she worked in Bahrain and set up the Middle East office for Comap (1983 Geological Society list; c/o Dehraz 1986 Geological Society list). After two children, Jane took a short career break from oil and gas and did a course in Teaching English as a Foreign Language (TEFL), which was to prove remarkably useful to her later when she began writing for, and then editing, the GEO ExPro magazine. As with other women, particularly where motherhood is involved, gaining skills in English or editing is a useful sideline that has kept the wolf from the door for many. For Whaley, GEO ExPro became the jewel in the crown in 2004, and this work allowed her to go to wonderful places and meet amazing people, particularly women.

Conclusions

Women Fellows of the Geological Society have worked all around the world in the 100 years since they were allowed admission. This paper considers a few but there are many other stories to gather. Many women Fellows of the Geological Society are still in need of obituaries and memorials. Here I have tried to add information of some of those, such as Phoebe Walder. Rarely do women reach Senior Fellowship. Why? I think this is because many women found (and find) it hard to last in the profession and to maintain Geological Society membership when they fail to get jobs after graduation and when they retire, and so they ‘disappear’ from the records before they receive their due.

When I look at recent copies of Geoscientist I am heartened that there are many more female Fellows in the Society in all aspects of the geosciences. In 2004, that amounted to 27.4% of new Fellows elected (but no information of where they lived and/or worked) and with almost 40% of graduating Candidate Fellows eligible, including Veronica L. Cubitt, daughter of Cynthia Burek (Anon. 2004). There have been surveys in the past and clearly the aim of increasing female membership has been met. As Jane Whaley noted (Whaley 2018), more women are graduating in geoscience subjects, more starting their careers in the geological world, but, as in the past, we are not retaining them; she emphasized that to lose these experienced geoscientists is to waste an enormous human resource with their valuable educations squandered. I concur with her from my own life that we need positive role models and resilience training!

The surveys of Geological Society documents I have made result in a few hundreds of women past and present who have become Fellows (list available on request). Invariably, going through the printed address lists available to me, the number of men far outweigh that of women, as in 1949 when there were only three women in 136 FGS (only 2.2%). This difference in number is still the case, although the twenty-first century has seen an increase in women taking geology courses at universities both in the UK and worldwide (e.g. Kölbl-Ebert and Turner 2017), and consequently in female members (Anon. 2004). If we read a recent Geoscientist, however, that trend may be reversed in the near future (Boatwright et al. 2019). What is interesting is the very few Honorary or ‘Senior’ Fellows in the Geological Society; this the Geological Society could redress. The lack is not only because of the vagaries of time – after all women live longer – but women’s circumstances in taking on marriage and children, for instance, in not gaining secure employment, in having less to retire on in terms of superannuation or other funds means that they are more likely to resign from the Geological Society before reaching the 50 years necessary to gain ‘Senior’ status. On top of that, the years as Junior Associate (now Junior and Graduating Candidate Fellows) do not count towards this. I do hope the Council will look more to rewarding loyalty to the Society.

Finally, on a positive note, after so many years seeing no or few awards go to women Fellows (Burek 2020), suddenly there has been a spate, some again going to palaeontologists. Sarah E. Gabbott, English taphonomist, achieved the President’s Award in 1998 for her work in unravelling the geochemical environment and palaeontology of the Ordovician Soom Shale Lagerstätte of South Africa. This award represents another link, as it was instituted in 1980 by my first teacher at Reading,
Professor Perce Allen. Then working as a postdoctoral research assistant at Leicester University. Professor Gabbott now focuses on soft-tissue fossilization in early life, working also on the Chinese Chengjiang and Jehol faunas. She has contributed to Britain’s very own ‘body farm’ concept in palaeontology, producing an atlas of decay (Sansom et al. 2013). Victoria Honour is studying the Skærgaard intrusion in the Arctic utilizing the 2017 Annie Greenly Fund (Honour 2018), looking at the migration of late-stage liquids using geochemistry and petrology to track liquid movement. Honour’s work reminds me of the times I met Lawrence Rickard Wager (1904–65) when I was a student, first at the old Reading geology museum when he came to retrieve his Greenland kayak and attend the Hawkins birthday party. A few months later and just 2 weeks before he died, we met in Blackwell’s bookshop in Oxford. A further link is that Gertrude Elles had been one of his teachers (Deer 1967).

Then, in 2014, the most senior Geological Society Wollaston Medal went to a woman for the first time. Los-Angeles-born Maureen Raymo also became an Honorary Fellow of the Geological Society. With her father a geologist, she had a good start back in the 1960s and she had wanted to be an oceanographer after watching Cousteau’s television programmes (Simmonds 2018). Raymo has become a world-class palaeoceanographer, working in the last 30 years on development of the controversial uplift weathering hypothesis to explain Cenozoic cooling/onset of Antarctic glaciation; her studies on Plio-Pleistocene sea levels are pertinent to the current climate change debate. In 2018, Susannah Maidment, researcher in Earth Sciences at the Natural History Museum (NHM), London, gained the Edmund Johnson Garwood Fund and took off to North Africa in search of dinosaurs (Maidment 2019). She conducts fieldwork also in western USA and is one of the up-and-coming vertebrate palaeontologists of her generation (Berta and Turner 2020). Emily Rayfield, currently President of the Society of Vertebrate Paleontology, in 2019 gained the Bigsby Medal for her work on dinosaur skull mechanics.

I won’t make another 50 years but I bet we shall see some great changes and, hopefully, a few more female presidents and many more female medal awardees to help us celebrate further.

Caveat – it is now difficult to search for data on women Fellows, because full membership lists are no longer printed and are not available online. In addition, because of privacy laws and changes in reporting gender and marital status, and it is often impossible to determine gender from a name alone (as for people from certain countries and cultures). I have searched some printed address lists available to me but found the current online directory frustrating because the ability to search by country does not exist, and now Fellows can opt out.

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Data availability The datasets generated during and/or analysed during the current study are not publicly available due to there being in a personal Filemaker database but are available from the corresponding author on reasonable request.

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