The life and scientific work of Trevor D. Ford (1925–2017)

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Abstract: The eminent geologist and speleologist Trevor Ford (1925–2017) was raised in Sheffield, Yorkshire. As a young boy he fell in love with the caves and geology of Castleton in the Peak District, and this profoundly influenced his future career. After military service in World War II, Trevor obtained his BSc and PhD degrees from the University of Sheffield. He was appointed Assistant Lecturer at University College, Leicester (later the University of Leicester) in 1952 and remained there for his entire career. Trevor was one of the founders of the Department of Geology at Leicester and helped it to become one the UK's leading research and teaching centres in the earth sciences. He was an enthusiastic teacher, and his singular charisma enlivened his highly entertaining lectures. Trevor was also an outstanding researcher, and his prodigious published output was largely on the geology and speleology of the Peak District. He worked on other topics: his career highlight was his research on the Ediacaran fauna of Charnwood Forest. Trevor also wrote many popular publications, notably on Blue John and the show caves of the Peak District. He edited several journals, including *Bulletin of the Peak District Mines Historical Society* between 1965 and 2000. Unsurprisingly, this most dedicated of scientists received many honours, the most high-profile of which was an OBE in 1997 for services to geology and cave science. A long academic career came to a formal end in 1987 when Trevor retired. The Emeritus Trevor Ford maintained very close links with the Department of Geology at Leicester and was scientifically very productive post-retirement.

The eminent geologist, speleologist and teacher Trevor David Ford died peacefully on the afternoon of 22 February 2017, shortly before his 92nd birthday, surrounded by members of his family in Leicester, UK (Anon. 2017; Gunn 2017; Khan & Baxter 2017; Shaw 2017; Riding & Worley 2020). Trevor was an extremely well-known character in the world of earth sciences, and was something of a polymath: there can be few geologists who have not come across his name. However, he is especially renowned for his work on all aspects of the geology of the Peak District in central England and the late Precambrian Ediacaran biota. His higher education was at the University of Sheffield between 1947 and 1953. After completing his PhD, Trevor was appointed as a lecturer in geology at University College, Leicester in 1954. He went on to have a 35-year career in the Department of Geology at the University of Leicester until his formal retirement in 1987. Trevor taught thousands of undergraduates, supervised 22 research students, and somehow found the time to publish around 500 articles, scientific papers and books (Riding & Worley 2020). Furthermore, Trevor had a life-long interest in speleology, and was made an OBE in 1997 for his many contributions to cave science and geology.

Trevor Ford's 65-year career in scientific research was based upon a profound natural curiosity that led him to search for answers through observation and deduction, but only if they were reliably founded on clear field evidence. Moreover, he lived and worked during a time of a continuous and incremental increase in laboratory-based research methods, and he actively encouraged others to embrace this approach. Trevor was passionate about his scientific ventures and was an enthusiastic team player. He shared his ideas collaboratively, and supported those who were attracted to follow them up. This *modus operandi*, plus his strong and sustained commitment to public outreach, brought Trevor into contact with many like-minded non-professionals and he endowed them with the confidence to express their knowledge and publish their findings. In this respect Trevor was a true pioneer of 'citizen science'.

Early years

Trevor Ford was born at Westcliffe-on-Sea, a suburb of Southend-on-Sea in Essex, southeast England on 19 April 1925. His father, Ernest, worked in commercial publishing, and was married to Hylda. A work-related move for Ernest in late 1925, when Trevor was a baby, took the Ford family north to Sheffield. They settled in Haugh Lane, Ecclesall, situated in the southwestern suburbs of the city and close to the Peak District. Wendy, Trevor's sister, was born at Sheffield in 1931.

A neighbouring family, the Harrisons, who had strong connections with Castleton in the Hope Valley west of Sheffield, took over the running of Speedwell Cavern in the 1930s and consolidated their interests in show caves by acquiring nearby Treak Cliff Cavern in the late 1940s. Happily for Trevor they had a son, Peter, who was similar in age. Peter Harrison and Trevor soon became lifelong friends. Together with other pals, notably Cyril Adamson, Trevor and Peter regularly cycled the ~20 km westwards to Castleton from Sheffield during weekends in the early years of World War II (WWII). These trips were profoundly influential in developing Trevor's interest in the natural sciences, especially geology, mineralogy and speleology. An awareness of the last-named topic came first, and all aspects of caving became Trevor's lifetime passion. On the weekend trips to Castleton, Trevor would help by guiding visitors through Speedwell Cavern and he also helped Dick Howe to resurvey this cave system. During the course of this voluntary work Trevor was introduced to the rudiments of cave exploration and took to it very enthusiastically. Trevor also helped in

the re-surveying of Speedwell Cavern, and explored many new sections of this cave (Ford 1991; Gunn 2017). Many years later, a new discovery in Speedwell Cavern was named Ford's Cavern.

Trevor's secondary education at the King Edward VII Grammar School in Broomhill, a western suburb of Sheffield, commenced in 1939. His schooling was abruptly interrupted in 1941 by WWII, when he became a temporary wartime bank clerk and served in the Home Guard. When Trevor reached the appropriate age, he was called up by the Royal Air Force (RAF) in 1944. However, his flying career was cut short because the RAF soon discovered that Trevor had imperfect colour vision. This led to a transfer to the Royal Navy later in 1944 as a Stores Assistant. Remarkably, his vision issues never inhibited his skills in using the petrological microscope, and he taught optical mineralogy and petrography for many years. Trevor was posted to the Far East, where he served in various land bases located in Burma (now Myanmar), Ceylon (now Sri Lanka), Hong Kong, India and Singapore. After the close of WWII in 1945 he was demobilised the following year. Trevor immediately returned to Sheffield and restarted his caving activities. He spent much time at Speedwell Cottage, and explored Speedwell Cavern and other caves and lead mines in the Castleton area while pondering his future career.

Geology undergraduate and postgraduate

After his relatively short time in the armed forces, and a period of reflection at Castleton, Trevor set about the task of qualifying to attend university. The choice of subject was absolutely straightforward in his case: the many cycling and caving trips to the Castleton area had imbued him with a deep love of caves, fossils, minerals and rocks. The Department of Geology at his local university had an excellent reputation at the time. The Sheffield Department was established in 1913 as a result of a generous legacy from Dr Henry Clifton Sorby FRS (1826–1908), the father of metallography, petrography and sedimentology (Ginsberg 1976; Worley 2009; https://www.sedimentologists.org/docs/sorby.pdf). Professor William G. Fearnsides (1879–1968) was the first Sorby Professor (Hunter 2015). Trevor applied to read geology at the University of Sheffield, was accepted, and began his undergraduate studies in the autumn of 1947 at the age of 22. Prior to WWII, the Department overwhelmingly taught undergraduate students of Applied Science, notably civil engineering and mining. However, the famous hydrogeologist Professor Frederick ('Fred') W. Shotton FRS (1906–1990) recruited many more 'single-subject' geology students in the late 1940s, and Trevor Ford was one of these. Professor Leslie R. Moore (1912–2003) replaced Shotton in 1949 when the latter moved to the University of Birmingham, in the middle of Trevor's undergraduate studies. Leslie Moore was an expert on Carboniferous geology and stratigraphy (Sarjeant 1984; Spinner et al. 2004), and clearly he and Trevor would have had much in common. Trevor's undergraduate dissertation was entitled *The origin of limestone caves* and contained original observations and interpretations as well as being a literature review. Unsurprisingly, Trevor undertook a PhD project supervised by Leslie Moore on the Ingleton and Stainmore coalfields in northern England between 1949 and 1953 (Ford 1954a, 1955a). There can be no doubt that Trevor benefited hugely from a time of rapid personnel change during his time at the University of Sheffield, learning from three Sorby Professors: Fearnsides, Shotton and Moore. He was also mentored and taught by Peter C. Sylvester-Bradley (1913–1978) and William H. Wilcockson (1891–1976), both of whom nurtured and further reinforced Trevor's profound interest in the geology of the Peak District.

Figure 1. *A photograph of Trevor in academic dress aged 28 when he received his PhD from the University of Sheffield in 1953. Precise date and photographer unknown. (Reproduced by courtesy of Janet Baxter)*

During his time at Sheffield, Trevor became the Editor of the *Journal of the University of Sheffield Geological Society*, which was initiated in 1951. George W. Charlton edited the first part of volume one, which included a report by Trevor on the 1950 meeting of the British Association for the Advancement of Science (Ford 1951a). This is the first publication by Trevor known to both authors. He edited the following two parts of volume one of this journal (1951 and 1952 respectively), and wrote several short pieces such as reports on excursions and guest lectures, plus society news in the first few issues.

One has a glimpse of Trevor's drive, enthusiasm and passion in Ford (1952) where he wrote (and one can easily imagine him saying this), *inter alia,* in an editorial:

> "A journal such as ours provides a golden opportunity for first attempts – without the threat of the examiners marking down! All but one of the articles in this issue are first tries. Have YOU had a go?"

Trevor's first scientific paper was Ford (1951b), a review of Blue John from the area around Treak Cliff, near Castleton in Derbyshire, written when he was a PhD student. He retained a close interest in this fascinating and unique gemstone from the Peak District all his life, and was the leading expert on all aspects of Blue John (e.g. Ford 1955b, 2019).

A career at the University of Leicester

Trevor obtained a position as an Assistant Lecturer in Geology in the Department of Geography at University College, Leicester in September 1952, one year prior to the completion of his PhD thesis entitled *The Upper Carboniferous rocks of the Ingleton and Stainmore coalfields* (Fig. 1). The embryo department was set up with a bequest from the keen amateur geologist Dr Frederick W. Bennett (1859–1930) to fund a lecturer position in geology in 1931. Trevor was appointed by, and was assistant to, John H. McDonald Whitaker (1921–2001), known to all simply as Mac, who had been appointed as the first Lecturer in Geology at Leicester one year earlier in 1951. During the early- and mid-1950s, Mac and Trevor between them taught geology to geography students according to the standards of the University of London External Honours Regulations. University College, Leicester gained university status in 1957, and acquired a Royal Charter enabling the conferring of its own degrees. Around that time, Mac and Trevor were soon joined by, for example, Anthony M. Evans, Ian G. Gass, Robert J. King, Mike J. Le Bas and Peter C. Sylvester Bradley in the new Department of Geology which was founded, independent of Geography, in 1954. This team laid the foundations which enabled the newly-founded entity to soon become one of the UK's leading research and teaching departments in the earth sciences. Trevor was a key member of the Department over four decades, and was promoted to Lecturer and then Senior Lecturer in 1980 (Fig. 2). He was later appointed Associate Dean for Combined Studies until his formal retirement in 1987. Following his retirement, after 35 years of service, Trevor maintained very close links with the department.

***Figure 2**. A relatively formal photograph of Trevor taken in 1982; note the Yorkshire Geological Society tie. At the time he was a Senior Lecturer at the University of Leicester. Precise date and photographer unknown. (Reproduced by courtesy of Janet Baxter)*

Trevor loved teaching, which was just as well because he always seemed to have a very heavy lecturing and tutorial timetable, in addition to leading many student field trips (Figs 3, 4). He taught undergraduate courses on, for example, economic geology (coal, oil and water), environmental geology, geological map interpretation, history of geology, micropalaeontology, Quaternary geology, palaeontology and stratigraphy. His all-morning sessions on Mondays teaching elementary map interpretation, mineralogy and palaeontology to first-year students were legendary. Trevor's deep, booming voice was ideally suited to the cavernous first year teaching laboratory. He would habitually take a register before he started and this was Trevor at his most schoolmasterly. If a student was persistently absent or late, he or she received acerbic comments aplenty. Trevor also taught a variety of extra-mural courses in geology at Vaughan College in central Leicester and elsewhere. The former is an adult education facility which is now known as Leicester Vaughan College (Brown 2012).

Trevor was a very charismatic and enthusiastic lecturer, and always gave extremely comprehensive and clear discourses. One of his hallmarks, especially to junior undergraduates, was that he frequently came across as a somewhat irascible school teacher. However, this apparently brusque manner was purely superficial. As Trevor began to get to know the undergraduate cohort, the barked orders and caustic comments largely disappeared. The students learnt that he was at heart a very helpful, humane and sympathetic man with an encyclopaedic knowledge of all aspects

***Figure 3**. Trevor suspiciously examining a living starfish on a beach on the Isle of Man during Spring 1979. He led a two-week field course for the third year Leicester undergraduates who majored on sedimentary geology at the start of the Easter vacation. To the left of Trevor are Lindsay Barnes (partially obscured) and Andy Guest, on his right are Trevor Lund, Jane Heasman and Dominic Manley. (Photo: James B. Riding)*

of the earth sciences, who would go the extra mile in all aspects of undergraduate mentoring. On numerous occasions, Trevor exhibited his very empathetic and understanding nature when helping undergraduates with their problems. Like many strong characters, he would respect those who stood up to him, provided of course they made good sense. He was an exacting teacher, and would continually exhort students to aim for absolute perfection in their academic work. In this regard he led by example; he continually strove for total flawlessness in his prodigious levels of written output. Trevor had an office in the back corridor of the Geology Department, opposite the electron microprobe room. The characteristic clicking noises made by the probe duelled with the pretty much non-stop tap-tap-tapping of Trevor's trusty old typewriter (he never really embraced the digital revolution). Trevor also supervised 22 research students. These included John Beck, Patrick Boylan, Cynthia Burek, Nick Butcher, Malcolm Clark, John Mosley, Dave Quirk, Richard Shaw, Lynn Willies and Noel Worley. These postgraduates mainly worked on aspects of the geology, mineralisation, mining history and speleology of the Peak District, and also the Proterozoic rocks of Charnwood Forest, Leicestershire and the Grand Canyon. He held Visiting Professorships at several universities in Australia and the USA: the latter included Kansas, Northern Arizona and Syracuse universities.

Judging by his expert editorship of the *Journal of the University of Sheffield Geological Society* in the early 1950s, Trevor developed his strong feel for the alumni so apparent at Leicester from his Sheffield days. He had an outstandingly good memory and remembered most of the hundreds of geology undergraduates he had

***Figure 4**. On the Isle of Man undergraduate field trip in the Spring of 1979 (see Fig. 3), Trevor would proudly demonstrate his dexterity (and hence his prowess at speleology) by climbing into and out of a rusty old boiler. The students in the background are, from left to right, Andy Guest, Jane Heasman, Richard Croft and Dominic Manley. (Photo: James B. Riding)*

taught, many of whom became lifelong close friends. The Department of Geology at Leicester has always prided itself on being friendly and welcoming, plus being interested in the careers and lives of its former students. Trevor's affinity for, and knowledge of, past and present students was at the forefront of this rather unique facet of the Leicester Department's character.

Trevor also had a strong sense of duty and responsibility, and he served on many boards and committees at the University of Leicester. He was a member of University Senate and Council. Trevor was also a member of the following Boards at various times: Collegiate Studies; Departmental Assistants; Education; Faculty of Science; Higher Degrees; Honorary Degrees; Research; and Vacation Awards. He sat on four committees: the Disciplinary Committee, the Part-time Degrees Committee, the Sites and Buildings Committee, and the Vice-Chancellors's Committee on Teaching Methods. Trevor was also Senior Tutor, and then Associate Dean, for Combined Studies in Science at Leicester, and Chair and Convenor of the Board of Studies in Earth Science at Nene College of Higher Education, Northampton (now the University of Northampton) between 1974 and 1987.

After Trevor formally retired in 1987 he was given emeritus status via the appointment as University Fellow (i.e. an honorary research fellow) as befitted such an iconic and respected figure. In this honorary position he maintained a very close association with the Department, visited regularly, and continued his research on the geology of the East Midlands, mining history and speleology. His published output after retirement was typically extensive (Riding & Worley 2020).

The geology of the Peak District

Trevor Ford's research output was largely on the geology, mineralisation, mining history, palaeontology and speleology of his beloved Peak District of Derbyshire. He loved it so much that he bought a weekend home, Sunnyside, in Castleton. His first paper was a review of Blue John from Castleton (Ford 1951b). Trevor's final scientific paper, co-authored with one of us (NW), was a comprehensive review of the mineralisation of the South Pennine Orefield (Ford & Worley 2016). This was a culmination of the overground and underground exploration and observations by both authors over many years of the Mississippi Valley type lead-zinc mineralisation which has a long history of exploitation. These deposits are stratabound horizontal and vertical bodies termed flats, pipes and rakes, which are largely hosted in the Mississippian (Brigantian) units of the Peak Limestone Group. The ore bodies are thought to have formed on and around structural highs due to the deep circulation and ultimate cooling of hot, acidic mineral solutions which leached barium, fluorine, lead, sulphur, zinc and other elements from the surrounding siliciclastic rock units. In particular, the pipe veins continued to conduct water into the Quaternary, and

Figure 5*. Trevor pictured outside the Moot Hall on Chapel Lane in Wirksworth, south of Matlock, Derbyshire; note the very distinctive railings. He was regularly invited to attend the annual Great Barmote Court held annually in the Moot Hall to decide upon disputes in the lead mining industry. The book he is holding shows himself giving the Miner's Toast in Speedwell Cavern. Precise date and photographer unknown. (Reproduced by courtesy of Janet Baxter)*

they transported alluvial/fluvial placer deposits of baryte, galena and sphalerite into karst cavities (Ford & King 1965; Ford & Worley 1977). The comprehensive review of Ford & Worley (2016) is a fitting and lasting tribute to Trevor's distinguished legacy of unstinting research on the geology and mineralisation of the Peak District.

Between the publication of Ford (1951b) and Ford & Worley (2016) Trevor established himself as the world expert on the geology and speleology of the Peak District with numerous books, papers and popular publications. His work covered all aspects including the Brassington Formation (Miocene), geochemistry, geomorphology, hydrology, industrial minerals, lithostratigraphy; mineralisation, mineralogy, palaeomagnetism, palaeontology, sedimentology and silicification (Riding & Worley 2020).

In addition to his long-standing interest in the lead-zinc mineralisation of the White Peak, Trevor was fascinated by the mining history of this region

and undertook much serious research on this topic, publishing numerous articles in the *Bulletin of the Peak District Mines Historical Society* (Riding & Worley 2020). His expertise was recognised when he was appointed to serve as a juryman for the Great Barmote Court at Wirksworth, a body established by an Act of Parliament to settle (mainly territorial) disputes in the lead mining areas of the Peak District (Fig. 5; https://pdmhs.co.uk/peak-district-mining-laws-and-customs/). Ford & Rieuwerts (2000) is his co-authored work with Jim Rieuwerts, *Lead Mining in the Peak District*, the current version of which is the fourth edition. This is the definitive account of the history of this fascinating, now-vanished industry. Furthermore, between 2000 and 2014, Trevor published ten comprehensive and definitive accounts of the old lead mines in various areas of the White Peak (e.g. Ford 2010; Riding & Worley 2020).

Special mention should be made of Trevor's many books on Peak District geology, mining history and speleology, most of which have extended to several editions. He authored many popular publications on Peak District geology, scenery, speleology and the various show caves (e.g. Ford 1964a, 1990, 1992, 2006, 2019; Ford & Allsop 1977). However, Sylvester-Bradley & Ford (1968), Ford (1977a) and Ford & Rieuwerts 2000 are major textbooks. The first-named is a key edited text describing all aspects of the geology of the East Midlands of England including seven contributions from Trevor on Leicestershire and the Peak District. Ford (1977a) is also a substantial edited volume focusing on the Peak Limestone Group (Courceyan to Brigantian) of the Peak District, and the karst features developed within it.

***Figure 6**. Trevor outside the Bennett Building at the University of Leicester with a photographic display of the holotype of* Charnia masoni. *The first-year teaching laboratory is in the background. Note that the photograph is not to scale; the fossil is 21 cm in length. Precise date and photographer unknown. (Reproduced by courtesy of Janet Baxter)*

Additionally, Trevor was fascinated by all aspects of the gemstone Blue John. This semi-precious mineral, which was first mined in the 18th century, is a variety of fluorite (CaF_2); it is typically banded with purple-blue, white and yellow layers. In the UK it is found only at Blue John and Treak Cliff caverns at Castleton, at the head of the Hope Valley in Derbyshire. Commercial mining of Blue John ended in around 1926, and Treak Cliff Cavern subsequently reopened as a show cave in 1935. Trevor published extensively on Blue John, and both his first paper and his final contribution, the latter published posthumously, are on Blue John (Ford 1951b, 2019). His research into the history of the commercial and ornamental use of Blue John led him to describe the utility of Ashford Black Marble, a variety of highly bituminous limestone from the Peak District village of Ashford-in-the-Water, for example Ford (1958a). Ashford Black Marble was very widely used for making clock cases, fireplaces and inlaid tables.

Charnia and the Ediacaran biota

Undoubtedly Trevor's most impactful paper was Ford (1958b), his description of the frond-like Neoproterozoic fossil *Charnia masoni* and the disc-shaped impression *Charniodiscus concentricus*. These taxa are from Charnwood Golf Course North Quarry (locally known as the 'Ring Pit' – after *Charniodiscus*), near Hanging Rocks, Woodhouse Eaves in Charnwood Forest, an upland area in northwest Leicestershire. The holotype of *Charnia masoni* is preserved as an impression in an indurated volcaniclastic siltstone deposited in relatively deep water (below wave base, perhaps 500–1000 m). It is 21 cm long and 4.5 cm in maximum width, and it exhibits segmented, leaf-like crests which branch either side of an angular medial suture (Fig. 6). *Charniodiscus concentricus* varies between 5 and 30 cm in diameter and has a rough-textured central area surrounded by a smooth flange possibly bearing concentric crests. The genus *Charniodiscus* was interpreted to be the holdfast of *Charnia* (see Ford 1958b, fig. 3). These two genera are representatives of the Ediacaran biota. This is a distinctive assemblage of highly enigmatic, largely frond-like and tubular benthic, sessile organisms representing the first complex multicellular organisms on the planet, and confined to the latest Precambrian (Ediacaran/Vendian ~635–541 Ma). The assemblage

appears to have emerged following the extensive Marinoan glaciation, and was replaced, over 20 million years later, by the diverse faunas which comprise the Cambrian explosion (Brasier & Antcliffe 2004; Darroch et al. 2018). Ediacaran fossils had been reported earlier from the Ediacara Hills in South Australia, and in Namibia and Newfoundland (e.g. Sprigg 1949). The ages of these occurrences were known to be close to the Precambrian–Cambrian transition, but were somewhat obscure and assumed to be Cambrian.

Ford (1958b) was the first well-dated report of the Ediacaran biota, and ultimately resulted from chance finds by schoolchildren. Surprisingly, the quarry had been disused for around 100 years before these finds were made, and it is probable that the fossils had been observed by others but not reported. In the early summer of 1956 a schoolgirl from Grantham, Lincolnshire, Tina Negus who was 15 years old at the time, observed *Charnia masoni* at North Quarry. She reported the find to her geography teacher who did not take her seriously, and told her that Precambrian rocks were entirely unfossiliferous, which was the prevailing wisdom at that time. Almost one year later, on 19 April 1957, local Leicester schoolboy Roger Mason went rock-climbing in the same locality with two of his friends, Richard Allen and Richard ('Blach') Blachford. The latter found the holotype of *Charnia masoni* and drew Mason's attention to it knowing that he was interested in fossils and rocks (Roger later became a well-known geologist). Roger Mason took a paper rubbing of the fossil, which he understandably thought was a plant, and showed it to his father who knew Trevor Ford through the latter's part-time teaching at University College Leicester. Unlike the unreceptive geography teacher of Tina Negus, Trevor was convinced that Roger was worth a reasonable hearing and agreed to accompany him and his father to the fossil site. In the 1950s, the Precambrian was universally thought to be entirely devoid of fossils, so Trevor was entitled to be somewhat sceptical. It says much about his open minded and trusting nature that he thought that Roger Mason and his father were credible. They both convinced Trevor that *Charnia masoni* was organic in origin and hence was highly significant. Trevor photographed *Charnia masoni,* and showed the images to his former palaeontology lecturer at the University of Sheffield, Peter C. Sylvester-Bradley. The latter confirmed that the find was significant and encouraged Trevor to publish the findings in the *Proceedings of the Yorkshire Geological Society* which was, at the time, edited by Sylvester-Bradley. If it were today, Trevor's paper on *Charnia* and *Charniodiscus* would have been a certainty for one of the major high-impact generic science journals. In the more innocent times of the late 1950s, Trevor was happy with a regional geological journal (albeit a venerable and much respected one).

The type material was extracted from the quarry with the help of two local quarrymen. A block was removed, with considerable difficulty, which weighed ~200 kg. This was transported to Leicester Museum where it was cut into a more reasonable ~30 kg; the slab is still on display there. Trevor then set about a formal description that was published as Ford (1958b), and acknowledged Charnwood Forest and Roger Mason's key involvement by naming the species name after him. He could not find any comparative organisms and tentatively assigned *Charnia* to soft-bodied algae. Obviously Ford (1958b) made a substantial impact because the beds containing *Charnia* are unequivocally Precambrian. Martin Glaessner of the University of Adelaide later undertook a systematic description of the Ediacaran biota from the Flinders Ranges of South Australia using *Charnia masoni* as a Neoproterozoic index fossil (Glaessner 1959a). In particular, *Charnia* was compared with specimens from the Ediacaran strata of South Australia and Glaessner (1959b) referred them to the Pennatulacea (sea-pens), which are related to the corals. Subsequently, Trevor discovered more Ediacaran fossils in Charnwood Forest, specifically at Bradgate Park, Cliffe Hill Quarry and Outwoods (Ford 2007).

The discovery of *Charnia masoni* gave Trevor an instant reputation in Precambrian palaeobiology, and he was invited to undertake fieldwork during visits to the Canadian Rockies, Newfoundland, South Australia, Sweden and the USA. In particular he embarked on mapping the Neoproterozoic Chuar Group at the base of the Grand Canyon during the late 1960s and early 1970s, and subsequently described organic microfossils from this unit which is logistically difficult to access (Breed & Ford 1973; Schopf et al. 1973). Ford (1958b) on *Charnia* and *Charniodiscus* is a very well-crafted taxonomic description and interpretation, and still reads well even after the passing of over six decades. Trevor continued to work on Ediacaran fossils, mainly the Charnwood Forest occurrences, and the geology of Charnwood Forest more generally throughout his career (e.g. Boynton & Ford 1979). The enigma of the Ediacaran biota is still intensely debated today. Thus, a conference was held in Leicester on 10 March 2007 to mark the 50th anniversary of the discovery of *Charnia masoni*, entitled 'Leicester's fossil celebrity: *Charnia* and the evolution of early life' (Ford 2007; https://www.le.ac.uk/gl/charnia2007/AbstractBooklet2007r.pdf).

Speleology

Trevor Ford is without doubt one of the most outstanding speleologists who ever ventured underground in both academic and practical terms (Gunn et al. 2015). He clearly became deeply interested in caving during his schoolboy excursions to Castleton from Sheffield and became a committed caver during his student days. Trevor began writing for caving periodicals early in his career (e.g. Ford 1951c, d), and was a founder-member of the Derbyshire Caving Association (DCA) in 1960. He put together the first edition of the regional guidebook *Caves of Derbyshire* (Ford 1964a). This

Figure 7. The team photograph taken outside the front entrance to the Bennett Building on the campus of the University of Leicester during the 'Ford Fiesta', a meeting held to celebrate Trevor's career in March 2013. (Photo: courtesy of Janet Baxter)

popular publication has had five subsequent editions with Trevor at the helm. He ensured that the DCA received royalties from the publishers, which came to several thousand pounds. During his career, Trevor wrote popular publications such as visitor guides and scientific papers on caves and caverns in the Peak District such as Poole's Cavern, Speedwell Cavern and Treak Cliff Cavern (e.g. Ford 1954b, 1956, 1986; Ford & Allsop 1977; Ford & Gunn 1990). He also wrote articles on karst in other locations such as Australia, Dorset, Scotland, Wales and Yorkshire (e.g. Ford, 1959, 1964b, 1978; Ford & Hooper 1965), and produced books on speleology (e.g. Ford & Cullingford 1976; Ford 1977a, b, 1989).

Other research interests

Trevor had a keen sense of the importance of the historic past and wrote many articles on the history of geology, particularly the early researchers who worked on the Peak District. For example, Trevor issued papers on the work of John Whitehurst (1713–1788), Barthelemy Faujas de St. Fond (1741–1819), Johan Jacob Ferber (1743–1790), White Watson (1760–1835), William Adam (1794?–1873) and John Farey (1806–1808). This work was mainly done during the 1960s and early 1970s (e.g. Ford 1960, 1974; Riding & Worley 2020).

Trevor ran a two-week third-year undergraduate field trip to the Isle of Man during the Easter vacation for many years (Figs 3, 4). Consequently he became an expert on all aspects of the island's geology from the Manx Group (Lower Ordovician) to the Quaternary sediments at the Point of Ayre in the north, and published extensively on this topic (e.g. Dickson et al. 1987; Ford et al. 2001). Largely during the 1990s, Trevor undertook investigations of the freshwater limestones tufa and travertine and published a comprehensive review paper (Ford & Pedley 1996).

Although Trevor never published on this topic, he was strongly involved with the search for the Barwell Meteorite. In the late afternoon of Christmas Eve 1965, a relatively large (43.7 kg) moderately metamorphosed olivine-hypersthene chondritic meteorite fragmented during its descent, with myriad pieces falling over the southern part of the large village of Barwell, southwest of Leicester and neighbouring Earl Shilton. It remains the largest stony meteorite fall observed in the UK (Jobbins et al. 1966). The event was accompanied by a sonic boom and, when the news broke, Barwell was flooded by meteorite collectors. These included a party from the Geology Department of the University of Leicester who combed the fields around the village searching for fragments on 6 January 1966. Serendipitously, Trevor arrived at the wrong pre-arranged meeting place, strode out on his own and found several large fragments (weighing ~5 kg) in a crater 23 cm across. He later discovered another fragment (2.3 kg) lying on the surface. As with *Charnia*, he was the right man, in the right place, at the right time!

Editorial and voluntary work

Trevor clearly had a great sense of obligation to learned societies in geology and speleology, coupled with a huge propensity for work. Throughout his career, he took on voluntary posts on the committees of many learned societies.

As mentioned earlier, Trevor was briefly the Editor of the *Journal of the University of Sheffield Geological Society* in 1951 and 1952. This experience as a student was clearly the beginning of his distinguished record as both an author and an editor. He was elected Honorary Editor of the Cave Research Group, later the British Cave Research Association, in 1964. Specifically, between 1973 and 1993 Trevor edited the *Transactions of the British Cave Research of Great Britain*, later

renamed *Cave Science* and then *Cave and Karst Science*. Trevor also became the Editor of the *Bulletin of the Peak District Mines Historical Society* (latterly *Mining History*) in 1965, a post he held until 2000. He was also the Honorary Editor of the *Transactions of the Leicester Literary and Philosophical Society* from 1986 to 2000. Furthermore, Trevor edited the *Proceedings of the Seventh International Congress of Speleology*, held in Sheffield in September 1977 (Ford 1977b).

Trevor also became Chair/President of many of the societies he had edited for, principally the British Cave Research Association, the Leicester Literary and Philosophical Society and the Peak District Mines Historical Society. He was also President of the East Midlands Geological Society between 1982 and 1985.

Honours and awards

In 1974 Trevor was rewarded for his distinguished research by the Geological Society of London by being given a moiety of the Lyell Fund. Three years later, in 1977, he was awarded Honorary Membership of the British Cave Research Association, a society Trevor helped to initiate, in recognition of his overall contribution to cave science, and especially his publications in this field (Gunn et al. 2015). Trevor was awarded the Certificate of Merit by the Speleological Society of the United States in 1995. At the time of his death in 2017, he was the longest serving member of that body. However, his most high profile honour was being awarded the OBE in the 1997 Queen's Birthday Honours List for services to geology and cave science. In 1998, he was awarded the 'Champion of British Sport' medal by the Derbyshire Caving Association, becoming the first Life Member in the same year. During 2009 he was elected an Honorary Member of the Yorkshire Geological Society. The University of Derby conferred upon Trevor an honorary Doctor of Science degree (DSc) in 2016 in recognition of his contributions on the geology and geomorphology of Derbyshire.

The Leicester Literary and Philosophical Society organised a meeting in honour of Trevor's many accomplishments in March 2013. The official title was 'From Bradgate Park to the Grand Canyon: celebrating the geological achievements of Dr Trevor Ford OBE'. However, it became known by the shorter and snappier title 'The Ford Fiesta' (Fig. 7; Gunn et al. 2015).

Overview

Trevor Ford was one of the giants of traditional British geology, and was an extremely astute and perceptive scientist. He was devoted to both his students and his subject, and achieved a prodigious amount in many areas of endeavour throughout his life. Trevor always displayed great humanity, despite a sometimes stern exterior. Probably due to his extensive caving activities in his youth without modern protective clothing, Trevor's mobility became impaired during his sixties. Despite these issues, he would always heartily welcome visitors to his home at any time. All were amazed by his extremely lively mind and phenomenal memory. Trevor moved into a care home in Leicester during April 2016 when he was no longer able to cope with living independently due to his mobility issues.

Trevor was always a keen family man, despite his preoccupation with the geology of the Peak District and his other myriad academic duties. Ann Thornhill, Trevor's first wife, passed away in 1956. Subsequently he married Betty Thomas in 1958 who died in 2006. Trevor is survived by Janet Baxter and Alison Tagg, his two daughters, and Kirsty Baxter his only granddaughter. Trevor's funeral took place 9 March 2017 at the South Leicester Crematorium at Countesthorpe, Leicester. The Yorkshire Geological Society and other associations held a commemoration meeting for Trevor in Buxton, Derbyshire in June 2018 (https://www.yorksgeolsoc.org.uk/archive/2018%20Circulars/615.pdf).

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References

Anon. 2017. Trevor Ford, 1925–2017. *Mercian Geologist*, **19**, 70–71.

Boynton, H. E. & Ford, T. D. 1979. *Pseudovendia charnwoodensis* – a new Precambrian arthropod from Charnwood Forest, Leicestershire. *Mercian Geologist*, **7**, 175–177.

Brasier, M. & Antcliffe, J. 2004. Decoding the Ediacaran enigma. *Science*, **305**, 1115–1117.

Breed, W. J. & Ford, T. D. 1973. Late Precambrian Chuar Group, Grand Canyon, Arizona. *Geological Society of America Bulletin*, **84**, 1243–1260.

Brown, C. 2012. *A blessing to the town: 150 years of Vaughan College, Leicester*. University of Leicester, 16 pp.

Darroch, S. A. F., Smith, E. F., Laflamme, M. & Erwin, D. H. 2018. Ediacaran extinction and Cambrian explosion. *Trends in Ecology and Evolution*, **33**, 653–663.

Dickson, J. A. D., Ford, T. D. & Swift, A. 1987. The stratigraphy of the Carboniferous rocks around Castletown, Isle of Man. *Proceedings of the Yorkshire Geological Society*, **46**, 203–229.

Ford, T. D. 1951a. British Association – Birmingham 1950. *Journal of the University of Sheffield Geological Society*, **1** (1), 24–27.

Ford, T. D. 1951b. Blue John stone. *Journal of the University of Sheffield Geological Society*, **1** (2), 28–35.

Ford, T. D. 1951c. Kittycross Cave. *British Caver*, **22**, 45–48.

Ford, T. D. 1951d. Northern Pennine karst – a postscript. *Cave Research Group Newsletter*, **35**, 3–4.

Ford, T. D. 1952. Editorial. *Journal of the University of Sheffield Geological Society*, **1** (3), 1–2.

Ford, T. D. 1954a. The Upper Carboniferous rocks of the Ingleton Coalfield. *Quarterly Journal of the Geological Society*, **110**, 231–266.

Ford, T. D. 1954b. Treak Cliff Cavern, Castleton, Derbyshire. *Transactions of the Cave Research Group of Great Britain*, **3**, 125–135.

Ford, T. D. 1955a. The Upper Carboniferous rocks of the Stainmore Coalfield. *Geological Magazine*, **92**, 218–230.

Ford, T. D. 1955b. Blue John fluorspar. *Proceedings of the Yorkshire Geological Society*, **30**, 35–60.

Ford, T. D. 1956. The Speedwell Cavern, Castleton, Derbyshire.

Transactions of the Cave Research Group of Great Britain, **4**, 99–124.
Ford, T. D. 1958a. The Black Marble of Ashford-in-the-Water, Derbyshire. *Liverpool and Manchester Geological Journal*, **2**, 44–59.
Ford, T. D. 1958b. Pre-Cambrian fossils from Charnwood Forest. *Proceedings of the Yorkshire Geological Society*, **31**, 211–217.
Ford, T. D. 1959. The Sutherland caves. *Transactions of the Cave Research Group of Great Britain*, **5**, 139–190.
Ford, T. D. 1960. White Watson (1760–1835) and his geological sections. *Proceedings of the Geologists' Association*, **71**, 349–363.
Ford, T. D. 1964a. *The caves of Derbyshire*. Clapham, Yorkshire: Dalesman Publishing Company, 105 pp.
Ford, T. D. 1964b. The Goyden Pot drainage system, Nidderdale, Yorkshire. *Transactions of the Cave Research Group of Great Britain*, **6**, 79–90.
Ford, T. D. 1974. Biographical notes on Derbyshire authors. John Whitehurst, F.R.S. 1713–1788. *Bulletin of the Peak District Mines Historical Society*, **5**, 362–369.
Ford, T. D. 1977a. (ed). *Limestones and caves of the Peak District*. Norwich: Geo Abstracts Limited, University of East Anglia, 469 pp
Ford, T. D. 1977b. (ed). *Proceedings of the Seventh International Speleological Congress, Sheffield, U.K., September 1977,* 444 pp.
Ford, T. D. 1978. Chillagoe – a tower karst in decay. *Transactions of the British Cave Research Association*, **5**, 61–84.
Ford, T. D. 1986. The evolution of the Castleton cave systems and related features, Derbyshire. *Cave Science*, **13**, 131–148.
Ford, T. D. 1989. *Limestones and caves of Wales*. Cambridge: British Cave Research Association, Cambridge University Press, 257 pp.
Ford, T. D. 1990. *The story of the Speedwell Cavern, Castleton – a guided tour by boat*. 6th ed. The Speedwell Cavern, Castleton, Derbyshire, 32 pp.
Ford, T. D. 1991. Exploring Speedwell in the 1940s. *Cave Science,* **18**, 22.
Ford, T. D. 1992. *Treak Cliff Cavern and the story of Blue John stone*. Castleton, Derbyshire: Harrison Taylor & Company, 24 pp.
Ford, T. D. 2006. *Rocks and scenery in the Peak District*. 2nd ed. Ashbourne: Landmark Publishing Limited, 96 pp.
Ford, T. D. 2007. *Charnia masoni* – 50th birthday party. *Mercian Geologist*, **16**, 208–284.
Ford, T. D. 2010. The geological setting of the lead mines in the northern part of the White Peak, Derbyshire. *Mining History*, **17**, 1–48.
Ford, T. D. 2019. *Derbyshire Blue John*. 3rd ed. East Midlands Geological Society in association with Treak Cliff Cavern, Castleton, Derbyshire, 80 pp.
Ford, T. D. & Allsop, D. G. 1977. *Guide to Poole's Cavern, Buxton Country Park*. Buxton, Derbyshire: Buxton Country Park, 32 pp.
Ford, T. D., Burnett, D. & Quirk, D. 2001. *The geology of the Isle of Man*. 2nd ed. Geologists' Association Guide, **46**, 92 pp.
Ford, T. D. & Cullingford, C. H. D. 1976. *The science of speleology*. London: Academic Press Incorporated, 593 pp.
Ford, T. D. & Gunn, J. 1990. *Caves and karst of the Peak District*. British Cave Research Association, Cave Studies Series, **3**, 32 pp.
Ford, T. D. & Hooper, M. J. 1965. The caves of the Isle of Portland. *Transactions of the Cave Research Group of Great Britain*, **7**. 11–37.
Ford, T. D. & King, R. J. 1965. Layered epigenetic galena-baryte deposits in the Golconda Mine, Brassington, Derbyshire, England. *Economic Geology*, **60**, 1686–1701.
Ford, T. D. & Pedley, H. M. 1996. A review of tufa and travertine deposits of the world. *Earth-Science Reviews*, **41**, 117–175.
Ford, T. D. & Rieuwerts, J. H. (eds). 2000. *Lead mining in the Peak District*. 4th ed. Ashbourne: Peak District Mines Historical Society, Landmark Publishing Limited, 208 pp.
Ford, T. D. & Worley, N. E. 1977. Phreatic caves and sediments at Matlock, Derbyshire. In: *Proceedings of the Seventh International Speleological Congress, Sheffield, U.K., September 1977* / edited by T. D. Ford, 194–196.
Ford, T. D. & Worley, N. E. 2016. Mineralization of the South Pennine Orefield, UK – a review. *Proceedings of the Yorkshire Geological Society*, **61**, 55–86.
Ginsberg, R. N. 1976. Preface. In: *Sorby on sedimentology, a collection of papers from 1851–1908 by Henry Clifton Sorby* / edited by C. H. Summerson. University of Miami, Florida, USA (Geological Milestones, 1), 1.
Glaessner, M. F. 1959a. The oldest fossil faunas of South Australia. *International Journal of Earth Sciences* **47**, 522–531.
Glaessner, M. F. 1959b. Precambrian Coelenterata from Australia, Africa and England. *Nature* **183**, 1472–1473.
Gunn, J. 2017. A visionary researcher. *Descent*, **255**, 34.
Gunn, J., Lowe, D. J. & Shaw, R. P. 2015. Dr Trevor D Ford OBE: A brief appreciation on his 90th birthday. *Cave and Karst Science,* **42**, 3–5.
Hunter, R. A. 2015. *Sorby's legacy: geology at the University of Sheffield*. 2nd ed. CreateSpace Independent Publishing Platform, USA, 204 pp.
Jobbins, E. A., Dimes, F. G., Binns, R. A., Hey, M. H. & Reed, S. J. B. 1966. The Barwell meteorite. *Mineralogical Magazine*, **35**, 881–902.
Khan, A. & Baxter, J. 2017. Obituary: Trevor David Ford 1925–2017. *Geoscientist*, **27** (10), 27.
Riding, J. B. & Worley, N. E. 2020. Trevor David Ford (1925–2017). *Proceedings of the Yorkshire Geological Society*, **63** (1), 61–62.
Sarjeant, W. A. S. 1984. Charles Downie and the early days of palynological research at the University of Sheffield. *Journal of Micropalaeontology*, **3**, 1–6.
Schopf, J. W., Ford, T. D. & Breed, W. J. 1973. Micro-organisms from the late Precambrian of the Grand Canyon, Arizona. *Science*, **179**, 1319–1321.
Shaw, R. 2017. Trevor D. Ford OBE, 1925 to 2017. *Peak District Mines Historical Society Newsletter*, **162**, 1.
Spinner, E. G., Lunn, P. & Owens, B. 2004. Leslie Rowsell Moore. *Proceedings of the Yorkshire Geological Society*, **55**, 159–160.
Sprigg, R. C. 1949. Early Cambrian "jellyfishes" of Ediacara, South Australia and Mount John, Kimberley District, Western Australia. *Transactions of the Royal Society of South Australia*, **73**, 72–99.
Sylvester-Bradley, P. C. & Ford, T. D (eds). 1968. *The geology of the East Midlands*. Leicester University Press, 400 pp.
Worley, N. E. 2009. Henry Clifton Sorby (1826–1908) and the development of thin section petrography in Sheffield. In: *Interpreting silent artefacts: petrographic approaches to archaeological ceramics* / edited by P. S. Quinn. Oxford: Archaeopress, 1–9.

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