

Obituary

David Wynn-Williams (1946–2002)

- ‘Microbiologist who took part in ten Antarctic expeditions’
- ‘Biologist who studied the life of the hardy polar microbe and from it evolved theories of life on Mars’
- ‘Scientist and astronomer fascinated by the possibility of life on Mars’
- ‘Applying the lessons of Antarctica to the study of the stars’

These obituary titles give a flavour of the work that David Wynn-Williams was engaged in before his tragic, early death on a country road whilst jogging near Cambridge on 24 March 2002 at the age of 55. David Wynn-Williams was a physically robust, highly sociable biologist, with an extraordinary exuberance, who developed new ideas concerning the origins of life by studying microbes in cold deserts, and who was an outright enthusiast for all things Antarctic. Something of a polymath, he created links across disciplines and advocated the idea that photosynthesis was adopted by bacteria that arose from the sea bed and subsequently colonised the land. He postulated that a similar evolution might have occurred on Mars, perhaps before life had arisen on Earth.

David Donaldson Wynn-Williams was born in West Kirby on the Wirral, Merseyside, on 16 July 1946, the only son of Joan and David ‘Rollo’ Wynn-Williams, and educated at Calday Grange Grammar School, Birkenhead Technical College, and the University College of Wales, Aberystwyth (1965–71). He was married briefly to Pamela Rees (1972) and subsequently to Elizabeth Davies (1979), by whom he had two daughters, Cherry and Rosanna. He worked as a research microbiologist with the British Antarctic Survey 1974–2002 and was awarded the Polar Medal in 1980. These are the bare essentials of a life lived to the full by a man who cared passionately about his science (and his singing and astronomy), but above all about the Antarctic.

The early phase of Wynn-Williams’ life, lived in West Kirby, provided hints of the future. His mother recalled that the scientific approach came out very early, when, for example, he exasperated his father by asking for a fully proven explanation as to why taking his medicine would do him good! As a young boy, Wynn-Williams was fascinated by the stars (he would go to bed straight after school in order to star-gaze at night through the family telescope), but, according to his life-long friend Rod Tann: ‘the exploration of space had to be more participatory for David. Flies were captured and sealed into capsules to be catapulted into the atmosphere aboard 5 November rockets.’ Together, they test-fired ball-bearings propelled by firework gunpowder through a tube clamped to the senior Wynn-Williams’ work bench. These invariably found their way through the shed roof!

At the age of 14, Wynn-Williams enthusiastically joined the Army Section of the local Combined Cadet Force and its band, initially as a drummer and later its drum major. Another friend, John Metcalfe, recalls: ‘everything had to be right for the drum major and you marched with your eyes on him; watching him throw his baton into the air and catching it. The band was David’s pride and joy.’ He also started the Astronomer’s Club at Calday Grange Grammar School, where they made a telescope for which Wynn-Williams spent many hours polishing the mirror. At this time, he and his friends developed a keen enjoyment of listening to music, Handel and Elgar being favourites. They all became good swimmers (as John Metcalfe recalled, ‘We knew how to have fun . . . the fun and the fellowship still come flooding back’). Wynn-Williams’ father, who was passenger manager for the Booth Shipping Line in Liverpool, had imbued his son with a love of rugby and male voice choirs and, although his rugby career was short-lived, his passion for singing in his rich baritone voice never left him. At 17, he took over the conducting of a local carol group, raising funds for Cancer Research; the group still continues to meet at Christmas. At grammar school, he naturally went into the science stream, emerging with good ‘O’ and ‘A’ Level results. After a brief time at Birkenhead Technical College, he gained a place at the University College of Wales, Aberystwyth, in 1965.

Wynn-Williams’ undergraduate studies in the Department of Botany and Microbiology, headed by Professor P.F. Wareing, included courses in bacteriology, mycology, phycology, and biochemistry, which laid the foundations for his subsequent career in microbiological research. He was awarded a BSc in botany and microbiology in 1968 and immediately embarked on his doctorate, supervised by Dr Muriel Rhodes-Roberts, who wrote:

He was a true pioneer, as we attempted to discover whether there were any nitrogen-fixing bacteria in the sea . . . Sampling was equally challenging; David’s sampling bottles, composed of a blood plasma bottle sealed with a cork activated by a mouse trap at the desired depth remains an hilarious memory. Nevertheless, they worked and solved the problem of lack of funds to buy commercial sampling bottles at £60 each.

Another technical device, to spread water samples evenly over plates of nutrient media, was patented from his research. His PhD thesis on environmental microbiology was successful in 1973. Wynn-Williams' contributions to college life were equally impressive, as he was part of the Prince of Wales Investiture Choir in Caernarfon Castle, organised the first charity walk in Aberystwyth, and led a student expedition to Iceland to continue the search for nitrogen-fixing bacteria. This latter project fully tested his organisational skills, as Dr Rhodes-Roberts reflected:

Just to organise the necessary sterile scientific equipment demanded considerable management skills. Crates of laboratory equipment . . . were packed, as well as basic living requirements such as tents, food, and clothing. All this arrived in Liverpool docks and remained there! A dockers' strike threatened to thwart the venture, but our indomitable David arranged the transport of all the crates to Hull docks, and thence to Iceland.

In the field at Dyrafjord, north Iceland, he successfully overcame the severe practical difficulties of using sterile microbiological techniques in a tent, and the expedition's final report (Iceland Expedition 1970) testifies to Wynn-Williams' dogged persistence, over-riding optimism, and team leadership.

On leaving Aberystwyth, Wynn-Williams' gift for teaching was immediately tested when he taught biology, first at Peckham High School and then at the Judd School in Tonbridge. The ability to engage with people (young and old), to enthuse them about science through his many ideas and theories, and to draw them out were characteristic, and he remained an inspiring teacher, lecturer, and raconteur throughout his career. He lectured widely — from international science conferences to university seminars and Women's Institutes — rarely turning down an invitation to speak.

In 1974, Wynn-Williams accepted, with alacrity, a contract appointment with the British Antarctic Survey (BAS) to carry out research in terrestrial microbiology at Signy Island, where he wintered in 1975 and 1976. He undertook the first quantitative study of the activity and population dynamics of micro-organisms (principally bacteria, yeasts, and fungi) in moss peat communities. Working conditions were primitive. To ensure that his 'bugs' did not experience temperatures above those of the natural environment, he made an air hole in the floor of the microbiology laboratory to maintain bench level conditions around +2°C, whilst it was permanently sub-zero below the bench ('we all dressed in polar clothing for lab work')! Sharing such a laboratory with him, one was immediately involved in his research programme; for example, he persuaded the base duty night watchman to take hourly readings throughout the night on his beloved Gilson respirometer (measuring gas exchange in peat samples), whilst he caught up with some sleep. It was during this early polar work that he developed a deep passion for, and appreciation of, the Antarctic and its



Fig. 1. David Wynn-Williams at Ross Island, Antarctica, with Mount Erebus in the background, February 2002 (photograph by Roger Worland).

environment, which was to remain for the rest of his life. As Cynan Ellis-Evans wrote:

Whilst he could be deeply thoughtful and philosophical, at times even writing poetry, his enormous enthusiasm and stubborn focus on getting a job done were what his wintering colleagues will remember . . . his obvious sincerity, his willingness to take on any base duty . . . and his school-boy like enthusiasm for polar life made him a very popular base member.

A permanent position with BAS soon followed, enabling Wynn-Williams to make a further 10 summer visits to Antarctica (Fig. 1), broadening his research field and allowing him to develop a keen interest in the ecology and survival of simple organisms such as cyanobacteria and micro-algae. His pioneer work on the fundamental importance of soil micro-organisms in colonisation processes in Antarctic fellfields helped to achieve a better understanding of the relative functions of moisture and temperature in such simple terrestrial ecosystems. During this time, he adapted an image-analysis technique to measure microbial components *in situ* in soil samples under the microscope and used it to assess the effects of warming on soil communities. He established extensive experiments using cloches in the Antarctic to simulate warming of the local microclimate. He then moved on to work on endolithic (within rock) communities, principally in the Ross Dependency. With a growing international reputation, Wynn-Williams was a guest scientist with the University of Canterbury team in the New Zealand Antarctic Research Programme in 1982–83, during which he made his first field studies at Ross Island and in the McMurdo Dry Valleys. In the austral summer of 1992–93, he led a six-man BAS team to the Mars Glacier on Alexander Island, Antarctica, possibly one of the most severe environments for terrestrial life. It was during these field studies that he came to recognise the importance of moisture, rather than of temperature *per se*, in the survival of micro-organisms in such extreme environments. He was subsequently (1995–96) co-leader of an international expedition to the Lake Hoare Long Term Ecology Research site established by the USA in the

McMurdo Dry Valleys and to Terra Nova Bay, northern Victoria Land, with an Italian research group. Two further visits were made to develop the BAS Antarctic cold desert research sites at Mars Oasis on Alexander Island from Rothera station (1997–98 and 1999–2000), and his most recent fieldwork was undertaken in collaboration with the US Antarctic Research Program, again at Lake Hoare in the Taylor Valley, with a team from Colorado State University and the University of Illinois (Wynn-Williams and Worland 2002). At BAS, he became head of the Terrestrial Biology Section (1993) and leader of the Antarctic Astrobiology Project and section head, *Origins of Life*, in 2000.

Wynn-Williams' research interests latterly centred on the ecology and survival of photosynthetically active micro-organisms in Antarctic cold deserts and their use as analogues of extra-terrestrial life, particularly on Mars. He was intensely interested in how such life forms would respond to environmental (especially climatic) change and increased UV-B levels. To this work he brought an unparalleled enthusiasm and a continual stream of ideas as well as a wide range of technology, including epifluorescence microscopy, image-analysis techniques, FT-Raman spectroscopy (in collaboration with H.G.M. Edwards of the University of Bradford) to determine *in situ* UV-protective pigments, and many innovative field experimental techniques. In co-operation with D.L. Dickensheets (Montana State University) and others, he was developing a miniature FT-Raman spectrometer that, combined with other techniques, was for the detection of UV-screening compounds and other signatures of past life in Antarctic desert substrates and in the sub-surface of Mars. His studies of endolithic communities in Antarctica broke new ground and, together with his life-long interest in astronomy, formed the basis for his ideas on the origins of life.

In 1980, Wynn-Williams was awarded the Polar Medal for his outstanding contribution to Antarctic science, an honour of which he was justifiably proud. He was a Fellow of the Royal Astronomical Society, the Royal Geographical Society, and the British Interplanetary Society, and played a leading role in many UK, European, and world-wide groups concerned with microbiology, astrobiology, exobiology, and the European Space Agency Mars Express Mission. In addition, he was joint editor of the new *International Journal of Astrobiology* and a member of the editorial boards of *Polar Biology*, *Extremophiles*, and *Advances in Astrobiology & Biogeophysics*. He was a member of several scientific societies and co-organiser (with Ronald Lewis Smith) of an international research programme (BIOTAS) on polar terrestrial ecosystems for several years.

Charles Cockell wrote: 'Like all things in which David was involved, he expressed an enjoyment of team involvement. He was frequently the glue that held together groups of people; his infectious enthusiasm, consideration, and interest in people made him a rare individual.' Such attributes were a tremendous asset for

Antarctic work and particularly important in the fast-developing science of astrobiology, which required interdisciplinary thinking, at which he became very effective. Wynn-Williams made significant contributions to this noisy new discipline's debate on how to search for life in extreme extra-terrestrial environments, much in the public eye. He revelled in radio and TV interviews about life on other planets and especially participating with Patrick Moore in 'The sky at night' programme in December 2001.

During his 28 years of Antarctic work, Wynn-Williams produced some 117 publications, including 80 research papers in a wide range of scientific journals on subjects as diverse as the microbial contribution to peat respiration, lichens at the limits to life, aerobiology, endolithic communities, freeze-thaw cycling, UV protective pigments, biomolecules, and Martian impact craters. The journals in which he published reflected his ever-expanding view, and understanding, of the natural world—from journals such as *Applied Bacteriology* in his early days to *Astrobiology* and *Astronomy & Geophysics* latterly. Seminal contributions were made by his major review entitled 'Potential effects of ultraviolet radiation on Antarctic primary terrestrial colonizers: cyanobacteria, algae and cryptogams' in 1994 and the paper (joint with H.G.M. Edwards) on 'Environmental UV radiation: strategies for protection and avoidance,' published in 2002. During the course of his research, Wynn-Williams initiated collaborations with a huge network of scientists and organisations, including the NASA Ames Research Center, the European Space Agency, and the NASA Johnson Space Center. A recent *curriculum vitae* listed 13 such active research collaborations, and his polar jacket bore no fewer than 10 Antarctic badges, reflecting his phenomenal networking abilities and his internationalism. David Walton, speaking at his funeral, said:

... he became enthused by the Dry Valleys/extra-terrestrial biology comparisons. It joined his two enthusiasms together and he began to develop his programme in astrobiology. Convincing the sceptics, and there were plenty in BAS, took a lot of time and energy but he had succeeded by the time he died... All this work allowed him to develop a programme that was uniquely his own... His blend of science, vision, and enthusiasm cannot be cloned or transferred.

During recent years, it was clear that Wynn-Williams felt increasingly constrained by the restructuring and management style of his home institute, and he sought outside research support and funding, which was reflected in his wide range of international collaborators.

Wynn-Williams (often known as 'Wynn' in polar circles) possessed an irrepressible zest for life combined with, at times, unbridled enthusiasm, which often left some of his colleagues floundering! As a Fid (the name for a BAS Antarctician), he wholeheartedly embraced polar life, its traditions, its privations, its rigour, and, above all, its camaraderie. He always grasped opportunities for

adventure: scuba diving with seals under ice, climbing ice-covered mountains, competing in the Signy thin ice race, running half-marathons at Rothera station, and many more. He was one of a generation of Fids that had a total commitment to the UK research programmes in Antarctica, a fact not always recognised today. His energy was almost boundless, his enthusiasm for any task was never less than 100%, and his interests were pursued almost to the point of obsessiveness. His interests in, and love of, Antarctica were wide and deep. He devoured its history (he was instrumental, with Lauritz Sømme, in locating Signy Sørllle in Norway, after whom the South Orkney island was named by her husband, Captain Petter Sørllle, in 1912, when surveying the area for sealing and whaling); he treasured the memories of BAS and its forerunners, FIDS (Falkland Islands Dependencies Survey) and Operation Tabarin; and he was fascinated by the extraordinary Antarctic whaling history (accumulating information for his proposed 'History of Signy Island').

Fid's tales always accumulate and Wynn-Williams was no exception. His use of pipe cleaners for almost any job or 'bodge' that had to be fixed in the field or laboratory — when all else failed — became legendary. Ronald Lewis Smith wrote:

On board RRS *Bransfield* during an ecological transect cruise along the Antarctic Peninsula in 1981, David was collecting soil samples for microbial respiration experiments using his trusty Gilson respirometer in the laboratory at the stern of the ship. He was working at least 18 hours a day, sampling ashore then preparing the samples for the experiments, and recording data manually over 12-hour periods. During a storm in the northern Peninsula, I noted he wasn't present at dinner and some time later went to the lab to see if he was there. I found him with both arms around the large Gilson respirometer, one leg wedged against the bench, a notebook clenched in his teeth and a pencil behind his ear. He muttered gratefully: 'Thank goodness you've come; I've been stuck like this for hours; can you take the pencil and notebook and write down the readings on these dials, and don't forget to note the time!' The ropes with which he had secured the large, heavy instrument to the bulkhead had snapped during a particularly rough spell and it had become mobile and threatened to topple over and destroy his precious experiment.

Wynn-Williams was always conscious of the responsibility to explain his science (and the funding thereof) to the public. For some years, he organised a lunch-time Science Club at Chesterton Community College, Cambridge, where he was also chair of its Parent-Teacher Association. The BAS Club (for past and current staff and

associates of the Survey) greatly benefited from his work as its secretary, membership secretary, and newsletter editor during the 1980s and 1990s. He was also a very keen supporter of the Antarctic Club.

He found time for other activities in his busy life: his Welsh ancestry coming to the fore in his choral singing with, amongst others, the Cambridge Philharmonic Choir; his photography, a hobby in which he indulged widely especially in the Antarctic; his family and the pleasure of seeing his daughters developing in so many ways; and his running (he competed in the London Marathon). Tragically he died doing what he loved — jogging in the country. As well as his artist wife, Elizabeth, he leaves daughters Cherry and Rosanna and his mother Joan.

David Wynn-Williams' life bore the hallmarks of a dedicated, innovative scientist who combined a passion for Antarctic microbiology with a lifelong interest in astronomy. He was indeed 'a child of the universe.' He was a true Fid, an exceptionally gifted environmental microbiologist and astrobiologist, but also a stalwart colleague and a good friend to many. He is and will continue to be missed for many years into the future.

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William Block

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