

Presidential Address

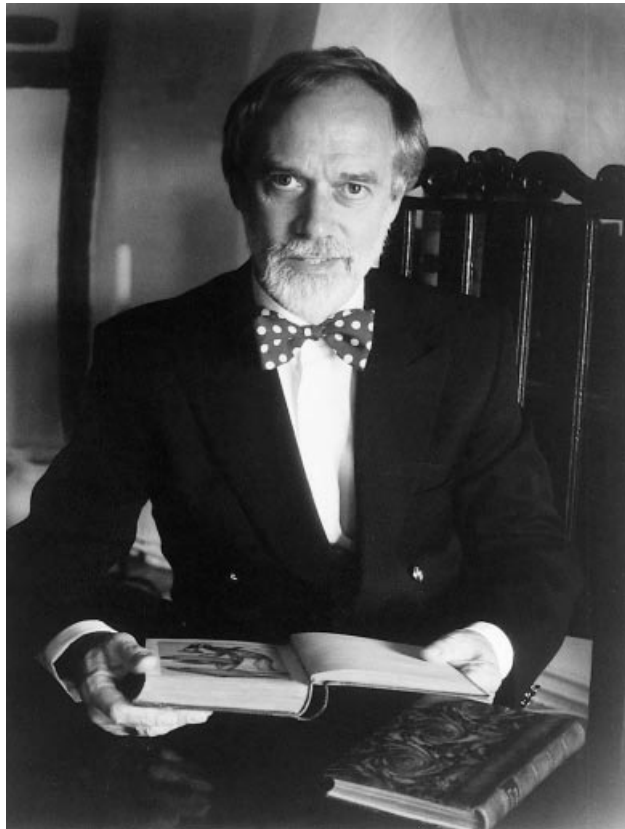
## Berkeley's legacy – who cares?<sup>1</sup>

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The current state of professional mycology in Britain is considered in relation to the intellectual legacy left by the founding father of British mycology, the Reverend M. J. Berkeley (1803–1889). Through a review of Berkeley's life and work, it is suggested that there are many unexpected parallels between British mycology today and in the nineteenth century. Although there are now a considerable number of professional mycologists, support for professional mycology and mycological education is considered to be inadequate and seems in some ways to have advanced little in the past century and a half. It is concluded that above all, the current poor level of support for whole organism studies is the greatest betrayal of Berkeley's legacy.



**Fig. 1.** Stefan Buczacki, President 1999–2000.

In 1889, there was one semi-professional mycologist in Britain. Now there are considerably more. So the subject is alive and kicking; it is clearly being adequately and amply supported by central and local government and by private commercial funds and there is a steady flow of new young mycologists, properly and competently trained in all aspects of the subject so they are fully equipped to take the place of those that retire, and are fully armed with all necessary knowledge to serve the breadth of the subject and society.

No; wrong. The subject is most definitely alive (the British Mycological Society has around 2000 Members and Associates of whom about half are resident in the United Kingdom) but mycology is hardly kicking very vigorously in the overall scheme of national science. Estimates of the number engaged in professional mycology vary. A private survey conducted for the Society at my request by John Peberdy during 1999 indicated a figure of between seventy five and one hundred, excluding people working on fungal genetics or yeasts. But that may well be an over-estimate and embrace workers whose connection with fungi is at best peripheral. Hawksworth (2001) has pointed out that 'the number of systematic mycologists (including lichenologists) in post in universities and other institutions fell from 25 in 1990 to 12 in 2000 – and the latter are increasingly required to undertake duties other than taxonomic research'. So mycology isn't being adequately and amply rewarded by either central or local government, or by private commercial funds. There isn't a steady flow of new young mycologists. Those that do exist are certainly properly and competently trained but they are not taking the places of those who retire because they are not being allowed to do so; and they are certainly aren't fully armed with all necessary knowledge to serve both the breadth

<sup>1</sup> Presidential address presented to the Society in the rooms of the Linnean Society of London on 2 December 2000.

of the subject and society because professional mycology itself has become too narrow a discipline.

How has this arisen, where have things gone wrong; and why have we failed to learn from the lessons of the past? To try to throw some light on this, or at least put it in perspective, I need to go back to that year 1889, a year when there was no full-time professional mycologist; just a Renaissance man.

There has of course only ever been one proper Renaissance man and that was Leonardo da Vinci (1452–1519). And it has been said of him that his time was the last moment in human history when any one person could know pretty well everything that was already known and worth knowing. But I doubt if even Leonardo knew much mycology. As a subject, it hadn't even embarked on the Dark Ages; it didn't exist. There had been almost nothing new since the Greek physician Nicander spoke around 185 BC of 'the evil ferment of the earth which men generally call ... by the name of fungus' (Ainsworth 1976). And after Leonardo's death we had to wait some considerable time before our discipline had a Renaissance man of its own. Some would argue the case for Anton de Bary (1831–1888) in Germany, others for Elias Fries (1794–1878) in Sweden and many for the Italian Pier' Antonio Micheli (1679–1737) the publication of whose *Nova Plantarum Genera* in 1729 was said by Ainsworth (1976) to be 'an outstanding work, far ahead of its time, and generally recognised as marking the birth of mycology'.

Nonetheless, I am going to fight the corner of an Englishman, a home-grown Renaissance man, a Northamptonshire cleric. He died 111 years ago, in the year of our Lord 1889, seven years before the British Mycological Society was founded, but his time and his work have given mycology, and me personally, huge inspiration; almost every step I have taken in my own mycology was to somewhere that Miles Berkeley (Fig. 2) had trodden first. His contributions to our discipline were enormous, as significant in their way as were Leonardo's in the fifteenth century. I believe that the age of Berkeley was the last time in human history when any one person could know pretty well everything that was already known and worth knowing about mycology. And I would suggest that Miles Berkeley was a good candidate to be that person.

Here I look at the breadth and scope of his achievements but this isn't to be a discourse on historical mycology because I want to do this to see how Berkeley's achievements led to his legacy; it was the legacy that I believe was hugely important; the fact that it happened to be Berkeley's legacy, the legacy of that particular man, is in a sense, not itself critical. What it was and what it did, however, was to set a framework on which modern mycology came to be built. It was the plan, the blue-print, with a large amount of the bricks and the mortar on which the structure of modern mycology is founded. And I want to see how much we, as British mycologists, as the British Mycological Society, are honouring that legacy today. I want, by looking back, to analyse the present; and by analysing the present to look forward.

But first, let's just spend a while appreciating the social and scientific climate that led to the moment on 30 July 1889 when Berkeley died, passed to that great foray in the sky and his

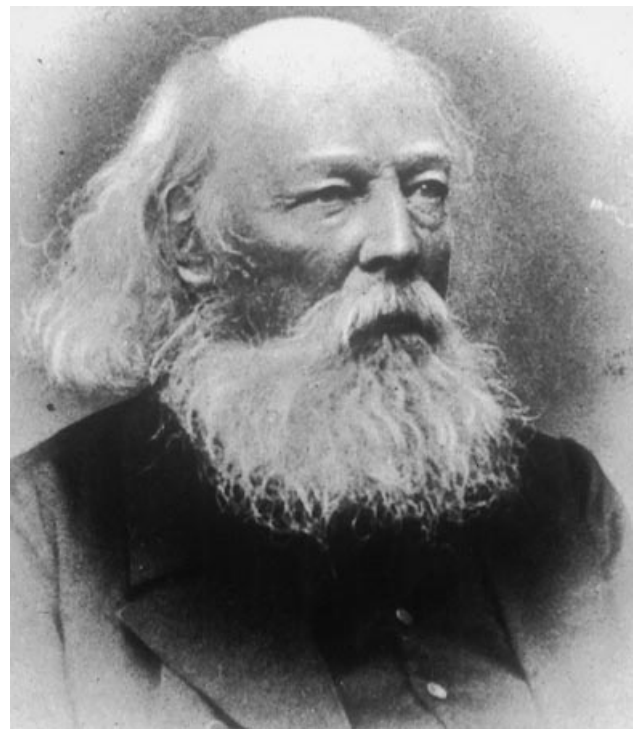


Fig. 2. Rev. Miles J. Berkeley (1803–1889).

life's work became everyone's property. In looking at his achievements and experiences, I shall pause to reflect on that legacy; on the skills, talents and attitudes that were manifest in Miles Berkeley from which we can draw lessons today.

So cast your thoughts back to the early years of the nineteenth century and to rural Northamptonshire. This was a time when homes were without electricity, when water came from the well (if you were lucky, from a well in your own garden rather than the street), and when transport was by horse, trap or stagecoach. Communication and correspondence were slow and the community, whether in a rural village or a town street was highly self-contained. The butcher, the baker and the all important candlestick maker were nearby.

The Berkeley family is an ancient one; the famous Irish Philosopher and Anglican Bishop George Berkeley (1685–1752) was probably a member of one branch and therefore one of their best known sons, and their most celebrated seat was at Berkeley Castle in Gloucestershire. But around 1650, one Maurice Berkeley (1636–?) moved to Northamptonshire where he settled. The family was, in modern terms, middle class. And the Berkeleys were always good breeders, but short on inspiration for names; Charles, Miles, Maurice and Joseph among the men, and Charlotte, Cecilia, Mary and Elizabeth among the women, crop up repeatedly in the archives, so rendering it sometimes extremely difficult to trace particular individuals. In one generation, two brothers even had the same Christian name. This tended to happen when one offspring had died and its name was re-used in memory, but in this instance both survived. Perhaps the parents had so many little Berkeleys running around that they forgot that the name had already been taken.

One of the Maurice Berkeleys married and he and his wife Susanna had seven children. The eldest son, also called



Fig. 3. Berkeley House, Lower Benfield.

Maurice, in turn married and he and his wife Mary produced, rather sparingly, only four offspring. Their third son was named Miles and when he married Ann, they restored the tradition of fecundity and spawned six. Their eldest son, Charles, was born in 1752 and became a land agent, as some of his family seem to have been before him. He and his wife Charlotte Elizabeth, did particularly well and produced eight. And on 4 April 1803, the Parish registers for Oundle in Northamptonshire recorded the baptism (at the age of three days) of Miles Joseph, their second son and fourth child; a Renaissance man to be. Baptisms were normal at such a tender age because of the high rate of infant mortality.

Miles' mother, Charlotte was the sister of Paul Sandby Munn (1773–1845), the distinguished water colour painter of the Norwich school. Artistic ability has often gone hand in hand with mycological talent; Miles himself in later life inherited some of Paul Munn's talents and was certainly no mean illustrator while in due course one of his daughters, Cecilia became a talented painter of fungi; Miles named *Agaricus ceciliae* in her honour. How many mycologists today are taught to draw and paint? Do they need to be? Has the photograph, micrograph and electron micrograph taken the place of the hand drawn picture? I hope not. It is no coincidence that the best, and best selling field guides, whether to fungi, birds or reptiles, are those with artwork that is the creation directly of the human hand.

Miles Berkeley's birthplace is not known with certainty. It is listed on his tombstone and always referred to as Biggin Hall, Oundle, but this is simply the name of the house for which his father worked as land agent and it is my belief that it was in a smaller property on the estate and in the village of Lower Benefield, a property known still as Berkeley House (Fig. 3).

So young Miles grew up in a middle class home, surrounded by siblings and with a handful of servants; probably a cook, nurse and butler (not, clearly, a prerequisite for a mycologist today). He attended the local grammar school in Oundle and then, in 1817, at the age of 14, went up to Rugby. And nor of course is a public school education today any prerequisite for mycological knowledge. Unfortunately, no records survive of Miles' schooldays although I have always found it fascinating to realise that he was a contemporary at Rugby,

not only of the son of Josiah Wedgwood but also of William Webb Ellis who 'with a fine disregard for the rules of football as played at his time, first took the ball in his arms and ran with it ...' Unfortunately, Miles had moved on by the time in 1823 when that pivotal moment in human history took place. Nonetheless, Rugby football has always been a fine contemporary of mycology and I know a good number of mycologists who are keen followers if not players of the noble game. I don't believe it is widely enough recognised that the inspiration for the oval ball can only have been an ascospore.

Sadly, too when Miles left Rugby in 1821, it was 7 years before Dr Thomas Arnold was appointed Headmaster, in his own words to 'change the face of education through all the public schools of England'. In Miles' time, Rugby, under its then Head Dr John Wooll was run, like most of the English public schools, on the same lines as Eton under the notorious John Keate. They were ruled by terror. Boys did not question; boys obeyed; and boys were flogged. Coleridge (Warner 1945) tells of his experience with his Headmaster Bowyer at Christ's Hospital. He had the temerity to ask the Headmaster why he had lost faith in religion and reported that 'For this, without more ado, Bowyer flogged me – wisely, as I think – soundly, as I know'. Perhaps Miles was flogged at Rugby; history doesn't tell us, and nor did he in later life and in any written document of which I am aware, ever refer to his school days. Frustratingly, letters written by him from school certainly survived after his death but they seem subsequently to have vanished.

It is of course difficult to draw parallels or even lessons from the type of schooling that Miles received at Rugby and that in state and private schools today. In no other area of activity that I cover is the past so apparently different from the present. But there is something revealing and relevant about the great public school reformers of the early nineteenth century, like Arnold, in that the revolution they wrought was through the raising of moral standards and an assertion of the power of masters to be the friends of the pupils rather than their persecutors. Arnold (Warner 1945) said, in defining his reforms: 'What we must look for here is, first, religious and moral principles; secondly, gentlemanly conduct; thirdly intellectual ability'. Worthy enough; but where was curriculum reform? Miles' successors at Rugby under Arnold were still being taught, as he was, Latin and Greek grammar and not a good deal else. Although perhaps Miles' was rather fortunate here because although the Classics did take up 90% of the teaching at Rugby, there was some English literature, mathematics, scripture, history and French; 'dancing and drawing were added extras'. And most interestingly, a series of lectures in Natural Philosophy (Science) had been given at Rugby every three years since 1796. In Miles' time, the lecturer was a D. F. Walker about whom I know little more. But there is good evidence that it was at Rugby that the seeds (or spores) for the future were sown.

I have always believed that mycologists are naturalists; and that naturalists are born and not made. If you didn't have an interest and preferably a passion for natural history as a child, you will never be a mycologist of the first rank. (In parenthesis, I would add that I don't think you will ever be much of a horticulturist either.) We simply don't know exactly

when or how Miles' interests in natural history were stirred but he was a country boy and many years later, after his death, his son Paul wrote<sup>2</sup> 'he became attached to Natural History from an early period and his scientific tendencies both Zoological and Botanical which had been fostered at Rugby ...' Perhaps it was that D. F. Walker who fostered them. There survive in the Rugby school archives two diaries kept by boys at the time which include scientific observations, including references to vegetation. It seems that someone was encouraging them to make scientific observations a regular activity. And, surprisingly in view of the strict disciplinary regime, the boys also had a fair amount of free time and wandering in the countryside and fishing were popular pursuits. Even today the country of that part of Warwickshire and neighbouring Northamptonshire is fairly rural and unspoiled. And Miles evidently loved trees; always an asset for a mycologist. When for a short period he later lived in Kent, he hankered for the woods of Northamptonshire.

Education today of course is universally available although interestingly, Rugby in the early nineteenth century was one of the schools that did continue, for a long time, to provide education for the poor and less well off of the district; unlike Winchester, Eton and Westminster for example. But the importance of a mentor, someone to detect a glowing ember of enthusiasm and set it aflame is, I think, just as much a pre-requisite for a naturalist today as it was in the early nineteenth century. For a less mainstream discipline like mycology, I believe it is almost essential. And here we enter on one of the frustrating paradoxes of mycology today. We need mentors to create new mycologists from the raw material of childhood enthusiasm. But without mycology in the school, where are the mentors to be found and what is to direct that childhood intrigue towards mushrooms rather than butterflies and newts? Incredibly, mycology is scarcely any more available in the modern school than it was in the Rugby of the eighteen twenties. I searched the National Curriculum web site ([www.nc.uk.net/](http://www.nc.uk.net/)) in vain for any mention of fungi. The closest I came was in Level 4 Science where a category exists called Microbes and Disease, but of fungi, there is nothing. In A-level syllabuses, I have tracked down a one word entry for *Fungi* along the following lines: 'Characteristic features of kingdoms: *Prokaryotae*, *Protoctista*, *Plantae*, *Fungi*, *Animalia*'. But encouragement has come from north of the Border where I understand that Scottish curricula now include the subject 'Decomposition'.

I find this quite frankly retrograde. When I was at secondary school in the 1960s, we saw plenty of fungi. We saw them in an A-level course called Botany, a subject that has long been mycology's practical home. But I don't mind what you call the course, if fungi gain a decent showing. We saw, studied and handled *Agaricus* (*Psalliota* as it was then), *Mucor*, *Phytophthora*, *Pythium* and so forth. We knew what a fungus looked, felt and smelled like. Of course, Botany itself, that 'noble discipline' as one of my interview panel at Oxford called it in 1968, has now itself effectively vanished. The failure of modern educational courses to elaborate on and describe in very much detail the differences between groups

of organisms, their failure to recognise that just because plants, fungi, molluscs and mammals all contain DNA doesn't mean they are the same has been one of the great tragedies of science education in my lifetime. And the water-tight strictness that is the modern curriculum means that even if outside bodies, like the British Mycological Society, wish to fill the gap in mycological teaching and themselves offer lectures to schools, they are effectively barred by reasoning along the lines of 'we don't have time to fit it in'.

But never mind the absence of mycology itself, how fitting are our school curricula today overall in equipping people so minded to become mycologists? It is a ripe subject for debate although I don't think it is a debate that has been aired sufficiently often, certainly not within mycology itself. We are told by policy makers and curriculum writers that young people in the past (by which I mean when I was younger) specialised too soon. What they need at school today is a broad-based education. If they specialise within science, it doesn't allow time for the non-scientific subjects that they also require to equip them for life at large. But is this really true? Are today's young people leaving school better equipped than I was at that age? My A-levels were all in science subjects. I didn't study English, History, Geography, foreign languages or anything else beyond O-level. And yet I would argue very forcefully that at the age of twenty, I and my contemporaries could write better English, spell better, had a better grasp of literature, world history and geography than their so-called broadly educated counter-parts today. And Miles Berkeley, with his education pretty well limited to Latin and Greek grammar didn't fair too badly either.

But it isn't right or fair to judge the quality of a mycological grounding by school achievements alone. We need to look at Universities too. From Rugby, Miles went to Christ's College, Cambridge in 1821 as a scholar. No grants were available of course and although it isn't known how much his scholarship was worth, he had to supplement this from his own resources. His father had left him £2000 and he used part of this inheritance. It was a considerable amount for the time of course, but after paying the university fees, there was nothing left because, as his son later put it 'the rest was served out by an elder brother in dribbles and the brother became bankrupt owing my father £370 and this sum was never repaid'<sup>3</sup>. Not much has changed there then; students these days have to put themselves in debt in order to gain an education.

As we have seen, Miles' interests in natural history had been stirred by some unknown schooldays mentor. Perhaps he should pursue that interest at university. We can't be surprised that there was no opportunity to study mycology but botany must surely have been a worthwhile option. There was after all a Professor of Botany in Cambridge, the Rev. Thomas Martyn (1735–1825) who was then 86 and had been Professor for the previous 59 years. No analogy there I think that any modern holder of a university chair will want particularly to make. Martyn had succeeded his father John to the Cambridge Botany Chair but Martyn Senior had made little impact on the department, having only held the post for a mere 30 years. And unfortunately, despite the venerable

<sup>2</sup> Kew: Letters to J. D. Hooker, 2: 260.

nature of its Professor and the fact that the Martyn dynasty had held sway for almost a century, it still wasn't possible to study Botany as an undergraduate. It was something to which you might aspire later. Looking at the undergraduate courses offered by our universities today, you could be forgiven for thinking that we have come full circle. But back to Cambridge; and yes, Martyn was the Professor but he hadn't given a lecture since 1796 and wouldn't allow anyone else to do so. So Miles studied for the mathematics Tripos and graduated in 1825 as fifth senior optime (in other words, fifth in the second class, below the wranglers); more or less a decent Upper Second.

By the time he went to Cambridge, Miles' interests must surely have been on some aspect of countryside natural history but they soon switched to algology and to some extent conchology; his first scientific paper was on molluscs (Berkeley 1828). He needed another mentor. In 1825, Martyn died and as there were no other Martyns available, he was succeeded by the Rev. John Henslow (1796–1861); Miles' son Paul was later to confirm that the interests that had been stirred at Rugby were 'kept in action by an intimate acquaintance with ... Professor Henslow'<sup>3</sup>. But there was another, more informal mentor too who was responsible for the unexpected passion for seaweed and shells. Whilst a student, Miles made visits to the West of Scotland with a college chum and fellow naturalist/cleric, Richard Lowe (1802–1874) who was greatly interested in marine plants and remained Miles' close friend until his untimely death by drowning off the Isles of Scilly. They stayed with a man who was undoubtedly a great influence on Miles' later life, Captain Dugald Carmichael (1772–1827) of Appin, a Hebridean soldier, surgeon, traveller and no mean naturalist. He assisted Miles and Richard with the study of marine algae and wrote in 1824 to Sir William Hooker, then Professor of Botany in Glasgow: 'I had two Cambridge Students staying with me some time ago who passed the last summer at Oban. A Mr Berkeley and a Mr Lowe. They are keen botanists and conchologists ...'<sup>4</sup>.

Early friendships can be enduring and apart from Richard Lowe at Cambridge, a Rugby contemporary with whom he stayed close, even though he went to Oxford, was the Rev. Andrew Bloxam (1801–1878) who became a notable amateur botanist and mycologist himself (honoured by the generic name *Bloxamia* Berk. & Broome 1854) and later had a Leicestershire parish not far from Miles' own. Bloxam's annotated copy of Miles' seminal book *Outlines of British Fungology* (Berkeley 1860) is now one of my own prized possessions.

Yes, we all need a mentor and shouldn't under-estimate the importance of the role that a mentor can play. I was reminded recently of the responsibility that tutors still have in this regard. In the interests of the British Mycological Society, I asked a group of young post-graduate mycology students to which scientific societies they belonged; and what had dictated their choice. Far and away the most significant factor was the society to which their tutors belonged and the direction in which they had pointed them. Today, if they are

**Table 1.** Age distribution of professional academic mycologists in the UK (1999).

Age group	Percentage in age group
25–35	11
35–45	30
45–55	27
55–65	32

so motivated and if they are very lucky, the student inspired by his or her tutor to take a proper and decent interest in fungi might aspire to a career in mycology. But this is becoming an increasingly difficult thing to satisfy. In 1999, I asked my colleague John Peberdy to convene a small group to survey the state of professional mycology in Britain and report on the best way that the British Mycological Society might foster and support it. Their findings are revealing (Table 1). Older mycologists are simply not being replaced (or are being replaced by specialists in related and more fashionable disciplines) and a career in mycology isn't easy. For Miles it was utterly unthinkable. Around half a century was to pass before Mordecai Cooke (1825–1914; *cfr* English 1987) became the first professional mycologist in Britain (that semi-professional to whom I referred) when Sir Joseph Hooker appointed him Keeper of Thallophytes at Kew in 1879. So although there was no family precedent for it and there is no obvious reason why, other than that it was an acceptable career for an intelligent young man, Miles decided to study for holy orders and was ordained in 1825. He obtained a local curacy before going to Margate in 1829. There was a strong family connection with Kent; his mother had been born in Blackheath and in later years, several of his family, including his widowed mother, returned to live there.

Under the influence of the woods of Northamptonshire and Warwickshire, Miles' mycological activities must have begun very early, perhaps even at Rugby, but only took a significant step when he was emboldened, in 1832 at the age of 29, to write from Margate to Sir William Hooker, who was embarked on his massive reference work, the *British Flora* (Hooker 1830): 'It would give me great pleasure if I could be of service to you in taking a share of the labour of the *British Flora* off your hands ... the only genus I can make any pretence to a knowledge of is *Agaricus*. It was a great favourite and would still be had I remained in a woodland county ...'<sup>5</sup>. Hooker agreed with some relief but Miles had clearly bitten off rather more than he could chew. A few months later, on his return to Northamptonshire, he was in trouble: 'I am very worried about *Clavaria* of which I am profoundly ignorant. Like *Rosa* and *Rubus*, it has many intermediate species'<sup>6</sup>. We have of course all been concerned about *Clavaria* (and most of us have been profoundly ignorant of it) ever since. Miles said that he would have given more time to the project but he had by then been appointed Perpetual Curate of the neighbouring Northamptonshire parishes of Apethorpe with Woodnewton, with a residence at King's Cliffe; and as he put it, he 'must rise early'<sup>6</sup>.

<sup>3</sup> Kew: Letters to J. D. Hooker, 2: 261–2.

<sup>4</sup> Kew: English Letters 1: 103.

<sup>5</sup> Kew: English Letters 1832–5, A–B, 3: 195.

<sup>6</sup> Kew: English Letters 1832–5, A–B, 3: 199.



Fig. 4. Berkeley's house, King's Cliffe.

The house in Kings Cliffe (Fig. 4) is now the village school but it was to be Miles' home for most of the next 35 years. When I first visited it in 1976, there was still, in an attic room, some Victorian wallpaper, probably put there by Miles. But before he left Kent, he achieved one more success, his marriage on 28 Jan. 1833 to Cecilia Emma Campbell (1814–1881), also of Blackheath, a wife who was to become his devoted companion and to bear him fifteen children, of whom thirteen survived to maturity. Miles Berkeley was the father of great deal more than British mycology. He was very self-evidently a family man but there is a telling commentary on the changing role of families, men and women in society at large and a comment on those people today who take early retirement to 'spend more time with their families'. In June 1850, Miles' wife had a miscarriage; but by 28 June the following year, merely twelve months later, she had remedied the misfortune. Miles wrote: 'My wife is expecting her confinement hourly so that I am in a great fidget. I very much hope that it may be well on before I set to my duties tomorrow. 11 p.m. I am thankful that my wife has a fine boy and is very comfortable'<sup>7</sup>. It is curious how relative devotion to subject and loved ones has changed over the past century and a half. A mycologist today might be thought slightly unfeeling if they wrote, as Miles did to Broome in 1848: 'I have not written to you for some days for we have been in great trouble on account of the death of our infant of inflammation of the lungs. All was done that skill could do but it died in a few hours. I send you another *Hydnangium* ...'<sup>8</sup>.

The interest in algae remained; Miles' first book was *Gleanings of British Algae*, (Berkeley 1833) although fungi were now taking over and I am sure that the English botanical fraternity was delighted to find someone who would take on this burden. But parish duties abounded and there were always sick parishioners to attend to; many of Miles' letters were black edged, after the mourning fashion of the time. Today's mycologist, feeling unwell, will take sick leave. No such luxury in the 1830s and once, after visiting a sick parishioner, Miles wrote to William Hooker: 'I sickened of smallpox and thought I would die so had made arrangements for my wife to return your books and specimens'<sup>9</sup>. But he sat in bed with

<sup>7</sup> Kew: English Letters 1851, 31: 49.

<sup>8</sup> London: Natural History Museum, Broome Correspondence.

<sup>9</sup> Kew: English Letters 1832–5, A–B, 3: 203.

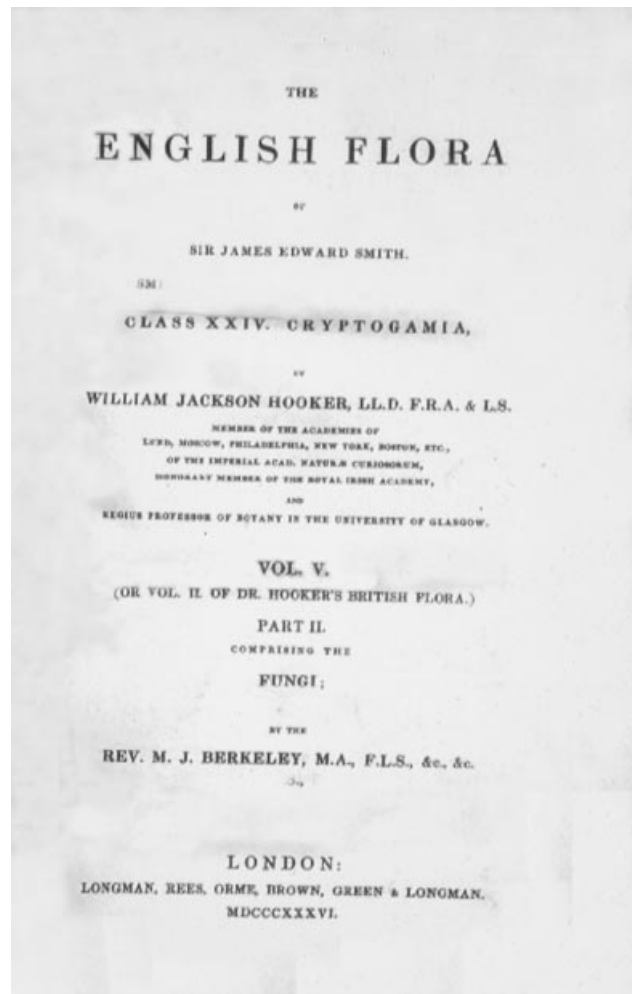


Fig. 5. Title page of Hooker's *British Flora* vol. 5 (1836).

his herbarium, checking the specimens which by then were flooding in from far and wide. He ran a small school to help supplement his income; £ 50 per year was the charge, excluding books. Then came the first child, the strangely named Emeric, who later became a Major General in the Indian Army and after whom *Emericella* is named; a fungus that Emeric himself discovered in India. Gradually, Miles recovered from smallpox and went to stay with friends in Margate for three weeks to convalesce. He wrote to Hooker that this would enable him to complete agarics and boleti but *Thelephora* remained to do and part of *Polyporus*; but, he said 'I am still worried about *Clavaria*'<sup>10</sup>.

Despite his increased parish duties, Miles did write an account of *Agaricus* for Hooker and of *Clavaria* too; and indeed this in due course became an account of the whole of the fungi which was published in 1836 as Vol. 2(2) of Hooker's *British Flora*, or Vol. V of *Smith's English Flora* as it is also called. Although when he opened his own copy of the work, Miles' was appalled: 'On the title page of English Flora you have given me a title to which I had no right (FLS) ...'<sup>11</sup> (Fig. 5). Miles immediately applied for Fellowship of the Linnean Society and said that 'if I am not blackballed at the

<sup>10</sup> Kew: English Letters 1832–5, A–B, 3: 204.

ballot all will be alright. If you think there is any chance of such a thing, which is not impossible if it has been observed that an FLS has been prematurely tacked to my name, you perhaps would be kind enough to write a line ... Perhaps however you may judge it better not to make any fuss about the matter but to let things take their course ...<sup>11</sup>. Things did take their course and Miles became an FLS, quite legitimately. The fuss that he made about becoming an FLS almost by accident however makes striking contrast to the laid-back attitude he took to his FRS in 1879. There was no reference in his correspondence to a nomination but when the election had been achieved, almost in passing, he thanked Hooker 'for having my name put up for the Royal Society – I was elected as one of the fifteen'<sup>12</sup>. We could usefully have a few more mycological names 'put up' today. It is no less true now than it was then that success in such matters comes partly from what you know, but more significantly from whom you know; although it does require a moderate lacing of self-confidence, ambition, and drive. But it is encouraging for this Society to know that Miles did consider membership of learned Societies very important. There can be no doubt that had lived a few more years, his name would have been among our own founder members.

The mycologist today is unlikely to succeed in his or her career without drive and ambition. In retrospect, it is interesting to speculate on how much more significant Miles' influence would have been had his own ambition been just that touch greater. In April 1861, he was certainly attracted to the Cambridge Botany Chair in succession to Henslow. He wrote to Joseph Hooker asking him to convey his deep concern about Henslow's illness and went on 'Your letter has determined me to accede to his and your suggestion and be a candidate for the Botanical Chair should the vacancy unhappily take place. The Professor was nominated immediately by the Crown and the same course would probably be taken again. I have accordingly written to Lord John Russell [then Foreign Secretary], of whom I have a slight personal acquaintance, to inform him of the contents of your letter and I write today to your father to make application to Lord Palmerston [then Prime Minister] in case of our friend's decease'<sup>13</sup>. Fortunately, importuning Downing Street, London has rather less influence in gaining admission to Downing Street, Cambridge today.

Miles wrote a particularly revealing letter to Hooker on 14 April 1861. He complained that 'our letters are 2 hours late this morning'<sup>14</sup>; 14 April 1861 was a Sunday. And he continued 'My kindest regards to Henslow if he is still living'. Henslow was still living but in fact died a month later on 16 May although Miles did not succeed him. He was persuaded that the Cambridge Senate would favour Charles Babington (1808–1895) and so keep up the university's tradition of nepotism. Charles Babington was the cousin of Churchill Babington who was soon to become Professor of Archaeology and who was a noted lichenologist. So Miles didn't apply. There was a move in 1867 for him to apply for the botanical

chair at Oxford in succession to Charles Daubeny (1795–1867) but although he went to Oxford to look into the possibilities, apparently it was decided that a clergyman was not eligible.

Publication, then as now, was the means for the dissemination of mycological knowledge. For us it is the learned journal, often specifically mycological, with an ever-increasing dependence on some form of electronic transmission. It was revealing moreover that speaking to another group of post-graduate students recently, the principle governing their access to knowledge was made clear to me: 'If it isn't on the Internet, it doesn't exist'. Nonetheless, there do remain large numbers of mycologists who still want to hold a physical document in their hands and browse it. Having a broadly-based mycological publication that is amenable to being browsed thus becomes very important. If each issue really does contain only one paper that interests you or that you can understand, access through the Internet to home in on it then is of course meaningful.

But the written word and the printed word were central to Miles' life; it was the everyday means of communication. For Miles however, there was no mycological journal to drop through his letter box each month. Spread of new findings was solely through the spoken word, the hand-written letter, the general scientific journal and the published book. He wrote approaching ten thousand letters and they are the embodiment of his life's work, a large part of his legacy. The corresponding replies from scientists the world over were meticulously filed and kept and they too are much of the legacy that Miles left us. The British Museum (Natural History) (now The Natural History Museum) in London gave ten guineas for them. The letters contain tens of thousands of identifications but are regularly enlivened with remarkable and perceptive comments on the political and social climate of the time. The letters to Hooker, the transatlantic correspondence with Curtis and the phenomenal but almost purely taxonomic exchanges with the lawyer Christopher Broome (1812–1886) of Bath (who takes my vote as the most boring mycologist who ever lived) are outstandingly important. Most of course are in English but Miles' classical education served him in good stead and his correspondence with Fries among others is entirely in Latin. And he wrote to his French and Swiss contemporaries in very good French. But writing materials were expensive and so when today, you contemplate the capacity of your hard disc or wonder if you need a larger zip drive, remember your nineteenth century forbears with thin, almost transparent paper which they covered on both sides; or sometimes, to the distraction of their future biographers, turned through ninety degrees and wrote again on the same side.

Everyone who had any interest in any aspect of mycology in the nineteenth century was a Berkeley correspondent. In many instances, the correspondence was the basis upon which the publications were founded; perhaps as E-mails are now. But how many of us today write letters or even E-mails that will be studied in a hundred years time for revealing insights into the way that our ideas and principles were formulated? Where is the stuff of the historical research of future generations? I have to conclude that the scientific historian of the future will only be able to study the history of topics, not the working of men's minds.

<sup>11</sup> Kew: English Letters 1836 A–G 7: 94.

<sup>12</sup> Kew: Letters to J. D. Hooker, 242.

<sup>13</sup> Kew: Letters to J. D. Hooker, 200.

<sup>14</sup> Kew: Letters to J. D. Hooker, 202.

Examination of Miles' publication list is illuminating. It is illuminating because I believe it sets out in shorthand form what the science of mycology should encompass. There are many hundreds of papers and articles and several books. Of course impact factors were of no significance then; nor were potential royalties. Or were they? In 1863 Miles wrote 'the Ray Society want me to write a work on British Fungi for them. I have consented provided they accept my terms which I think are very moderate but even on these I fancy they will hesitate'<sup>15</sup>. They did; the book was never written.

The core of the publication list is the taxonomy, the careful descriptions, the new species by the thousand. Miles' identification service was a one man Natural History Museum, Royal Botanic Gardens Kew and Edinburgh and CAB International shoe-horned into a Northamptonshire vicarage. But his strength and the huge value of his legacy are that he was much, much more than that. The taxonomic papers are punctuated by those on techniques ('On the preservation of objects of natural history for the microscope' (Berkeley 1845)), fine structure, or what passed for it in 1833 ('On the existence of a second membrane in the asci of fungi (Berkeley 1833b)), developmental anatomy (Note on recent discoveries in relation to the microgonidia of freshwater algae' (Berkeley 1857a)), physiology (On the development and action of the roots of agricultural plants at various stages of their growth' (Berkeley 1863)), veterinary matters (Nouvelle Végétation parasite sur les poissons', (Berkeley 1864)), a scattering of medical subjects (Observations on the recent investigations into the supposed cholera fungus' (Berkeley 1869)) and even the really outlandish, 'On the bleached wood of the Arctic Voyagers, as a possible indication of the route of Capt. Sir John Franklin (Berkeley 1853)).

There was lichenology of course; he wrote many times that he was convinced that lichens belonged to a distinct class within the *Fungi* (in his book *Cryptogamic Botany* (Berkeley 1857b) he described the orders *Lichinales* and *Fungales* in a group *Mycetales*) and Hawksworth (pers. Comm.) is of the view that insufficient credit is given to Berkeley's contribution to the understanding of lichens. In a letter to William Lauder Lindsay (1829–1880), he noted that 'it is quite impossible to distinguish some lichens from fungi' (Lindsay 1869). Nonetheless, most significantly of all, there was a heavy dose of plant pathology. And for many people, the jewel in the crown of the entire publication list is the series of 173 papers on Vegetable Pathology published in the *Gardener's Chronicle* between 1854 and 1857 (*cf* Plant Pathology Committee of the British Mycological Society, 1948). For Plant Pathology, these were seminal. They fell in the middle of Miles' productive life and to my mind, this is where Plant Pathology should be: in the middle of mycology. Let me quote from Geoffrey Ainsworth (Ainsworth 1981) who put this far more succinctly than anyone: 'Although advances in scientific knowledge may in part be attributed to man's curiosity and desire for explanation, more practical ends and economic drives have also given impetus to advances in most branches of science. What navigation was to horology and cartography, fungal disease in man, animals and particularly plants has been

to mycology'. Joan Moore (1920–1986), in her presidential address to this Society in 1978 (Moore 1979) surveyed the debt that plant pathology owes to the British Mycological Society. Joan Moore herself was one of the group of leading mycologist/plant pathologists that was instrumental in the establishment of the Federation of British Plant Pathologists, a joint enterprise between the British Mycological Society and the Association of Applied Biologists founded in 1966. It was a group born of the Plant Pathology Committee of the British Mycological Society that had been formed under the chairmanship of F. T. Brooks (1882–1952) as long ago as 1919. It was shorter lived than its fore-runner, however, and was itself replaced by the wholly independent British Society for Plant Pathology.

My next remark is open to being misunderstood; I am aware that it is something for which I am likely to be criticised, if not condemned and pilloried. I hope that it isn't and I hope that I am not and I shall try to justify it. For me, the founding of the British Society for Plant Pathology was one of the pivotal yet unfortunate moments in the history of the British Mycological Society. I was present at the meeting in London at which it occurred. I was there as the Association of Applied Biologists' representative on the Committee of the Federation of British Plant Pathologists. And I have personally been professionally more a plant pathologist than I have anything else in mycology. In common with most of the leading plant pathologists of the day, I wished the new Society well and I continue to wish it well which is why I don't want this remark to be misunderstood. It was inevitable, the infant had been straining at the leash. Plant Pathology had grown up as a subject and it didn't want to continue being represented, as it saw it, as some sort of offspring of dubious legitimacy of two venerable parents. But for me it was a sad day because plant pathology, a major part of Berkeley's legacy, had been at the core of the activities of the British Mycological Society since its inception. What went wrong as far as this Society is concerned is that it didn't just support the establishment of the new Society; it most unfortunately took its eye off the ball and almost let go of the entire subject, of its influence in that subject and of being engaged in one of the most important of all the applications of mycology, mycological research and mycological funding. It has taken a considerable time for that ground to be regained.

Some of the first papers to be published in the first volume of our *Transactions* were plant pathological but there was a period when they became as scarce as hen's teeth. It is gratifying now to see that *Mycological Research* is again attracting plant pathology papers of the highest calibre and that plant pathologists are once more recognising its standing as a vehicle for publishing their work. After all, it isn't as if plant pathology as a subject has decreased or diminished. Plant diseases still cost this country many millions of pounds every year. Most plant diseases are caused by fungi. Mycology and plant pathology are inseparable. I can't believe that this Society and mycology in general can have a viable and vigorous future unless it can work closely with plant pathologists and foster that discipline as it did in the past.

Berkeley's legacy as a plant pathologist is frankly immense. I have mentioned my finding that everywhere I went in my

<sup>15</sup> Kew: Letters to J. D. Hooker, 208.



own research, Miles Berkeley had been before. And just as Berkeley didn't devote his time and his life to one branch of mycology, so he didn't devote his time in plant pathology to just one disease. He published on almost every plant disease worthy of the name. Of course, his fame and for plant pathologists, his immortality lie with his studies of potato blight and his very firm belief, only confirmed later, that the cause was fungal (Berkeley 1846). Most interestingly, original material from the Irish famine was preserved by Berkeley and this has enabled molecular work to be conducted on it recently<sup>16</sup>. But did this make him Jack of all plant pathogens, master of none? Certainly not; and yet time and again I meet plant pathologists today who have seldom if ever strayed outside a single group of pathogens. For me, and I strongly suspect for Berkeley too, you do learn by a certain degree of diversity and you can pick up ideas from the most unexpected places. But I can hear you telling me what I know: that our current system of research funding doesn't permit that. Our research funds when they do arrive are detailed and specific. They require you to study one plant disease, one problem, one particular technique.

When I was beginning my research career some 30 years ago, I remember talking to a very fine research worker and teacher, Paul Williams from Wisconsin. Paul told me to do something that I endeavoured to follow throughout my research career. He told me to spend between 5 and 10% of my time doing 'crazy things'. There may be some who felt I spent most of my time doing crazy things; but it was from those crazy things that I believe, ultimately, some of my own most significant findings came. People thought Miles Berkeley crazy when he said the 'potato murrain' had a fungal cause. There isn't enough craziness in research any more.

And personal contact, even in this electronic age, is still important. For Miles it was especially valuable. He took every attempt to meet and talk with foreign scientists. He met the algologist Agardh for instance at Cambridge in 1833 and Rostafinski stayed with him in 1875 but travel wasn't very easy; there was a coach from London to Kings Cliffe every Tuesday, Thursday and Saturday: 'The Oundle' from the George and Blue Boar in Holborn. Things did improve later; on 3 June 1845 he wrote '... our railroad is now open to Oundle and we are only 5½ hours distant from London'<sup>17</sup>. A planned visit by Curtis to Europe never materialised but a succession of dignitaries came to the Northamptonshire vicarages. In 1853, Miles wrote: 'M. de Candolle arrived with his son last night and left this morning'<sup>18</sup>. But Miles' didn't pay lip service to other people's fame. He was astutely critical. In 1874, he wrote to Joseph Hooker 'Mr Sullivan sent some beautiful drawings from the US but I in vain asked Montagne for the accompanying specimens without which I couldn't have described them. Montagne who knew less about Agarics than of any other branch of fungi has described them but I have little faith in his descriptions and I fancy that he hadn't much in them himself as he refused to let me see the

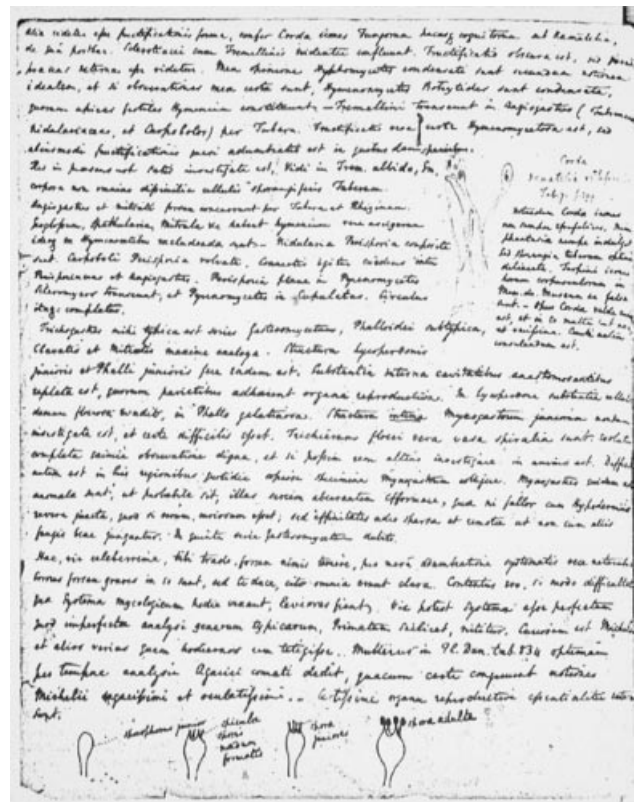


Fig. 6. Part of Berkeley's letter to Hooker describing the structure of basidia dated October 1837 (Kew: English Letters 1837, 9: 92).

specimens'<sup>19</sup>. Today, with travel (relatively) easy, we must not under-value the importance of personal contact. Yet it is too often the travel budget that is cut first when economies have to be made and we in the Society know only too well the difficulties that are sometimes put in the way of members attending meetings. We may not be able to offer M. de Candolle and his son but the importance of the travel funds available to scientists must be re-assessed.

Life is competitive today and it is important as individual mycologists, as national scientists and as our Society that we endeavour to stay ahead of the field and use all and every influence to persuade those who control budgets and research priorities that our discipline is important. Otherwise, we shall miss the boat for mycology in the way that Miles Berkeley missed a personal boat when he wrote to William Hooker in October 1837: 'I have lately made some curious discoveries with respect to the Pileate & Clavate fungi ... the sporidia are not contained in Asci but are naked seated on the top of little papillae and generally definite in number'<sup>20</sup> (Fig. 6). What had the man done? He had discovered the structure of basidia although sadly, and unknown to him, Ascherson (1836) and Leveillé (1837) had published the same findings a short while earlier. Miles had been very close to this discovery even earlier in 1836 so why had he failed? English reserve and diffidence had been partly to blame but so had lack of facilities and equipment. He spent much of his life working with doublets (hand lenses) although he did obtain a micrometer to measure spores and fine structure and by 1840 was looking at

<sup>16</sup> See Mycological Research News, *Mycological Research* 105 (9): 1026 (September 2001).

<sup>17</sup> Kew: English Letters 1845, 23: 60.

<sup>18</sup> London: Natural History Museum, Broome Correspondence.

<sup>19</sup> Kew: English Letters Balf-Bev 1866–1900, 79: 207.

<sup>20</sup> Kew: English Letters 1837, 9: 92.

microfungi like *Cladosporium*, *Helminthosporium* and *Alternaria* (honey dew moulds on orange trees in conservatories). In 1846, he obtained a better lens whilst on a visit to Paris but he didn't have a compound microscope until 1868, when he was presented with one by Hooker. Among his lack of other facilities was a decent climate. In a letter dated 3 December 1844, he wrote 'The weather is dreadfully dark for the microscope'<sup>21</sup>.

Mycologists now are rather better off; I doubt if very much mycological research in this country today is hampered through lack of facilities and very rarely by the climate. But let's just look again at that letter of December 1844 and read more into it. Yes, the weather was dreadfully dark for the microscope in December but bear in mind that Miles was working early in the morning by candlelight through necessity because he had to do his research before parish and other duties. There, nothing has changed. We also have too many other duties. Our parishes are the university department and the research laboratory. We spend far, far too much time on the parochial and clerical duties and far too little on mycology. In seeking further funding and support for mycology, we shouldn't forget that channelling new funding directly into the discipline itself may not always be the most productive. Let us see some funds channelled legitimately and realistically, not, perish the thought, simply into administration for administration's sake; but into administration that will allow mycologists to do what they are best at: mycology.

It is especially appropriate that the Society's award to outstanding young mycologists is called the Berkeley award. For here too, our man played a major part. He educated his own children with some success. Among his offspring, Rowland later succeeded to the living of Sibbertoft, Emeric became a Major General in the Indian army and only a few months after enlisting had become so fluent in Hindustani as to be an official army interpreter; Richard became a Surgeon Major in the Navy; Paul worked for the Post Office and was involved in wireless communication; while Ruth and Margaret became missionaries in Zanzibar (one of Miles' last papers published four years before his death was 'Notices of some fungi collected in Zanzibar in 1884 by Miss R. E. Berkeley'; Berkeley 1885). Emeric became something of an authority on orchids but only Ruth and Cecilia, the artist became at all serious about mycology. There may be a lesson there for us today. Growing up in a house full of fungi and with a regular procession of foreign mycologists trooping through the guest rooms, perhaps the children decided that you could have just too much of a good thing. But outside his own family, Miles always recognised the importance of fostering a younger generation and to this end he was an examiner for the Universities of London, Oxford, Cambridge, the Civil Service of India, the Society of Apothecaries, and botanical referee to the Royal Horticultural Society. The Society of Apothecaries was worth having; when Miles finally decided to give it up in 1880 and suggested to Joseph Hooker that he might like to take it on, he mentioned that the fee was 10 guineas for each exam. But he added a rider: 'you must not make the exam too difficult for the young apothecaries'<sup>22</sup>. A warning there

perhaps when we are told that the A-level exam is becoming easier by the year. The future life-blood of our discipline lies of course with the younger generation. But where are they? As I have shown, they are certainly not working in mycology at present.

There is no doubt that mycology won't make you rich. Miles was awarded a Civil List pension of £ 100 a year in 1867 for his services to mycology but his family were not left well provided for. His stipend at Sibbertoft, his last parish, was £ 403 per year but with a gradually decreasing deduction of £ 70 per year until the debt incurred by his predecessor for rebuilding the vicarage was paid off. His furniture and books fetched about £ 1000. There was the British Museum (Natural History)'s princely ten guineas for the scientific correspondence. His library was sold in 1890 to John Wheldon for £ 250 ('£ 100 down, £ 100 in three months & £ 50 in six months'); better the family thought than 'the risk of a sale'. And how mycological book collectors will weep to read Wheldon's catalogue (Wheldon 1890–1) today as they learn that Berkeley's copy of Micheli could have been had for 14 shillings. A few of Miles' books do surface from time to time at auction and I have been fortunate enough to garner a handful of them. A few hundreds more were realised by the sale of some Munn pictures. Little changes. Although the government today have said they would like scientists to own Ferraris, the reality is rather different.

In 1875, during a serious illness, Miles made a far-reaching decision, to donate his herbarium to the Royal Botanic Gardens Kew. The collection was immense: more than 10 000 species, over 5000 of them types. By the end of 1878, he had already sent more than 6000 species. That legacy too was immense and one on which Kew has built and, we hope, will continue to build its herbarium. Miles Berkeley was a biological polymath of a kind that today you rarely meet. His letters are laced with references to multitudes of organisms outside the fungi; and it gives me special satisfaction to note that he never neglected his garden, no matter what other great matters exercised his mind. In 1854, during the Crimean War, he wrote 'I have no faith in Prussia and less in Lord Aberdeen. My melons and cucumbers have died off this year very unpleasantly'<sup>23</sup>. He was consulted on all manner of topics, far removed from mycology. In 1865 he wrote: 'I have been asked what is the most characteristic genus of South American orchids, capable of being modelled and ultimately worked for Prince Albert's monument. I suggest *Catasetum* or *Stanhopea* ...'<sup>24</sup>. And there is a story that I do hope isn't apocryphal, of Miles having dinner with Joseph Hooker and Charles Darwin; what a gathering that would have been. A dish of tropical pickles was served as part of the meal; and in such distinguished company, Miles Berkeley alone was able to identify the botany of all the varied ingredients.

Gradually however, the lifetime of work began to take its toll. By the mid 1880s, Miles was a tired man. His eyesight and faculties gradually failed. When in January 1886 he wrote to William Thistleton-Dyer (1843–1928) to congratulate him on succeeding his father-in-law Joseph Hooker at Kew, the letter wasn't in his own hand. He went to London for

<sup>21</sup> London: Natural History Museum, Broome Correspondence.

<sup>22</sup> Kew: English Letters Balf-Bev 1866–1900, 79: 355.

<sup>23</sup> London: Natural History Museum, Broome Correspondence.

<sup>24</sup> Kew: English Letters Balf-Bev 1866–1900, 79: 342.

**Table 2.** Major human, animal, and crop health and protection products developed, or in development, that are based on fungal metabolites<sup>1</sup>.

Metabolite	Biosynthetic family	Fungal source	Some commercial products*
Penicillins	Peptide	<i>Penicillium</i> and <i>Aspergillus</i>	amoxicillin ampicillin benzylpenicillin carbenicillin methicillin
Cephalosporins	Peptide	<i>Acremonium</i> and <i>Emericellopsis</i>	cephalosporin N Ceftrioxone Cefzil
Pravastatin	Polyketide	<i>Aspergillus terreus</i> , <i>Penicillium</i> and <i>Monascus ruber</i> <i>Pleurotus</i>	Zocor
Cyclosporin	Apeptide	<i>Tolypocladium</i> and other <i>Hypocreales</i>	Sandimmun
Ergotamine	Tryptophan-isoprenoid	<i>Claviceps</i>	Cafergot Lingraine Migril
Mycophenolic acid	Polyketide-isoprenoid	<i>Penicillium</i>	CellCept (mycophenolate mofetil)
Pneumocandin	Peptide-polyketide	<i>Glarea lozoyensis</i>	Cancidas**
Strobilurins	Polyketide-amino acid	<i>Strobilurus tenacellus</i> and other basidiomycetes	Allegro Brio (kresoxim-methyl) Amistar Heritage (azoxystrobin)

Note: Some of the products are semi-synthetic derivatives, or wholly synthetic derivatives based on a fungal-derived natural product.

\* Proprietary names are given capitals; \*\* In advanced clinical trials.

<sup>1</sup> Based on original data supplied by G. Bills (pers. comm.).

treatment and had to be carried onto the train on a chair. Eventually, he faded and died on 30 July 1889, to be buried alongside his beloved wife close by the porch in the churchyard at Sibbertoft.

And so I come to what I believe most strongly of all about Berkeley's legacy. How many members of the British Mycological Society today can identify accurately and correctly, not necessarily the ingredients of a dish of pickles, but to species level, say 27 or 28 of the thirty commonest British macromycetes; to genus level, say seven or eight out of the ten commonest microfungi? Very few. And just as pertinently, how many can identify and name with any sort of accuracy the thirty commonest British algae, molluscs, birds, butterflies, beetles, eelworms, or freshwater fish? How many know how many British amphibians there are? Very few and this saddens me because if a biologist can't place in the context of other living things the organism that he or she studies on a day to day basis, I feel they lose touch with the environment to which we all pay lip service. My old botany professor was a plant physiologist and 30 years ago, he felt that even plant physiology was becoming detached from the whole organism to the extent that he asked his assistant to be certain that every day, he had a vase of fresh wild flowers on his desk; to ensure that he never forgot what he was or why he was doing it.

I am open to being called, in modern language, 'retro'. That to be a naturalist, to be conversant with whole organisms is old fashioned and irrelevant. It is not 'cutting edge biology'; with some notable exceptions, it is isn't perceived as sexy. And it certainly doesn't attract grant funding. Put the name of a fungus on a grant application I was told recently, and it will fail. I'd suggest that if you put the scientific name of any whole organism on a grant application, it stands a fair chance of failing. I am not out of touch, I don't want

mycology or this Society to be out of touch and in drawing my inspiration here from a man who died 111 years ago, I don't believe I am. Someone else said recently, not to me but rather publicly, that they would frankly be jolly relieved when this 'genome business' was done and out of the way because we could then get back to looking at organisms again.

A Presidential Address is a unique vehicle. It isn't subject to peer review or to the strictures of the Editorial Board; although the Executive Editor rightly has his say. Certainly in this Society, it has never been rejected. It can serve to publicise new research findings, to rework old ones, to criticise or praise one's peers or to grind one's axe. I've ground my axe. But to mix my metaphors, in grinding my axe, I don't think I am whistling in the dark, trying to reverse the fortunes of some abstruse and irrelevant discipline. I would suggest with evidence that fungi have never been as important to human beings as they are today. Crop diseases annually cost millions of pounds. So do crop pests. There is a huge gulf in our practical use of fungi as agents for the biological control of pests, yet it is a constant difficulty for our own members in this area to obtain funds for their research. Of course we all know the traditional uses of fungi (and I do include yeasts) that, if we were fortunate, we were taught at school: baking, brewing, fermentations and so forth. And we all remember being told the story of penicillin. But today, fungal drugs (or their synthetic analogues) account for a very high proportion of the world's pharmaceutical output (Table 2). And today, conversely, fungal induced diseases in humans have never been as important; more AIDS patients die from fungal infections than from any other cause.

Mycology has become technology and process driven: the organism itself has often been forgotten in the drive for molecular efficiency. And in this of course, it reflects a great deal of what is happening in society at large. Hens are egg

laying machines. Cows, sheep and pigs are big bags of chemicals designed to produce protein, crops are manipulated at the whim of the laboratory, sheep are grown from test tubes, human cells multiplied *ad lib in vitro*. Fungi are no different from anything else in this respect. But what has happened to that care and concern for the environment which is still trumpeted from politicians and policy makers? The environment isn't populated by bags of chemicals and molecules. It is populated by whole organisms that interact with each other and with the environment itself as whole organisms. The skills, in the words of this Society's own motto, to recognise the known, inspect the unknown are being lost.

Would Miles Berkeley have been an investigative, bio-chemical, molecular technologist had the opportunity been presented to him? I rather doubt it. Yes, of course he would have recognised the significance of using whatever techniques were available to look within cells, within molecules to obtain a basic understanding of how the whole thing functions. But I do believe he would have recognised too that a balance is required; that we lose the skills and knowledge of whole organisms at our peril and at our environment's peril. I do fear that a time will come, not so many years hence, when a generation will have grown up that can recite by heart the genome of organisms without ever knowing what the organisms are, what they look like, what they do, or where they live. And some of these people will call themselves mycologists. If that happens, we shall really have betrayed Berkeley's legacy and I do ask this society to be at the forefront of ensuring that what I believe would be that scientific tragedy never arrives.

## ACKNOWLEDGEMENTS

I am deeply conscious of the debt that I owe to the many people who have assisted and fostered my own career in mycology and research and take this opportunity to mention especially John Manners, Dick Pawsey and Graham Keyworth. My studies of Miles Berkeley would have been impossible without the collective assistance of countless archivists, librarians, professional and amateur historians and fellow mycologists who recognise that the past can still teach something to the present.

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