Charles Plowright M.D., F.R.C.S. 1849-1910: Norfolk mycologist (with notes on his fungus records from 1872)

Tony Leech

In 1872, just three years after the founding of the Norfolk & Norwich Naturalists' Society, Charles Plowright, a young doctor in King's Lynn, published a list of over 800 species of fungus that had been recorded in Norfolk (Plowright 1883). He was 23 years old and had made his first fungal records seven years earlier.

Charles Bagge Plowright was born in 1849 and brought up by his grandfather, a farmer, at North Wootton, near King's Lynn (Figure 1). Time spent on the surrounding heaths and marshes gave him early acquaintance with plants and fungi, an interest which appears to have been fostered by his aunt, Sarah Ann Pung.

Figure 1. Charles Plowright. From the obituary in Transactions of the Norfolk & Norwich Naturalists' Society, Volume 11: 1911.

Norfolk fungi

Plowright's list comprised the names of 383 basidiomycetes, 86 rust and smut fungi, 28 myxomycetes (slime moulds) and oomycetes, and 368 ascomycetes and conidial fungi. They are arranged in the taxonomic order of the time with brief statements of abundance or locations for less common species. The list includes species recorded by James Sowerby earlier in the century, marked with an asterisk if not subsequently seen by Plowright. Records acknowledged to the Rev. Kirby Trimmer and to Mordecai Cubitt Cooke are also included. Plowright notes that *"after nearly a century of relative neglect, the study of fungology both in Norfolk and nationally is increasing."*

Very few of the species listed bear the same names today as they did nearly 150 years ago. The majority of gill-fungi are assigned to *Agaricus* (Table 1). Despite this I have been able to assign over 90% of the basidiomycetes to 'modern' species with some confidence (Table 2). Some of the more notable or interesting are described below. A discussion of his other records will be published separately.

Although the majority of the fungi listed would be encountered in a season of active foraying today, some are decidedly scarce and a few have not been recorded in Norfolk since. Foremost amongst these, and a truly iconic fungus, is the Pepperpot *Myriostoma coliforme* (Figure 2). This earthstar, recorded by Plowright as *Geaster coliformis* has multiple openings in its spore-sac which is supported by a cluster of thin pedicels rather than by a single stalk as in many other earthstars.

Table 1. Agaric genera included in Plowright's 1872 list of Norfolk fungi.

Genus	Number of species
Agaricus	147
Hygrophorus	13
Lactarius	8
Russula	8
Coprinus	7
Marasmius	7
Cortinarius	7
Lepista	2
Paxillus	3
Cantharellus	2
Lentinus	2
Gomphidius	2
Bolbitius	2
Panus	1
Xerotus	1

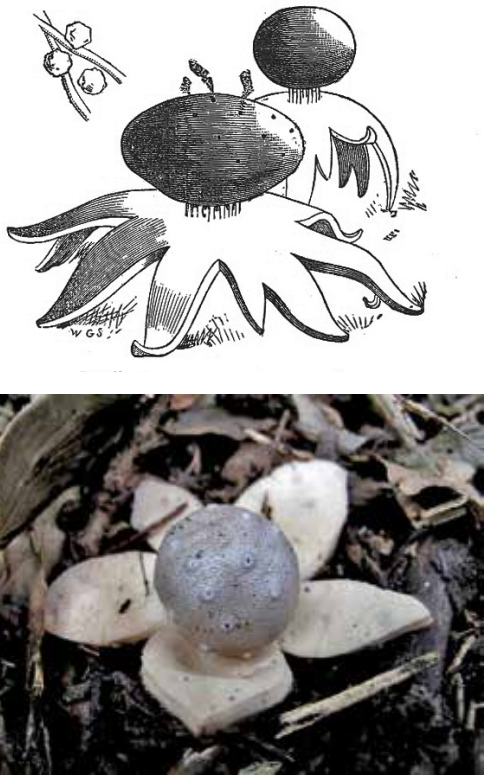

Figure 2. The Pepperpot. Upper: illustration from Plowright (1872). Lower: Suffolk specimen. *Neil Mahler.*

The Pepperpot earthstar was first described by William Withering in 1776 but had been known from Kent from the late 17th century (see Mahler & Ainsworth 2010). In 1794, Thomas Woodward wrote an account of the fungus being found in the neighbourhood of Bungay, at Gillingham and Earsham (Woodward 1794). Gillingham is about two kilometres north-west of Beccles, and Earsham is about one kilometre west of Bungay. These sites are in Norfolk, being north of the river Waveney, some nine

Table 2 Status of species names in Plowright's 1872 list of Norfolk fungi. Note that the groups listed no longer have taxonomic significance. 'Synonyms' are names which are now considered to belong to a species already listed. 'Not verifiable' are names for which an unambiguous modern name cannot be traced.

Group	Accepted names	Synonyms	Not verifiable
Agarics	217	6	19
Boletes	18	0	1
Gasteromycetes (puffballs etc.)	30	1	1
Polypores (brackets)	44	0	3
Corticioids (crusts)	34	0	3
Clavarioids (spindle fungi)	19	3	2
Hydnoids (tooth fungi)	7	0	2
Cantharelloids (chanterelles)	1	0	0
Jelly fungi	12	1	2

kilometres apart. Woodward also describes finds from Bungay and Mettingham in Suffolk. At about the same time it was recorded by James Sowerby at a site near Norwich. Plowright notes that it is *"a plant* [sic] *the sight of which would gladden the heart of the most lethargic mycologist".* Fittingly however, it was Charles Plowright's own heart that was gladdened when, on September 25th 1880, Philip Higbin brought him a freshly gathered specimen from Hillington, eight kilometres east of King's Lynn (Plowright 1881). Plowright reported that the peridium bore 46 actual or potential openings and "*looked as if it were covered by an extremely thin coating of silver leaf*". It was supported by 17 complete or partial pedicels, some fused.

A month later, Plowright found several old specimens at the same location, but this was the last time the fungus has been found in Norfolk. However, in 2010, Neil Mahler discovered a small colony in Suffolk just 200 metres from the Norfolk border, possibly at one of Woodward's original locations (Mahler & Ainsworth 2010). Very few other records of the fungus have been made in the British Isles, apparently only from Worcestershire (1817); Kent (1840) and Suffolk (reported in 2006). It was found in Jersey in the 1990s.

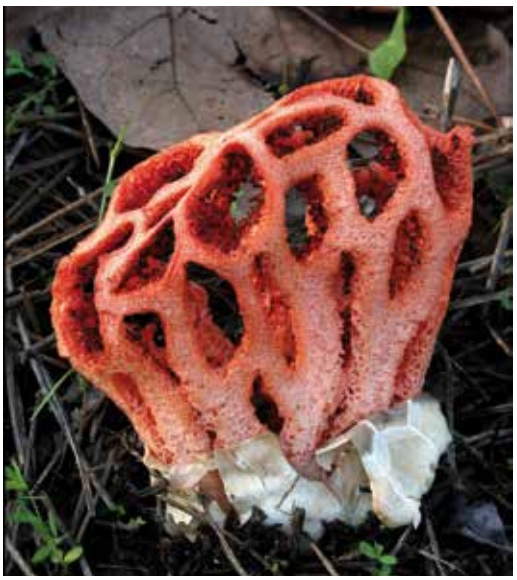

Figure 3. Red Basket Fungus. Portugal. *David Gough. Creative Commons***.**

Figure 4. Oak Polypore. Suffolk. ***Tony Leech.***

Another iconic fungus on Plowright's list that has not made a subsequent appearance in the county is the Red Basket Fungus *Clathrus ruber* (recorded as *Clathrus cancellatus*) (Figure 3). This was not seen by Plowright himself but found by Miss J.A.Rabett in October 1859 on a bank covered with moss and bracken in Mintlyn Wood near King's Lynn. Related to the Stinkhorn, it emerges from its 'egg' to form an open cage of deep-red ribs covered with a foul-smelling slime. It is a southern species found increasingly in south-east England but only this once in Norfolk.

A fungus which Plowright almost certainly found himself in 1871, and again in 1873, (Martyn Ainsworth, pers. comm.) was the Oak Polypore *Buglossoporus quercinus* (recorded as *Polyporus quercinus*) (Figure 4). This bracket occurs only on oak trees more than about 200 years old and on exposed heartwood. If he had realised it would not be re-found in the county for a further 130 years he may have made more than a simple reference to its place of discovery, Castle Rising, probably less than three kilometres from his home. That it was found again was a good example of 'chance favours only the prepared mind' (*Pasteur: 1894*). Martyn Ainsworth, a senior mycologist at Kew, who some years previously had undertaken a study of Oak Polypore for English Nature,

was being driven from Brancaster to King's Lynn. Aware of Plowright's record, he suggested a small detour and at the north end of Castle Rising Wood found the fungus on the end of a sawn section of an oak trunk. Since then it has been recorded from two more sites in Norfolk.

The re-finding of fungi from old records is a satisfying activity although their lack of geographical precision almost always casts doubt. When uncertainties about species identification are present too, the doubts multiply – but it is still tempting to speculate. Many species of stalked tooth fungi are restricted to the Scottish Highlands and only a few occur in Norfolk. In 2011, Anne Crotty found a tooth fungus in a deciduous wood a few hundred metres from Felthorpe Common which was tentatively identified as *Sarcodon scabrosus* (Figure 5). Five years later she found another fleshy tooth fungus nearby, *Phellodon niger*, both new records for the county. Intriguingly Plowright reports a record by Kirby Trimmer of what he called *Hydnum imbricatum,* and would now be known as *Sarcodon squarrosus,* from Felthorpe in 1861. There is still confusion between species in this group and it is possible that Anne had re-found a fungus recorded 150 years previously.

The genus Amanita is well-known for including Deathcap *Amanita phalloides* and Fly Agaric *A. muscaria* but the genus includes at least 40 other species. One of the rarest is the Barefoot Amanita *A. vitadinii.* Although first reported in Britain in 1847 from near Wymondham, and painted by Mrs A.M. Hussey (reproduced in Kibby 2012), Plowright curiously makes no mention of this but states that *"Mr Amyott found this species under a gorse fence at Billingford in June 1856".* Unfortunately there are two Billingfords in Norfolk, one eight kilometres north of Dereham and the other five kilometres east of Diss. However, Plowright also cites records from Kenninghall (1859) and Roydon (1862), helpfully noting that the latter is near Diss. It is remarkable that in the space of 15 years this agaric was recorded from four places in South-west Norfolk and has been noted from only five other places in the British Isles (Huntingdonshire, 1859; Hampshire, 1901; Yorkshire, 1909; Oxfordshire, 1976; West Sussex, 1978).

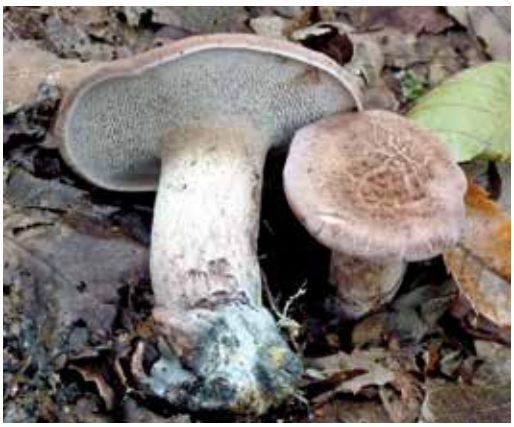

Figure 5. *Sarcodon scabrosus.* St Faith's Common. *Tony Leech.*

A name in Plowright's list likely to be unfamiliar to modern mycologists is *Xerotus degener*. This is a *nomen dubium*, a name that cannot be assigned with certainty to any taxonomic group because the description is insufficient for identification and the original specimens no longer exist. In the Basidiomycete Checklist (Legon & Henrici 2005) it is stated that *X. degener* appears to be a species of *Omphalina* now named Firesite Funnel *Faerberia carbonaria*. This is supported by one of the few line drawings in Plowright's 1872 Transactions paper which clearly shows an omphaloid fungus (Figure 6). This is a widespread but uncommon species that normally occurs on old bonfire sites on

Figure 6. Firesite Funnel. Illustration from Plowright 1872.

calcareous soil but was found by the Rev. Robert Francis of Holt in 1798 "*on heathy ground where turf stacks have stood*". It has been recorded only once since in Norfolk, by Reg and Lil Evans at Easton in 1991.

Plowright recorded no fewer than 86 species of rust and smut fungi, a group he later became particularly interested in. Such are the complex life cycles of these plant pathogens that 21 of these are now regarded as synonyms and a further nine cannot be assigned unambiguously to modern species. The abundance of some species has undergone large changes; for example, Stinking Smut *Tilletia caries*, a cause of disease in cereal crops, was described by Plowright as common but has been virtually eliminated by fungicides.

Conversely, some fungi, for example Birch Milkcap *Lactarius tabidus* and the Ochre Brittlegill, *Russula ochroleuca*, now considered very common, are not mentioned. Both were described some forty years earlier so perhaps they were genuinely absent from the county at the end of the 19th century. However, the suspicion remains that these groups may not have been studied fully as only eight species each of *Lactarius* and *Russula* are recorded; the current Norfolk list includes 41 and 74 species respectively.

By 1884, Plowright had added nearly 700 more species to the county list (Plowright 1884) and in 1889 a further hundred (Plowright 1889a). The 1884 list included 237 agarics and eight boletes but no locality or frequency data, whereas the 1889 list did contain information about where species had been found. By 1884, the genus *Agaricus* had been split into 35 subgenera bearing names which would be familiar to naturalists today. It is some wonder to the latter, spoiled by access to illustrated field guides and comprehensive keys, that so many species could be identified at the end of the 19th century. Books for identification were available; Plowright would have called them 'mycological hand-books'. He possessed Berkley's *Outlines of British Fungology* at the age of 16 and five years later his uncle and aunt gave him the first two volumes of Sowerby's *British Fungi*. While studying medicine in Glasgow he copied the figures from Volume 3 and the Supplement which he found in the library. In addition, he was in frequent correspondence with leading mycologists at home and abroad.

As well as maintaining correspondence with other British mycologists, in 1888 Plowright travelled to Sweden to meet with Theodor Fries. Theodor's father, Elias Fries, had established the 'modern' taxonomy of fungi and Plowright wished to find out what Fries the elder had actually meant in his descriptions of various species. The Friesian taxonomy has now been completely overtaken by molecular data.

Wider mycological interests

To make important discoveries in almost any branch of study it helps to specialise. In around 1873, Plowright took up the study of pyrenomycetes. These are unexciting looking, but biologically interesting, ascomycetes, many of which are black, hard and more or less spherical. Their spores are produced in small chambers embedded in these fruiting bodies and extruded through minute openings. They are typically saprotrophic, feeding on wood and other dead organic material. Familiar examples include King Alfred's Cakes *Daldinia concentrica* and the woodwarts *Hypoxylon* species. They are no longer considered to form a discrete evolutionary group but the name remains useful despite having no taxonomic significance. Plowright published several papers on these fungi in *Grevillea* 'a monthly record of cryptogamic botany and its literature' edited by Mordecai Cubitt Cooke and published from 1872 to 1894. Between 1873 and 1878, Plowright issued sets of dried pyrenomycetes (exsiccati), some 300 in

all which would presumably have been distributed to fellow mycologists.

The name Plowright was immortalised in the creation of the genus *Plowrightia* by Saccardo in 1883. The genus has included many familiar black 'warty' fungi pushing through bark but most have been re-named to better reflect their evolutionary relationships Two are listed on the Fungus Database of Britain and Ireland but under the names *Dothiora ribesia* (recorded occasionally on currant species) and *Anisogramma virgultorum* (a rare species on birch). Charles Plowright does not use the name *Plowrightia* himself, listing the former as *Dothidia ribesia.* The fungus he lists as *Hysterium vigultorum* is probably not *P. virgultorum* (now *A. vigultorum*) as he records it on bramble. *H. virgultorum* is now known as *Hysterium rubi* and is widespread.

At about this time he collaborated with his friend William Phillips from Shrewsbury to publish a series of articles entitled *New and Rare British Fungi*, also in *Grevillea*. These continued until 1885 and included 296 species. For most, however, relatively little information was given.

In 1881, Plowright began his experimental studies on rust fungi ensuring his lasting contribution to mycological science. He was particularly interested in heteroecism, the phenomenon by which some species of rust fungus have their different stages on different host plants. This had been shown for the 'terrible pest, Mildew of Wheat' by Heinrich de Bary, a German botanist, in 1865. The disease is now known as Wheat Stem Rust *Puccinia graminis* but remains a problem in many parts of the world. Plowright was able to show experimentally that plants belonging to the genus *Mahonia* as well as *Berberis* could host the cluster-cup (aecial) stage and thus perpetuate the infection. In Australia, however, the fungus appears to behave differently in that it can by-pass the cluster-cup stage and re-infect wheat directly. He was sent infected material from Australia and established that in all probability the species of fungus was the same but that in Australia it responded to the year-round availability of grasses in the absence of frosts.

In 1889, Plowright published a *Monograph of the British Uredinae and Ustilaginae* (Plowright 1889b) which included much experimental work on heteroecism and established species delimitation for many species. It brought him fame but no fortune as many copies were unsold but A.D. Cotton, speaking as President of the British Mycological Society in 1913, said, *"It is not too much to say that Plowright's monograph ranks amongst the most important works ever produced in systematic mycology . . . containing the results of years of labour and investigation."*

Throughout his life, Plowright was interested in the practical aspects of his studies. He advocated the use in British agriculture of Bordeaux mixture (a preparation containing copper sulphate and slaked lime) which had been developed to control mildews in French vineyards. He also contributed to gardening magazines and gave talks to Norfolk farmers on crop pathology.

Plowright was one of a band of mycologists who met annually under the auspices of the Woolhope Field Naturalists' Club in Hereford to foray and exchange views. He "*was always noted for his advanced ideas and his endeavours to elevate mycology from its old Friesian rut in which at the time it was firmly embedded*" (*Nature*, May 5th 1910). When this gathering ceased in 1892 it was effectively replaced by an event organised by the Yorkshire Naturalist's Union and in 1896 this spawned the British Mycological Society. Plowright was a strong supporter of this young organisation and became its second President, serving from 1897 to 1899.

Norfolk and Norwich Naturalists' Society

Most of Plowright's early publications were in the newly-established *Transactions of the Norfolk and Norwich Naturalists' Society*. These included notes on such diverse topics as an account of poisoning by Deathcap (Plowright 1880a), a report of fungi on whalebones (Plowright 1877) and the occurrence of ergots on wheat (Plowright 1880). He became President of the Society and gave his presidential address on March 25th 1895 (Plowright 1895). In those days, the address began with what we would now call a 'Chairman's Report' relating the activities of the past year and the state of the Society which appeared good despite the somewhat ambiguous comment that the Treasurer's balance sheet was *on the whole* satisfactory! He reported an additional 14 new members which, with a loss of seven, brought membership to 275 and outlined some of the papers published in *Transactions* which included the statement that *"Mr Hotblack favoured us with some interesting observations on the Herring"*.

Much of the Address concerned Plowright's accounts of his experiments with rusts but this was preceded by a more general observation which is quoted here in full, not only for its intrinsic interest but for the light it sheds on Plowright's own approach to his studies:

> *The importance of young members taking up a special line of research cannot well be over-estimated. Doubtless there are many amateur naturalists who derive a great amount of enjoyment by culling the cream from all branches of the subject, but they never accomplish, except under very special circumstances, much in the way of solid and enduring work: they are mere dilettanti, and as such remain to the end. Of course, a man who takes no interest whatever in other branches of natural history outside his own, if such an one exists, cannot be taken as a desirable model for imitation. All-round knowledge is admirable, but very few of us can aspire to be all-round men.*
>
> *When a young man starts with that enthusiasm which success demands, working on any special line of research, he is only too apt to receive disparagement, and therefore discouragement, from his candid friends. He is almost certain before he has been long at work to be asked, what is the good of all this labour which he is taking? He will not find it easy off-hand to give a satisfactory answer to his would-be mentor, unless he follows the good old plan of when in doubt speaking the truth, and saying that he is working because it gives him pleasure – for if his investigations are not a genuine source of enjoyment to him he will never succeed in accomplishing anything of importance. Benefits to humanity may arise from his work, but they may not. He works for the love he has of his work. If he be incited to some extent by a desire of acquiring a certain amount of renown, do not let us judge him too harshly: it is not a dishonourable motive: it is not the prime force actuating him, and is it not preferable to attain distinction in such a manner than in many others?*

Plowright ends his address with a plea that further research on plant pathogens be carried out *"in England (sic) where our agriculturalists are wringing their hands in despair, our landowners are plunging their hands into empty pockets and our young men are taught science in well-nigh every school"*. But he fears that it will not.

Medical career

Although no doubt aware of his breadth of knowledge and interest, few of Charles Plowright's patients would have realised that he was one of the leading authorities in his non-medical field and that his opinions were sought internationally. There is no evidence that he neglected his medical duties, on the contrary he was described as a thoroughly competent and skilful practitioner and clearly held in high esteem.

In 1865 he became a pupil at the West Norfolk and Lynn Hospital under John Lowe, Surgeon -Apothecary to the Prince of Wales. After qualifying in Glasgow (and studying under Lister of antiseptic fame) he returned to the West Norfolk and Lynn Hospital as House Surgeon, later setting up a practice at North Wootton but retaining links with the hospital. He became Medical Officer for Health for the Freebridge Lynn Rural District.

From 1891 to 1894 he was Hunterian Professor of Comparative Anatomy and Physiology at the Royal College of Surgeons. This appears to have been what we would now call a visiting professorship and during this time he delivered lectures on fungi, plant diseases and the action of fungi on the human body.

He was never rich but when he retired he doubled his fees. This had no effect on his practice so the next year he doubled them again, following which he was able to spend more time on his hobbies!

Life, and other interests

Charles Plowright married Mary Jane Robb who bore him two children, Edith Mary (b. 1875) and Charles (b. 1879). Charles became a surgeon, like his father, at the West Norfolk and Lynn Hospital and served in the Royal Army Medical Corps. In 1908, Edith Mary married Thomas Petch who became an eminent mycologist and plant pathologist in his own right, working for most of his life in Ceylon where he founded the Tea Research Institute. A son of Edith and Charles (also named Charles) went on to read medicine and later co-authored a *Flora of Norfolk* (Petch & Swann 1968).

In what must have been a very busy life, Plowright also found the time and energy to serve as a local magistrate, a governor of Lynn Grammar School and vice-chairman of the Girls' High School,

In one obituary, Plowright was described as a Victorian polymath and his interests extended well beyond medicine and fungi. Amongst other topics, he wrote on Neolithic man in Norfolk, on the use of native dye plants, and on the origin of apothecaries' symbols. He published prolifically in *Transaction*s, including a note entitled 'Notes on Paraselinae (Mock Moons)' (Plowright 1889c).

Charles Plowright died in 1910, tragically soon after his retirement in 1908, and is buried at North Wootton Church.

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