

The mycological legacy of Elias Magnus Fries

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Abstract: The taxonomic concepts which originated with or were accepted by Elias Magnus Fries were presented during his lifetime in the printed word, illustrative depiction, and in collections of dried specimens. This body of work was welcomed by the mycological and botanical communities of his time: students and associates aided Fries and after his passing carried forward his taxonomic ideas. His legacy spawned a line of Swedish and Danish mycologists intent on perpetuating the Fries tradition: Hampus von Post, Lars Romell, Seth Lundell and John Axel Nannfeldt in Sweden; Emil Rostrup, Severin Petersen and Jakob Lange in Denmark. Volumes of color paintings and several exsiccati, most notably one edited by Lundell and Nannfeldt attached fungal portraits and preserved specimens (and often photographs) to Fries names. The result is a massive resource from which to harvest the name–concept relationship with clarity. In the 20th century, nomenclatural commissions legislated Fries's *Systema* and *Elenchus* as the “starting point” for names of most fungi, giving these books special recognition. The present paper attempts to trace Fries's legacy from his lifetime to the recent past.

Key words:

Biography
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Uppsala

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INTRODUCTION

Embedded in the electronic age as we are, when indices, databases, compilations and countless files are at our finger tips, it is difficult to recollect the early days of “modern” mycology. Such personages as Fries, Persoon, Bulliard, Batsch, Schaeffer, Holmskjöld and numerous others have become surnames (usually abbreviated) following species epithets, and even though some information about such people is available through on-line outlets like Wikipedia, the temptation is to simply copy the worker's name automatically.

A check-list of fungus names attributed to collections from the Great Smoky Mountains National Park (Petersen 1979) included over 1200 names of agaricoid taxa, of which nearly a third bore Fries's name, almost always as author, less often as sanctioner. The compiler of the list, L.R. Hesler, depended on generations of prior workers to interpret Fries's concept of the names he authored. The present paper is an attempt to present the succeeding generations of mycologists, mostly Swedish, who with the best of intentions, perpetuated Fries's concepts. How did they do this? Aside from Fries's own writings, what other resources did they have or create? And how has this lineage come to the present? Who are the workers who brought the tradition introduced by Fries to the present?

ESTABLISHMENT OF THE LEGACY

Elias Magnus Fries (1794–1878)

The body of work gathered by Fries cannot be separated from the milieu of his life and times. Elias Fries, born into the household of a rural clergyman in southern Sweden, did not have any family name or wealth to catapult him to greatness in any field of endeavor. Although life in Femsjö may have been bucolic, times were tumultuous elsewhere. In a short war with Russia in 1809, Sweden lost what we know now as Finland, which became semi-independent. By the time Elias was coming of age, Europe was engulfed in the Napoleonic Wars, in which Sweden, in 1814, wrested present-day Norway from the Danes, who sided with Napoleon. Napoleon was defeated in 1815, at Waterloo when Fries was 21. By that time, he had wandered in the neighborhood of his school at Växjö, keeping a diary of his discoveries, ¹ had graduated from the University at Lund, been appointed “docens,” visited Copenhagen in pursuit of illustrations from *Flora Danica*, been befriended by the Danish botanist J.W. Hornemann, and part I of *Observationes Mycologicae*, a book-length treatise on the fungi around his home had been published. He did not lack in honest self-confidence (Lundqvist & Moberg 1995, Elfström *et al.* 1994, Petersen 1996, Eriksson 1962).

Although biographical information is available, for a first-person narrative of Fries's early life here must also be mentioned Fries's autobiography, *Historiola studii mei mycologici*, first published in 1857 (Fries 1857b; in Latin)

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Fig. 1. Elias Magnus Fries. A portrait reproduced numerous times but thought by the Fries family to have a good likeness.



Fig. 2. (Heinrich) Christian Friedrich Schumacher (1757–1830), surgeon and botanist in Copenhagen, Denmark, with whom Fries exchanged botanical ideas. Source: Library of the Danish Natural History Museum, Copenhagen.



Fig. 3. Jens Wilken Hornemann (1770–1841), Danish botanist, editor of *Flora Danica* and collaborator with Fries. Source: Library of the Danish Natural History Museum, Copenhagen.

and again in 1877 (Fries 1877; again in Latin), and again in 1955 (Fries & Fries 1955; in English, as part of the 50-year celebration of the Danish Mycological Society). Numerous sketches and portraits of Fries have been executed (Fig. 1).²

Christian Molbech (1783–1857), a well-connected man from Copenhagen, traveled to Lund in 1812, and there visited the phycologist Carl Adolph Agardh (1785–1859), who was one of Fries’s mentors at the university. Molbech offered to introduce Fries to Jens Wilken Hornemann (1770–1841) and other Copenhagen botanists. Since Lund and Copenhagen were geographically quite close, Fries (and three other students) ventured to Copenhagene later in the year, but the botanists were out of town. Fries spent time in the library but later complained that he had consumed too much time shopping and sightseeing. This initial visit began a series of trips to Copenhagen for the next decade (Fries & Fries 1995).

Early in his tenure in Lund, Fries had been introduced to the fine illustrations of “Hymenomyces” by (Heinrich) Christian Friedrich Schumacher (1757–1830) (Fig. 2), some of which had been reproduced in *Flora Danica*. Fries resolved to see the originals, so he returned to Copenhagen in 1814, and there met Schumacher, the surgeon and botanist who included ca. 900 species of fungi in his flora of Copenhagen and the surroundings (Schumacher 1803), and Hornemann (Fig. 3), who, a decade previous, had taken over the editorship of *Flora Danica* from his predecessor, Martin Vahl. Hornemann, in preparing plates for *Flora Danica*, understood that the names attached to the images were not perfect and that more accurate nomenclature was called for. This was especially true of the cryptogams. After protracted interaction with Fries, Hornemann asked the young man to revise the names on at least the illustrations of fungi (Wagner 1995). Fries did so, not only of the as yet unpublished plates, but also those already published. He also undertook to name the

lichens for the series. Numerous letters between Hornemann and Fries are preserved in the libraries at Copenhagen and Uppsala.

Hornemann generously volunteered to read galley proof for Fries’s *Observationes* (part 1) (Fries 1815) in spite of difficulty reading Fries’s longhand manuscript, and the publication was produced in Copenhagen. Notable are three pages of “*Errata graviora*” which precede the body of the publication.

Not only did Fries study and publish on fungi during these formative years, but also on green plants and, among his special interests at the time, lichens. By 1821, part 2 of *Observationes* (Fries 1818) had appeared, volume 1 of his *Systema Mycologicum*³ (Fries 1821) was in the press, followed shortly by volume 2 (Fries 1823). Strangely, in 1824, an imperfect reissue of the *Observationes* appeared, important in its date which was later than 1821, the date much later established as the “starting date” for nomenclature of most fungi (Rogers 1939, 1954). In 1825 (Fries 1825), his *Systema orbis vegetabilis* appeared. Notes on volume one of *Systema* (*Elenchus Fungorum*, part 1; Fries 1828a) and the second volume (*Elenchus Fungorum*, part 2; Fries 1828b)⁴ was published the same year as *Novitiae Florae Suecicae* (Fries 1828c), followed by volume 3 of the *Systema* (Fries 1829–1832), all before his 38th birthday.

Apart from the scientific influence he received from his mentors, young Fries was also much influenced by the dominating spiritual thinking of the period, Romanticism (Eriksson 1962). Thus, the God-created perfect world is especially seen in his taxonomy in *Systema* vol. 1, where all fungi are divided into four classes, each class into four orders, each order into four tribus, and the number of species in each tribus often a multiplum of four: Tribus I *Amanita* 12 spp., II *Lepiota* 12 spp., III *Armillaria* 12 spp., IV *Limacium* 12 spp. Then he comes to the larger *Tricholoma*, where a

subdivision is needed: *Tricholomata Limacina* 12 spp., *Tricholomata Genuina* 12 spp., *Tricholomata Spuria* 12 spp., and *Tricholomata Personata* 12 spp.!

His academic progress at Lund University brought him to the attention of others and in 1834, aged 40, he accepted the position as professor of practical economy (the chair in botany being already occupied) at the University in Uppsala. Years previous, the chair of botany had been occupied by Carl Linné (a.k.a. Carolus Linnaeus), whose considerable cachet grew from monumental compilations, introduction of binomial nomenclature and world-wide travel by his students. He was recognized by an international botanical community. All this offered higher visibility for the position in the academic world. Important then and especially now, though, was that although Fries's *Systema* took up fungal names from exotic locales, his major acquaintance up to that time was with the mycobiota in southern Sweden, for when Fries moved to Uppsala, he, himself, reported that he had entered "a whole new world of fungi" (Fries 1857), passing from cold temperate southern Sweden dominated by beech to boreal central Sweden dominated by conifers. The first major work produced in his new surroundings was the *Epicrisis Systematis Mycologici* (Fries 1836–1838).

In retrospect, this accumulation of mycological writing would seem to validate an entire career, but both at Lund and at Uppsala, Fries maintained a teaching load. Part of this dealt with what we would know now as graduate students; those students who defended a thesis or dissertation. Certainly strange for our understanding, in those days in all of Europe the professor wrote the dissertation which the student discussed with a "disputant" in front of gathered faculty.⁵ The student was expected to know and have experience with its contents even though the written words were those of the professor. A superficial survey⁶ indicates that over Fries's career more than 200 students defended Fries-written dissertations. Subjects ranged from generic monographs of mushrooms in Sweden to philosophy of teaching, to treatises on lichens and green plants. *Anteckningar öfver de i Sverige växande ätliga Svampar* (Fries 1836; see also Pennycook 2003) and *Monographia Hymenomycetum* (Fries 1857a, 1863a, b) were amalgamations of student-defended theses.

Elias and his wife, Christina (Wieslander; 1808–1862) parented nine children (Fig. 4). Their first-born, Thore Magnus Fries (1832–1913) and sixth, Oscar Robert Fries (1840–1908), took an interest in mycology, the former holding the Uppsala chair in botany some years after his father's death. Thore's major interest was in lichens. Robert was a physician in Gothenburg and keen mycologist. The brothers saw Fries's last major contribution, *Icones Selectae Fungorum* (Fries 1867–1884) through the press, including their father's autobiography.

As might be expected from such a large assortment of children, the Fries family widened over succeeding generations, and even now keeps some traditions from their forebearer, Elias, including his personal library⁷. Even in recent years, at least three representatives have carried on the Fries legacy; Nils Fries (1912–1994), fungal physiologist, Magnus Fries (1917–1987), botanist, and Eric Fries, biochemist, all at the university in Uppsala.



Fig. 4. The Fries family around 1859. From left to right (below): Christina (1809–1862), Elias's wife, Elias Magnus (1794–1878), Sally (1836–1905) and Julia (1845–1906); left to right (above): Robert (1840–1908), Sanna (1841–1919), Thore (1832–1913), Otto (1838–1931). Source: T. Almén (1945, *Elias-Fries-Släktens Historia*. Stockholm, p. 93).

In 1841, Edward Tuckerman (1817–1886), the premier lichenologist from the United States, with background including courses at Harvard University, visited Fries in Uppsala. The interaction not only imprinted Tuckerman (1845) but years later, Fries remembered the visit with pleasure (Farlow 1887)⁸. An American lichenological connection was forged.

In 1844, a young Norwegian, Nicolaus Lund, received a grant from the University at Christiania (at that time, now Oslo, Norway) to work with Elias Fries. Although apparently stationed in Stockholm,⁹ under the guidance of Fries Lund was directed to study lower plants, especially fungi and Fries requested that Lund write a book about the Hymenomycetes that were to be found around Stockholm. The resulting book, *Conspectus Hymenomycetum circa Holmiam crescentium...* (Lund 1845), ostensibly written by Lund, also contained some improved descriptions by Fries as a supplement to his *Epicrisis* of 1836–1838. The book was published in Kristiania, establishing a connection between Fries and the Norwegian botanical community.

Well into his time in Uppsala, Fries was appointed as superintendent of the botanic garden, a post that required a good knowledge of cultivated and native plants. After some time, he accepted the position as "Rector Magnificus" of the University, which meant time sacrificed for curricular matters and social responsibilities. In fact, Fries became acquainted with the royal family, and at the request of the king, he took a special interest in Prince Gustav.

In spite of these time-consuming duties, and in spite of frequent bouts of ill health, both his and his wife's, Fries continued to write and publish large mycological contributions. In the years from his arrival in Uppsala until his death, no less than nine major works were published (Fries 1836–1838 through 1877). During the same period he received specimens from Berkeley and Curtis, including some collections from Surinam (Petersen 1980). Their fate is unknown to us.

In 1841, Parliament authorized a grant to illustrate 80 plants to form a resource for education of the general public. Difficulties ensued, not the least of which involved artists for the project. Fries was involved in the process, but eventually convinced the Royal Academy to change the topic to fungi, and the first fascicles appeared in the 1850s. Artist, Elias Petersson started working with Fries in 1845, and moved from Stockholm to Uppsala in 1850 to get geographically closer to Fries. Petersson produced 679 paintings single-handedly and collaborated on an additional 160. A bound volume was produced and published between 1860 and 1866 as a popular, Swedish language guide entitled *Sveriges ätliga Svampar* (Fries 1860–66), with 93 illustrated fungi. Still more illustrations were gathered over subsequent years, many contributed by Hampus von Post and others. Late in 1875, a fire at the printing plant destroyed 229 original paintings.¹⁰ Almost all had already been printed, but for historical purposes, the fire was devastating. Including the remaining stock, a more formal volume, *Icones Selectae Fungorum*, was produced in 1877 (Fries 1877). Fries's sons, Thore (Theodor Magnus Elias, 1832–1913) and Robert later poured over the cache of theretofore unpublished plates and published volume 2 of *Icones Selectae* in 1884 (Fries & Fries 1884¹¹). Strid (1994) reported that some catalogued plates were missing, but improbably, Dennis (1949) found some Fries drawings in the archives at Kew and indicated that they may have been sent to Berkeley. Likewise, numerous “designs” by Fries and others made their way to Berkeley and some were copied by Berkeley's daughter, Cecilia Jane. While many of the images were apparently returned to Fries, what remained with Berkeley, including several Fries originals which seem to be related to some plates in Fries's *Icones*, was bought by William Gilson Farlow (1844–1919) and now resides in the library of the Farlow Herbarium (Pfister 1992). Even Fries's use of color terminology has been scoured to make sure these designations were “translatable” in common parlance (Wharton 1884). Finally, Farlow, still in the early years of his career at Harvard, visited Fries and his son, Thor, in 1872. By this time Fries was amassing the large collection of mushroom portraits, which he surely would have showed Farlow. Later, Thor was to become co-compiler of *Icones selectae Hymenomycetum II*. Later still (*circum* 1889), Farlow began commissioning artists to make such color portraits, the results being *Icones Farlowianae* (Farlow 1929; Pfister 1975b). Whether there was cause and effect remains uncertain.¹²

In Mustiala, Finland, at a rural agricultural institute, Petter Adolf Karsten (1854–1917) was describing the fungi of his countryside. In 1871, the first part of *Mycologica Fennica* (Karsten 1871) was published and on page one of the introduction Karsten referred to: “Hymenomyces secundum systema ab illustrissimus Fries in operibus ejus summi laboris: *Epicrisis* et *Monographia Hymenomycetum Sueciae* adhibitum sunt distributae; ...” Thus, a Finnish connection existed and some correspondence between the two mycologists indicates that a postal exchange was formed. Over time, Karsten revised Fries's system for the “Hymenomyces,” most notably adding new generic names, usually by segregating taxonomic groups that Fries knew but preferred to retain in larger genera. This was often

caused by Fries's reluctance to use a microscope.¹³ It was probably no coincidence that Karsten titled his 1888–1891 (Karsten 1888a,b,1891) illustrated work *Icones selectae Hymenomycetum Fenniae nondum delineatorum*, the same as Fries's volumes some years previous.

Fries was conscious of his attention to “Hymenomyces” (i.e. gilled fungi = mushrooms) at the expense of other fungal groups. Although he abjured the use of a microscope, thinking that the primitive instruments of the day did not provide any information he could not get by other means, he nevertheless undertook to distribute sets of specimens of “Ascomycetes” as an exsiccatae¹⁴ entitled “*Scleromycei Sueciae*” (Graniti & Zucconi 1995; Pfister 1975a) which, accompanied by *Systema* volume 2, and *Elenchus* 2, attempted to fill the taxonomic hiatus.

Fries had a fascination with lichens, shared by some other friends. Together, Fries and Christian Stenhammar gathered and distributed a lichen exsiccata, *Lichenes Sueciae Exsiccati*¹⁵ in 14 fascicles from 1818–1852. Early on, Fries had some correspondence with the aged fellow Swede Erik Acharius (1757–1819), the founder of systematic lichenology and the last person to defend a thesis under Linnaeus. Fries went on to author a major work on European lichens, *Lichenographia Europæa Reformata*, in 1831 (Fries 1831). Some lichens were also included in the *Systema Mycologicum*.

Fries, by modern standards, did not keep a large herbarium of fungi. The technique of drying fleshy specimens had not yet been perfected, and no other method had been discovered which retained the essential characters of the fresh specimens and, for Fries, the microscope did not yield worthwhile information. It is said that the only specimens Fries kept were those from other, usually foreign, workers, and odd growth forms of otherwise identifiable organisms. What there is of his herbarium is at the Museum of Evolution of Uppsala University and scattered among his several correspondents.

But Fries kept up a correspondence with some of his contemporaries. Berkeley not only exchanged letters with Fries, but received some fragments of specimens (Petersen, 1980) and illustrations as well (Dennis 1949). The American clergyman cum botanist, Moses Ashley Curtis complained to Berkeley that he (Curtis) could not correspond with Fries for his (Curtis) knowledge of Latin was insufficient. Karsten also exchanged some letters with Fries, but these have been lost.¹⁶ De Notaris (Italy) not only exchanged letters with Fries, but received an autographed photo of Fries (aged 74) (Fig. 5) and a set of *Scleromycei Sueciae* (Graniti & Zucconi 1995). Fries was busy and alert until his last days. In 1877 (Fries 1877), he caused the printing of his critique on a publication by Lucien Quélet (Quélet 1876), the French mycologist, which Fries considered to be Quélet's dissertation. Quélet has already published a major work four years prior (Quélet 1872).

To the question of what Fries's successors inherited and sought to perpetuate, an answer must comprise a dozen or more comprehensive mycological publications (including some which were later accepted as the “starting point” for nomenclature of most fungi until 1981, when they became “sanctioning works”), three published sets of accurate and



Fig. 5. Elias Magnus Fries. Signed image, probably 1876, two years before Fries's death.

usually full-size color illustrations of many species he knew, numerous students and especially their dissertations, two exsiccatae, wide personal correspondence and, perhaps best of all, intimate interaction with at least two succeeding individuals of mycological inclination, Hampus von Post and Lars Romell.

FRIES ACOLYTES

Hampus Adolf von Post (1822–1911) and Matts Adolf Lindblad (1821–1899)

The circumstances of von Post's initial contact and interaction with Elias Fries are lost in history. Von Post was born into a military family, his father having been discharged from the army with a wound incurred during the Finnish War. Hampus (Fig. 6) was the sixth of nine children. By all accounts, he seems to have been a bit of a dilettante¹⁷, dividing his time among military appointments, studies in chemistry, which he taught, and as manager of a glassworks. Much of his early life was spent in Ultuna, not far from Uppsala, and in 1840 (aged 18), he was a student at the University. It might have been there that he encountered Fries. Somewhat later, Hampus was also a pioneer in proselytizing for Louis Agassiz's theory that the Northern Hemisphere had once been covered by glaciation.

By all accounts, von Post was a meticulous observer of nature and compiled voluminous notes on what he saw, including both agaricoid and plant-pathogenic fungi. Perhaps influenced by Fries, von Post began collecting, identifying and illustrating fleshy fungi among other objects of nature. His notes and drawings were shared with Fries, who must have given positive feedback.

When Fries received the commission from the Academy of Sciences, which he used to illustrate species of fungi, Fries

saw this task as arduous but important to expand on his short descriptions of the fungi already published. He complained that he had to begin his "fourth reorganization of the fungi" he thought he had known (Fries 1857), the first being for *Observationes Mycologicae*, the second preparing for *Systema Mycologicum* and *Elenchus Fungorum* and the third upon his arrival in Uppsala. One can imagine that an eager collector-illustrator could have been a valuable contributor to the effort. In fact, while most illustrations were based on material collected in the general area around Uppsala, sketches, drawings and aquarelles were received from other parts of Sweden as well. Two mycologists were the largest contributors of illustrations, Hampus von Post, who lived in Östergötland¹⁸, and Matts Adolf Lindblad (more below). Strid (1994) reported that the National Museum in Stockholm shelters over 7000 von Post sketches and drawings.

Through his relationship with Fries, von Post became well-known enough to gain recognition even in America. Shortly after von Post's death, a short note in *Mycologia* (Anon. 1912a) included the following: "As is well-known, he was one of the most diligent and assiduous contributors to Elias Fries. Not a few of the new species described in Fries' later works were detected and distinguished by him, and quite a number of Fries' *Icones*, both published and unpublished, were originally drawn by this '*felicissimus fungorum investigator*,' who continued every year, even after Fries' death, and as long as his health and energy permitted, to collect, describe and illustrate species, varieties, and forms of the fungi growing around the agricultural college of Ultuna, where he was engaged during about 30 years." Later in the same issue (Anon. 1912b) appeared: "The large and valuable collection of unpublished drawings and descriptions left by the late Professor H. von Post, of Uppsala, Sweden, has been presented to the Naturhistoriska riksmuseet in Stockholm."

Matts Adolf Lindblad (1821–1899; Fig. 7) was not only a student under Fries,¹⁹ but went on to contribute substantially to the illustration project (Strid 1999). Recognizing that the important name-giving period for Fries was 1815–1834, almost all of it spent in and around Femsjö, Lund, Lindblad and an artist, Petter Åkerlund, spent a considerable time in that area. Over 500 paintings resulted. Next to Hampus von Post, Lindblad was important in perpetuating Fries's legacy, especially by illustrating Femsjö fungi for posterity.

Long after he returned to Stockholm, Lindblad helped found a mycological society there in 1879 (Strid 2000) and wrote a book-length manuscript on edible fungi. Work on the manuscript was taken up by Romell & Sandeberg (1901) and published a few years after Lindblad's death and again in 1913 and 1920 (Hirell 2013). The club remains active to this day, with regular forays and lectures. A name which appears in its membership is Lars Gunnar Romell, son of the below-mentioned Lars Romell. Meanwhile, Severin Petersen in Denmark was preparing his own mycological Flora around Slagelse, and he corresponded with Lindblad from 1882–1885.

Fries was swamped by the paintings and drawings which arrived from all quarters. Others were allowed to help select those paintings that were candidates for publication: Sven Johan Lindgren, Lindblad and two of Fries's sons, Oscar Robert and Elias Petrus. Those illustrations thought eligible

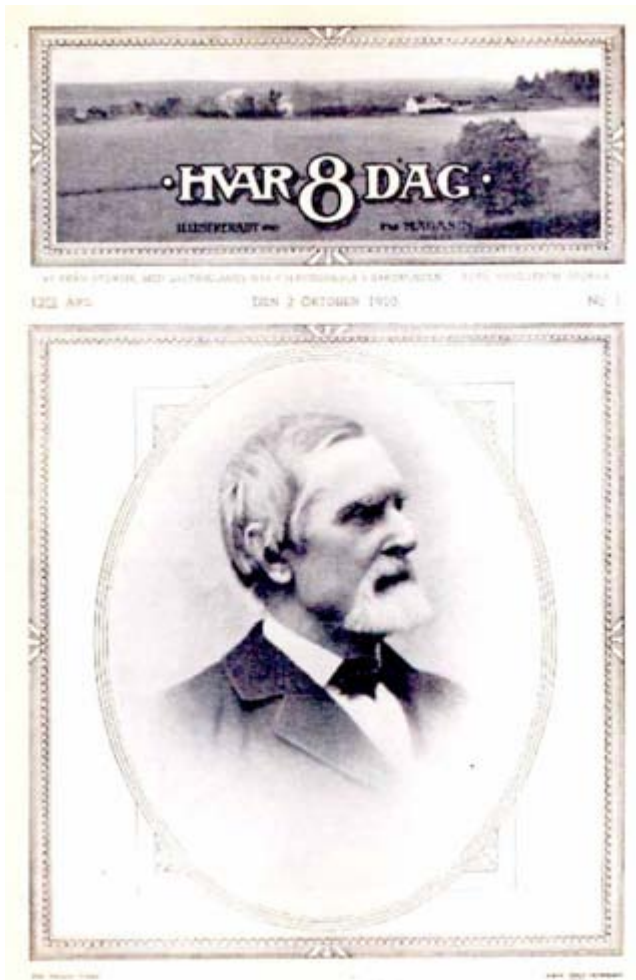


Fig. 6. Hampus von Post (1822–1911). Source: Cover of a local agricultural magazine.



Åke Strid

**Mykologen
Mats Adolf Lindblad
1821-1899**

Fig. 7. Mats Adolf Lindblad (1821–1899). Collaborator of Elias Fries and Hampus von Post. Source: Cover of *Jordstjärnan* 1999 (Strid 1999).

were approved by these helpers and finished paintings were produced by artists. Before reproduction by color lithography, the finished products were approved by Fries, thus establishing the “imprimatur” of these plates.

So as Elias Magnus Fries breathed his last, others were on hand to keep his taxonomic *corps de travail* intact. All of these people had personal interaction with him and to that extent knew not only his mycological products but his intimate ways of thinking, his rationale, his ideosyncracies. Von Post not only outlived Fries by some 33 years, but also brought Fries’s work into the 20th century.

THE DANISH CONNECTION

In 1847, Fries travelled to Copenhagen with his son, Thore, to attend a meeting of Scandinavian nature researchers. There he proposed that Swedish plants should be included in *Flora Danica* since the series already covered Denmark, Norway and Schleswig-Holstein in northern Germany. His proposal was accepted, but *Flora Danica* being financed by the Danish King, Swedish plants were added as a supplementary volume only after the Danish contributions were published. Thus additional botanical ties suggested by Fries were forged

to encompass Scandinavia as a whole, not just the individual nations.

During the 1850s, a new Danish connection emerged. Anders Sandøe Ørsted (1816–1872), of Copenhagen, had been on an expedition to Central America from 1845–1848, and among the specimens he gathered were some fungi. He sent them to Fries, who noted several of them in *Novae Symbolae Mycologicae* in 1851. Ørsted later became a teacher in the University at Copenhagen. Among those who were already on the faculty were Frederik Michael Liebman (1813–1856), involved in *Flora Danica*, and Joakim Frederik Schouw (1789–1852), a plant geographer and also an editor of *Flora Danica*. A student at the university was (Frederik Georg) Emil Rostrup (1831–1907), who credited Liebman for his (Rostrup) introduction to cryptogamic plants (including fungi). In 1858, Rostrup took a position at the Skårup Seminarium, a teacher-training college. By his own testimony, 1860 saw a wet summer and he was drawn to the mushrooms, which were so common, adding them to his knowledge of other cryptogams. His first emphasis, however, was on plant pathology. Nonetheless, he became a correspondent of Fries.

Rostrup (Fig. 8) is credited by Danish botanist-mycologists as a chief contributor to the study of the nation’s fungi, and



Fig. 8. Frederik George Emil Rostrup (1831–1907), Danish pioneer in phytopathology and correspondent with Lars Romell. Source: Library of the Danish Natural History Museum, Copenhagen.

among his circle were two individuals who would continue to expand his (and Fries's) legacy. Severin Petersen (Fig. 9) was a teacher in a small town near Slagelse²⁰ when, in 1881, he came upon some rather spectacular mushrooms. Knowing of Rostrup's reputation in such, he sent a specimen on, and Rostrup identified it as *Agaricus vahlii* (now *Phaeolepiota aurea*), a painting of which had appeared in *Flora Danica*. The two men struck up a correspondence, and Petersen's studies produced several small contributions as well as a large book (Petersen 1907–1911) on Danish mushrooms. Another supporter was (Johannes) Eugenius (Bülow) Warming (1841–1924), often held to be the father of the study of ecology. Warming had spent a few years studying in Stockholm, where he met Oscar Robert Fries, one of the sons of Elias and co-producer of the second volume of *Icones Selectae Fungorum*. Warming, therefore, had an appreciation of the fleshy fungi, and once aware of Petersen's studies, helped him obtain some financial support to continue his (Petersen) work.

The second aspiring mycologist to come into Rostrup's circle was Jakob Emmanuel Lange (1864–1941; Fig. 10), a gardener. Although not connected directly with Rostrup, Lange took an interest in "toadstools," and shared his discoveries with Rostrup, who encouraged him to continue. Not unlike Fries, Jakob Lange concluded that a good watercolor depiction of a mushroom was at least as important as its description and more important than a shriveled herbarium specimen. Much



Fig. 9. Severin Petersen, collaborator of Rostrup and author of a book on Danish mushrooms (Petersen 1907–1911). Source: Library of the Danish Natural History Museum, Copenhagen.

later, Lange opined that he had illustrated over 1100 species. Starting in 1914 (Lange 1914–1938), a series of agaric generic treatments for Denmark was published, often accompanied by a plate of illustrations. Invariably, Lange discussed the taxonomic system of Fries but supplemented Fries's concept with microscopic characters. In 1935, a sumptuous five-volume set entitled *Flora Agaricina Danica* (Lange 1935; often seen as two bound volumes) was compiled, including 200 color plates. The volumes bear obvious resemblance to Fries's *Icones Selectae Hymenomycetum*.

In addition to his studies of Danish agarics, Lange was interested in the use of the same name to represent widely scattered populations of the "same" mushroom. To this end, he visited the United States (Fig. 11) and Canada, accompanied by his teen-age son, Morten, to compare European and American mushrooms. During this trip Lange visited the Farlow Library and Herbarium. Farlow had commissioned artists to illustrate the fleshy fungi in New England, of which some were used in the *Icones Farlowianae* (Farlow 1927). Lange examined and annotated unpublished originals in the Farlow Library (Pfister, pers.comm). At home in Denmark, a popular guide to fungi was authored by Jakob and Morton Lange (Lange & Lange 1961), used Jakob's mushroom portraits, and was the most commonly used guide in Europe for many years.

To our knowledge, Jakob Lange was never associated with an academic program, so direct students did not follow.



Fig. 10. Jakob E. Lange (1864–1941), author and illustrator of *Flora Agaricina Danica*. Source: Library of the Danish Natural History Museum, Copenhagen.

However, he was a great inspiration for F.H. Møller among the Danish amateurs and of course for his son, (Knud) Morten Lange (1919–2003), who became the first professor in mycology in Denmark. In turn, Morten mentored Lise Hansen and Henry Dissing and inspired his own daughter Lene Lange. He later was appointed rector for the University of Copenhagen, and was also heavily involved in national politics, leaving little time for one-on-one mentoring. However, his annual field courses in which the students identified 300–500 species during the week trained numerous biology students in mycology. Lene recalls the original *Flora Agaricina Danica* drawings in a cabinet in her parent's house (Lange 2012), the other set being at the Natural History Museum of Denmark.

FIRST GENERATION REMOVED

Lars G. Romell (1854–1927)

Lars Romell (Shear 1928; Fig. 12) was 24 when Fries died, so his exposure to Friesian concepts was limited by youth. Romell took a B.A. from Uppsala in 1885, just seven years after Fries's passing. He entered a career as a professor at a Stockholm college but soon switched jobs twice and, in 1890, became a patent attorney, a profession which he practiced until his death, but a profession which granted him adequate time for excursions. During those years he became associated with Hampus von Post, with whom he shared an intense love of nature, and with Oscar Robert Fries, son of Elias, in Gothenburg. Through von Post, Romell was introduced to the Fries (and von Post) paintings and other Fries reliquiae and quickly picked up the nuances of mushroom taxonomy.

In his later years, Romell was appointed as a "curator" at the Swedish Museum of Natural History, where he helped to file and arrange the fungus specimens. Probably



Fig. 11. Small group of mycologists in Tennessee, 1939. Left to right: C.L. Shear, J. Dearness, Morten Lange, Jakob Lange, Robert Hagelstein. Photo by L.R. Hesler.

a consequence of the stature of the Museum, Romell was consulted by numerous international mycologists²¹, who always received encouraging words and often some specimens for comparison. In 1903, George F. Atkinson (1854–1918) of Cornell University, visited Sweden. His first stop was Uppsala where he collected on E.M. Fries's favorite sites and sought identifications from Fries's son, Robert, who was bedridden at the time (Thom 1956). Atkinson's second stop was Stockholm where he repeated his routine with Romell furnishing identifications. Curtis Gates Lloyd visited Romell and received specimens of polyporoid and resupinate fungi. Cornelius L. Shear visited three times with the same welcoming interaction. Calvin Henry Kauffman visited in 1908, and Gertrude Simmons Burlingham also spent time with Romell while on a Scandinavian trip during which she also worked with Seth Lundell and Jakob Lange (Denmark). Romell acted in the role of internationalist. Romell's spirit of cooperation also spread his expression of the Fries legacy. After a lively correspondence, William Chambers Coker traveled to Europe in 1921 and spent time with Romell in Stockholm as part of his (Coker) monograph on North American *Clavaria*'s (Joslin 2003). There are letters between Edward Angus Burt and Romell as well as several Romell specimens at Harvard (Pfister, pers. comm.). Oskar Robert Fries (Gothenburg) and Romell exchanged visits in 1888–1889, and Fries, who visited Severin Petersen in Denmark in 1889, reminded Romell about Petersen, which resulted in a lively correspondence between the two, particularly about *Russula*, Romell's favorite genus. Petersen was to visit Fries in Gothenburg in 1890 and 1896, further firming a relationship between these two countries.

When Romell was in his 50s, events at the Brussels International Botanical Congress (1910; Pfister 1981) brought new and added value to Fries's early writings. Urged to agree



Fig. 12. Lars Romell (1854–1927), collaborator of Elias Fries and perpetuator of the Fries legacy. Source: Lloyd CG (1911, Frontispiece, Synopsis of the section *Ovinus* of *Polyporus*. Cincinnati, pp. 73–93).

on a “starting point” for the nomenclature of fungi, mycologists at the Congress put forward a proposal to “start nomenclature” of most fungi with Fries’s *Systema Mycologicum*, volume 1, the date of which was accepted as 1821 (Petersen 1977). No mention was made of volumes 2 and 3, nor of the *Elenchus* 1 or 2 (eventually to be included, and legislatively dated as 1 January 1821). To be sure, no separation was made between taxonomy and nomenclature: Fries’s adoption of names was not distinct from his concepts of definable taxa. This was a distinction which was debated later. Fries’s *Observationes Mycologicae* (Fries 1815, 1818) was not included in the “starting point” literature, and Persoon’s *Synopsis Methodica Fungorum* (Persoon 1801) was designated as starting point for nomenclature of certain selected fungal groups.

The Brussels decision made Fries’s adoption (this was later deemed as “sanction” when later starting points for all fungi were abandoned in 1981) of names (most concisely summarized in the general index following vol. 3 of the *Systema*, where names accepted by Fries are in Roman font, synonyms etc. in italics) all the more important, and therefore also the preservation of his life’s work and maintenance of the Friesian tradition. Two more recent sources for these names have been produced (Gams 1984, Crane <http://www.fungaltaxonomy.org/nomenclator/>).

Embued with a sense of the overall contribution of Fries’s taxonomic concepts, Romell sought to perpetuate the legacy. As Fries had done years before, Romell decided to amass an exsiccata of fungi. Entitled *Fungi exsiccata praesertim Scandinavica* (Scheuer 2002), Romell conceived of three centuries of specimens. The first century was distributed in 1890, the second in 1895. The planned third century was not completed (Pfister 1985, Stevenson 1971).

In 1870, the Stockholm Museum began receiving an exsiccata produced by Heinrich (Simon Ludwig Friedrich Felix

Rehm (1828–1916), a German medical doctor with a strong avocation in ascomycete fungi, including lichens. Entitled merely *Ascomycetes*, fascicles comprised 50 specimens each and because the exsiccates were distributed long before the germane article of the International Code of Botanical Nomenclature appeared, new species could be validly published by way of specimen labels. Rehm was careful, however, to publish new taxa independent of exsiccate labels (usually in *Hedwigia*, and later in *Annales Mycologici*). In total, 2174 specimens were distributed, adding significantly to the fungi already accessioned. Romell (and later Lundell) curated this exsiccata, which, while not strictly within the Fries legacy, nevertheless lent stature to the Stockholm Museum and, thereby, to its staff. Eventually, Rehm’s personal fungal collection joined the herbarium at Stockholm. Moreover, as the Stockholm herbarium gained in reputation, other German collections were added, notably those of Paul Sydow (1851–1925) and his son Hans Sydow (1879–1966), Paul Hennings (1841–1908), including specimens from the German tropical empire (some of which became eligible for type status upon the destruction of the Berlin herbarium in World War II) and Paul Dietel (1860–1947; mostly *Uredinales*, on which Dietel worked for many years)²².

Both individually and as a collaborator with leading European mycologists, Giacomo Bresadola (1847–1929), Roman Catholic priest and rector of the diocese of Trento, Italy, became well-known for his voluminous work on the fungi of the Tyrol. He amassed a fine library, an herbarium collection of plants, many paintings and drawings and a significant herbarium collection of fungi. Economic circumstances during and following World War I put him in impecunious times and he was forced to sell portions of his accumulated holdings to make ends meet. Lars Romell, anticipating a grant to defray the costs, personally borrowed funds to buy a large portion of Bresadola’s herbarium. When the grant failed to materialize, Romell used his own funds to purchase the Bresadola specimens. Although financially awkward, the purchase added to the Stockholm Museum’s holdings (Strid, pers. comm.).

Romell served as an Associate Editor for *Mycologia* for some years and was awarded an honorary degree by the University of Uppsala in 1927, but passed away before the award ceremony.

Seth Lundell (1892–1966), John Axel Nannfeldt (1904–1981) and the *Fungi Exsiccata Suecici*²³

Seth Lundell (Fig. 13) became an honorary member of the Danish Mycological Society in 1962, which is hardly noteworthy, but in the presentation, the following deserves mention: “.....for your co-editorship of the grandiose and beautiful exsiccata *Fungi exsiccata Suecici*, in which the agarics have been preserved in the special preparation technique developed by you. You have in an ideal way given an exceptionally important contribution to stabilizing the types for several of the fungi described by Elias Fries”²⁴.

Lars Romell (Santesson 1982–1984) spent only a few years in academia, but it is said that one of his students was Seth Lundell. After graduation, Lundell had a brief early career as an auditor for the postal authority but in the midst of military service he was afflicted with tuberculosis, dictating



Fig. 13. Seth Lundell (1892–1966), founder of *Fungi Exsiccati Suecici*. Source: *Friesia 7*: frontispiece (1963) [“1962”].



Fig. 14. John Axel Nannfeldt (1904–1985), Professor of Botany at Uppsala University and mentor to numerous mycological students. Source: Svensk Biografisk Lexikon.

a long convalescence at his home, Storvreta, near Uppsala. In this period he spent time walking in the nearby forests and perhaps was introduced to a study of nature, especially fungi, by Romell²⁵ and Carl Mörner, a son-in-law of Elias Fries. The “Hymenomycetes” in particular became his strong avocation, essentially mushrooms and their relatives. Lundell’s birth coming some 14 years after Fries’s passing, meant that for the first time there was no personal interaction between the master and the mycological second generation. Lundell strived to connect the fungi which he found and collected with the descriptions, paintings, and names left by Fries.

As time passed, Lundell’s wish was to be recognized for his mycological expertise and to be offered a position which allowed him to express his talents, but much as in the present day, positions which recognized such a talent were in academia and those positions usually required a doctorate degree. He was often asked to participate in mushroom “control”²⁶, attended numerous forays and excursions and identified collections from all parts of Sweden. His reputation grew and somewhat at odds with tradition, Lundell was hired by the Swedish Museum of Natural History in Stockholm (1929–1934), ostensibly to bring order to and accession the large fungal collection of Lars Romell. Among other tasks, Lundell revised and published a hardly known Fries manuscript²⁷.

While Lundell and the mycologists of the Stockholm Mycological Society acted as a “hub” of activity in those years, the University at Uppsala was being mycologically resurrected. (Johan) John Axel (Fritiof) Nannfeldt (1904–1985; Fig. 14)²⁸ studied botany at the University, with his doctoral dissertation dealing with the inoperculate discomycetes. He received his degree in 1931, and after a temporary appointment as Professor at the Agricultural High School (1934), Nannfeldt moved to Uppsala, where he rose in the ranks. From 1939

through 1970 (31 years) he occupied the position as professor of botany, directly in the line of E.M. Fries.

The idea of an exsiccatae of Swedish fungi was Lundell’s, with the expressed purpose to give reliable knowledge of what Fries’s names meant. In late 1933, with war looming on the European horizon, a group of interested parties, including three Fries family members and Nannfeldt, formed the Elias Fries Committee²⁹ with the expressed intention of assembling an exsiccati of specimens from Sweden, more particularly the collecting grounds of Elias Fries. This was the birth of the *Fungi Exsiccati Suecici* (Stevenson 1937)³⁰. “The Committee is privileged in having the assistance of Mr. Seth Lundell, the most eminent expert of Swedish Hymenomycetes...” “The majority” of species were collected by Lundell, but ascomycetes were collected by Nannfeldt and fungi of groups other than these were identified by Nannfeldt. As time passed, other collectors contributed, but explanatory notes were almost always penned by Lundell or Nannfeldt, often including geographical, ecological, phenological or taxonomic information. In addition to the *Exsiccatae*, Lundell sent specimens to international workers: several specimens from Lundell came to the University of Michigan from 1922–1929 (to Calvin Kauffman) and 1932–1956, probably for Alexander Smith.

Thus a mycological axis was formed between Uppsala and Stockholm and assembly of the *Exsiccatae* began. It was envisioned as comprising 500 collections divided into 10 fascicles of 50 each. The initial fascicle was distributed in 1934, edited by Lundell and Nannfeldt. Soon, Nannfeldt arranged for the first of several appointments for Lundell at the Botanical Museum in Uppsala in order to provide for continuity for the *Exsiccatae* and to process specimens for the UPS herbarium. This arrangement, which psychologically put Lundell subservient to Nannfeldt, may not have met

with Lundell's enthusiasm³¹ but it kept him occupied with mycological tasks for much of the rest of his life. The notice of his death inside fasc. 57–60, summed up his career. The subsequent fascicles appeared regularly, the latest and perhaps last of this valuable and reputed exsiccata appearing in 2012 (nos. 3750–3800!).

World War II greatly disrupted national economies, including those of “neutral” nations. In spite of this, the *Exsiccati* continued in distribution. The scheduled International Botanical Congress of 1945 could not be held, but following the war's cessation, a botanical congress was convened in Stockholm in 1950, in many ways acknowledging the relatively peaceful and progressive Swedish society. Numerous nomenclatural acts were considered and ratified, but at least one was germane to the *Exsiccatae*. Theretofore, names of new taxa could be published on labels of exsiccata specimens, but at the Stockholm Congress a new text made such proposals of names “not validly published” after January 1953³². Instead, separately printed and distributed documents, fulfilling the requirements for effective publication were required. Lundell and Nannfeldt anticipated such a change, and catalogues reproducing specimen labels appeared separately from the specimens themselves from the beginning.

RECENT HISTORY

Nannfeldt was very productive, with many papers in mycology, including lichenology, but equally important was his mentoring of a new generation of mycologists in the Fries tradition. The first of these was Lennart Holm (1921–2012), not only an expert in ascomycete systematics but fastidious nomenclaturalist, followed by others; Rolf Santesson (1916–2013), lichenologist at the University of Uppsala and later the Naturhistoriska riksmuseet in Stockholm, who, with Nannfeldt, mentored Leif Tibell, lichenologist and now retired, Roland Moberg, lichenologist, Uppsala University and Gunnar Gilenstam, lichenologist now retired; Kerstin Holm, partner (and wife) in Lennart's career; John Eriksson (1921–1995), mentored also by Seth Lundell, professor at the University in Gothenburg and himself a mentor to at least three succeeding generations of mycologists; Ove E. Eriksson, retired ascomycetologist in Umeå; Nils Lundqvist, author of a monograph and an exsiccata of fimicolous fungi and professor at Uppsala and later at the Naturhistoriska riksmuseet in Stockholm; Åke Strid, curator at Stockholm for many years; Svengunnar Ryman (Ryman & Holmåsen 1984), curator of the fungal herbarium at UPS, researcher on “Hymenomycetes” and recently retired; Brita Lindeberg, who studied smut fungi and whose dissertation, *Ustilaginales* of Sweden, was published under the editorship of Nannfeldt; and Lena Junell, a student of the *Erysiphales*. The “progeny” of Nannfeldt's mentoring have investigated wide spectra of fungi, but are reaching (or have reached) retirement. Their mycological “offspring” continue.

Early in the 20th century, Swedish lichenology developed a genealogy of its own, from G. Einar Du Rietz, through Rutger Sernander and Gunnar Degelius to the above-mentioned Nannfeldt, Santesson, Tibell and Moberg (Jonsell 2007). Three of these students issued exsiccati of their own, not

necessarily to specifically perpetuate Fries's legacy, but to more firmly attach specimens to names.³³

The Swedish amateur mycological community has remained strong and active, with numerous forays including an annual national event. For many years an active group of educated amateurs in Stockholm also interacted, perhaps most prominently Nils and Astrid Suber (Suber 1968, 1976) and Olle Persson (Persson 1971, 1994, Persson & Nilsson 1977a, b) together with Bo Mossberg, a brilliant mushroom illustrator).

For Lundell and Nannfeldt, the collections for *Fungi Exsiccati Suecici* came chiefly from central Sweden, ideally from the collecting grounds of E.M. Fries. Not emphasized were Fries's early collecting grounds in southern Sweden. Recognizing this oversight, Meinhard Moser (1924–2002), from Austria and for many years the chief authority on mushroom taxonomy for continental Europe, took up the task of recollecting mushrooms bearing Friesian names or names accepted by Fries in the neighborhood of Femsjö. For at least 25 seasons Moser pilgrimaged to that area, carefully working up specimens for deposit in his home herbarium at the University in Innsbruck, Austria. (now preserved in Museum Ferdinandeum, Innsbruck).

As mentioned previously, in 1981, the International Botanical Congress in Sydney approved rolling back the “starting point” of fungal nomenclature uniformly to Linnaeus (1 May 1753), while names accepted in the basic books by Persoon and Fries (former starting points) were granted sanction (protection against competing, non-sanctioned older homonyms or synonyms). Korf (1983) proposed the most suitable formulation of this fact. Lists of sanctioned name have been compiled by Gams (1984) and superseded by a database compiled by Lee Crane: <http://www.fungaltaxonomy.org/nomenclator>. Gams & Kuyper (pp. 25–31 in Lundqvist & Moberg 1995) summarized the situation. Thus Fries's actions continue to stabilize fungal nomenclature to the present day (see Art. 15 ICN, McNeill *et al.* 2012).

In 1994, a spate of events commemorated the 200th anniversary of Fries's birth. One took place in Uppsala, with papers on Fries's life and philosophy, his contributions to taxonomy of Hymenomycetes and field trips to some of his favorite collecting locations (Lundqvist & Moberg 1995). Another was a jubilee celebration in Stockholm (Elfström *et al.* 1994). At the annual meeting of the Mycological Society of America, held jointly with the Fifth International Mycological Congress in Vancouver, Canada, in 1994, E.M. Fries (in the form of Richard P. Korf) presented himself and delivered some cautionary words about changes in fungal nomenclature (Korf 1994).

CONCLUSION

So what is to be made of such a legacy and its nurture over two centuries? Several avenues have been used to foster and diffuse the concepts of Fries. Despite the underlying Romantic philosophy, fungal taxonomy continues to give Fries's early volumes a special place in spite of tinkering with their role and ongoing nomenclatural terminology. Despite the small size of the Fries herbarium, *Fungi Exsiccati Suecici* has expressly

intended to be faithful to Fries's identifications. Despite Fries's often brief descriptions, thousands of paintings, drawings and sketches have been produced precisely to depict Fries's concepts of fungus taxa. A prodigious number of students defended dissertations written by Fries, adding to the wealth of major works by Fries over his lifetime. In the latter half of the 20th century, new generations of mycological students became faculty and mentored succeeding generations. The Fries legacy was carried to other Scandinavian countries through correspondence by Fries, himself, and successors. More recently, the mycological network and community have spread worldwide. Currently, on-line resources, none more important than *Index Fungorum*, facilitate the search for accurate names and protologues. The introduction of "epitype" for material suited for molecular analysis has diluted traditional typification through preserved material, but at least Fries's original meaning can hopefully be ascertained and preserved more accurately.

For most of the two centuries since Fries's *Observationes* I, the tradition was guarded and enlarged by a few individuals, but the second half of the 20th century saw a significant increase in mentor-student numbers. This has been accompanied by a widening of disciplines in which Fries's legacy may be seen, but which do not directly perpetuate it. Fungal genetics, fungal physiology, research on mycorrhizal associations, fungal ecology, clinical mycology and others use bits and pieces of the Fries tradition, but do not guard it. This may be typical of our society's time, but it would be a shame to overlook perhaps the most important legacy established in mycology.

ACKNOWLEDGEMENTS

The germ of relating this story was transmitted some 50 years ago by Marinus Anton Donk, to whom RHP is indebted for so many things in his mycological career. To data already in hand and found, several Swedish mycologists furnished their own reminiscences and sources, specifically Nils Hallenberg (retired professor at Gothenburg), Karen Hansen (mycologist at the National Museum, Stockholm), Martin Ryberg (faculty member at the University at Uppsala), Svengunnar Ryman (retired curator at the Museum of Evolution, Uppsala), and Åke Strid (retired curator at the Stockholm Museum). From the American side, we are indebted to the following: Pat Rogers (University of Michigan); and Roy Halling (The New York Botanical Garden).

Heartfelt thanks from RHP to Don Pfister (Farlow Herbarium, Harvard) for several leads included here and a signed review of the initial manuscript.

END-NOTES

¹ Fries's diary for 1810 and 1811 is with the family, with a copy in Copenhagen. In it, Fries wrote (transl. HK): "Last year I kept a diary in natural history for what I found in May and June, and since this was both of pleasure and useful to me, I intend to make a similar book this year, although in a more strict way, mostly from the most flower-rich months, but very likely I will continue it throughout the year, since I have found that no month is missing flowering plants."

² Fries, Sigurd. [date unknown]. Elias-Fries-porträtt. Särtryck ur nation Smolandica XIV, ärskrift utgiven av Smålands nations I Uppsala kamratförening.

³ *Systema Mycologicum* vol. 1

The three volumes of *Systema* were reprinted by Hafner in 1952.

The two parts of *Observationes*, the three volumes of *Systema* plus the two parts of *Elenchus* were reprinted in three volumes in 1994 by Confederatio Europaea Mycologia Mediterraneensis A.E.

⁴ *Elenchus Fungorum* vol. 2

Elenchus 2 published the same year as:

⁵ Against this tradition, Fries wrote his own dissertation (1814) under the supervision of C.A. Agardh. *Novitiae Florae Suecicae* (Part. 1) included vascular plants, ferns, lichens and other fungi. Thanks to Svengunnar Ryman for this information.

Fries EM (1828) *Novitiae Flora Suecicae*. Edit. Altera. Londini Gothorum, "ex officina Berlingiana," xii + 304.

⁶ A survey of the library catalog of the New York Botanical Garden, the *Thesaurus* of Lindau & Sydow and *Taxonomic Literature* II of Stafleu & Cowan for items listed as dissertations along with the name of the student. In the University Library at Uppsala is a catalog of disputations defended there between 1820 and 1855. Considering that Fries moved to Uppsala in 1834, and continued his life well beyond 1855, there are 116 disputations listed under his name (Marklin 1856).

⁷ Web pages for Fries family association (mostly in Swedish):

www.eliasfries.org/elias-fries-och-slakten-5398331

www.eliasfries.org/litteratur-lankar-archiv/elias-fries-portrat-av-sigurd-fries-7795233

⁸ Farlow (1887) related the following in his memorial to Tuckerman (thanks to Donald Pfister):

The most important event of [Tuckerman's] life, botanically considered, was his journey to Sweden in 1841, where he met Elias Fries, professor of botany at Uppsala, the leading lichenologist of his time, and, after Linnaeus, the most distinguished of Sweden's many distinguished botanists. Thirty years later, when the writer was at Uppsala, Professor Fries, then a venerable man of eighty with undiminished mental vigor, recalled the days when the enthusiastic young American was at Uppsala and related how, when walking together on the famous avenue near the university, Tuckerman discovered a species of lichen which he, the authority on lichens, had not seen there before. The visit to Fries was important because it enabled Tuckerman to acquire, if one may say so, the traditions of the science. In some branches of cryptogamic botany it is almost a necessity that an American should see the species of Europe under the guidance of a botanist trained on the spot if he would clearly recognize the same species when they occur in America. There is an indescribable something, especially in lichens, which certainly is not and probably could not be laid down in books. It is fortunate for our lichenologists that Tuckerman was able to transfer to America and perpetuate on this side of the Atlantic the ideas of classification and specific limitations derived from Fries himself. Certainly, during his life he always adhered to the Friesian views of classification, which he preferred to those of later botanists.

⁹For information in this paragraph we are indebted to Åke Strid, now retired from the Swedish Museum of Natural History, Stockholm.

Lund came to work with Fries in July, 1844, just as Fries was assembling his *Summa vegetabilium Scandinaviae* and gave Fries an opportunity to publish some taxonomic notes without a free-standing publication. See: *Bot. Notiser* **1845**: 130.

¹⁰ Handwritten list by Thore Magnus Fries at the museum in Stockholm.

¹¹ Title page for volume 2 dated as MDCCCLVII, but reprinted Fries autobiography dated as 1884. Final fascicle dated as MDCCCLVII-MDCCCLXXXIV.

¹² In the introduction to *Icones Farlowianae*, Farlow writes: "During the pursuit of his studies which have occupied a considerable number of years, he has himself met with many difficulties and he has often felt that, if there were only in existence a work giving good illustrations and full descriptions of our principal species, his progress in the study would have been greatly helped. A good many persons, attracted by the numerous and striking forms of fungi which abound in this country, have been deterred from attempting to study them by the difficulty of finding descriptions of them in the scattered literature on the subject which is not readily obtained and not always easily understood. For such persons the quickest and most practical way would be, by comparison of living specimens with good plates and adequate descriptions, to obtain a definite knowledge of a certain number of forms which they could refer to as types and, with these as a starting point, proceed in their study."

¹³ Strid (pers. comm.) reports that Fries's rejection of the microscope led to his small herbarium. Fries considered that poorly preserved specimens (either air-dried or dried over a fire, neither with satisfactory results) were of little use compared with good illustrations from fresh material.

¹⁴ Exsiccatae comprise collections large enough to be divided into several individual packets. Once this process had been completed for multiples of collections, sets of specimens are numbered, formed into decades (10) or centuries (100) and distributed to interested workers, usually free of charge, but sometimes as subscriptions. See: Holm L, Nannfeldt JA (1963) ["1962"] Fries *Scleromyceti Sueciae. Friesia* **7**: 10–59.

The various endings of the term "exsiccati" were discussed by Pfister (1985), who devised a protocol. We have attempted to follow this protocol in text.

¹⁵ *Lichenes Sueciae Exsiccati*. E.M. Fries and Chr. Stenhammar, curators.

Fasc. I–II: 1818, reissued in 1824

Fasc. III, IV, VII, VIII, IX, XIII: 1824–1827

Fasc. V, VI, X, XI, XIV: 1825–1833, Chr. Stenhammar

Fasc. XII: 1852.

See also: Sayre G (1969) Cryptogamae Exsiccatae – an annotated bibliography of published exsiccate of *Algae*, *Lichenes*, *Hepaticae*, and *Musci*. *Memoirs of the New York Botanical Garden* **19**: 1–174 (p. 125).

¹⁶ Correspondence with Seppo Huhtinen, Dec. 2014.

¹⁷ http://sv.wikipedia.org/wiki/Hampus_von_Post

¹⁸ Östergötland is well to the southwest of Uppsala and Stockholm, and perhaps about equidistant between Uppsala and Gothenburg.

¹⁹ Matts Lindblad's dissertation, written by Fries, is variously listed as: Fries EM (1853). *Synopsis fungorum hydnaceorum in Suecia nascentium* ... Lindblad, Matts Adolf (see Marklin 1956) and New York Botanical Garden library catalog; vs. *Monographia Lactatorum Sueciae* in other sources.

²⁰ From the autobiography by Jakob Lange: "Apart from Rostrup, who from the start followed my work with great interest, I have to mention Severin Petersen, best-known for his popular book 'Our song birds.' Some years before me he had taken an interest in the 'toadstools' and gave me in the first years many valuable hints and information. He worked himself under very difficult conditions. He was a schoolteacher; and only after 3 o'clock in the afternoon he could hurry out to the quite distant forest and in the dwindling hours of the autumn days collect material, which he then had to study under a lamp at home. Nevertheless, he succeeded in making a quite complete fungus flora, the first of its kind" [in Denmark].

²¹ Shear noted that he had started interacting with Romell as early as 1893, indicating that Romell already had an association with the Swedish Museum of Natural History.

²² Åke Strid (pers. comm.).

²³ Information on Lundell was generously furnished by Åke Strid, retired curator of fungi at the Swedish Museum of Natural History and Nils Hallenberg, Gothenburg. Some was gleaned from a paper by Rolf Santesson.

²⁴ The technique was to first dry the fungi normally, then put them in a box with wet paper, that was slowly taken up by the dried fungi so they became flexible, and then they were put under pressure as in a plant press until dry. The advantage of this technique is especially the small space taken up by the collections afterwards, but it is argued that the fungi also may lose characters if not taken in the exact right moment; otherwise they start to rot or develop new "disturbing" hyphae.

²⁵ Buchwald (*Friesia* **7**: 107, 1963) wrote in connection with this (translation by HK): "Dr Seth Lundell became acquainted with mycology through Lars Romell when very young, and with whom he collaborated closely over a half-dozen years until his [Romell] death in 1927. Romell himself was a student of Elias Fries' son, the mycologist, Dr Robert Fries in Gothenburg, and it may therefore be said that Dr Seth Lundell to a higher degree than any other living mycologist preserves and continues the mycological traditions from the period of Elias Fries."

²⁶ "Control" is a service throughout continental Europe by which experts judge and approve fresh collections by the public for edibility and possible sale in the market.

²⁷ As part of his respect for Fries: Lundell S (ed.) (1936) Fries, E.M. Svamplokaler ved Femsjö. ("a manuscript left by Fries and edited by Lundell"). *Friesia* **1**: 259–286.

²⁸http://en.wikipedia.org/wiki/John_Axel_Nannfeldt_sok.riksarkivet.se/sb/Presentation.aspx?id=8756

²⁹ The “undersigned” committee: Rob. E. Fries, Carl Th. Mörner, Thoralf Fries, John Axel Nannfeldt, Nils E. Svedelius, Elias Melin, Rutger Sermander. The *Exsiccati* effort was financially supported by a grant from the “Längmanska kulturfonden.”

³⁰ “*Fungi exsiccati suecici, praesertim Upsalienses mandatu collegii ex Elia Friesio nominata edendos curaverunt Seth Lundell et J.A. Nannfeldt*”. Distributed through the Botanical Institute of the Uppsala University in 10 copies to UPS, S, C, PC, BM, V, PR, LE, BPI, DAOM, [B partial]. Dried specimens are often accompanied by black and white photos of fresh material.

The exsiccati began distribution in 1934. Over the years, editorship was shifted from Lundell and Nannfeldt, through Lundell, Nannfeldt and Holm; Holm and Nannfeldt; finally to Holm and Ryman, all close associates of Nannfeldt. About the first half of the specimen labels were reproduced as “Publications from the Herbarium, University of Uppsala.” Subsequent labels have been published as issues of *Thunbergia*, merely reflecting a change in the title of the publication series.

The exsiccatae was interrupted due to the death of Lundell, but interest from Sweden and abroad led to a reconstituted Elias Fries Committee on 29 January 1976. This announcement was dated November 1978 and signed by: Magnus Fries, Lennart Holm, Elias Melin, Nils Fries, Gösta Lindeberg, Rolf Santesson, Olov Hedberg, John Axel Nannfeldt and Hugo Sjörs.

Inside the next catalogue of labels [1979: Fasc. 57–60]: “With the death of Dr. Seth Lundell, Sept 23, 1966, a life's work in the service of mycology was brought to an end. He has raised to himself a memorial in this exsiccata, which he initiated and to the very last embraced with ardent interest.” [Pp. 116–145 is a cumulative index of fascicles 1–60 (nos. 1–3000)].

³¹ Correspondence: Nils Hallenberg, 2014–2015; Åke Strid, 2015.

³² International Code of Nomenclature (McNeill *et al.*, 2012) Art.30.7: “The distribution on or after 1 January 1953 of printed matter accompanying specimens does not constitute effective publication.” By implication, this includes the label with each specimen.

³³ Lundqvist, N. *Fungi fimicoli Exsiccati*: fasc. 1–2 (nos. 1–50. 1981) Publications from the herbarium, University of Uppsala Fasc. 3. (nos. 51–75. 1981). Labels published as issues of *Thunbergia* 3–5. Santesson, R. *Fungi lichenicoli exsiccati*: Fasc. 1–2. (nos. 1–50 1984). Fasc. 3–4. (nos. 51–100. 1986). Labels published as *Thunbergia* 16. Moberg, R. *Lichenes selectae exsiccati Upsaliensis* Fasc. 1 (nos 1–25. 1986). Issued as *Thunbergia*. Fasc. 2 (nos. 26–50. 1987). Issued as *Thunbergia* 2. Fasc. 3 (nos. 51–75. 1989). Issued as *Thunbergia* 7. Fasc. 4 (nos 76–100. 1990). Issued as *Thunbergia* 14. Fasc. 5–6 (nos. 101–150. 1994). Issued as *Thunbergia* 20. Fasc. 7–8 (nos. 151–200. 1996). Issued as *Thunbergia* 24.

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