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Kärnefelt, Ingvar; Seaward, Mark; Thell, Arne

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LUND UNIVERSITY

PO Box 117
221 00 Lund
+46 46-222 00 00

From Hoffmann to Wirth – an historical perspective of published German Lichen Floras

INGVAR KÄRNEFELT, MARK R. D. SEAWARD and ARNE THELL

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German lichen flora projects are surveyed from Georg Hoffmann's *Deutschlands Flora oder Botanisches Taschenbuch. Zweyter Theil für das Jahr 1795. Cryptogamie* to the recently published *Die Flechten Deutschlands* 2013, via Wilhelm Körber's *Systema Lichenum Germaniae* 1855, and the supplementary volume *Parerga lichenologica* 1859, Gustav Lindau's *Die Flechten, Kryptogamenflora für Anfänger* 1913 & 1923, Ludwig Rabenhorst's *Kryptogamen-Flora von Deutschland, Österreich und der Schweiz* 1930–1960, Walter Migula's *Kryptogamen Flora von Deutschland, Deutsch-Österreich und der Schweiz* from 1929 & 1931, Georg Lettau's *Flechten aus Mitteleuropa* 1939, 1944 & 1958, and Josef Poelt's *Bestimmungsschlüssel Europäischer Flechten* from 1969.

Ingvar Kärnefelt, Botanical Museum, Lund University, Box 117, SE-221 00 Lund, Sweden; ingvar.karnefelt@biol.lu.se

Mark R. D. Seaward, Department of Archaeological, Geographical & Environmental Sciences, University of Bradford, Bradford BD7 1DP, United Kingdom; m.r.d.seaward@bradford.ac.uk

Arne Thell, Botanical Museum, Lund University, Box 117, SE-221 00 Lund, Sweden; arne.thell@biol.lu.se

This work is dedicated to our friend Tassilo Feuerer on the occasion of his 65th birthday acknowledging in particular his fieldwork and collections, as well as his impressive database of checklists.

Introduction

Lichen flora projects have a long tradition in Germany (Kärnefelt *et al.* 2012), the most recent one, *Die Flechten Deutschlands* by Volkmar Wirth, Markus Hauck and Mattias Schultz providing a major scientific contribution to our knowledge in an elegantly presented two-volume edition of 1244 pages (Wirth *et al.* 2013). Details of the anatomy, chemistry, ecology and distribution are provided for 2140 species, a third of which are beautifully illustrated, following the high standard set by Wirth's *Die Flechten Baden-Württembergs* (Wirth 1987). The layout follows the typical concept developed in his first *Flechtenflora* (Wirth 1980), the detailed characters listed for the numerous genera supported by diagnostic keys to the species. The excellence of the work is portrayed in the numerous reviews (e.g. Aptroot 2014, Llimona 2014, Lücking 2014, Printzen 2013). Suffice it to say that this modern German lichen Flora rests upon the enormous experience and knowledge of the first author with over four decades of recording in the field.

Volkmar Wirth was born in 1943 in Herrnhut in Saxony, but the family later moved to Zell in

Schwarzwald. His first published lichenological paper was in 1963 whilst he was studying at Freiburg University; he received his habilitation at Würzburg University where he worked with Otto Lange. In 1975 he was appointed as a botanist at the Staatliches Museum für Naturkunde in Stuttgart; here he stayed until he became the Director of the Staatliches Museum für Naturkunde in Karlsruhe in 2001, where he remained until his retirement in 2008. At Stuttgart he started work on a new Flora, based on careful fieldwork in Baden-Württemberg, first published as *Flechtenflora* (Wirth 1980); a 2nd edition (Wirth 1995a), with coloured photographs, *Die Flechten Baden-Württembergs* (Wirth 1987), and a further revision *Die Flechten Baden-Württembergs* (Wirth 1995b) followed. He also contributed to other major works, such as *Farbatlas Flechten und Moose* (Wirth & Düll 2000), and its enlarged edition in Spanish (Wirth *et al.* 2004), as well as more popular texts (Kirschbaum & Wirth 1997, Wirth & Kirschbaum 2013).

Markus Hauck, born in 1970, studied biology at the University of Göttingen 1991–1997, whereafter he continued his postgraduate studies, obtaining his doctorate in 2000 for a thesis on ecology of epiphytic lichens in a montane spruce forest. His habilitation was awarded in 2003 from the same university (Kärnefelt *et al.* 2012).

Matthias Schultz was born in Prignitz in 1972 and studied biology in Rostock, later following his tutor Burkhard Büdel to Kaiserslautern. He developed a special interest in cyanobacterial lichens in the Lichinaceae and has also contributed to the monumental *Lichen Flora of the Greater Sonoran Desert Region* (Nash *et al.* 2002, 2004, 2007).

This paper reviews those important German lichen Floras from Georg Hoffmann onwards upon which the latest (Wirth *et al.* 2013) was founded. Only Floras which have more or less corresponded with the geo-political regions of Germany have been surveyed; local Floras covering provinces, such as Bayern (Krempelhuber 1861), Sachsen and Thüringen (Rabenhorst 1870), Schleswig-Holstein (Erichsen 1957) and Brandenburg (Hillmann & Grumann 1957), or regions, such as Josef Anders's popular *Die Strauch- und Laubflechten Mitteleuropas* (Anders 1928), have been excluded. Attention has been paid to Georg Hoffmann's *Deutschlands Flora oder Botanisches Taschenbuch. Zweyter Theil für das Jahr 1795. Cryptogamie*, Wilhelm Körber's *Systema Lichenum Germaniae* (1855) and the supplementary *Parerga Lichenologica* (1859), Gustav Lindau's *Die Flechten, Kryptogamenflora für Anfänger* (1913 & 1923), Ludwig Rabenhorst's *Kryptogamen-Flora von Deutschland, Österreich und der Schweiz* (1930–1960), Walter Migula's *Kryptogamen Flora von Deutschland, Deutsch-Österreich und der Schweiz* (1929, 1931), Georg Lettau's *Flechten aus Mitteleuropa* (1939, 1944, 1958), and Josef Poelt's *Bestimmungsschlüssel europäischer Flechten* (1969). It should be noted that Rabenhorst's *Kryptogamenflora* was published over three decades by different authors, using Ludwig Rabenhorst's good name in the title. From all these works it is most probably that Lindau's more practical textbook, being for its time rather modern in text and illustrations, would have been more frequently used, and for many years Poelt's *Bestimmungsschlüssel* was widely used in academic teaching, being popular among both students and teachers.

Hoffmann's *Deutschlands Flora oder Botanisches Taschenbuch. Zweyter Theil für das Jahr 1795. Cryptogamie*

Georg Franz Hoffmann, born 1760 in Marktbreit, was a botanist who became interested in lichens. He was offered a professorial chair in Erlangen in 1787 where he stayed until 1792, when he was offered a chair in botany chair at Göttingen. Here he was much appreciated by the students due to his excellence as a lecturer. Hoffmann is best known for his publications *Plantae lichenosae*

Descriptio et adumbratio and *Descriptio et adumbratio plantarum e classe cryptogamica etc.* (Hoffmann 1789–1801) and his pocket-sized *Deutschlands Flora oder Botanisches Taschenbuch. Zweyter Theil für das Jahr 1795. Cryptogamie* (Hoffmann 1796). The latter was a very handy cryptogamic Flora (comprising groups of fungi, ferns, bryophytes) of c. 100 pages, which treated (in Latin) 266 species and infraspecific taxa of lichens. It was most probably used by Hoffmann's students whilst on excursions in the surroundings of Göttingen. In 1804, he accepted the chair in botany at Moscow, where he stayed for 22 years, having no opportunity to visit his beloved Göttingen, and died in 1826.

Körber's *Systema Lichenum Germaniae* and *Parerga Lichenologica*

Gustav Wilhelm Körber, born in Hirschberg in Silesia in 1817, studied in Berlin and Breslau. His first degree allowed him to become a teacher, in due course being promoted to the highest rank. However, he continued on an academic career and obtained a doctorate for his work on lichen algae; he then defended a second thesis allowing him to look for a higher academic position, eventually leading to an associate professorship in 1873 at the University of Breslau, where he remained until his death in 1885. His most important publications were *Systema Lichenum Germaniae* (Körber 1855) and the supplementary volume *Parerga Lichenologica* (Körber 1859), but he is also remembered for his severe criticism of Schwendener's theory on the dual nature of lichens (Körber 1874). Körber's *Systema Lichenum Germaniae* was primarily a treatment of the lichens occurring within the German border at that time, the province of Silesia (now south westernmost region of Poland) receiving particular attention; however, Switzerland and parts of northern Italy, such as the province of Lombardy, were included. The work (458 pages and four colours plates) is based on an examination of more than 1000 taxonomic entities, each described in Latin, but with ecological observations and discussions in German. Further observations appeared in *Parerga Lichenologica*, a supplement to his *Systema Lichenum Germaniae*, where Latin descriptions in many cases include spore measurements. The very detailed texts of these two works were appreciated by scientists in central European universities.

Lindau's *Die Flechten, Kryptogamenflora für Anfänger*

Gustav Lindau, born in Dessau in Anhalt in 1866, studied natural sciences in Heidelberg and Berlin. Together with Georg Bitter and Gustav Krabbe, Lindau was also fortunate to have had Simon Schwendener as his tutor and he defended a thesis on the development of apothecia in lichens in 1888. A few years later, he moved to Münster to become Director of the Botanical Garden, but in 1892 he returned to Berlin as an assistant in the Botanical Garden. However, in 1902 he was promoted to full professor. Lindau published extensively, preferably on material of collections obtained from exotic places through expeditions, which he determined in the Berlin Museum. He is mainly known for his bibliographic work, together with the mycologist Paul Sydow, which was published in many issues as *Thesaurus Literature mycologicae et lichenologicae* etc. between 1907 and 1917 (Lindau & Sydow 1907, 1954). His popular lichen flora for beginners, published as a part of the series *Kryptogamenflora für Anfänger* (Lindau 1913, 1923), was a useful manual on lichen biology with information on lichen morphology and anatomy, as well providing a general key to 137 genera. The major part of the book is a treatment of species arranged according to the accepted family classification of that time. The descriptions are generally short and diagnostic, focussing on key characters, such as spore size and chemical reactions of the thallus. The book was richly illustrated with line drawings of thallus morphology,

as well as ascocarp and pycnidial characters. It is probable that this little book was used extensively by students. Lindau died in Berlin in 1923; his herbarium and documents, all kept in Berlin, were unfortunately destroyed during air raids in 1943.

Rabenhorst's *Kryptogamen-Flora von Deutschland, Österreich und der Schweiz*

Ludwig Rabenhorst, born in Treuenbrietzen in 1806, chose a career in pharmacy, a subject strongly associated with botany in those days, and therefore he decided to deepen his knowledge in botany at the University of Berlin. After managing a pharmacy in Luckau for a short while, he gained his doctorate in 1841 at the University of Jena, having developed a comprehensive knowledge in botany, especially in cryptogamic botany. He settled in Dresden in 1840, moving to nearby Meissen in 1875 until his death in 1881. During his time in Dresden he published the first volumes of *Deutschlands Kryptogamenflora* and also launched and published the periodical *Hedwigia*. He published extensively on lichens and distributed many exsiccates (Rabenhorst 1845, 1855–1879, 1870). Rabenhorst's legacy is above all for his contribution to our knowledge of the cryptogamic floras of central Europe, and his well-known *Rabenhorst's Kryptogamenflora*, which appeared in a multi-volume second edition after his death. These provided detailed information on taxonomic groups and appeared from 1930 to 1960 under the authorships of well known specialists:

- C. F. E. Erichsen: Bd 9. Abt. 5(1): 321–728. 1936 (Pertusariaceae).
- E. Frey: Bd 9. Abt. 4(1): 1–424. 1933 (Cladoniaceae and Umbilicariaceae).
- J. Hillmann: Bd 9. Abt. 5(3): 1–309. 1936 (Parmeliaceae); Bd 9. Abt. 6(1): 1–36. 1935 (Teloschistaceae).
- K. v. Keissler: Bd. 8. 722 pp. 1930 (lichen parasites); Bd 9. Abt. 1(1): 1–43. 1934 (Moriolaceae); Bd 9. Abt. 1(2): 1–846; 1938 (Pyrenulaceae, Mycoporaceae and Coniocarpineae); Bd 9. Abt. 5(4): 1–640. 1958–1959 (Usneaceae).
- K Köfaragó-Gyelnik: Bd 9. Abt. 2(2): 1–272. 1940 (Cyanolichens).
- B. Lyngbe: Bd 9. Abt 6(1): 37–188. 1935 (Physciaceae).
- A. H. Magnusson: Abt 5(1): 1–318. (Acarosporaceae and Thelocarpaceae).
- K. Redinger: Abt. 2(1): 181–404. 1937 (Arthoniaceae et al.).
- H. Sandstede: Abt. 4(2): 1–531. 1931 (the genus *Cladonia*).
- H. Zschacke: Abt. 1(1): 44–695. 1934 (Epigloeaceae, Verrucariaceae and Dermatocarpaceae).

Migula's *Kryptogamen Flora von Deutschland, Deutsch-Österreich und der Schweiz*

Walther Migula was born Zyrowa in Upper Silesia in 1863 and studied at the University of Breslau, receiving his doctoral degree in 1888. He was appointed associate professor at the Technical



Figure 1. An example of the beautiful line-drawings in Migula's Flora.

University in Karlsruhe, before he accepted a position at the Forest Academy in Eisenach in 1895. He retired in 1929 and died in 1938, renowned for his work on the cryptogamic floras of Germany, Austria and Switzerland. For its time his *Kryptogamen Flora von Deutschland, Deutsch-Österreich und der Schweiz* was an impressive work comprising two volumes (1393 pages) which treated and impressive 2080 species, many including a number of infraspecific taxa (Migula 1929, 1931). The text was entirely in German with careful generic descriptions followed by keys to the species. The species are described using morphological, anatomical and chemical characters, supported by coloured line drawings and b/w photographs, as well as information on distributions and habitat ecology (Fig. 1). Unfortunately, this comprehensive work is not widely known, due no doubt to the size of both volumes and the limited value for students and amateur biologists.

Georg Lettau's *Flechten aus Mitteleuropa*

Georg Lettau was born in Weißenfels in the Prussian province of Saxony (now part of Sachsen-Anhalt) in 1878. He first studied natural sciences in Halle and Leipzig, but switched to medical studies in the Universities at Freiburg, Heidelberg and Munich. He began his career as a doctor in Dresden, as an ophthalmological specialist in Arnstadt in Thüringen and from 1910 in Lörrach in Baden. During the first decades of the 20th century, he became interested in lichenology, influenced by Alexander Zahlbruckner and Julius Steiner, publishing mainly on lichens from Thuringia. He was clearly more interested in botany than in medicine, but as a physician he had a secure income. Furthermore, his chosen narrow field of ophthalmology within medicine allowed him enough time for botanical studies. During the depression following the First World War he lost all his savings and for several years had to work solely as a physician to earn his living, but he returned to lichenology and published *Monographische Bearbeitung einiger Flechtenfamilien* (Lettau 1937) and *Flechten aus Mitteleuropa*, several parts issued posthumously (Lettau 1939, 1944, 1958). This large work treats 1965 species, providing detailed information on morphological and anatomical characters, as well as thallus reactions, ecological preferences and distributions. Lettau died in 1951. His major work on central European lichens was used mainly by specialists in lichen taxonomy, and his large herbarium formed the basis for the new post-war lichen herbarium at Berlin-Dahlem.

Josef Poelt's *Bestimmungsschlüssel europäischer Flechten*

Josef Poelt, was born in the small town of Pöcking on the north-western side of Starnberger See in 1924. At an early age he developed an interest in botany, but at the end of his schooling at the beginning of 1943 he was sent to the eastern front in southern Russia. Luckily he managed to survive and in the summer of 1945 he could return to Pöcking, where he came in contact with Hermann Paul, a specialist in bryophytes and rust fungi, who introduced him to cryptogams. He continued his studies in biology in the autumn of 1946 at the University of Munich, and by 1950 this enthusiastic student received his PhD based on a thesis on bryophytes, after which he was offered a position as assistant in the Botanical Garden. In 1954, he appointed as a curatorial assistant in the cryptogamic herbarium, being promoted to Curator in 1957 and Senior Curator in 1959, at which time he completed his habilitation. In the autumn of 1965 Poelt accepted a chair at the Free University of Berlin where he became head of the new and expanding Department of Systematic Botany and Plant Geography. Already during the Munich years he had been working on a key to European lichens, which first appeared as *Bestimmungsschlüssel der höheren Flechten von Europa* (Poelt 1962). He had foreseen the need for a modern key to the lichens, not only for

his own teaching and research, but also for other users; so, a few years after his arrival to Berlin, a revision (757 pages), his well-known *Bestimmungsschlüssel europäischer Flechten* was published (Poelt 1969). This Flora was a great success as a research tool for lichenologists, as were the two supplements co-authored by his friend, Antonin Vězda (Poelt & Vězda 1977, 1981). They were suitable for use over a wide geographical region which extended from Germany into central Europe, the Mediterranean, Scandinavia and the British Isles. However, the core interest for Poelt's Flora continued to be the German-speaking regions, and particularly the Alps, throughout his career. Poelt, who died in Graz in 1995, had become an admired scientist and teacher of generations of lichenologists, and his legacy is his more than 300 publications based on his numerous collections, his many successful pupils and, above all, his cornerstone Flora.

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