

## Fredrik Emil Wolmar Elfving, Professor of Botany

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Elfving was professor of botany during 1892–1918 at the Imperial Alexander University of Finland and during 1919–1926 at the University of Helsinki. He was a member of *Societas pro Fauna et Flora Fennica* for decades and served in several important positions in the *Society*: as secretary in 1876–1878, as botanical curator in 1880–1892, as printing committee member in 1875–1878, 1880–1892, and 1892–94, as board member in 1894–1942, and as vice president in 1892–1911. Elfving wrote the *Society*'s centennial history in 1921 and the history of the *Finnish Society of Sciences and Letters* in 1938.

Elfving reformed the entire teaching of botany in Finland. During his inauguration year as professor, he published an extensive overview of the level of both students and teachers in botany. This became his agenda. Apart for plantgeography and taxonomy, Finnish botany used to be mainly applied. Only very few could devote themselves to basic research. He began lecturing in plant physiology, morphology, anatomy, vascular plant and cryptogam systematics, plant geography, and the history of botany.

Elfving conducted his most important plant physiological studies in Germany in the 1870s and 1880s, while acting as a guest researcher at the laboratories of the most prominent researchers in the field at the time. Elfving primarily published these results in *The Finnish Society of Sciences and Letters* series. The Imperial Alexander University laboratories at the time were not suitable for the purpose. Construction work on the new Botanical Institute began in 1901, and the main building was completed in 1903. It was only thanks to Elfving's determined efforts that it was established.

Elfving had adopted Nylander's antischwenderian ideas, and most of Elfving's own laboratory studies tended to prove that lichens were not symbiotic. He also sought to prove that abiogenesis was possible.

In addition to earlier plant physiology experiments, Elfving conducted very significant studies on Finnish crops and the history of botany. These writings are significant source works.

As a person, Elfving was highly ambivalent. He was a very demanding teacher, but he also demanded a great deal of himself. His purpose was to awake national awareness of the high quality of our science, as the Russians had begun repressive measures in Finland. His career coincided with the period that is called The Golden Age of Finnish Art and Sciences, an era that ran from approximately 1880 to 1910. Elfving was well connected with the country's cultural circles. On the other hand, he was very fond of the Swedish language and preferred Swedish-speaking students in teaching. This, in turn, caused bitter disputes between the Finnish- and Swedish-speaking university students and teachers. Still, as a whole, Elfving's scientific efforts brought the country's botanical sciences to par with the international scientific community.

## Introduction

Fredrik Elfving was born on 9 October 1854 in Tammisaari, southern Finland. His parents were district doctor Johan Fredrik Elfving and Vendla Sucksdorff. His father had been an assistant to Professor of Chemistry Pehr Adolf von Bonsdorff (1791–1839). Elfving married Thyra Ingman (1870–1939) in 1897, and they had four children. Elfving died in Helsinki on 21 June 1942.

Elfving graduated from Turku secondary school in 1870. His aunt's husband, Carl Jacob Arrhenius, taught natural history in high school. He awoke Elfving's interest in plants and fungi. Elfving's level of competence deepened when his father bought him a microscope. In 1875, Elfving also began studying medicine, which he continued for a few years. However, his future was in plant physiological studies (Collander 1943)\*.

Elfving went on to study natural sciences at the Imperial Alexander University of Finland\*\* at the age of 15 in 1870. The Professor of Botany at the time was Sextus Otto Lindberg (1835–1889). Lindberg held the professorship before Elfving, during 1865–1889.

Elfving received his Bachelor of Natural Sciences in 1874 and Master of Natural Sciences in 1877. He became a Licentiate in Philosophy in 1877 with honourable mention at promotion (*Helsingfors Dagblad*\*\*\* 141A, 27.5.1877), a docent in botany in 1881, and Doctor of Philosophy in 1890. Elfving held the position of professor of botany for 34 years and retired at the age of 71 in 1926 (Anonym 1926).

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\* Collander's (1943) obituary of Elfving is an important source for this article.

\*\* The University of Helsinki was founded in 1640 in Turku, as The Royal Academy of (Åbo) Turku (*Regia Academia Aboensis*, in Swedish Åbo Akademi), when Finland was still a part of Sweden. It was renamed the Imperial Academy of Åbo in 1809 after Finland was incorporated into the Russian Empire as an autonomous Grand Duchy. Following the Great Fire of Turku in 1827, an Imperial decree laid down that the Academy was to be transferred to Helsinki and be known as the Imperial Alexander University of Finland. The name University of Helsinki was adopted after Finland became independent in 1919.

\*\*\* Hereafter *Helsingfors Dagblad* = HD

## Societas pro Fauna et Flora Fennica

Professor Lindberg recommended Elfving as a member of *Societas pro Fauna et Flora Fennica* (hereafter *Societas*) as early as 1870. It is Finland's oldest scientific society and celebrated its bicentennial on 5 November 2021 (Väre 2022a). Monthly meetings, awarding grants to biology students, and publishing have been central activities.

With support from the *Societas*, Elfving explored Åland in the summer of 1871 with entomologist Hugo Ingelius (1853–1899) and the southwest archipelago in 1872. Amongst the specimens collected in Åland, Lindberg found a new bryophyte for Finland (Collander 1943). In 1877, Elfving received a grant from the *Societas* to study the flora of the southwest archipelago (HD 142, 27.5.1872).

On Lindberg's initiative, Elfving acted as an extra amanuensis of the Botanical Museum in 1875–1880 (HD 39, 10.2.1880; 92, 7.4.1880), where, among other things, he assisted Docent Johan Petter Norrlin (1842–1917) in preparing lichen exsiccata published jointly by Norrlin and William Nylander (1822–1899).

Elfving was chosen as the curator of the *Societas*' botanical collections in 1880, again, on the initiative of Professor Lindberg (HD 39, 10.2.1880; 137, 24.5.1880).

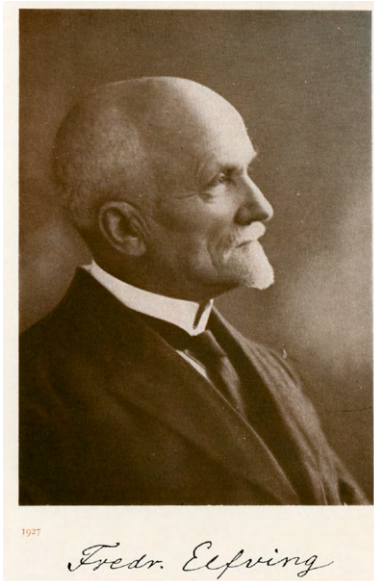
Elfving served as secretary of the *Societas* in 1876–1878, as botanical curator in 1880–1892 (Norrin & Palmén 1898), as printing committee member in 1875–1878, 1880–1892 and 1892–94, as board member in 1894–1942, and as vice president in 1892–1911 (Elfving 1921a, Palmgren 1943). As curator, he wrote annual reports on the activities (Elfving 1886b, e, 1889f, h, 1892d, i, k, 1893c, 1906d).

Throughout its history, the *Societas* has had six scientific publication series, including the first biological series published in Finland: *Notiser ur Sällskapet pro Fauna et Flora Fennica förhandlingar* (1843–1857), *Notiser ur Sällskapet pro Fauna et Flora Fennica förhandlingar, ny serie* (1858–1875), *Meddelanden af Societas pro Fauna et Flora Fennica* (1878–1924), *Acta Societatis pro Fauna et Flora Fennica* (1875–1980), *Acta Zoologica Fennica* (1926 – still active, published at irregular intervals), *Acta Botanica Fen-*

*nica* (1925 – still active, published at irregular intervals), and *Memoranda Societatis pro Fauna et Flora Fennica* (1927 – still active, published annually as an electronic yearbook).

Between 1843 and 1921, the *Societas* published 13 issues of *Notiser*, 47 issues of *Meddelanden*, and 50 issues of *Acta Societatis*. A total of 37 000 pages (Elfving 1921a). During a nearly 80-year period, most Finnish researchers in the field, including Elfving, published primarily in these scientific series.

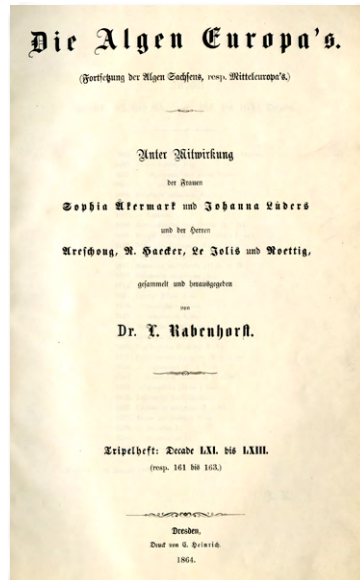
When *Societas* celebrated its 100th anniversary in 1921, Elfving was professor of botany. For the celebrations, he wrote its centennial history (Elfving 1921a), published in the series *Acta Societatis pro Fauna et Flora Fennica*, in its 50th issue. He was elected an honorary member of the *Societas* that year.



Fr. Elfving at his 70s. *Acta Societatis pro Fauna Flora Fennica* 55. 1924.

## Algologist

At the beginning of his career, Elfving was especially interested in algae, particularly desmids. Of great importance was a small book by Nave (1869), in which the collection, preparation, and examination of algae are described in detail (Collander 1943). Lindberg soon ordered for Elfving the *Algae Europaeae Exsiccatae* compiled by Gottlob Ludwig Rabenhorst (1806–1881).



*Algae Europaeae Exsiccatae*, compiled by Gottlob Ludwig Rabenhorst, was an important source to Elfving to study algae.

As early as 1872, after two years of studies, Elfving became acquainted with algae researchers in Stockholm and Uppsala, and in 1876 he visited Switzerland for the same purpose. In Stockholm, he got to know several advanced researchers in the field: Per Teodor Cleve (1840–1905), Fredrik Wilhelm Christian Areschoug (1830–1908), Theodor Magnus Fries (1832–1913), Veit Brecher Wittrock (1839–1914), Frans Reinhold Kjellman (1846–1907), Nils Gerhard Wilhelm Lagerstedt (1847–1925), and Peter Magnus Lundell (1841–1930).

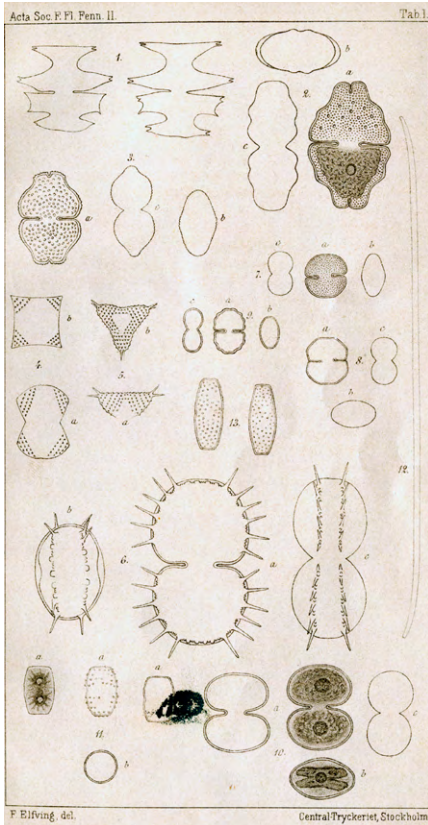
When Elfving began his algae research, knowledge of the topic was scarce in Finland. *The Herbarium Musei Fennici* had a short list of species of marine diatoms compiled by Nylander and Anders Thiodolf Saelan (1834–1921). In total, the catalogue includes 83 algae taxa (Nylander & Saelan 1859).

At a monthly *Societas* meeting, Elfving presented a collection of approximately 30 algal species collected by himself in 1872 at Utö in the southwestern archipelago (*HD* 95, 8.4.1873), and later he presented 41 slides of algae, mainly representing the families *Zygamenaceae* and *Oedogoniaceae* (*HD* 97, 10.4.1878). The algal collection of the Botanical Museum (H)\* still has 47 slides of algae that were collected or determined by Elfving.

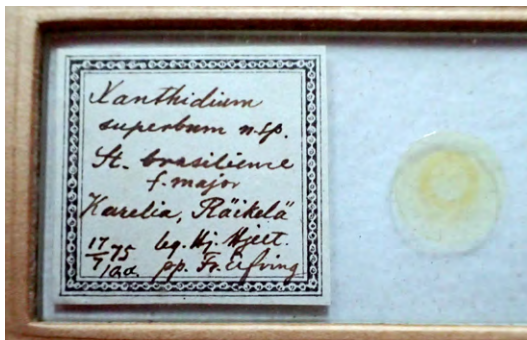
\* Herbarium acronyms follow *Index Herbariorum*.

Thus, Elfving's (1881a) study of microscopic freshwater algae, desmids, primarily from southern Finland, is a breakthrough in its field in Finland. He described nine species new to science (Table 1), all of which are shown in the picture table. Approximately 250 Finnish taxa were mentioned by him (Boldt 1888). In *Notes on Finnish Nostocaceae Heterocystee*, a new species to science was described (Elfving 1885g), and *Notes*

*on the systematics of desmids* (Elfving 1889i) provided perspectives on the systematics of these algae. Elfving (1893a: 144) provided the German synopsis himself. Type specimens of five names given by Elfving have been found in the slide collections (H).



Picture table of nine algae species new to science by Elfving (1881a).



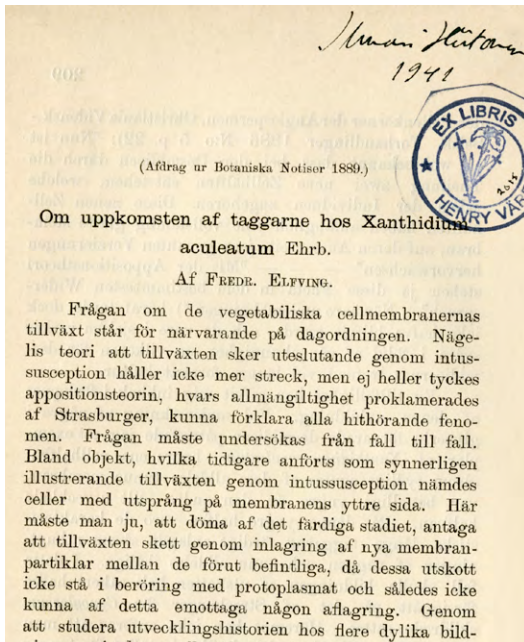
Slide of *Xanthidium superbum* at H, original material.

**Table 1.** The ten algal taxa Elfving described as new to science. Hj. Hjelt collected specimens at Karkku. The last three names were originally also described by Elfving. However, concerning family *Oedogoniaceae*, the nomenclatural starting point is 1 January 1900 [Hirn, K. E. "Monographie und Iconographie der Oedogoniaceen", in *Acta Soc. Sci. Fenn.* 27(1). 1900.]

**Elfving**

- Anabaena inaequalis* Elfving; *Meddel. Soc. Fauna Fl. Fenn.* 21: 59. 18. 1885, nom. illeg., as *Anabaena inaequalis* Bornet & Flahault 1886 is an earlier homonym.
- Cosmarium ellipsoideum* Elfving; *Acta Soc. Fauna Fl. Fenn.* 2(2): 13, fig. 10. 1881. Current name *Cosmarium contractum* var. *ellipsoideum* (Elfving) West & G.S.West.
- Cosmarium hexagonum* Elfving; *Acta Soc. Fauna Fl. Fenn.* 2(2): 12, fig. 8. 1881. Current name *Cosmarium rectangulare* var. *hexagonum* West & G.S.West. *C. hexagonum* Elfving is illegitimate, as *C. hexagonum* Nordstedt, 1870 is an earlier homonym. *C. rectangulare* var. *hexagonum* West & G.S.West can be treated as a new name with an Elfving type, but Elfving is not to be cited as a parenthetical authority.
- Cosmarium impressulum* Elfving; *Acta Soc. Fauna Fl. Fenn.* 2(2): 13, fig. 9. 1881.
- Cosmarium subpalangula* Elfving; *Acta Soc. Fauna Fl. Fenn.* 2(2): 14, fig. 11. 1881. Current name *Actinotaenium subpalangula* (Elfving) Teiling
- Euastrum aboense* Elfving; *Acta Soc. Fauna Fl. Fenn.* 2(2): 7, fig. 2. 1881.
- Euastrum pinque* Elfving; *Acta Soc. Fauna Fl. Fenn.* 2(2): 12, fig. 3. 1881.
- Penium adelochondrum* Elfving; *Acta Soc. Fauna Fl. Fenn.* 2(2): 17, fig. 13. 1881. Current name *Actinotaenium adelochondrum* (Elfving) Teiling
- Staurastrum tristichum* Elfving; *Acta Soc. Fauna Fl. Fenn.* 2(2): 8, fig. 4. 1881.
- Xanthidium superbum* Elfving; *Acta Soc. Fauna Fl. Fenn.* 2(2): 10, fig. 6. 1881.
- Bulbochaete subintermedia* Elfving ex Hirn; *Acta Soc. Sci. Fenn.* 27: 332, tab. 53, fig. 338. 1900. First described by Elfving in Hirn (1895: 8).
- Oedogonium acmandrium* Elfving ex Hirn; *Acta Soc. Sci. Fenn.* 27: 150, tab. 28, fig. 120. 1900. Ab. in lacu Hormajasjö et in Outamo sund nec non ad oppidum Åbo (H). First described by Elfving in Hirn (1895: 13).
- Oedogonium rufescens* Wittr. f. *exiguum* Elfving ex Hirn; *Acta Soc. Sci. Fenn.* 27: 76, tab. 1, fig. 5. 1900. Ab. Pargas. Kapellstrand. First described by Elfving in Hirn (1895: 19) as *O. exiguum*.





Elfvig wrote many of his articles in Swedish, like "The organological development of the spikes of the diatom *Xanthidium aculeatum*" (Elfvig 1889b).

"The organological development of the spikes of the diatom *Xanthidium aculeatum*" (Elfvig 1889b) was his last original article on algae from this period. A bit later, Elfvig (1892j) gave a lecture on the current knowledge of Finnish blue-green algae. And much later, Elfvig (1921c) presented a communication on *Oscillatoria rubescens*, which dyes the water red, found in Lake Kaukojärvi near Tampere.

While Elfvig was active in studying algae, researchers from abroad also contributed to knowledge of Finnish species. Herman Julius Brorson **Juhlin-Dannfeldt** (1852–1937) determined the diatoms collected in the Baltic Sea and the Gulf of Finland in 1879–1881 and described three species new to science, all collected off the coast of Helsinki: *Berkeleya fennica*, *Navicula thurholmensis*, and *Stauroneis hyalina* (Elfvig 1883h, *HD* 99, 13.4.1883). In 1886–1888, **Bornet & Flahaults** published a revision *Nostacacées hétérocystées* (*Bulletin de la Société botanique de France* 36: 144–157, 1889), based on which Elfvig (1895c) determined the specimens of the Botanical Museum. In total, 41 species were found from 14 genera: 11 in the family *Rivulariaceae*, six in *Siro-*

*siphoniaceae*, eight in *Scytonemaceae*, and 16 in *Nostocaceae*.

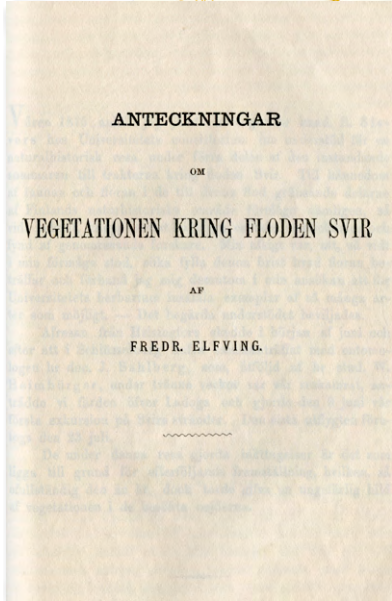
Among the other foreign researchers, Oslo-based plankton researcher Haaken Hasberg **Gran** (1870–1955) collected microalgae data from the Gulf of Finland and the Gulf of Bothnia in May 1912, which **Leegaard** (1920) published with the support of Kaarlo Mainio **Levander** (1867–1943), professor of zoology.

Although Elfvig's own career as an algologist was short, he managed to attract several students to study them in Finland: Johan Georg Robert **Boldt** (1861–1923), Harald Fredrik Georg **Strömfelt** (1861–1890) from Sweden, Karl Engelbrecht **Hirn** (1872–1907), Carl **Cedercreutz** (1893–1968), and Rolf **Grönblad** (1895–1962). Cedercreutz later acted as a docent of botany at the Botanical Institute and as amanuensis of the Botanical Museum (Fagerström 1953).

## As a plantgeographer

Inspired by **Norrlin**, extraordinary professor of botany (1879–1903), and supported by a grant from the consistory, in the summer of 1875 Elfvig studied Fennoscandinavian plantgeography of the southeastern border at *Karelia Olonetz* (Aunuksen Karjala in Finnish) with Richard **Sievers** (1852–1931), a bachelor in zoology. For two months, they studied the areas surrounding rivers Syväri (Svir) (Erkamo 1942, Collander 1965). A rich collection of specimens was donated to the Botanical Museum (*HD* 140, 24.5.1876).

Elfvig's article has an extensive description of the region's vegetation and includes a comprehensive list of species. The lists also include 330 dicotyledons and 152 monocotyledons, along with many bryophytes and lichens (Elfvig 1878c). A new species for Europe was *Androsace filiformis*, which was reported by **Wainio** (1889a, b, 1892). Later, Wainio wrote his lastname **Vainio**. Lindberg determined the bryophytes, Nylander the lichens. William **Nylander** acted as professor of botany in 1857–1863, prior to Lindberg and Elfvig. *Carex orthostachys* = *atherodes* and *Rubus humulifolius* were found as new species in the area (Elfvig 1878d). **Erkamo** (1942) published an excursion map. Elfvig's career in plant geography remained short.



▲ *Androsace filiformis*, new species for Europe was collected near Petrozavodsk in 1875.

◀ Vegetation along river Svir remained the only plantgeographical article by Elfving (1878).

▼ Elfving's route (dashed line, number 1) mainly followed river Syväri (Svir). Those places are marked with larger dots, from which Elfving made more extensive plant lists (Erkamo 1942).





## To Central Europe

The new research fields of botany, plant anatomy, cytology, and plant physiology had developed considerably in Europe. Julius **Sachs** (1832–1897) was a leading researcher in the field. Elfving understood the importance of the topic. His plant physiology publications amount to a few dozen.

In 1878, Elfving made an extensive research visit to Germany, first to Jena, where he studied pollen cytology under the supervision of Eduard **Strasburg** (1844–1912). Strasburg was the leading cytologist of his time, who discovered plant cell division, mitosis, in 1880. Strasburg's textbook, *Lehrbuch der Botanik für Hochschule*, was the most important textbook for Finnish botany students for decades. Students knew it simply as *the Strasburg!* The textbook was full of information in small print with German thoroughness, a student's nightmare.

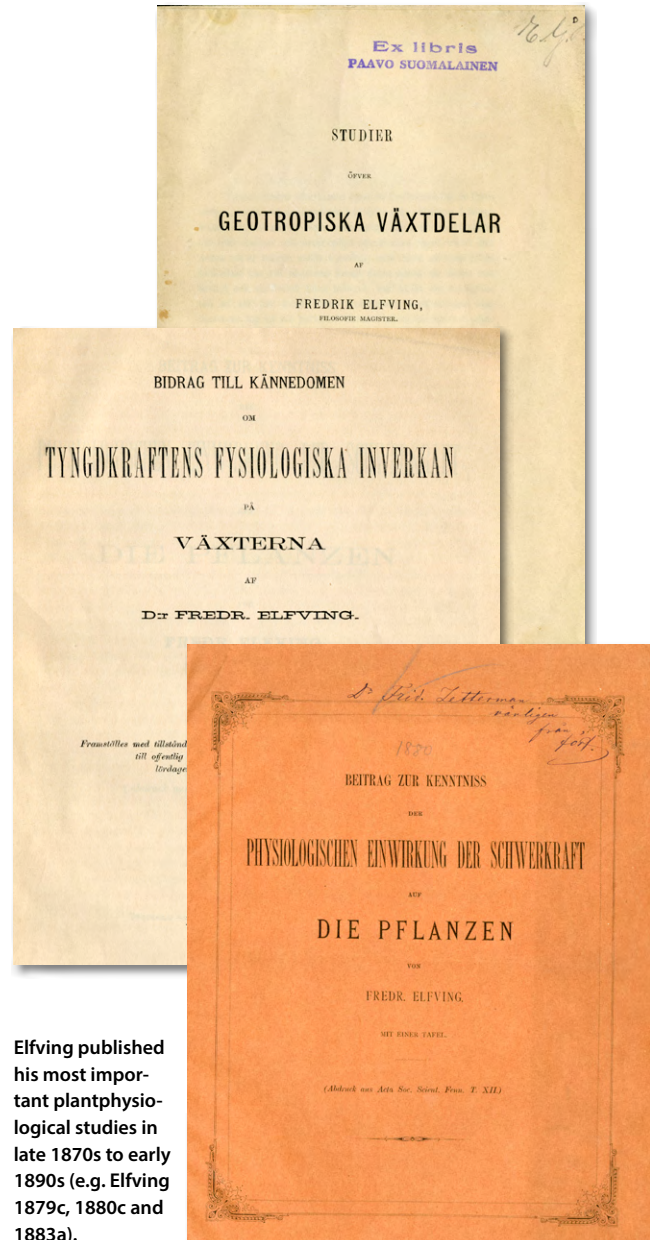
The results of the pollen studies of 23 species and their germination were published, with pictures, in the series *Jenaische Zeitschrift für Naturwissenschaften* (Elfving 1879a) and *Quarterly Journal of Microscopical Science* (Elfving 1879b).

In 1878–1879, Elfving visited the laboratory of Julius Sachs in Würzburg and studied the colourants of the buds and the geotropism of roots, why some plants have rhizomes that grow horizontally. The studied plants were *Eleocharis*, *Scirpus*, and *Sparganium*. Elfving concluded that this too is due to gravity (Elfving 1880a). A summary of the results was presented in *Botanisches Centralblatt* [1880(42–43): 1287–1288].

In Germany, Elfving (1880b) also investigated the interaction of etiolin and various spectra of light in the seedlings. No etiolin was produced in blue and violet light. *Botanisches Centralblatt* [1880(28): 835–836] and *Botaniska Notiser* (1880: 55–56) presented a synopsis of the results.

## Theses

Using the results of the research conducted in Germany, Elfving defended his licentiate thesis and simultaneously aimed to obtain the rank of docent. **Norrlin**, who was the opponent of the licentiate thesis (3.12.1879) "Studies on geotrop-



Elfving published his most important plantphysiological studies in late 1870s to early 1890s (e.g. Elfving 1879c, 1880c and 1883a).

ic plant organelles" (Elfving 1879c), made some critical remarks on it, and so it was not accepted as a docent thesis. Geotrophy refers to the downward direction of root growth. Elfving's study plants were *Heleocharis* = *Eleocharis palustris*, *Scirpus* = *Bolboschoenus maritimus*, and *Sparganium ramosum* = *erectum*. However, when Lindberg (1880) reviewed the dissertation, he considered Elfving to be a young, promising researcher.

Due to Norrlin's assessment, Elfving immediately wrote a separate study on the effect of gravity on the horizontal length growth of roots and defended his thesis "Contribution to the knowledge of the impact of gravity to the physiology of plants" on 3 April 1880 (Elfving 1880c). It was also published in German titled *Beitrag zur Kenntniss der physiologischen Einwirkung der Schwerkraft auf die Pflanzen* (Elfving 1883a). A preprint had already appeared, in 1880 (HD 321, 25.11.1880), which Lindberg (1881) introduced. **Lindberg** himself was the opponent, in 1881. Now, Elfving was a docent (HD 67, 10.3.1881).

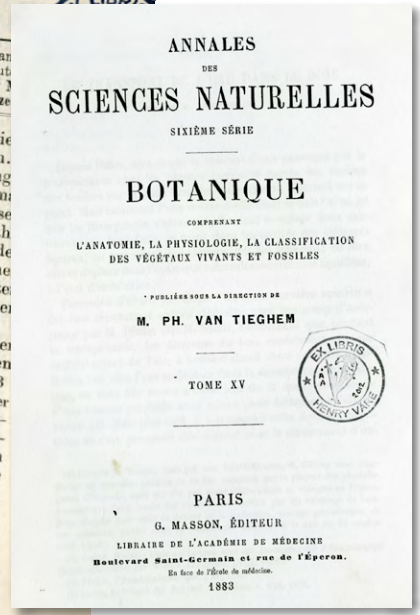
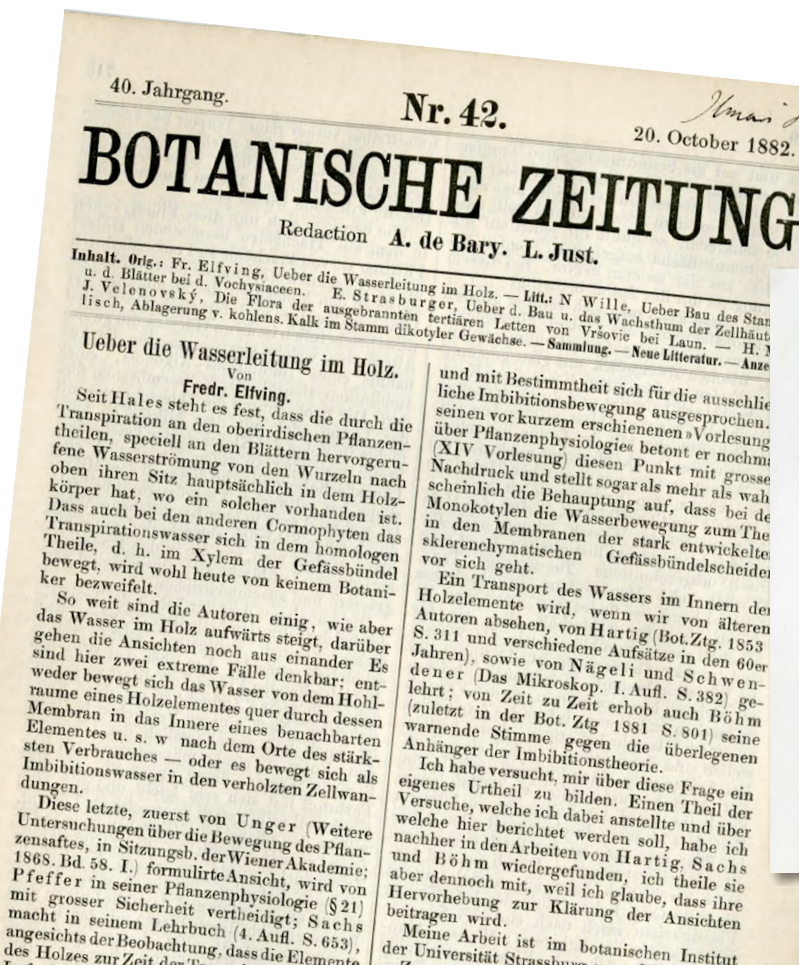
**Back to Germany**

After his thesis, Elfving studied in Strassburg in 1881–1882 as a student of Heinrich Anton de **Bary** (1831–1880). The result was Elfving's most internationally significant article, *Über die Wasserleitung in Holz* ("On water transport in tree") (Elfving 1882a, 1883b). **Molich** (1883) wrote a synopsis for German-speaking readers.

Elfving showed that water movements occurred in the vascular bundles and not in the cell walls (imbition theory), as physiologists Johan **Sachs** and Wilhelm Friedrich Philipp **Pfeffer** (1845–1920) had assumed. Elfving demonstrated this by blocking the bundles with melted cocoa butter. On the same research visit, he studied the effects of galvanism on root growth (Elfving 1882b, c). **Molisch** (1882) also presented this article. In 1882, Elfving had received a young researcher's travel grant for plant physiological and microbiological studies (E. Hjelt 1894: 25).

Elfving also studied the response of *Avena = Arrhenatherium elatior* stem nodes to gravity in a clinostat. It is an instrument for rotating plants horizontally around their longitudinal axis to compensate for the unilateral influence of gravity. The rotation of grass nodes induced a growth response, the nodes were negatively geotropic (Elfving 1884f, 1906i). Thus, gravity is not at all nullified, but only the growth direction of the rotated plant organ remains unchanged. **Klebs** (1885) provided a synopsis.

Über die Wasserleitung in Holz ("On water transport in tree") was Elfving's most significant international article. It was published also in France (Elfving 1882a, 1883b).





### Carlsberg

In 1886–1887, Elfving was a visiting scientist in Copenhagen at Carlsberg Laboratory, established by Jacob Christian **Jacobsen** (1811–1887), in Utrecht at Theodor Wilhelm **Engelmann**'s (1843–1909) laboratory, and in Paris at the laboratories of Gaston Eugène Marie **Bonnier**'s (1853–1922) and Émile **Duclaux**'s (1840–1904). His aim was to learn about the research of bacteria and other microorganisms.

Jacobsen set up Carlsberg Laboratory in 1875, which worked on scientific problems related to brewing. It featured a Department of Chemistry and a Department of Physiology. The species of yeast used to make pale lager, *Saccharomyces carlsbergensis*, was isolated by Danish mycologist and fermentation physiologist Emil Christian **Hansen** (1842–1909) at the laboratory in 1883. The yeast was shared freely by Carlsberg. Hansen described it first in 1908, and it is considered a younger synonym of *S. pastorianus* Reess 1870 (*Index Fungorum*, 5.11.2023).

Several years after his medicinal studies, Elfving participated in the preparation of a new pharmacopoeia in 1883. The 1850 pharmacopoeia still included 145 medicines based on the plant kingdom, but by the fourth edition in 1888 the number had decreased to 93. In other countries, as in Finland, pharmacists' contributions to botany had been significant in the past in Finland and elsewhere. Very late, Elfving (1942) wrote about uniting topics between medicine and natural history.

In 1885, Professor **Lindberg** made a new initiative that Elfving be appointed as an extraordinary professor of botany (*HD* 153, 9.6.1885). However, Professor of Zoology Johan Axel **Palmén** (1845–1919) opposed the idea until the competences of both Elfving and Vainio were evaluated. **Vainio** was a world-renowned lichen taxonomist.

The proposal went to the vote of the consistory, and Lindberg's proposal lost 17–10. Chancellor Theodor **Bruun** (1821–1888) opposed the decision, which may have been influenced by Elfving's (1883d, e) critical article in *Finsk Tidsskrift* a couple of years earlier concerning Bruun's arbitrariness in filling positions at the University.

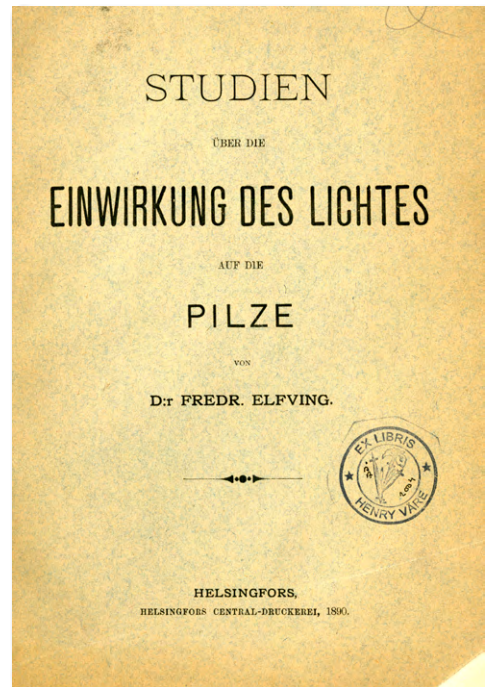
Elfving applied for a position at Stockholm University in 1883, but Norwegian botanist Jo-

han Nordal Fischer **Wille** (1858–1924) received the post.

Previously, a dissertation had to be defended at the University when applying for a professorship. Elfving's (1890b) exemplary work for the qualification was a mycophysiological study "*Effects of light on the fungi*". The competition applicants were Alfred Oswald **Kihlman** (1858–1938) (later **Kairamo**) and Edvard August **Vainio** (1853–1929). Kairamo was a respected plant ecologist, an expert on the formation of the northern forest line, and Vainio was a lichenologist.

The Faculty appointed three experts to evaluate the applicants' scientific merits. All experts considered that the applicants met the qualification requirements with some critical observations. Thereafter, the Faculty placed Professor **Palmén** as the opponent for all three candidates (Anonym 1891).

Regarding Elfving, the evaluations were positive, but his point claiming that the mould fungus *Aspergillus glaucus* could be changed into another species, *Penicillium glaucum*, by changing cultivation conditions, was justifiably crit-



Elfving's (1890b) exemplary work for the professorship qualification was a mycophysiological study "Effects of light on the fungi".

icized (Anonym 1891). Elfving got three votes, so did Kihlman. The matter went to the consistory, where Professor of Law Robert **Hermanson** (1846–1928) voted against Elfving because of his anti-Christianity (Elfving 1885b), with Professor of Theology Otto Immanuel **Colliander** (1848–1924) concurring (sic!). However, Elfving won with a vote of 15–11. The expert opinions were widely discussed in Faculty meetings (Ramsay 1891).

Unfortunately, this useful way of publishing appeal letters has been forgotten. They have proven useful when writing histories.

The inaugural lecture (Wiik 1892) was given by Fredrik Johan **Wiik** (1819–1909), the dean of the Department of Physics and Mathematics. The appointment took place on 7 February 1892, and Elfving held his post for 34 years.

## Research

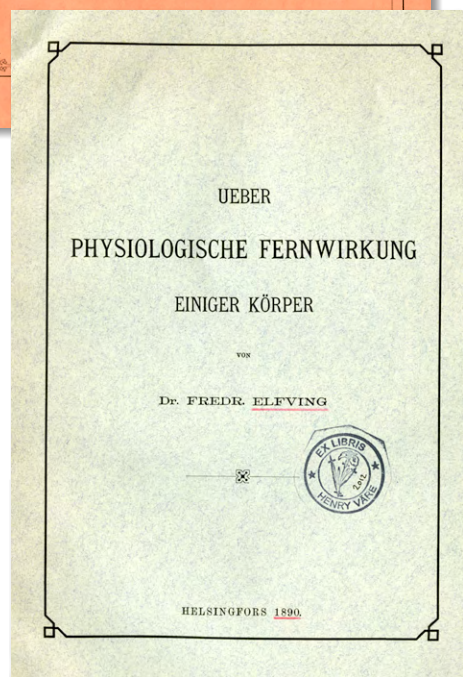
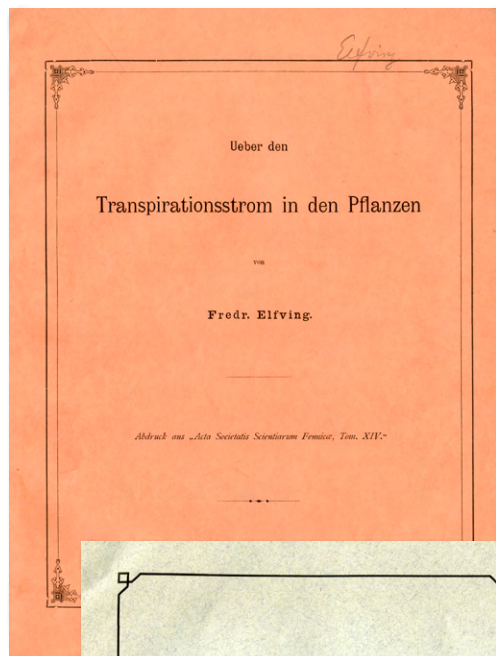
### Laboratory works

In particular, Elfving emphasized the increasing importance of laboratory work. He saw the gathering of the various departments of botany into one building as very important. A new building for the Institute of Botany was necessary. These tasks Elfving promoted consistently.

Elfving continued as a professor with plant physiology research, which, however, became less important to him. It should be noted that together with Swedish Professor of Botany Bengt **Jönsson** (1849–1911), they were the first in their field in the Nordic countries.

The laboratory courses were initially conducted by Elfving alone, later by Elfving, Kihlman, and Vainio. The first assistant at the Botanical Laboratory, in 1897, was Karl (Charles) Emil Valentin **Boldt** (1866–1922). Thereafter, he was mainly responsible for these courses.

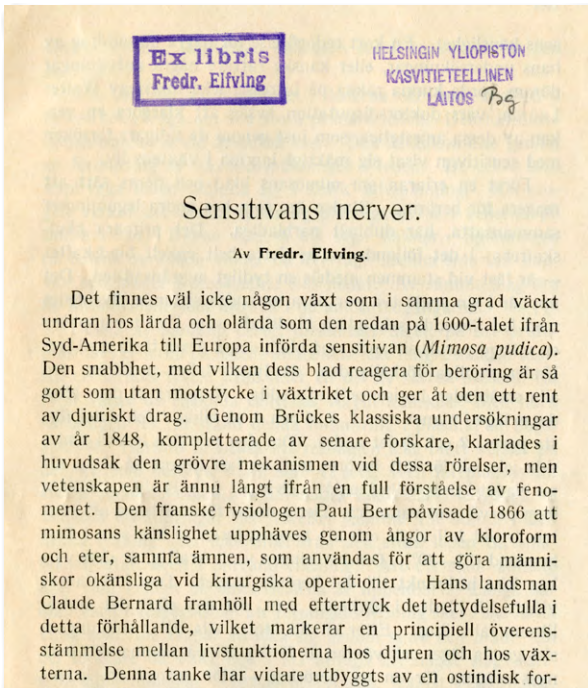
Elfving primarily published the results of his work in *The Finnish Society of Sciences and Letters* series. Typical titles, in addition to those mentioned elsewhere, were "About the transpiration flow in plants" (Elfving 1885a), the synopsis of which was published (Anonym 1885), "On the effects of ether and chloroform on plants" (Elfving 1886f), "To understand the curvature of plants" (Elfving 1888b), "Remarks on Wort-



▲ Elfving (e.g. 1885a, 1890a) primarily published the results of his laboratory experiments conducted in Finland in *The Finnish Society of Sciences and Letters* series. The front covers were stylish.

mann's hypothesis of plant curvatures" (Elfving 1889j), "On the physiological long-distance effects of some organs" (Elfving 1890a), "On the knowledge of plant irritability" (Elfving 1894o), and "The photometric movements of plants" (Elfving 1901). All these articles were written in German.



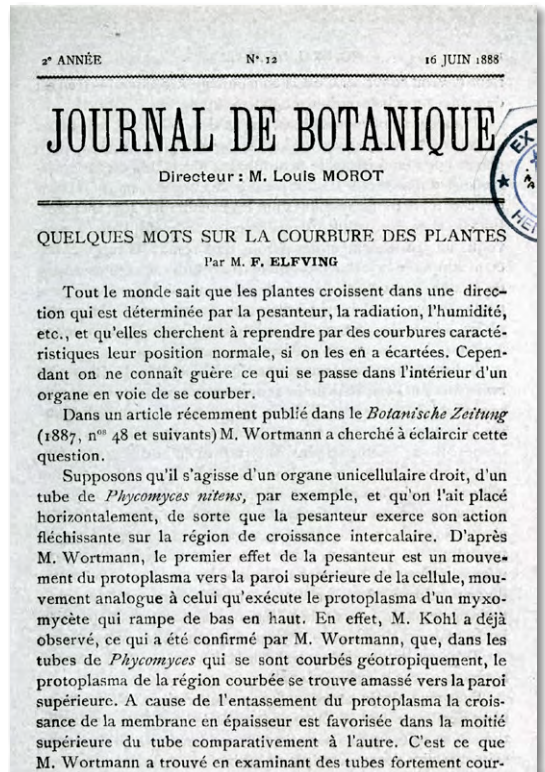


Elfving (1926a) wrote an article in which he explained on the the physiology [the fastest movement in the plant kingdom] of *Mimosa pudica*. It was his last in plant physiology, and related on studies performed elsewhere.

A total of twenty plant physiology publications were published. Much later, during the retirement of Assistant Professor of Pharmacology Eliel Walter Kalixtus Laurén's (1866–1932), a celebration issue was published, where Elfving (1926a) explains the physiology [the fastest movement in the plant kingdom] of *Mimosa pudica*, including the effect of chloroform on the plant.

### Nomenclature

When changes to nomenclature rules to be made at the Copenhagen World Conference on Botany were discussed in Finland, Elfving suggested that the authors should be written in connection with the species name, so that a person could clearly know which plant was meant. The author should not be written after the species name if it is given only on the specimen label but the name has not been published. The term *hort.* is unnecessary in connection with the species name (*Botaniska Notiser* 1893: 153–155).



Elfving (1888a) studied the physiology of *Phycomyces nitens* in de Bary's laboratory in 1881–1882.

### As a mycologist

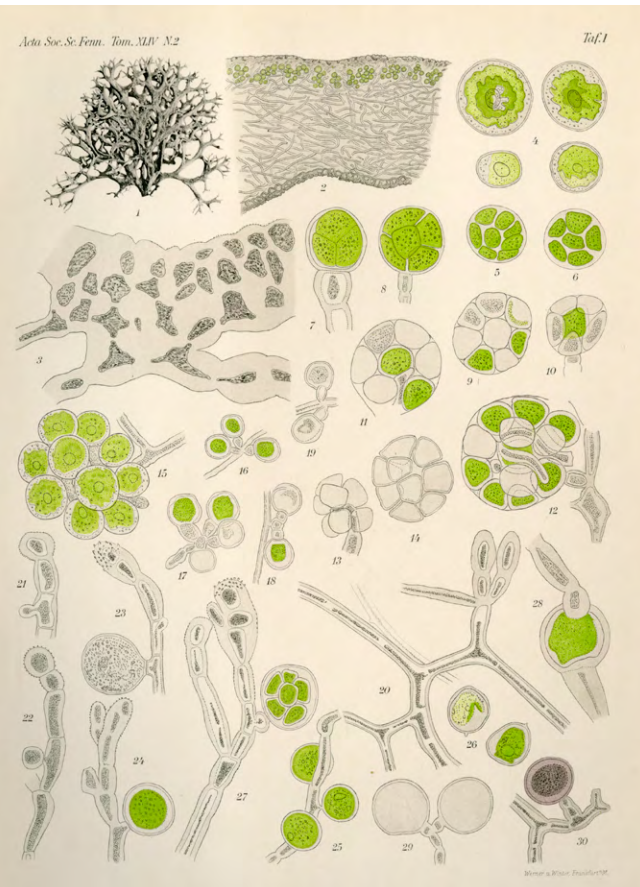
In de Bary's laboratory in 1881–1882, Elfving also studied the physiology of *Zygomycota*. *Phycomyces nitens* reacted to moisture in the opposite way to roots, they directed the colonies towards upward growth (Elfving 1881c, m, 1888a). Two *Zygomycetes* were found in Mikkeli: *P. nitens* and *Rhizopus nigricans* (Elfving 1881h). Soon Elfving began to study lichen symbiosis.

### An antischwenderian lichenologist

The studies of German Simon Schwendener (1829–1919) in the late 1860s showed that lichens were symbiotic organisms consisting of fungi and algae. The fungi form the thallus and apothecia, the algae form the gonidial layer.

This theory found its most vehement and prominent opponent in William Nylander. He even broke off long-standing contacts, not only with supporters of the theory, but also with li-

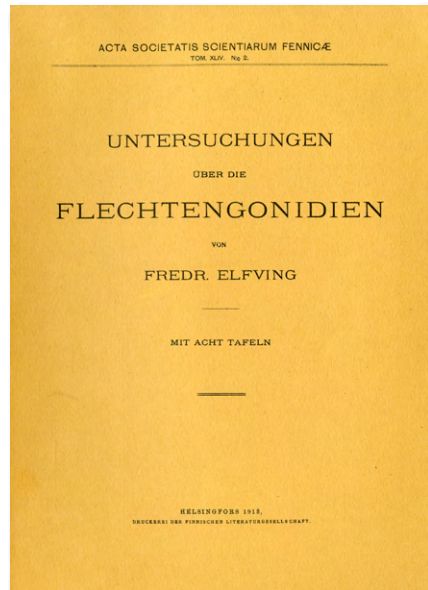




chen scholars who did not oppose it vigorously enough or who did not publish ready-made theses on the subject offered by him. Nylander's taxonomy was based on the principle that no single character was more important than any other (Nylander 1855).

Elfving met Nylander in Paris in 1887, and he came to influence Elfving's ideas regarding the dual nature of lichens. Elfving adopted Nylander's antischwenderian ideas.

In this regard, Elfving's career suffered a setback. He presented his results of lichen studies for the first time in 1902 at the Nordic Conference of Natural Scientists at Helsinki. Elfving chaired the botany section and gave a presentation on lichen gonidia (Elfving 1902a). He also gave the subject to his student: *Observations on the culture of lichen fragments*, which **Häyrén** (1902) presented at the same meeting. **Nordenskiöld's** (1902) report on the meeting states that the presentation received a great deal of attention.



Elfving performed many growing experiments of lichen fragments and developed a solid understanding that the dual nature of lichens is not true. ▲ Front page of "Untersuchungen über die Flechtengonidien". ◀ Drawings of lichen gonidia which Elfving believed to show that they were born of mycelia (Elfving 1913a).

Elfving's later experiments showed, as he believed, that the coloured gonidia [algae] and fungi had a genetic connection and that the gonidia [algae] were born from mycelia. Elfving studied the gonidia at the Tvärminne Zoological Station in the summers of 1906 and 1908 (Luther 1957).

Elfving developed a solid understanding that the dual nature of lichens is not true. He regarded them as independent organisms. Here he steadfastly continued in Nylander's antischwenderian tracks and published two extensive works on lichen gonidia (Elfving 1913a, 1913a). **Huomonen** (1914) gave a moderate review to the 1913 publication on gonidia.

Elfving gave a presentation on the topic at the *Finnish Society of Sciences and Letters* (*Dagens Press* 231, 23.11.1917). Next, Elfving (1919c) wrote about various opinions regarding the structure of lichens.

Elfving believed he had found a weak spot in Schwendener's theory. Although no genetic link has been found between the components, Elfving thought it would be possible to prove a link existed. He believed he had demonstrated the con-

Sonderabdruck aus den Berichten der Deutschen Botanischen Gesellschaft,  
Jahrgang 1934, Band LII, Heft 4.  
Ausgegeben am 31. Mai 1934.

## 24. Fredr. Elfving: Zur Gonidienfrage.

(Mit 6 Abbildungen im Text.)

(Eingegangen am 14. April 1934. Vorgetragen in der Aprilsitzung.)

In zwei Abhandlungen von den Jahren 1913 und 1931 habe ich für verschiedene Flechtenarten nachgewiesen, daß ein genetischer Zusammenhang zwischen den farblosen Zellen und den gefärbten Gonidien existiert, so daß jene zu Gonidien umgewandelt werden können. Meinen Angaben, die in schroffem Gegensatz zu der herrschenden Lehre stehen, ist nicht die nötige Unbefangenheit



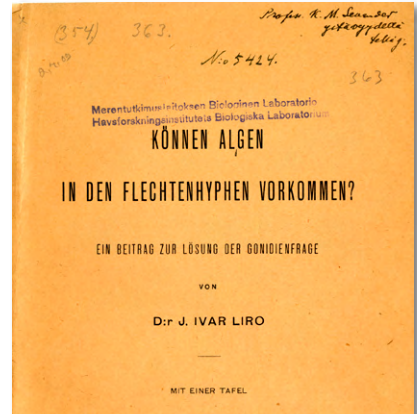
Abb. 1.

entgegengebracht worden. Soweit ich erfahren habe, sind sie als phantastisch und wertlos betrachtet worden. In einer wenig verbreiteten Schriftserie veröffentlicht, sind sie vielen Botanikern un-

nection between gonidia and mycelium. In a 1913 publication, he believed he proved, using eight lichen species, that gonidia ("algal partners") are born from filaments. This would have scrapped the entire algal systematics; they would be born from fungi! He also gave a presentation of the subject at the 1923 Scandinavian meeting of naturalists in Gothenburg (Elfving 1924b, 1925a). To convince foreign researchers, Elfving (1934a, 1935c) wrote about his views twice more, in a French and a German journal. Oddly enough, Elfving never conducted breeding experiments. It should be noted here that he unfortunately did not have the opportunity to directly follow the progress *in vivo*. He had, for the most part, found a number of development stages on dead, often fixed, cut and coloured lichen tissues, which he combined in such a way that they together form, at least apparently, a continuous series of development.

◀ Elfving (1934a) tried to convince foreign researchers, that lichens were not symbiotic organisms.

▼ Lauri Eerikki Kari (1901–1962) and Johan Ivar Liro in Finland demonstrated the nature of lichen symbiosis.



GONIDIOLEVIEN P<sub>n</sub>-VAATIMUKSET  
VERRATTUINA VASTAAVIEN JÄKÄLIEN  
JA KASVUALUSTOJEN P<sub>n</sub>-ARVOIHIN

LAURI E. KARI

TURKU 1936

Elfving fought against windmills, as the rest of the scientific world had already accepted that lichens are symbiotic organism of fungi and algae.

### Reactions

The academic world in Finland reacted with moderate elegance, the topic was hardly commented on. For example, **Liro** (1914) politely refuted Elfving's claim that lichens are not symbiotic. Liro grew algae isolated from *Alectoria ju-*



*bata* [*Bryoria fuscescens*] on a substrate. **Linkola** (1914) reviewed the article and considered Liro's results to be correct. Johan Ivar Liro (1872–1943), **Lindroth** until 1906, later acted as professor of plant pathology in 1921–1943.

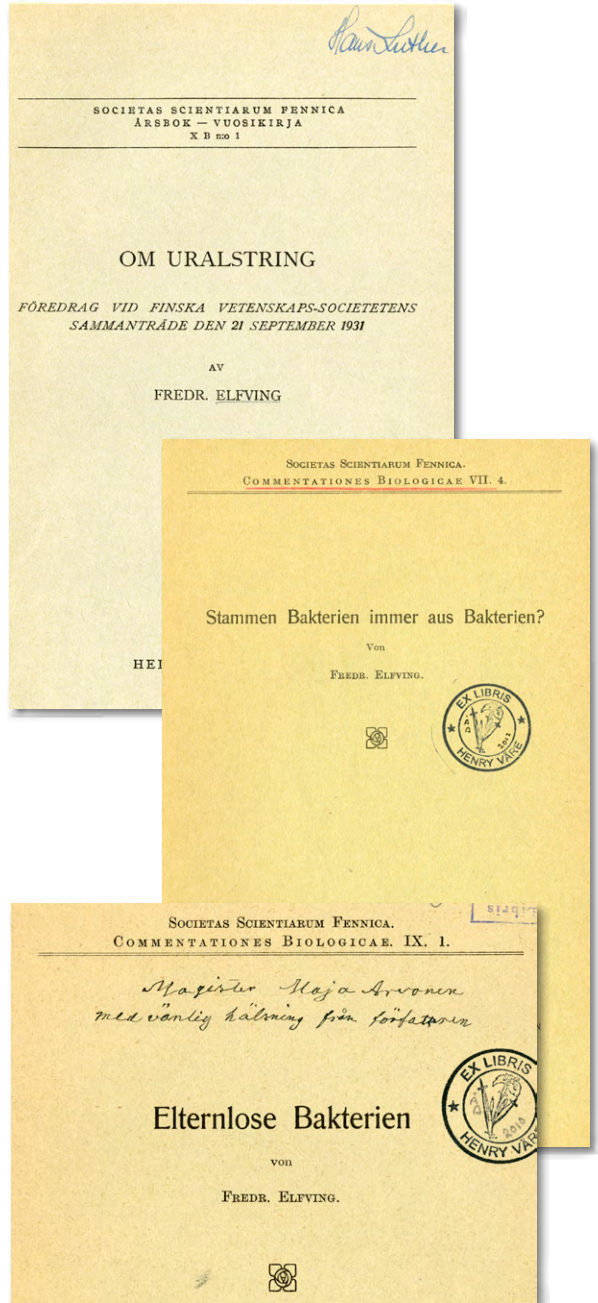
Lauri Eerikki **Kari** (1901–1962) and Liro had demonstrated the nature of symbiosis in their works. Both had been Elfving's students but did not gain his favour. To be able to continue his academic career, Kari continued his studies at the University of Turku and made his dissertation on the phosphorus economy of lichen gonidia under the supervision of Harry **Waris** (Kari 1936). Subtly, Kari and Liro do not refer to Elfving at all. Palmgren (1943) was at Elfving's deathbed on 26 February 1942, and recorded how Elfving ended up in the opposition, as told by Elfving himself.

Abroad, Elfving received more attention. His 1913 publication was criticized particularly strongly by **Nienburg** (1914) but also by others (Lorraine **Smith** 1914, **Irmscher** 1915, **Letellier** 1917). The 1931 publication was criticized more thoroughly by **Mattick** (1932), **Nienburg** (1932), and **Tobler** (1934a, b).

A few subsequent publications (Elfving 1931c, 1938c, 1941), concerning the abiogenetic origin (uralstring) of bacteria from the decomposition of living plant matter, caused further confusion, as belief in abiogenetism had died out 100 years earlier. Perhaps Elfving's observations were correct in themselves. Bacteria live in the cells of plants, which may have been alive on the culture plate. Elfving had carried this idea with him for a long time. In 1896, he held a lecture "On the abiogenetic birth of living beings" at an event for university teachers, aimed to benefit the "Folk High Schools" in the country. 270 people attended.

On his deathbed, Elfving dictated his thoughts of lichens as symbiotic organisms and the origin of bacteria to Palmgren (1943). Until the end, Elfving believed that Schwendler was wrong: "Algae and fungi of lichens have a genetic connection, as shown in my experiments". "The origin of bacteria from organic matter seemed possible to me in the 1890s. I had no real basis for this idea. At first it was just a whim." "But, around 1935, I performed an experiment in which bacteria were accidentally created by the decomposition of higher organisms". Elfving considered these works his most important, and he devoted

most of his research years to this subject. **Collander** (1943) has suggested that, although Elfving was an empiricist who shunned theories, he had a romantic confidence in himself as a seer of truth. A few microscope samples and intuition!



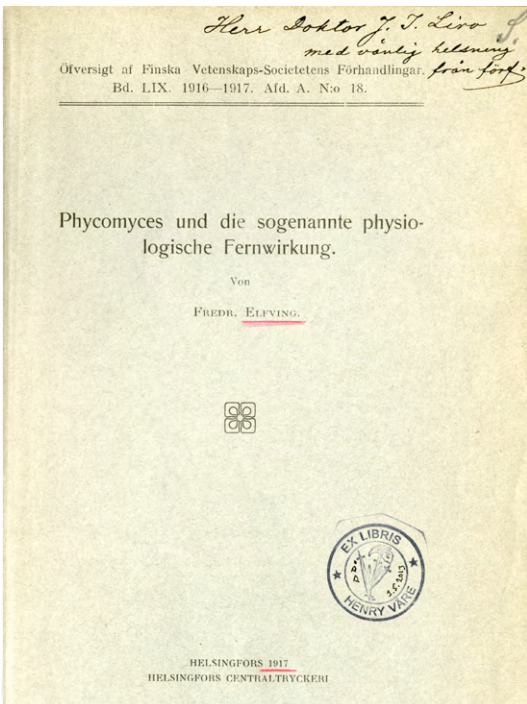
▲ Already in 1896, Elfving held a lecture "On the abiogenetic birth of living beings", and published later three articles on the topic (Elfving 1931c, 1938c, 1941).



## Mycologist

Elfving's versatility is shown through the many studies and exercises he performed on fungi with his students. For example, Ernst Häyrén wrote several articles on fungi, e.g. "A list of *Mucorineas* known from Finland" and "A list of some *saprolegniaceae* collected near Helsinki" Häyrén (1904a, b). Ernst Fredrik **Häyrén** (1878–1957) later acted as assistant professor of botany in 1926–1945.

The published works by Elfving were mycophysiological, such as an article regarding the sugar metabolism of the yeast fungus *Saccharomyces glutinis*. He disproved the assumption that this fungus could assimilate carbonic acid (Elfving 1886e). There were other topics, e.g., "Phycomyces and the earlier mentioned physiological long-distance action". The hyphal colonies bent towards an iron plate and towards certain other metals (Elfving 1890a, 1891a, 1894o, 1917d). **Rothert** (1893) gave a synopsis of an article printed in France (Elfving 1891a).



Elfving (1917d) performed many mycophysiological works at Helsinki, like "Phycomyces and the earlier mentioned physiological long-distance action".



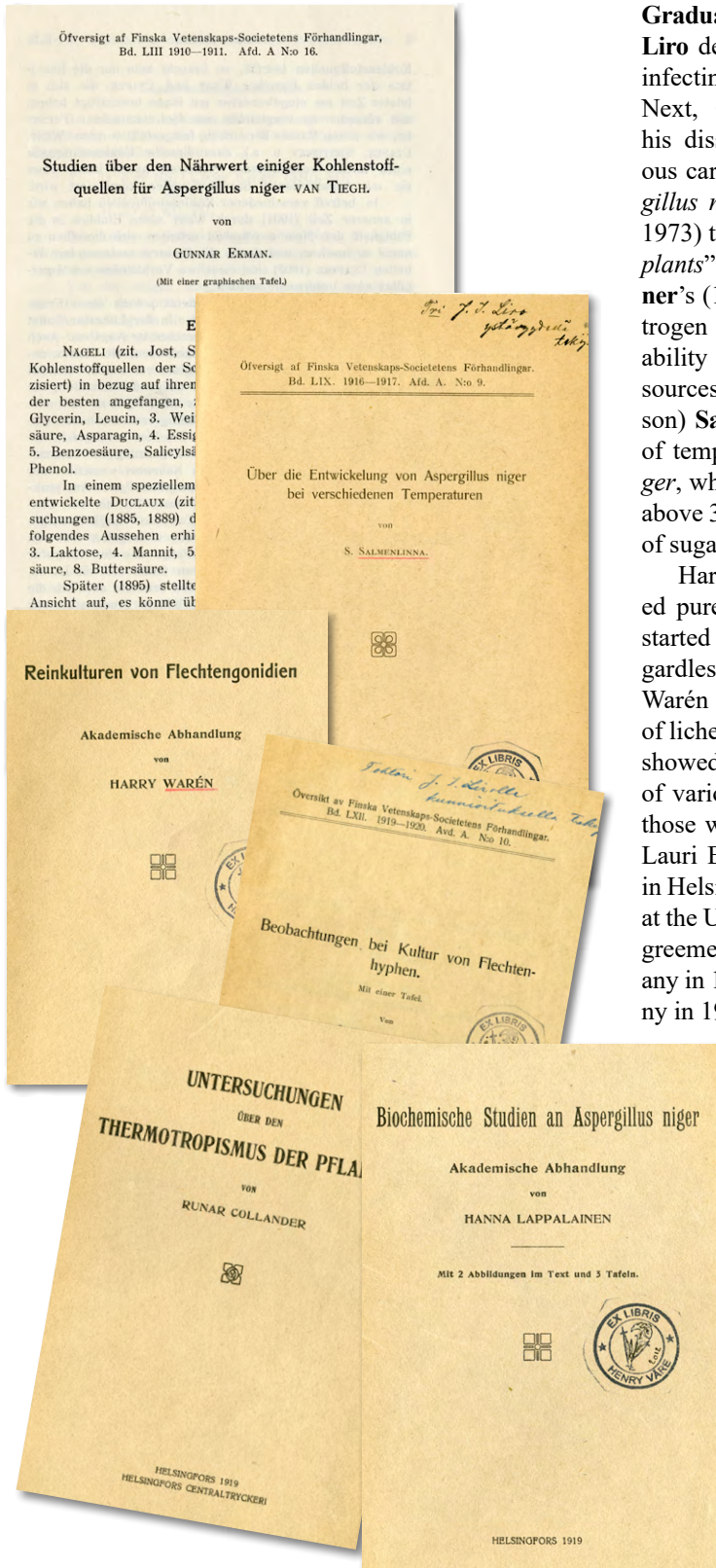
A powder mould *Sphaerotheca mors-uvae* infecting *Ribes uva-crispa* was a serious threat to plantations (Elfving 1906b).

**Noack** (1921b) gave a synopsis of Elfving's (1917d) article for the German language region. Elfving interpreted that it was the effect of invisible radiation.

The fungus *Cladothrix* [*Crenothrix*] *kühniiana* (Elfving 1889g) was found in the sewer network of Berlin. This species was the culprit behind the infections spread through the waters. It is a bacterium that also has a filamentous form.

*Aspergillus niger* produces both oxalic and citric acid (Elfving 1920d). However, it was not a question of neutralizing the nutrient medium, as acids were also produced in sugar solutions. Noack (1921a) gave the synopsis in German.

The article about *Sphaerotheca mors-uvae* was translated into Finnish (Elfving 1906b, f, h). This powder mould was a serious threat to plantations, and it was much studied in the early 20th century.



### Graduate students in mycology

**Liro** defended his dissertation on the rust fungi infecting *Umbelliferae* [*Apiaceae*] (Lindroth 1902). Next, Gunnar **Ekman** (1833–1937) defended his dissertation concerning the effects of various carbon sources on the metabolism of *Aspergillus niger* (Ekman 1911), **Collander's** (1894–1973) topic was "Studies on the thermotropism of plants" (Collander 1919), Magnus Widar **Brenner's** (1887–1932) dissertation concerned the nitrogen metabolism of *Aspergillus niger*, i.e., the ability of this fungus to use various nitrogen sources (Brenner 1914), Sune Samuli (Fredriksson) **Salmenlinna** (1917) defended on the effect of temperature on the growth of *Aspergillus niger*, which unexpectedly stopped at temperatures above 37 degrees. At higher temperatures, the use of sugars was more economical.

Harry **Warén** (1920a, b, 1921), who conducted pure-culture experiments on fungal mycelia, started with pure cultures of lichen gonidia. Regardless of the results, as an attentive student, Warén did not take a position on the dual nature of lichens, which was opposed by Elfving. Warén showed that the metabolism of the algal partners of various lichens differed from each other, and those were probably the different species. Later, Lauri Eerikki **Kari** (1901–1962) studied botany in Helsinki but defended his dissertation to Warén at the University of Turku. The reason was a disagreement with Elfving. Kari was a docent of botany in 1937–1958 and assistant professor of botany in 1953–1955 in Turku.

### Hanna Lappalainen

Hanna (Johanna) **Lappalainen** (1881–1966) was Finland's first woman to hold a doctorate in botany (Lappalainen 1919a, b). She worked for short period at the University but created

◀ Gunnar Ekman, Sune Samuli Salmenlinna, Harry Warén and Hanna Lappalainen defended their mycophysiological dissertation under the supervision of Elfving, while Runar Collander focused on plant physiology. All but Salmenlinna continued as researchers at the university. Salmenlinna started his career at Lepaa Garden School.

her life career in the pharmacy industry. **Freund** (1922) and **Noack** (1921) both wrote a synopsis of Lappalainen's (1919a, b) dissertation. It deals with the sugar, oxalic acid, and citric acid metabolism of *Aspergillus niger*, a food spoilage fungus. Her opponent was Widar **Brenner**, Elfving's student. Brenner had studied plant physiology in Leipzig in 1913–15 under Professor Wilhelm Friedrich Philipp **Pfeffer** (1845–1920).

Lappalainen also showed that the zinc used as a growth medium on Petri dishes affected the metabolism of *A. niger*. The German Carl Friedrich Wilhelm **Wehmer** (1858–1935) had already found, in 1893, that some *Citromyces* fungi form citric acid and, in 1897, that *Aspergillus niger* forms oxalic acid. The new finding of Elfving and Lappalainen's research was that *A. niger* formed both oxalic and citric acid under certain growing conditions. The production of citric acid using *A. niger* later became an important and productive industrial method.

### Communications on mycology

1. *Boletus elegans* = *Suillus grevillei* was found in Åland. 1883g
2. *Cyathus striatus* was found in N, Helsinki, Kumpula and *Rhizopogon luteolus* in Ka, the eastern archipelago. 1892c
3. *Sparassis crispa* was found in Ab, Kustavi [SW Finland] 1892f. Kihlman (1894: 116) provided a German synopsis.
4. *Penicillium glaucum* was a collective name for several species 1892g. A German synopsis by Kihlman 1894: 116.
5. Fungi that rots floors. 1893a
6. *Phallus impudicus* in A, Jomala. 1907d
7. *Sclerotinia trifoliorum* in Ik, Kurkimäki Kronoborg. 1908c
8. Carl Axel Gottlund as mushroom collector and developer of drying method. 1909b
9. Mushroom photographs taken by the trader Wladimir Schon. 1910a
10. *Fistulina hepatica* at N, Tammisaari, Hästö. 1913c
11. *Rhizomorpha* on paper pulp. 1915b
12. New fungal species, *Sterigmatocystis opiophaga*, from a Petri dish culture. 1918a. This name seems to have gone unnoticed in the literature. Especially species of genus *Aspergillus* produce sterigmatocystin.
13. *Polysaccum crassipes* at St, Kankaanpää 1920a. This is probably the *Pisolithus tinctorius*.
14. Species of the genus *Geaster* in Finland. 1920b
15. *Polyporus* = *Ganoderma applanatum* at Ta, Hattula. 1925b

### Botanic Garden

The Kaisaniemi Botanic Garden (4.5 ha) was founded in 1828. The first wooden greenhouse was completed in 1832. Greenhouses are challenging structures. They must be renovated frequently, or a new one must be built. The new Palm room of the Botanic Garden was completed in 1889. Its construction had begun during Elfving's predecessor's, Professor Lindberg's, time. He died shortly before the Palm room was completed. The greenhouses have been a popular place to visit ever since.

The duties of professor of botany included managing the Botanic Garden. Elfving quickly acted. Renovation of the *Victoria* room was completed in 1892, and *Victoria amazonica* was growing in the pool. The photograph shows three children sitting on one of its leaves (*Kyläkirkjaston Kuvalehti* 9, 1 September 1899, Elfving 1900a). Elfving visited Bergielund's Garden (Bergianska trädgård) in Stockholm that same year (*Nya Pressen* 177, 3.7.1892) In 1903, the regularly blooming *V. cruziana* replaced *V. amazonica*, and has become one of the favourite plants for visitors. The buildings next to the Palm room were in poor condition and were renovated in 1896.

Two Nepalese *Cyrtopodia*, the East Indian *Callanthe vestita*, an *Anthurium* and *Echeveria* [*Garden* 11(2): 32, 1908] flowered in the greenhouse in the winter of 1908. The pride of the Palm room, *Thrinax radiata*, had grown up to the ceiling and had to be cut down. Elfving (1915a) was semi-serious when he stated that this palm was the reason for the considerable height of the Palm room. In 1869, when gardener Bockström was a student at the garden, the palm was still small. Elfving held Bockström in high esteem (*Nya Pressen* 235A, 1.9.1907).

The outdoor garden was also renovated several times. Many new plants were planted, including a selection of useful plants and pond plants in a series of water pools. These pools were later filled.

Based on his experiences with the Kaisaniemi greenhouse plants, Elfving (1905a) described the possibility of growing 124 plant species in seminary greenhouses. Seminar is the historical term used for teacher training institutions for public school teachers in Finland. The seminars



also taught botany and therefore had greenhouses. Elfving (1905c) also published a catalogue of the *University seed collection*. It has survived to this day.

When Elfving served as a professor, Karl Henrik **Bockström** (1842–1907) acted as the head gardener in 1871–1907. His successor Karl Edvin **Liljeström** (1878–1957) was appointed in 1908, and his career lasted for 40 years, until 1948. He started filling in the wetland in the western part of the garden in 1908. It was once part of Töölönlahiti Bay (Elfving 1933b, Linkola 1933).

### Arboretum

Elfving let fell seed-born *Acer platanoides* and *Ulmus glabra* in the garden, and a large number of foreign trees and shrubs were planted in their place between 1896 and 1910 (Elfving 1913b, e).

For the inauguration presentation of Geography Professor Johan Evert **Rosberg** (1864–1932), Elfving (1913e) compiled the results regarding the success of woody plants in the garden. The success of each plant was evaluated. In all, 44 co-

nifer taxa had been tried, and circa 500 deciduous trees and shrubs. The presentation of *Abies sibirica* was the most comprehensive. Many taxa died young, but many also survived (Elfving 1913b). In 1926, trees planted in the 1840s, such as *Abies sibirica*, were still growing in the garden. *A. balsamea*, *Acer platanoides*, *Larix sibirica*, *Pinus cembra*, *P. strobus*, *Quercus robur*, and *Ulmus montana* = *glabra* were also old at the time.

The arboretum was renewed again between 1910 and 1920 (Elfving 1926b). The seeds were ordered from L. Späth (Berlin) and Regel & Kesslering (St. Petersburg), and approximately 170 species were planted (Elfving 1926b). This article was published in the "Finland-Buch" of the *German Society of Dendrology* in its scientific serie *Mitteilung der Deutschen Dendrologischen Gesellschaft*. This special issue was published to celebrate the *German Society of Dendrology's* visit to Finland in 1926. Elfving compiled the information regarding the woody species of the Kaisaniemi Botanic Garden.

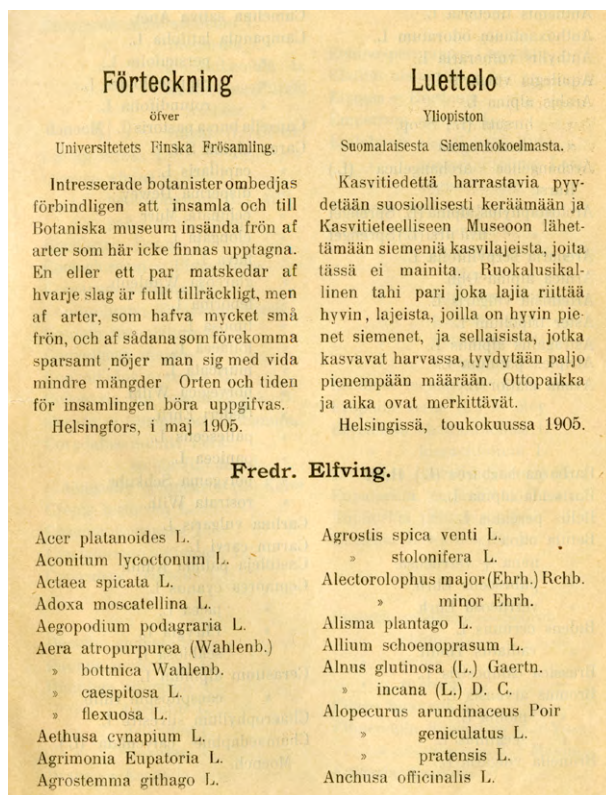
### Escapers

At the Swedish Agricultural Weeks, Elfving (1922a) presented recent changes to the flora of Finland, e.g., *Matricaria discoidea* had escaped from the Kaisaniemi Botanic Garden in 1849 and spread throughout the country. Another fugitive was *Elodea canadensis*, which Elfving had obtained from Uppsala Botanic Garden in 1884 for plant physiology experiments. It was planted in a pool in the Botanic Garden on 6.11.1886 (HD 303, 7.11.1886. Several others are also mentioned. *Reynoutria sachalinensis* was a new ornamental plant in Kaisaniemi in the late 1890s (Fr. Elfving 1893p *Polygonum sachalinense* [*sachalinense*]). Today, *Elodea* and *Reynoutria* are classified as harmful alien species.

### Garden guides and histories

The greenhouse guidebooks (Elfving 1904e,f) included valuable information of the garden to the

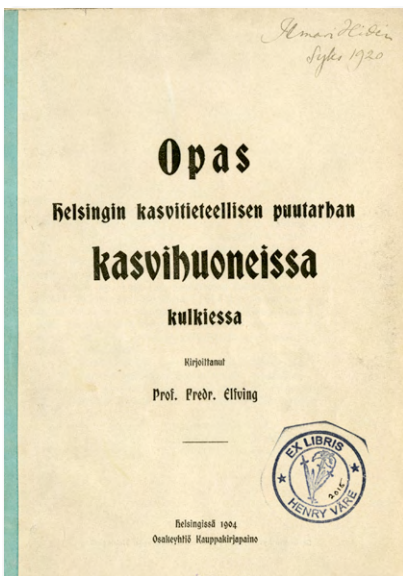
◀ Elfving (1905c) established the seed collection of the Botanical Institute. The current seed bank continues research work related to seeds.



public. The first guide was translated into Finnish by Antti Johannes **Siltala** (born Silfvenius) (1878–1910). 135 species grew in the section of useful plants (Elfving 1905d,e). A separate section for new amateur gardeners was established in the early 1890s, and a guidebook was soon written about the topic (Elfving 1912c). The histories of the Botanical Institute 1828–1852 and the centenary history of the Botanic Garden 1833–1933 (Elfving 1918c, 1933b) are significant. The first history received positive reviews (Levander 1918).

### Delectus Seminum

As a Professor, Elfving (1893v, 1894p) implemented seed exchange immediately, and seed catalogues were sent abroad. The exchange soon became lively. The first list contained 388 taxa, including 35 taxa of *Hieracium*. The second list had 383 taxa, with 62 *Hieracium*'s. J. P. Norrlin's *Hieracium* studies were underway. Correspondingly, 814 and 1 193 seeds were sent, and 1 355 and 736 were received from abroad, respectively. Most of the sowings were destroyed, and the Garden had little scientific importance (Elfving 1913e). As a consequence, the exchange was reduced, and plants were bought mainly from Berlin and St. Petersburg.



Elfving (e.g. 1904f) wrote garden guides to help visitors get the most out of their visits.

The next *Delectus Seminum* was sent for exchange in 1916, seeds were collected in 1914 and 1915 (Elfving 1933b). There were 540 taxa (Elfving et al. 1916). The next list included 467 taxa, and additionally 24 *Taraxaci* recently described by Harald **Lindberg** (1871–1963) (Elfving & Liljeström 1917). He was the first curator of the Botanical Museum in 1897–1910 and the first appointed custodian (custos), son of Sextus Otto Lindberg (Väre 2010).

After this, the seed exchange was organized quite regularly. Until the beginning of the 1960s, the seeds for the seed exchange were collected from the Garden.

### So far away

The townspeople admired the beauty of the greenhouses, but the location of Kaisaniemi was considered remote by the residents of the city centre: "In our city, there is a small quiet nook where the noise of the city never penetrates, a wetland in this rocky desert, a real tropic with palm trees, banana trees and papyrus plants, even a cooling spring, albeit artificial, where lively goldfish swim. However, it is very rare for any city dweller to pay a visit to the Botanic Garden. It is so far away. For those of us from Helsinki, the city does not extend beyond the streets of Pohjoisesplanadi and Aleksanterinkatu. Only some very special temptation will make us go on such a long and arduous journey as to the end of Pitkäsilta". (Viikon Kuvat 6: 88–89, 10 February 1906). The area required enhancement. Nowadays, the garden is in the heart of Helsinki.

### Garden versus city

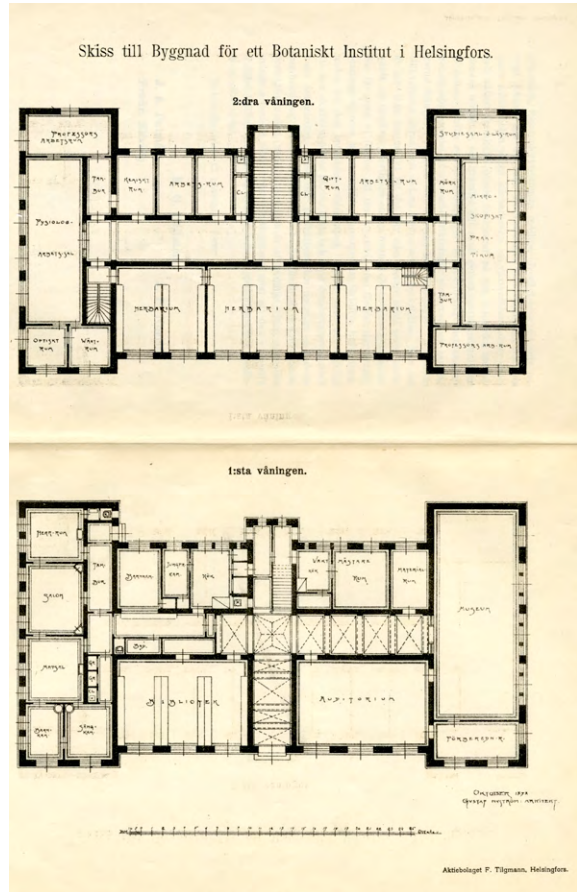
The University and the City of Helsinki have repeatedly argued about the boundaries of the Botanic Garden. The City made it its goal to spoil the general appearance of the Garden by demanding a beach promenade be built on the shore of Töölönlahti in 1892. In 1893, the City sent the Siltasaari – Kaisaniemi plan proposal to St. Petersburg for approval, but the waterfront promenade was removed from the plans. This is probably why the City refused to pay its share of the garden fence, which was completed in 1895. In the same year, the City renewed its claim, based

on the view that it owned the land. According to Elfving’s counterpart, the Garden had originally been intended to follow the shoreline. The city, in turn, appealed to vague maps from 1826. The territorial dispute was decided by the Senate Judiciary Department, which, in 1900, gave the City a favourable decision. The University gave the City an 18-metre wide beach strip and moved the buildings from the strip in 1911 (Elfving 1933b, c). Street Kaisaniemen rantakatu (today Kaisaniemenranta) was only completed in 1929. This sad state of affairs prevails.

### New Botanical Institute

Norrlin and Palmén had proposed the construction of a new Natural History Museum in 1890. At the turn of the century, the botanical collections were still housed in the main University building. The first drawings were completed in 1893, and the museums were together. However, the planned building was considered to be too large.

New drawings were made in 1896, this time only for the Botanical Institute. A corresponding building at the University of Leipzig was used as a model. Elfving had been there as a visiting scientist. That plan was abandoned in 1898, as the consistory did not approve of keeping the old institution building. A new proposal, made that same summer, was accepted. On 25 February 1899, the consistory appointed a new committee for designing the final building. The new plan was approved on 2 July 1901.



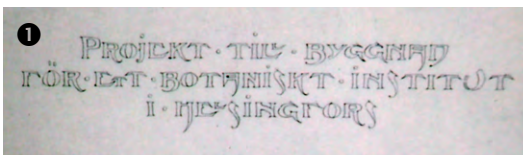
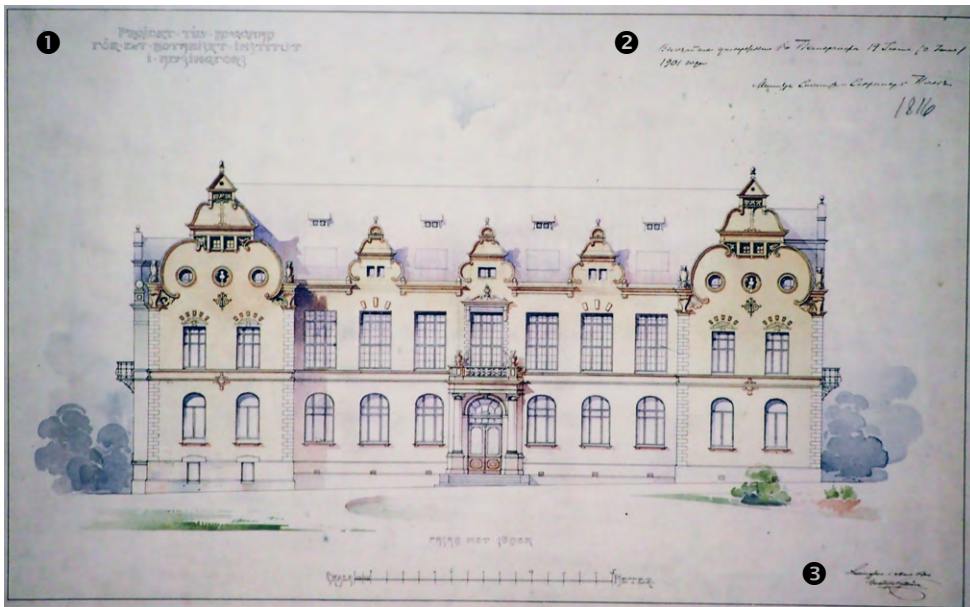
The first plan of the new Botanical Institute from 1898 drawn by Gustav Nyström (Anonym 1898).



▲ The main entrance to the Botanical Museum.

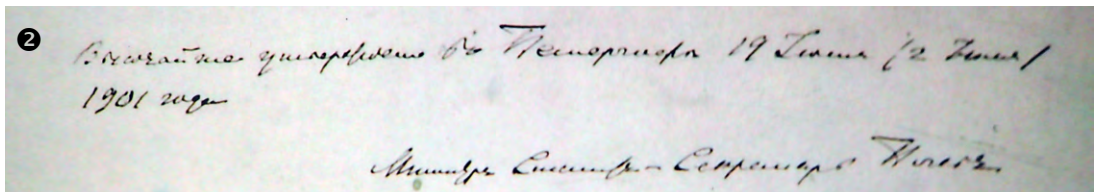
◀ On the first and second floors of the Botanical Museum, there are plenty of plant-themed ornaments.



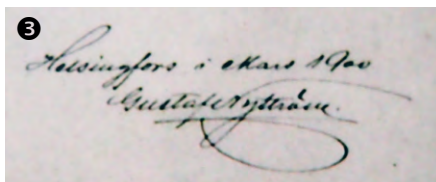


▲ The almost final version of the facade of the Botanical Institute.

◀ PROJECT TILL BYGGNAD FÖR ETT BOTANISKT INSTITUT I HELSINGFORS



▲ Высочайше утверждено в Петергофе 19 июня (2 июля) 1901 года  
Министр Статс-Секретарь Плеве  
Approved by His Royal Highness in Peterhof, 19 June (2 July) 1901  
Minister State Secretary Plehwe



◀ Signature by architect Gustav Nyström in Helsingfors (Helsinki) in 1900.

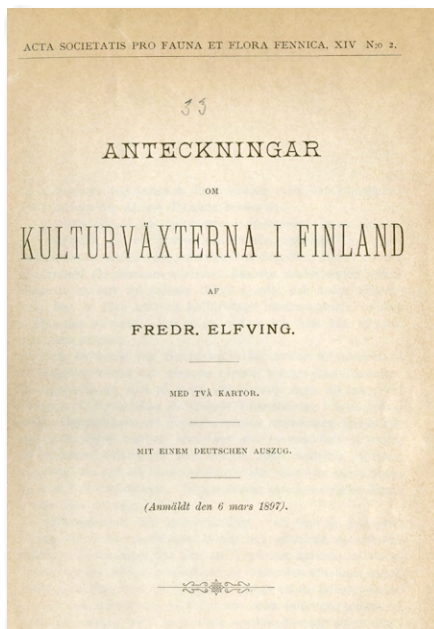
Construction work began in 1901, and the main building was completed in 1903 (Silfvenius 1904). The castle-like building was drawn by architect Gustaf Nyström (1856–1917). On August 26, 1904, *Helsingin Kaiku* praised the facilities as appropriate, unlike the facilities for zoologists. Elfving stopped keeping livestock in the Botanic Garden, the traditional perks of the professor and head gardener. It was only thanks to Elfving's determined efforts that a Botanical Institute was finally established. Elfving gave a

speech at Nyström's funeral as a representative of the University (*Dagens Press* 7, 9.1.1918).

## Studies on cultivated plants

### Notes on the cultivated plants in Finland

In the early 1890s, Elfving wrote a summary of Finnish crops based on extensive survey data. Elfving (1894a) had presented his project at a *Societas* meeting. He sent 1 000 polite, printed let-



◀ "Notes on the cultivated plants in Finland" was Elfving's (1897a) first publication on the cultivation area of food plants in Finland.

▶ "The most important crops" by Elfving (1895e) contains 77 images of Finnish crops. This re-print was dedicated to Juho and Nora Pöyhönen. Alexandra Eleonora (Nora) Pöyhönen (1849–1938) had established Kitchen garden school for common people in Haapavesi in 1892.



ters to gather information. He received 373 responses, the northernmost from Utsjoki in north Finland (Collander 1943). Based on the responses, Elfving (1897a) compiled the publication "Notes on the cultivated plants in Finland". This was the basis for subsequent Finnish crop studies.

The work presents 239 taxa, mainly species and only a few cultivars. There were 127 woody plants, the remainder were useful herbs. Ornamental grasses were not presented. The table on pages 24 and 25 lists the kitchen garden plants grown in advanced gardens, and the maps at the end show the northern limit of some of the most important useful plants in terms of success. The work was reviewed in several publications, also abroad, e.g., *Peltomies* 6: 163–166 (1897), *Luonnon Ystävä* 2: 32–36 (1898), *Biet* 18: 263–264 (1897), *Botanisches Centralblatt* 7: 533–535 (1898).

### The most important crops

Three Swedish (Elfving 1895e, 1898c, 1911a) and two Finnish (Elfving 1896h, 1927) editions of a very popular book: "The most important crops" were printed. For this purpose, Elfving received a grant of FIM 800 (*Hufvudstadsbladet* 84, 27.3.1896). Based on the book, *Kansan Lehti* (Easter issue 1895: 19–21) presented the

coffee tree (*Coffea arabica*) and the tea bush (*Camellia sinensis*), and the Swedish-language society *Länsi Suomalaisten Yhdistys* covered the history of potato (*Solanum tuberosum*) and tobacco (*Nicotiana tabacum*) cultivation (Anonym 1903). Elfving (1896f) also gave a presentation on: "The types of cereals that are cultivated now have better grains than their ancestors, the apples and other fruits of our days are larger and tastier than in the past, and so it is with all crops".

The book was written in the most thorough way. About 190 taxa were presented. Characteristics of the plants, probable original distribution, cultivation area, cultivation history, yield data and values, and success in Finland. The new editions were supplemented, but they did not differ substantially from the first.

It is still a useful textbook, and what the introduction says remains correct: Elfving stated the students had very limited knowledge of cultivated plants. General education must include information about nutrition and origin. **Stenberg** (1897) and **Hult** (1898a, b) greatly appreciated this textbook. For example, the Kurkijoki agricultural school used it as a textbook (Anonym 1925).

Elfving (1898a, b) called for apple cultivation, also in northern Finland, as hardy varieties were available. For example, it was worth trying the new Russian cultivar 'Skvosnoje Nalif'.

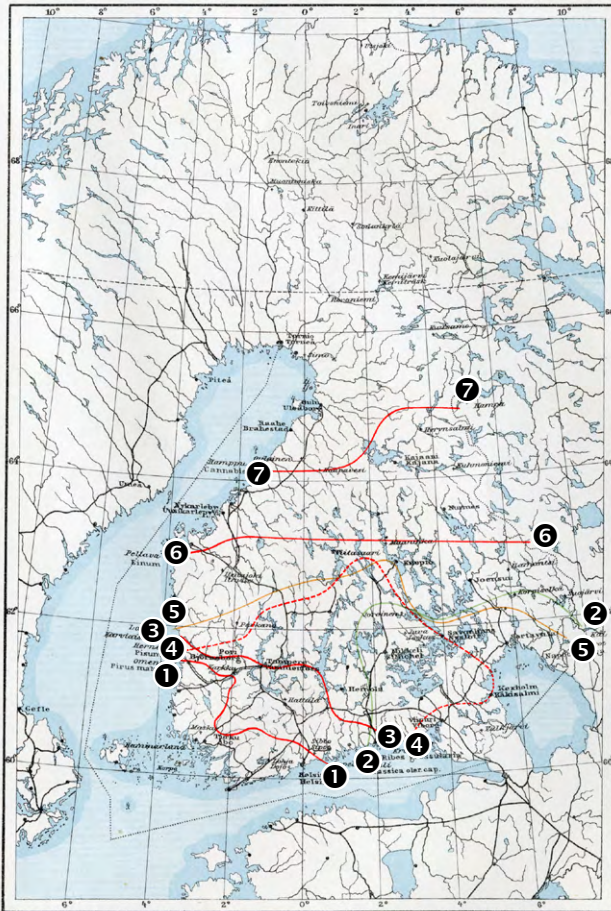


### Atlas of Finland

In the *Atlas of Finland*, Elfving (1899c, d, e, f) introduced Finland's most important cereals and other useful crops such as hemp (*Cannabis sativa*), flax (*Linum usitatissimum*), and potato (*Solanum tuberosum*). In the 1910 edition, the domestic cultivation of cereals and other food crops was

briefly presented in three languages (Grotenfelt & Elfving 1911a, b, c). For some reason, a French version was also printed in *Fennia* (Grotenfelt & Elfving 1911c, d). The accuracy of distribution maps was better in 1911 than in 1899.

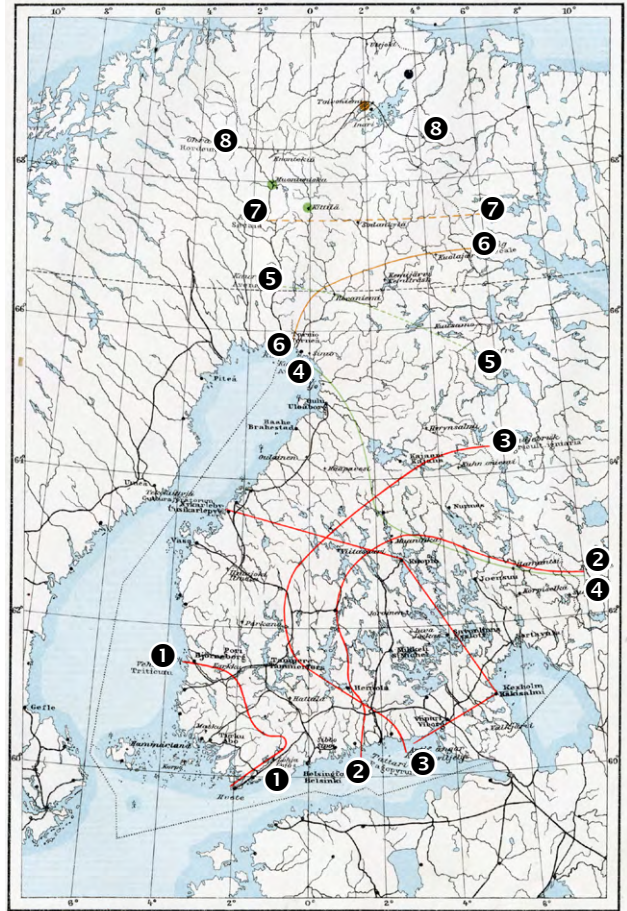
### Viljelyskasveja. Yleisen viljelyksen rajat. Kulturväxter. Gränser för allmän odling.



Cultivation areas of some crops in Finland (Elfving 1897a, 1899c, d, e, f).

1. *Malus domestica* (red line)
2. *Brassica oleracea* (green line)
3. *Ribes uva-crispa* (red line)
4. *Lathyrus oleraceus* (*Pisum sativum*, dashed red line)
5. *Brassica napus* subsp. *rapifera*
6. *Linum usitatissimum*
7. *Cannabis sativa*

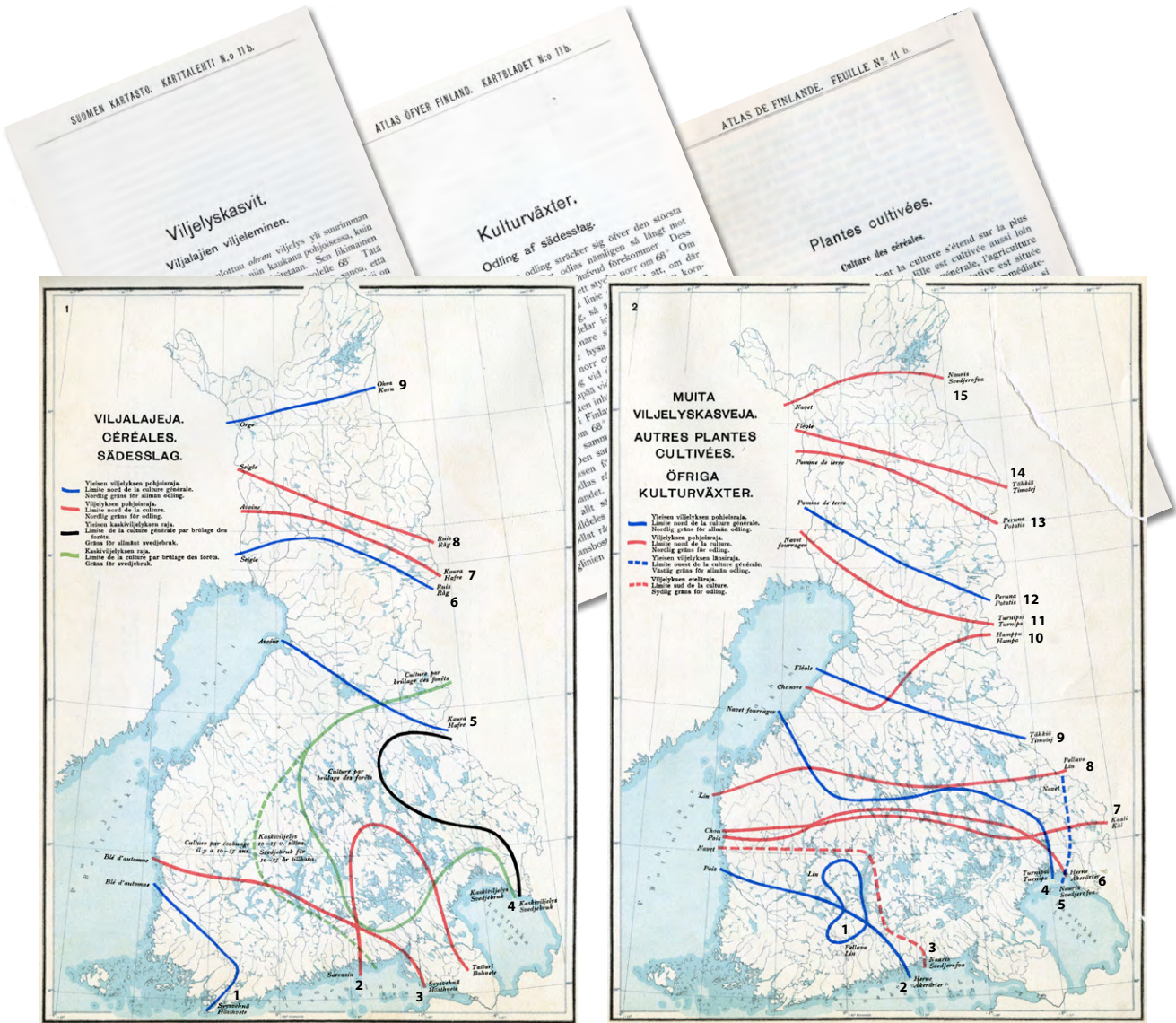
### Viljalajien viljelys. Odling af sädesslag.



Cultivations areas of cereals in Finland (Elfving 1897a, 1899c, d, e, f).

1. *Triticum aestivum*
2. Eastern border *Fagopyrum esculentum* cultivation
3. Eastern border of slash and burn culture
4. *Avena sativa* (green line, common)
5. *Avena sativa* (dashed green line, northern border)
6. *Secale cereale* (common)
7. *Secale cereale* (dashed red line, northern border)
8. *Hordeum vulgare*





Cultivations areas of cereals in Finland (Grotenfelt & Elfving 1911a, b, c).

1. Autumn *Triticum aestivum*
  2. *Fagopyron esculentum*
  3. Summer *Triticum aestivum*
  4. Slash and burn culture (green and black lines)
  5. *Avena sativa* (blue line)
  6. *Secale cereale* (blue line)
  7. *Avena sativa*
  8. *Secale cereale* (red line)
  9. *Hordeum vulgare*
- Blue line = the northern border of the common cultivation area  
 Red line = the northern border of the cultivation area  
 Green line = eastern border of the slash and burn culture area  
 Black line = eastern border of the common slash and burn culture area

Cultivation areas of some crops in Finland (Elfving 1897a, 1899c, d, e, f).

1. *Linum usitatissimum* (common)
2. *Lathyrus oleraceus* (sugar pea)
3. *Brassica rapa* subsp. *rapa* (slash and burn culture)
4. *Brassica rapa* subsp. *rapa* (turnip, common)
5. *Brassica napus* subsp. *rapifera*
6. *Lathyrus oleraceus* (field pea)
7. *Brassica oleracea*
8. *Linum usitatissimum*
9. *Phleum pratense* (common)
10. *Cannabis sativa*
11. *Brassica rapa* subsp. *rapa* (turnip)
12. *Solanum tuberosum* (common)
13. *Solanum tuberosum*
14. *Phleum pratense*
15. *Brassica rapa* subsp. *rapa*



Cultivated plants, their history, distribution and use presented 112 species (Elfving 1902c). It was published also in Finnish (Elfving 1906j).



### The cultivated plants, their history, distribution, and use

Elfving (1902c) compiled a shorter textbook for lower educational institutions about the world's most important cultivated plants and their use, cultivation history, and distribution. 112 plants were presented. The book was translated into Finnish and published by *Societas Biologica Fennica Vanamo* (Elfving 1906j).

### My country

In *Oma Maa* ("My Country"), Elfving (1908d) wrote about cereals and their breeding. Until then, only selection had been performed in Finland. Barley was the earliest grain in our country. Elfving presented the importance of Pehr **Kalm** to Finnish economical botany (Elfving 1911b), Rein et al. (1907, 1920) the life history of Pehr **Forskål**. Elfving & Heikel (1928) introduced the readers of "My country" the benefits University

achieved during the era of utility. By this are meant the years between 1718–1772. Strong public attention was focused on various beneficial ways e.g. in agriculture: new species and types better suited to our climate were tested and which would benefit the economy.

"My Country" appeared once a month. Its purpose was to increase citizens' awareness of their own country's history and the present awakening national pride under Russian rule. The Russians had begun repressive measures in Finland.

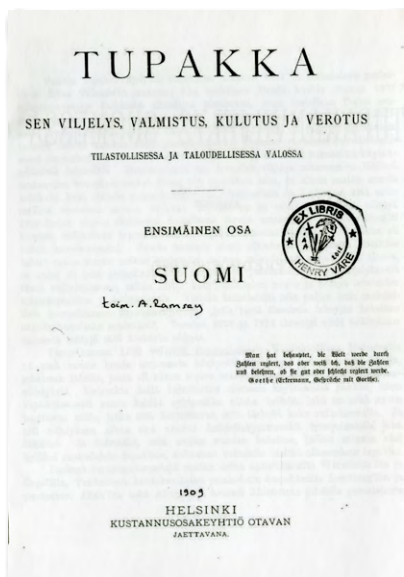
### Tobacco

Elfving's writing on the history of tobacco (*Nicotiana*) cultivation in Finland is a highly important source in the field (Elfving 1909c, d). The article contains versatile information regarding the history of tobacco cultivation in Finland. Elias **Tillandz** (1640–1693), professor of medicine, had already mentioned that tobacco was cultivated in Turku in southwestern Finland as early as 1671[1673]. Elfving thought the plant came from Olof Rudbeck the Elder's (1630–1702) garden at Uppsala.



Drawing of *Gossypium* (Elfving 1906j).





Serious efforts were made to promote tobacco cultivation in Finland at the beginning of the 20th century (Elfving 1909d).

Since tobacco was an imported commodity, the Swedish College of Commerce had tried to promote its cultivation in the country on several occasions with regulations, especially in the 1720s after the bitter war between Russia and Sweden. The period is called the Great Wrath (1713–1721), during which Russians destroyed the Finns' livelihoods and killed tens of thousands of people. Consequently, there was no money for imported products, and domestic production had to be promoted.

As a result of the regulation, Finland's first tobacco factory was established in Turku in 1731. Cultivation did not progress in the cities, but it did in the countryside, as Commercial Council Ulrik **Rudenschöld** (1704–1765) stated. The craving for tobacco was strong from early on, a servant's salary was barely enough to sustain the habit. However, the weather did not favour growing the crop, and Rudenschöld considered the situation hopeless.

However, cultivation increased, and new tobacco factories were established. They used both foreign and domestic tobacco leaves. For example, in the 1750s, Pori annually sent approximately 6 000 kg of leaves to the Turku tobacco factory. Due to this success, a factory was also established in Pori in 1761. It was operative until 1825. 20–25 ha of tobacco plantations was located in

Turku, the annual harvest was 68 000–85 000 kg, and hundreds of women and children worked in the fields. In the 18th century, Heinola, Kokkola, Kuopio, Oulu, Porvoo, and Vaasa also had tobacco factories. Trade counsellor Abraham **Kingelin** (1788–1849) owned the last tobacco plantations in the Turku area, in the 1830s, but cultivation continued in Pietarsaari until 1866 (Elfving 1909c, d). Thereafter, large-scale tobacco cultivation in Finland ended.

A former tobacco factory employee explained in detail to Elfving how tobacco was raised from seeds to factory condition. The seeds were ordered from Holland, and Elfving speculated that the species might be *Nicotiana bigelowii*. That is unlikely. Mainly *N. tabacum* and *N. rustica* were grown in Finland, the former was of better quality, the latter more durable.

There were still many small-scale tobacco plantations at the end of the 19th century, mainly for home use. In the mid-1890s, Elfving conducted a nationwide survey of the cultivation of various crops. *Nicotiana rustica* was cultivated as far as Rovaniemi, although cultivation was minimal in the north. The distribution map of the Finnish cultivation area was published in this work (Elfving 1909c, d).

## University administration

Saelan et al. (1890) made a proposal to the University to buy the late Professor of Botany Sextus Otto Lindberg's bryophyte collection for the Botanical Museum. Much later, Elfving (1913d) took the initiative that aimed to expand the phytopaleontological studies of Finnish bogs.

Elfving (1909a) opposed Liro's election as assistant professor of plant physiology and pathology. Elfving knew that Liro supported the idea that lichens are symbiotic organisms. In addition, Liro considered that university teaching must be increased in the country's majority language, Finnish.

When the University's rector, Professor I. A. **Heikel**, resigned re-election, Elfving applied for the position of rector of the university. In the election, Professor A. **Donner** received 31 votes, while Professors Fr. Elfving and W. **Ruin** both received 28 votes (*Hangö Bladet* 64, 2.5.1911).



However, Elfving was not an absolute supporter of the Swedish language when it came to the language issue. He supported establishing an extraordinary professorship, which aimed to teach botany also in Finnish (Elfving 1919a). Kaarlo **Linkola** became selected in 1925. When Magnus Widar **Brenner** (1887–1932) applied for professorships at the University, Elfving repeatedly recommended his student (among others, Elfving 1923a).

Elfving served as dean of the Physical-Mathematical Faculty in 1911–1924. There, Elfving (1916a, b) supported, for example, the grant applications of botanists. Elfving was a member of the Agricultural-Economic Faculty in the years 1902–1910 and a tax inspector of the University in the years 1905–1920.

Elfving was a popular speaker at university celebrations. Among other things, he represented our University at the Linné jubilee in Uppsala and Stockholm in 1907 (*Hufvudstadsbladet* 138, 24.5.1907; *Västra Finland* 59, 25.5.1907) and at the Darwin jubilee in Cambridge in 1909 (Collander 1943). Elfving held a lecture in Solemnity Hall titled "Recent research about heredity". The lecture was highlighted with magic lantern images (*Västra Finland* 135, 20.11.1909). Elfving acted as a promoter in 1910 (Elfving 1910b, c, *Hufvudstadsbladet* 146, 1.6.1910).

## Teaching

For the first years, Elfving worked alone as a professor at the Botanical Institute. A typical week's schedule was: In autumn, implement the physiological exercises of a course that starts on 3 September and continues daily. After this course ends, another course on the general organograph (in Swedish, with a practical introduction also in Finnish) is held at 9–11 am Thursdays, Fridays, and Saturdays (to attain an approbatur grade for a bachelor's degree in philosophy). Plant physiology lectures (in Swedish) in the spring on Tuesdays, Wednesdays, Fridays, and Saturdays from 8–9 a.m. in the botany lecture hall. Hold examinations for botany students on the first and third Wednesday of every month in the botany laboratory [*Practicum physiologicum*]. Available for students on Mon. and Thu. at 3 p.m. in the botany



The door of the former botany laboratory in the current Botanical Museum.

laboratory and Wed. and Sat. from 5 to 6 p.m. at home. Apartment: Botanic Garden (Heikel 1940).

In the year of his inauguration as professor, Elfving (1892b) published an extensive overview of the level of both students and teachers in botany. This became his agenda. Finnish botany was mainly applied, except for plant geography and taxonomy. Only a very few could devote themselves to basic research, and even that was often limited to a short period of study at the University. In high schools, botany was studied very little, one hour a week, and this was not questioned in the graduation essays. The subject did not even have a representative on the governmental school board.

For a long time, books on botany for the general reader were very scarce and helplessly obsolete, especially when it came to Finnish language textbooks. An early work of this kind was published in 1791 by a clergyman, Johan **Frosterus** (1720–1809): "A useful reminder of the works of creation, for simple people to feel and serve God's goodness" (Frosterus 1791). Six pages were devoted to the plant kingdom. The chief aim was to praise the greatness of God. Eight editions were published, the last one in 1850. The next book in Finnish was "Uncle's lessons about nature"

(Warelius 1845). These were superseded by Zacharias **Topelius** (1818–1898), professor of Finnish language in 1854–1898, when he published his "*Book on nature*" (Topelius 1856, 1860). It contains 20 pages on botany.

All this resulted in a miserable standard of students. Even the little that they had been taught, had been forgotten upon entering the University, so the information was unfathomably incomplete, even among those aspiring towards science. Students did not recognize the most common trees or useful plants, or spruce cones from pine cones. There was a flash of light in the dark sky if a student distinguished a seed from a fruit. Reasons behind this misery were not only the non-existent lessons in high school and the lack of textbooks, but also teacher incompetence. Due to all of this, the ability to absorb new knowledge was negligible. That is why teachers should encourage students to be independent, especially in the summer when nature can be studied in its bloom.

The majority of botany students graduated as doctors, pharmacists, or teachers. Medical students in particular were "children of misery". They should recognize medicinal plants at least. How can they make a diagnosis if they cannot even differentiate plant species from each other? It was better to learn the art of visualization with plants than with patients. Medical students also had to master plant anatomy and physiology, as well as microbiology.

In horticultural education, medical students were like weeds, whose growth should be limited so that the "nobler" students would not be weakened. During the harvest, their presence is no longer noticeable, but they have taken a lot of time and caused trouble. Pharmacists were perhaps the worst, "unfortunate children of society, almost ungifted students" from the lower levels of schools. However, their knowledge levels were rising as the competition increased. Simultaneously, the level of demand was decreasing.

Finland had 40 positions for teachers, 16 in full-sized high schools, 19 in schools with two to four classes, and five in girls' schools. There were also a few teachers in private educational institutions. None of the above-mentioned institutions specialized in natural sciences with a view for preparing students for university. Therefore, Elfving did not consider the bad situation a mir-

acle. In conclusion, he states: They pass through the University without leaving a trace. The skills that have been poured into them – testing the strength and patience of the teachers – are lost. Elfving promoted study opportunities by writing textbooks and with the initiative of the new Botanical Institute, which were realized.

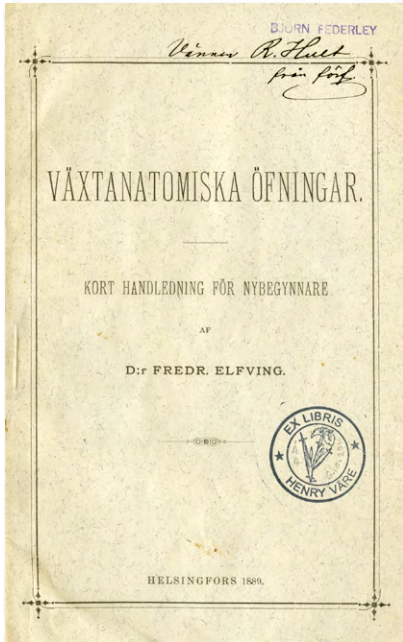
## Reformist

Elfving thoroughly reformed the teaching of botany. Elfving (1892b) outlined the future of teaching using the master-to apprentice model, where student work had to be related to a professor's research interests. In this way, the professor's knowledge and skills are transferred hand-in-hand. The custom was common in Germany. Although science was international, there were also national aspects in botany. For example, the Botanical Museum could develop into a first-class institution only in its own area. Specimens from other countries could only be obtained as examples.

Eventually the knowledge of vascular plants was already at a relatively good level, but the situation was poor for other plant groups. This could be supported by laboratory work, for example. When choosing research topics, the northern location of the country was a good research theme, i.e., the importance of temperature for plants, the spread of plants towards the north, the importance of long days for the functions of plants, the study of archipelagos and inland waters. The latter were globally rare habitats. It was important to examine increasingly precisely which useful plants thrive in the country. Some of these tasks had been transferred to the Economic Society, the Agricultural Society, the Agricultural Institute, and the garden associations. For this reason, the research importance of the Botanic Garden was rather small.

Higher agricultural education should be transferred from Mustiala Agricultural College to the University (Elfving 1897b). Elfving et al. (1902) also proposed that a Department of Forestry be established at the University. There should be a professor of forest management, a professor of forest inventory, and a teacher in forest mathematics. When the University was organizing the

teaching of plant physiology, bacteriology, and plant pathology, Elfving believed that one teaching position would be sufficient (Elfving & Gebhard 1903).



Textbook of exercises in plant anatomy (Elfving 1889k).

### Textbooks

For a long time, all botany teaching in Finland was the sole responsibility of Elfving. His first assistant was Charles Emil **Boldt** in 1897. In practice, Elfving founded the botany education at the University of Helsinki. His predecessors had been very one-sided focusing on lichenology or bryology. John Erhard **Areschoug's** (1811–1887) *Lärobok i Botanik* (Areschoug 1863), favoured by Professor **Lindberg**, was hopelessly out of date. Plant physiology was completely neglected. Thus, Elfving began to lecture in plant physiology, morphology, anatomy, vascular plant and cryptogam systematics, plant geography, and the history of botany. The pictures drawn during the courses were of a high standard.

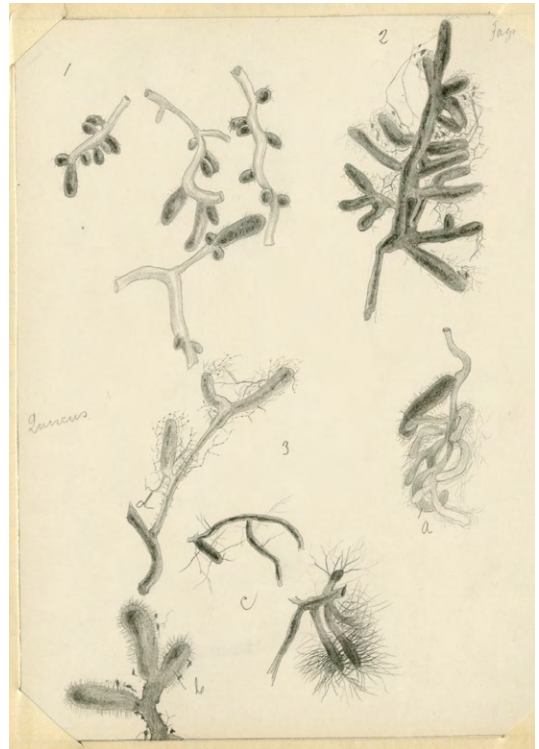
Elfving had begun the educational reform already in 1880 by holding a microscopy course. Elfving (1889k) prepared a guide for a training course in plant anatomy, where plants and their parts were studied by making tissue sections. Li-

chens, fungi, bryophytes, and algae also had to be studied. For teaching to be effective, usable textbooks were needed. Elfving wrote several.

### Botanical microscopy

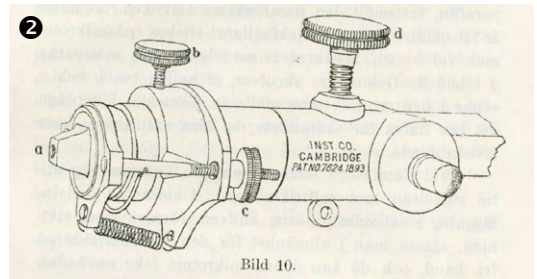
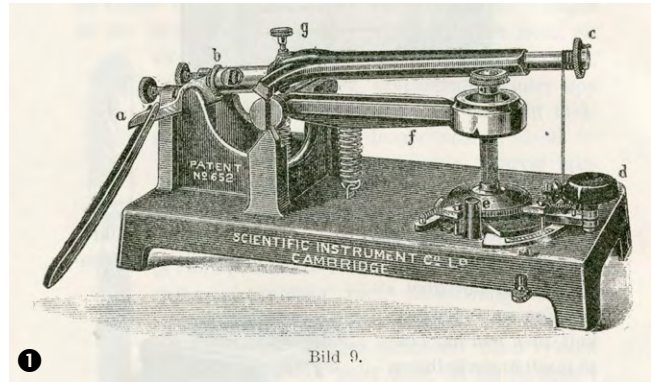
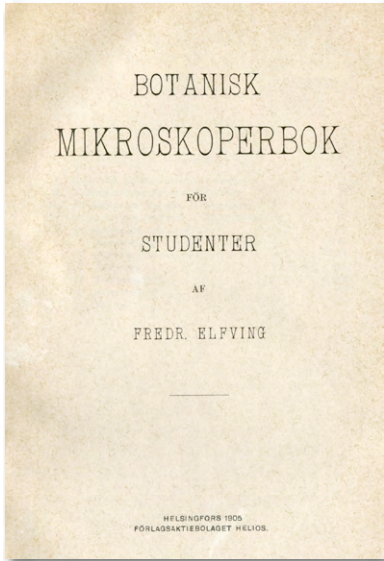
Plant physiology studies became compulsory in 1905. For this purpose, Elfving wrote the textbook "Botanical microscopy book for high school students" (Elfving 1905b). The director general of the Fisheries Board, Toivo Henrik **Järvi** (1877–1960), assessed it as most necessary (Järvi 1905).

The second edition (Elfving 1912b) was assisted by Ch. E. **Boldt** and Ernst Fredrik **Häyrén** (1878–1957). Boldt translated the last 170 botanical terms of the book into Finnish. The course covered, among other things, starch grains, cell mucus, chlorophyll grains, plasmolysis, chloroplasts, leucoplasts, chromoplasts, aleurone grains, collenchyma, pores, and other cell structures. The microscopes used had a maximum magnification of 450 times. The assistant in botany at the Department of Propaedeutic Education, Toivo Juho



Mycorrhizal *Fagus sylvatica* roots drawn during plant anatomy course.





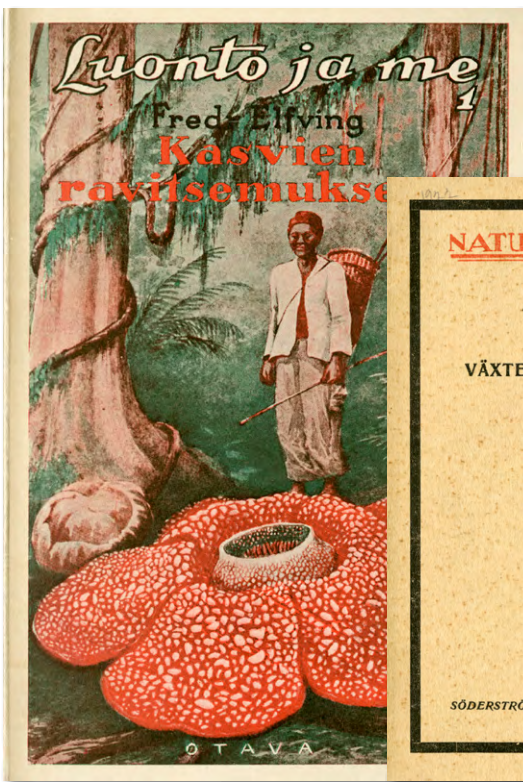
▲ Textbook of botanical microscopy exercises in plant anatomy and equipments that were used during the courses (Elfving 1905b). 1. Cambridge rocking microtome. 2. Cambridge object holder, auxiliary to the previous one.

▼ "On plant nutrition" was based on course Elfving gave. It was published both in Swedish (Elfving 1923b) and Finnish (Elfving 1924d).

**Hintikka** (1888–1952), translated the 2nd edition into Finnish (Elfving's 1923c, 1936). The textbook was in use for at least 30 years.

**On plant nutrition**

A student, Vilho Suonio **Setälä** (1892–1985) translated into Finnish (Elfving 1924d) Elfving's (1922a, 1923b) graduate course lectures on plant physiology "On plant nutrition", held in 1919. In the foreword, Elfving mentions that the basic knowledge of students is so bad that the textbook is inevitably of a general nature. The Professor of Botany Kaarlo **Linkola** (1888–1942) assessed the book as being highly comprehensive, skilfully written, and very suitable for young people (Linkola 1926). At the time, Linkola was extraordinary professor of botany, i.e., a colleague of Elfving.



### Prantlin's *Lehrbuch der Botanik*, Botany textbook

At the annual meeting of *Vanamo* (*Societas Biologica Fennica Vanamo*) on 21 May 1900, the chair, Aukusti Juhana **Mela** (1846–1904), natural history and geography lecturer at a Finnish normal high school, proposed that the 11th edition of Prantlin's *Lehrbuch der Botanik* from 1900 be translated into Finnish for use as a university textbook. Elfving accepted the project. Elfving wrote a manuscript in Swedish, which was translated into Finnish as "*Textbook of Botany*" (Elfving 1903b). He was greatly assisted by Antti Johannes **Silfvenius** (later **Siltala**) (1878–1910). The work received a good review, but Elfving's erroneous understanding about lichens as independent organisms was brought to the fore (Norrlin 1904). To promote sales, the entire edition, 1 000 copies, was sold to the publisher Yrjö Weilin. Three new editions were taken from the textbook, which were in use for a long time (Elfving 1908e, 1921e, 1930b). The latest edition had expanded by more than a hundred pages. The book was read at the University for decades.

"*The most important crops*" (Elfving 1895e, 1896h), "*Botanical Microscopy*" (Elfving 1905b, 1912b) and a second edition of the textbook (Elfving 1908e) were the requirements for obtaining a pass mark (*approbatur*, *approbatur cum laude*, or *laudatur*) (Anonym 1905, 1911a, b, c). The books were also part of the course requirements of the Department of Agricultural Economics.

### Reviews

In the journal *Botaniska Notiser*, Elfving collected botanical publications printed in Finland in 1873–79 (Elfving 1881b) and 1880–82 (Elfving 1883c).

Russian botanist Andrei Sergeyeovich **Famintsyn** (1835–1918) compiled botanical reviews from Russia into German synopses. Elfving (1893å) provided information compiled of Finnish publications in 1891.

A landmark was when the first batch of *Plantae Finlandiae Exsiccatae*, edited by H. **Lindberg** and his predecessors, was distributed to the world's leading botanical museums (Elfving 1908a). Likewise, Anders Thiodolf **Saelan**'s (1834–1921) "*Finnish Botanical Literature up*



Four editions of "Textbooks of botany" were read by decades by students in Finland.



*to and including the year 1900*" (Saelan 1916) received a justifiably excellent review. The book contains circa 6 000 references, including the topics of agriculture and forestry (Elfving 1917a). Also, Gunnar **Andersson**'s book on the food plants of the world in world production received a good introduction (Elfving 1917b). Carl **Forsstrand**'s "*Linné in Stockholm*" was a continuation of the Linné literature boom that began in 1907, 200 years after Linné's birth. Forsstrand's book was written with humour and was enjoyable to read although the content was not particularly new (Elfving 1919b). *Die Laubmoose Fennoskandiens* by Viktor Ferdinand **Brotherus** (1849–1929), teacher at a girls' school, was a benchmark in its field. 826 bryophyte species are presented, 524 of which had been found in Finland. The book was aimed at specialists (Elfving 1924a).



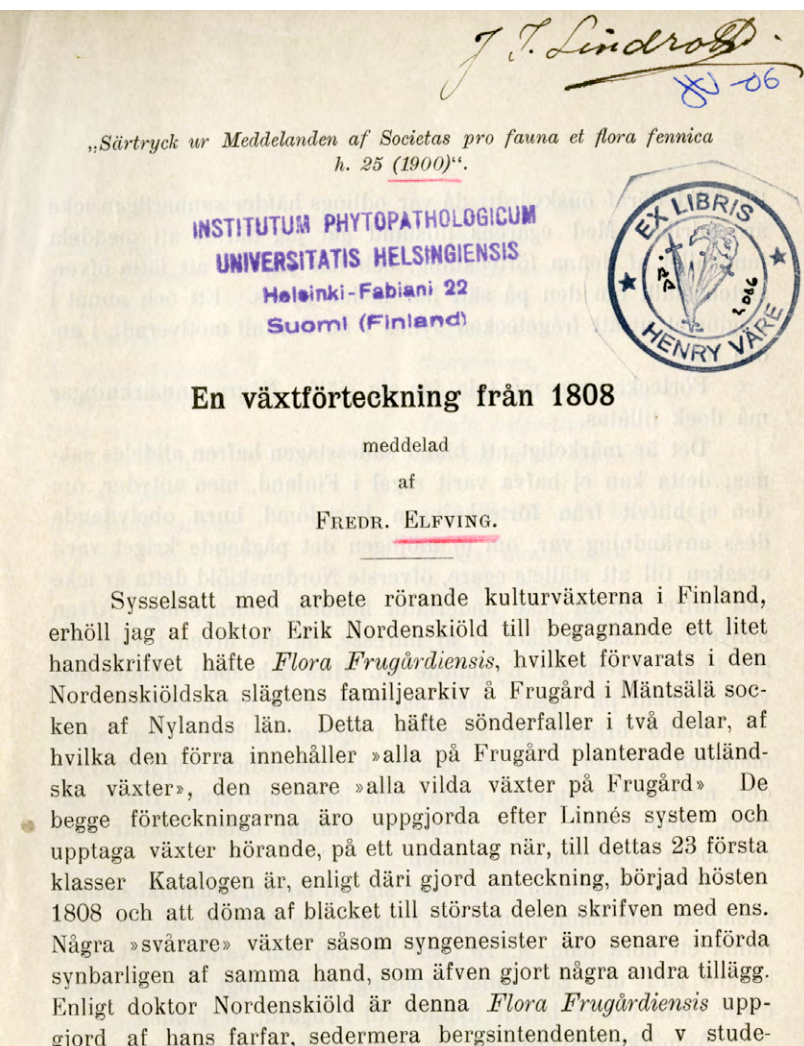
## As a historian

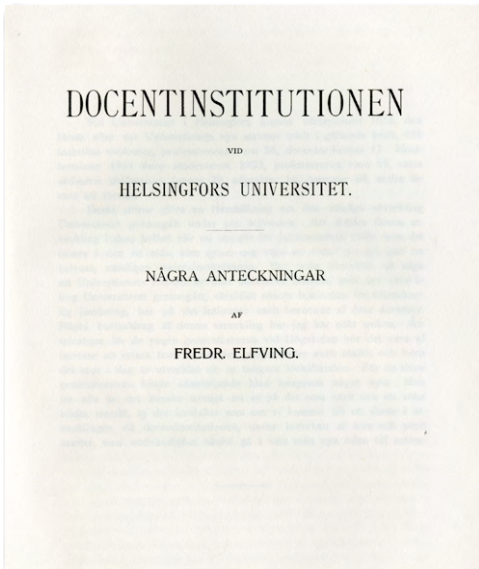
Elfving was very interested in the history of botany from an early age. His very first publication deals with recent achievements in botany, especially the results of domestic and foreign expeditions (Elfving 1877). Elfving (1881g) compiled a synopsis of the comprehensive biography by Lagus (1880) of **Laxman**. Carl Axel **Gottlund** was introduced as a mushroom collector, the first significant one in Finland (Elfving 1908b). Elfving (1907a, b) also paid attention to the 200th anniversary of **Linné's** birth. In a series *Oma Maa* ("My country") Rein et al. (1907, 1920) wrote about Pehr **Forsskål** and Elfving (1911b, 1923e) wrote about Pehr **Kalm**.

Elfving had studied the minutes of the consistory and prepared an overview of life at the Åbo Academy in 1640–1809 and the Imperial Academy of Åbo in 1809–1827. The Academy was like a state within a state, with its own judicial power that City authorities could not influence. Privileges were meticulously monitored. Nothing was as important as the seating arrangement during church proceedings and other occasions. Student life was free and full of excitement. The burghers sold beer against pledges. The minutes of the consistory are full of offences (Elfving 1887).

Elfving (1900b) published a list of plants found in the archives of Mäntsälä's Frugård manor, the *Flora Frugårdiensis*, compiled by Superintendent of the Mining Board Nils Gustav **Nordenskiöld** (1792–1866) in 1808, of whom Elfving had very briefly communicated on before [Luonnon Ystävä 2(8–9): 177. 1898]. The list mentions four cereals, two fibre-producing plants, 42 kitchen plants, and 82 ornamental plants. In addition, the original list mentioned 187 wild plants that Elfving did not list. They were mostly common species. Elfving (1922b) published **Sahlberg's** letter sent to the Professor of History Gabriel **Rein** (1800–1867), where Sahlberg explains the establishment of the Yläne orchard and its fruit tree varieties. In 1850, 1 227 *Malus domestica* trees grew at Yläne, representing more than a hundred varieties, along with 16 *Pyrus communis*, 19 *Prunus domestica*, and approximately a hundred *Prunus cerasus*. In its time, it was the largest fruit garden in Finland (Väre 2017).

◀ Elfving (1900b) published a list of plants found in the archives of Mäntsälä's Frugård manor.





Elfving wrote several histories of the Imperial Alexander University.

### Presentations on the history of the University

**Browallius'** lecture notes from 1739 and 1740 had survived on Dean N. **Karila's** estate. The previous note dealt with the history of botany and Tournefort's system. Next, 146 domestically cultivated plants are presented, particularly including ones with medicinal properties (Elfving 1912a).

During the master's and doctor's promotions, Elfving (1910c) gave a lecture on how the bachelor's degree requirements had changed with the new statutes, and at the inauguration of Lars William **Öholm** (1872–1944), professor of chemistry, he gave a lecture on the history of the docent institution at the University of Helsinki Elfving (1915c).

When Professor of Astronomy Karl Frithiof **Sundman** (1873–1949) received a professorship, Elfving (1918c) gave an inaugural speech titled "Botanical Institute in the years 1828–1852", with the help of the minutes of the consistory, the correspondence of professor **Sahlberg**, invoices, and other documents kept at the Botanical Museum. When the Botanic Garden celebrated its centennial history 1833–1933, Elfving (1933b, c) held the key speech.

Elfving gave the 250th anniversary speech of **Tillandz's** 1670 appointment as professor of medicine (Elfving 1921a).

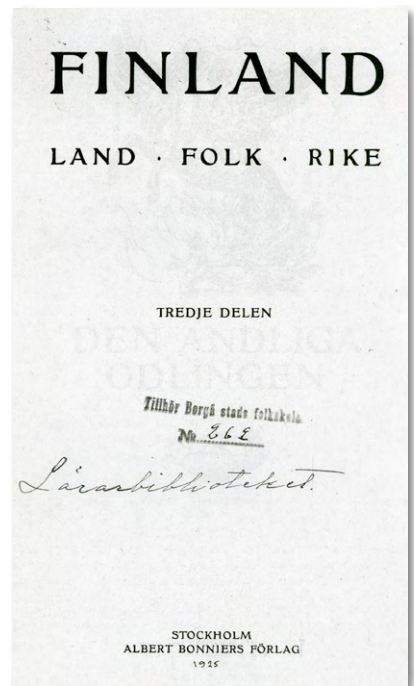
### Diaries of Kalm's North American journey

In 1899, Georg **Schauman** (1870–1930), amanuensis of the Main Library of the Imperial Alexander University, found the manuscripts of Pehr **Kalm's** diaries, "Travels in North America", in the library (Schauman 1904). They were not exactly in accordance with the published volumes and continued beyond what Kalm (1753, 1756, 1764) had been able to publish. The travelogue ended in Montreal on 5 October 1749 (old style). The library's manuscript continued until 31 December 1749 (old style), i.e., 11 January 1750 (new style).

As a result of the discovery, the *Svenska Litteratursällskapet* funded a new print of the published travelogues and the unpublished part of the diary (Schauman & Elfving 1904, 1910, 1915, 1929). Docent of Zoology Nils Erik **Nordenskiöld** (1872–1933) introduced their effort (Nordenskiöld 1905, 1930).

### Societas pro Fauna et Flora Fennica

Elfving (1896a, 1921a) thoroughly presented the importance and activities of *Societas pro Fauna et Flora Fennica* and likewise the centennial history of the *Finnish Society of Sciences and Let-*



► After Finland's independence, its scientific associations were introduced in several books presenting Finland, such as Elfving & Hintikka (1925).



ters (Elfving 1938a). Aarni Penttilä translated the latter history into Finnish (Elfving 1938b). Both are extremely important source works for the research of history.

Around the time of the national awakening, a celebration book *Finland* in the 19th century (e.g., Estlander et al. 1893), illustrated by our foremost artists, was published in English, Finnish, Swedish, German, Russian, and French. The English and Russian editions were not reprinted. In it, Elfving presented the *Societas* (Elfving 1893z, å, 1894q, r, s, t, 1898f, g, 1899g, 1900d) and the short history of natural sciences in Fin-

land (Elfving 1893w, x, 1894u, v, x, y, 1898d, e, 1899f, 1900e).

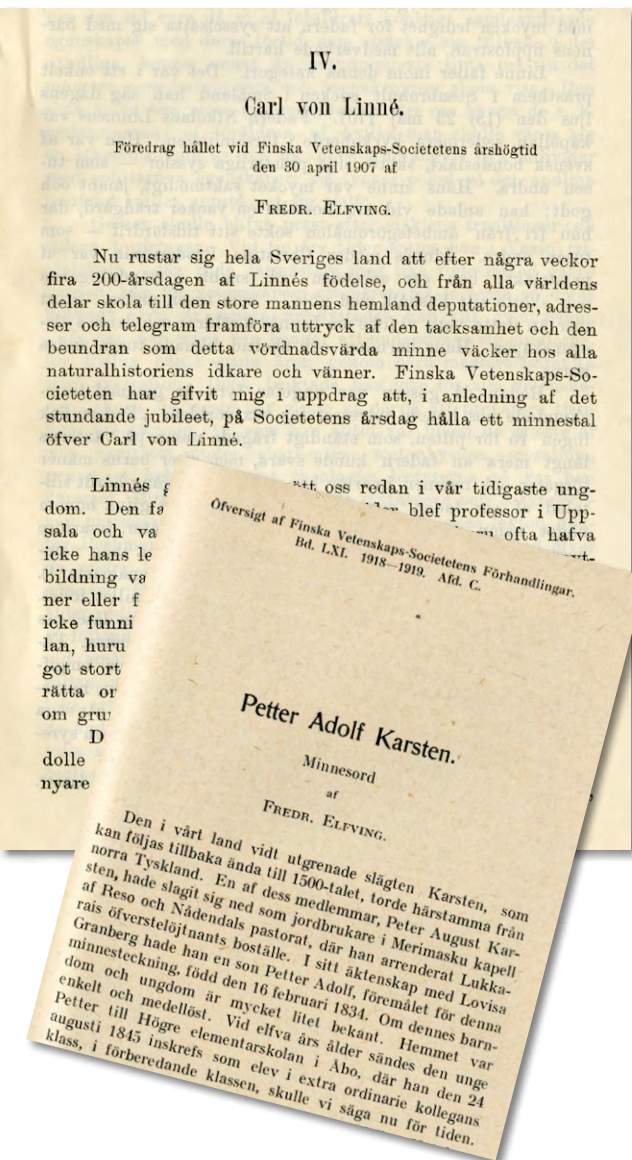
After independence in 1917, Finnish cultural life was presented at least as effectively as in "Finland in the 19th century" and "My country" and "Finland. Country, nation, state" (Elfving & Hintikka (1925a, b, 1926a, b) presented the *Societas*, *Vanamo*, and the *Forest Society*, and a few other scientific societies. In addition, Elfving (1925f, g, 1926c) also introduced the science of botany in Finland.

▼ Elfving wrote many obituaries and biographies.

### Obituaries and biographies

Elfving compiled several obituaries, especially when he was acting as vice president of the *Societas*. In addition, he was interested in important botanists and wrote biographies about them.

1. Carl von Linné. 1878a, 1907a, b, f
2. Elias Magnus Fries. 1878b
3. Sextus Otto Lindberg. 1889a, e, 1893w, x, 1894u, v, x, y, 1898d, e, 1899f, 1900e, 1935a
4. Pietari [Pehr] Kalm. 1893w, x, 1894u, v, x, y, 1898d, e, 1899f, 1900e, 1911b, 1923e, 1928a, b
5. Pehr Adran Gadd. 1893w, x, 1894 u, v, x, y, 1898d, g, 1900d, e
6. William Nylander. 1893w, x, 1894u, v, x, y, 1898d, e, 1899a, b, f, 1900e
7. Carl Reinhold Sahlberg. 1893w, x, 1894u, v, x, y, 1898d, e, 1899f, 1900e, 1928a, b
8. Johan Petter Norrlin. 1893w, x, 1894u, v, x, y, 1898d, e, 1899f, 1900e
9. Aleksander von Nordmann. 1893w, x, 1894u, v, x, y, 1898d, e, 1899f, 1900e
10. Carl Niclas von Hellens. 1903a, 1928a, b
11. Edvard Hisinger. 1904a
12. Ivar Ossian Bergroth. 1904b, d
13. Per Theodor Cleve. 1906g
14. Karl Engelbrecht Hirn. 1907c, e
15. Pietari [Pehr] Forskål. [Rein et al.] 1907, 1920
16. Carl Axel Gottlund. 1908b, 1909b
17. Petter Adolf Karsten. 1917c, 1919d
18. Elias Tillandz 1921b
19. Arthur Thesleff. 1921d
20. Anders Thiodolf Saelan. 1923d
21. Eugenius Warming. 1924c, 1925e
22. Carl Fredrik Otto Nordstedt. 1925c
23. Johan Nordal Fischer Wille. 1925d
24. Christian Steven. 1928a, b
25. Johan Magnus af Tengström. 1928a, b
26. Hedvig Vilhelmina Hjelt. 1930a
27. Mårten Magnus Wilhelm Brenner. 1931b
28. Richard Sievers. 1933a
29. Hampus Wilhelm Arnell. 1934b
30. Jagadis Chunder Bose. 1939





## Observations and popular books

### Communications

Presenting botanical and zoological notes was a very common practice at the monthly meetings of *Societas*, which were later printed in the *Societas'* publications (see also e.g., Väre 2021, 2022a, b). Elfving also did this.

1. *Verbascum phoenicum* in Mikkeli for two consecutive summers. 1881i
2. In 1880, the collections of the Botanical Museum had 1092 plant species. 1881j
3. *Salix arctica* and *S. rotundifolia* = *nummularia* new to Fennoscandia, collected by Fr. Nylander in Russian Lapland. 1881k
4. In 1882, the collections of the Botanical Museum had 1105 species. 1883i.
5. According to P. A. Karsten's records, in 1883 the collections had 1758 samples of 623 basidiomycetes species, 545 samples of 233 pyrenomycetes species, 527 samples of 259 ascomycetes species, 81 samples of 37 slime fungi species, 145 samples of 65 rust fungi species, 14 samples of 7 smut fungi species, and 122 samples of 77 other fungi species. A total of 3192 samples of 1301 species. 1886b
6. *Elodea canadensis* succeeded beyond expectations in N, Helsinki, Kaisaniemi. Elfving 1886c
7. *Carex arenaria* new to Finland (N, Hanko). 1892e. However, already mentioned by Gadd (1765).
8. *Sisymbrium loeselii* in Ka/EK, Vyborg [Viipuri]. 1892h. Kihlman (1894: 116) provided a German synopsis.
9. *Fagus sylvatica* grew as a tree in Finland only in Brödertorp in N, Raasepori, Fagervik in Inkoo, Frugård in Mäntsälä, and Mustio manor. 1893b
10. Probable *Picea excelsa* [*abies*] f. *versicolor* in St, Ylöjärvi. 1893d.
11. Branching inflorescence of *Secale cereale* from St, Kjuloholm [Vanhakartano]. 1895a
12. Elm occurring in northern Savo [Sb] in Jorois parish. 1895b
13. Account of the distribution of certain cultivated plants, viz. apple tree, common bean, tobacco, cabbage, etc. 189d
14. Crown disorder of *Abies picta* = *sibirica* in N, Helsinki, Kaisaniemi. 1896b
15. *Littorella lacustris* = *Plantago uniflora* on Sa, Taipalsaari, and the pink-flowered *Nymphaea alba* in the heaths of Ka/EK, Vyborg. 1896c
16. Sterility in *Littorella* = *Plantago uniflora* caused by *Anguillula* [nematode]. 1896d
17. *Thlaspi alpestre* = *caerulescens* in N, Vihti. 1896e
18. Mårten Magnus Brenner's bryophyte collections in Obo, Oulu area. 1900c
19. *Cuscuta* [*epithymum* var.]. *trifolii* produced ripe seeds in N, Inkoo, Fagervik. 1902b
20. *Anagallis coerulea*, *Ruta graveolens*, and *Cerfolium silvestre* [*Anthriscus sylvestris*] var. *parviflorum* in N, Loviisa region. 1904c

21. Six-metre long rhizome of *Pyrola chlorantha*, at least five years old. 1906c
22. Mrs. Ester Cajanus had sent white berries of *Vaccinium vitis-idaea* from Obu, Ylitornio. 1906e
23. Movements of *Mimosa pudica*. 1918b
24. Distribution information of aquatic plants needed to be supplemented, especially of *Nymphaea alba* and *Potamogeton lucens*. Elfving 1920c

### Popular writings

Elfving promoted the knowledge of botany by writing numerous articles for the public. The topics were highly varied, from general to detailed subjects. Scientific understanding of bacterial importance was slowly increasing. Bacteria influenced everything, and Elfving presented the recent research results of eminent scientists such as Louis **Pasteur** (1822–1895) (Elfving 1886a). The love bacterium, "*Bacillus amoris*", was a representation in the form of a story describing the contagiousness of love (Elfving 1885f).

### Naturen

In Finland, a nature magazine *Naturen*, aimed at the public, was released in 1893 and 1894. A trial number appeared in 1892. The editor-in-chief was chemist August Benjamin af **Schultén** (1856–1912) (Kurikka & Takkala 1983). The intention was ambitious, but there were not enough subscribers for profitable operations. Elfving worked as an assistant to the magazine, either under his own name, under the pen name F.E., and apparently also anonymously. The latter's texts have been evaluated based on the titles of the articles. Some of the writings were Swedish translations of international scientific articles. Botanical subjects were also popularized by botanist Carl Filip Gunnar **Andersson** (1865–1928) and Professor of Agriculture Karl Gustaf (Gösta) Johannes **Grotenfelt** (1855–1922). Elfving wrote 31 articles in total, including the anonymous ones.

1. Lack of iron in (chlorotic) plants. 1892a,i
2. World's oldest collection of plants in Cairo. 1893e
3. A luminescent fungus. 1893f
4. How bacteria can improve the aromaticity of tobacco and wine. 1893g
5. On the effects of calcium and magnesium salts on the physiology of plants. 1893h
6. Effects of light on bacteria. 1893i
7. On the production of gutta-percha. 1893j

8. Artificial colouring of living flowers. 1893k
9. On the evaporation and respiration of plants according to H. Claussen. 1893l
10. Movement of fluids in plants according to J. Marey. 1893m
11. About the world's tallest plants. 1893n
12. Kitchen plants of the past. 1893o
13. Giant buckwheat [*Fallopia sachalinense*], a new ornamental plant in the Kaisaniemi Botanic Garden. 1893p
14. About the production of tea. 1893q
15. Mushroom cultures of some South American ants based on Alfred Möller. 1893r
16. Chemical composition of giant buckwheat [*Fallopia sachalinense*]. 1893s
17. Chemistry and physiology of leaves based on H. T. Brown and G. Harris Morris. 1893t
18. Use of cacti in arts. 1893u
19. Californian giant, *Sequoiadendron giganteum* at the Chicago World's Fair. 1894b
20. "Dropsy" disease of plants according to G. F. Atkinson. 1894c
21. Growth of pumpkins based on Darwin. 1894d
22. Artificial production of fragrances of the garden gorse [*Iris germanica* 'Florentina'] according to F. Tiemann and P. Krüger. 1894e
23. Cultivation under stained glass according to A. M. Villon. 1894f
24. Flower scent according to A. Cartaz. 1894g
25. A peculiar sensitivity in a mould fungus (*Mucor nitens*). 1894h
26. The number of vascular plants and fungi in the world according to P. A. Saccardo, of which 105 231 were vascular plants, 2 819 were ferns, 565 were horse-tails, marsileans, and clubmosses, 4 609 were mosses, 3 041 were liverworts, 5 600 were lichens, 39 603 were fungi, and 12 178 were algae, i.e., a total of 173 706 species. 1894i
27. Conservation of plants while maintaining their natural appearance. 1894j
28. Plant sleep and fatigue according to G. Zacher. 1894k
29. Cultivation of bonsai trees in Japan. 1894l
30. Jarrah (*Eucalyptus marginata*), which was also called Australian mahogany because of its durability and red colour. 1894m
31. Effect of light on the development of flowers. Elfving 1894n.

### Finsk Tidskrift

Even as a student, and much later, Elfving wrote essays in the daily press (mainly *HD*) on various subjects, including correspondence from his foreign travels.

Soon he drifted into a social circle that greatly influenced the social and cultural development of our country. This group included the Schybergson brothers, i.e., bank manager Ernst Emil

Schybergson (1856–1920) and Professor of History Magnus Gottfrid Schybergson (1851–1925), and Professor of Physiology Robert Tigerstedt (1853–1923), Professor of Agricultural Chemistry and Physics Arthur Rindell (1852–1936), and lyceum lecturer and journalist Gustav Cygnaeus (1851–1907). Together they founded the journal *Finsk Tidskrift*. The journal was managed by humanist Johan Thurman (1866–1931), the founder of the villa town of Kauniainen.

Elfving edited the journal in 1883–1885 (Kurikka & Takkala 1983). Reviews of poetry collections (Elfving 1883f, 1885c, d, e, 1889c) gave a relatively conservative impression of Elfving as a reader. For him, Johan Ludvig Runeberg (1804–1877) was the great, admired poet above all others (Collander 1943). His poetry was remarkably lyrical and epic. Runeberg is considered Finland's national poet. As a romantic, Elfving (1886a) connected love and bacterial life in his writing.

Elfving wrote 17 book reviews, five histories of the University and introduced nine remarkable botanists to *Finsk Tidskrift*. Altogether 39 articles. With its over 140-year history, *Finsk Tidskrift* is the oldest continuously published cultural periodical in the Nordic countries.

1. Botany. 1877
2. Carl von Linné. 1878a
3. Elias Magnus Fries. 1878b
4. Book review. Meddelanden af Societas pro Fauna et Flora Fennica. Femte häftet. 1881d
5. Book review. Th. M. Fries: Om växternas spridning. 1881e
6. Book review. From the life of the plant. 1881f
7. Erik Laxman. 1881g
8. About the representation of minorities. 1883d
9. Current state of the University. 1883e
10. Book review. För morgonbris, dikter [K. Aug. Tavaststjerna]. 1883f
11. Some ghosts. 1884a
12. Book review. Charles Darwin [F. W. C. Areschoug]. 1884b
13. Book review. Album utgifvet af nyländningar IX. 1884c
14. Book review. Notiser ur Sällskapets pro Fauna et Flora Fennica 18. 1884d
15. Different worldviews. 1884e
16. The religious question in our country. 1885b
17. Book reviews. För morgonbris. Ny reviderad och tillökad upplaga [K. Aug. Tavaststjerna]; Dikter [Jonathan Reuter]; Nya dikter [Rafaël Hertzberg]; Studentens barn, en samling dikte [Karl Johan]. 1885c

18. Book review. Polemiskt [Rafaël Hertzberg: Nya dikter]. 1885d
19. Dr. Bang's Literary Lectures. 1885e
20. The love bacteria. 1885f
21. Bacterial life. 1886a
22. At Turku Academy 1640–1664. 1887
23. Book review. Nya sånger och dikter [Jonatan Reuter]. 1889c
24. Book review. Droger ur växt- och djurriket, kort öfversig [Hugo Lojander]. 1889d
25. Sextus Otto Lindberg. 1889e
26. The botanical studies at our University. 1892b
27. Societas pro Fauna et Flora fennica. 1896a
28. The reorganization of higher agricultural education. 1897b
29. William Nylander. Biography I & II. 1899a
30. Carl von Linné. A bicentennial commemoration. 1907a
31. Book review. Plantae Finlandiae Exsiccatae e Museo Botanico Universitatis Helsinkiensis distributae [Harald Lindberg]. 1908a
32. Carl Axel Gottlund as a mushroom collector. 1908b
33. Book review. Vi och våra blommor [C. A. M. Lindman]. 1914
34. Book review. Finlands botaniska litteratur till och med år 1900 [Th. Saelan]. 1917a
35. Book review. Vårt dagliga bröd. Näringsväxterna i världproduktionen [Gunnar Andersson]. 1917b
36. Book review. Linné i Stockholm. Svenska Linné-Sällskapets årsskrift I [Carl Forsstrand]. 1919b
37. Elias Tillandz. A 250-year memory. 1921b
38. Book review. Die Laubmoose Fennoskandias [V. F. Brotherus]. 1924a
39. Extract from the fates of natural history at the University of Helsinki. 1929

## Elfving's legacy to Finnish botany

### As a teacher and scientist

At the Botanical Institution of the University of Helsinki, Elfving represents the beginning of an entirely new era. He lectured on subjects that had never before been dealt with at this university, especially plant physiology, starting the courses in 1881. He began microscope training as applied to vascular plant anatomy in 1880, compulsory for all botany students since 1890. Later, in 1905, the training was expanded to cover cryptogam systematics. Since the 1890s, as a professor, he lectured on general botany in its all aspects, also to beginners. His lectures were always clear, concrete, lively, and highly personal in presentation (Collander 1965).

Elfving was the first person in Finland to perform experimental plant physiology. He thoroughly reformed the teaching of botany and wrote textbooks. He was amongst the most advanced plant physiologists in Fennoscandinavia.

Elfving did not have many graduate students that defended their dissertations under his supervision. Nevertheless, one of them, Runar **Collander**, greatly advanced the field of plant physiology at the University of Helsinki. He was an adjunct professor of plant physiology at the University of Helsinki from 1935 to 1939 and professor of botany from 1939 to 1961.

Others who defended under Elfving's supervision have been presented above, viz. **Brenner**, **Ekman**, **Lappalainen**, **Salmenlinna** and **Warén**. Their dissertation topics were mycophysiological.

### As a person

Elfving's progressiveness was evident early on when, as a young docent of botany, he gave a speech in favour of Darwinism at Darwin's centenary commemoration (Elfving 1883j, *HD* 85, 30.3.1883; 87, 1.4.1883 *Föredrag om Darwinismen*). In the spirit of Mela's famous speech in 1872, Elfving stated: "...can one imagine a greater blow to someone who just considered it their exclusive right to be the image of God, suddenly they become a monkey's cousin" and continued: "...[it] shows a greater than usual imbalance of thought when one believes in gradual development based on certain laws in nature while concurrently Church dogma decrees that man was created perfect at the beginning" (Lappalainen 1959: 229).

Darwin's theory of evolution was still relatively recent, and the Church opposed it strongly. Other notable early Darwinists in Finland included mathematics and natural history teacher Otto Alfred **Alcenius** (1838–1913) and Professor of Zoology Johan Axel **Palmén** (1845–1919). Alcenius (1864) presented Darwin's theory of evolution shortly after the publication (1859) of *On the Origin of Species*. The most prominent Finnish naturalist of the time to oppose Darwinism was Professor of Zoology Fredrik Wilhelm **Mäklin** (1821–1883). Probably inspired by Alcenius, he wrote an article on his opinions of Darwin's



theory of the origin of animal and plant species (Mäklin 1864).

When Elfving turned 60 years, **Nordenskiöld** (1914) described him anonymously (Collander et al. 1973) in *Studentbladet* as a mysterious figure, a distinguished doctor of doctrina amabilis, a busy man, a gentleman free from prejudice and showing interest in people. In the words of **Kairamo**, "A serious and civilized person with whom true friendship is possible" (Virtanen 2014: 120). Elfving considered Kairamo a friend and gave him 1907 seedlings of *Picea abies* f. *virgata*, which came from Elfving's summer place in Tammela (Virtanen 2014: 179). Kairamo planted the seedlings onto his Ellilä estate.

Elfving's largest shortcoming was his unconditional and strict adherence to the Swedish language, even though his textbooks were translated into Finnish. Due to his language bias, he preferred Swedish-speaking students. However, it became possible to teach in Swedish and Finnish at the University. Elfving (1906a) did not oppose the reform.

A larger conflict took place in 1925. On 23 November 1925, Professor of Geography Iivari **Leiviskä** (1876–1953) published a newspaper *Helsingin Sanomat* article in which he wrote that the Department of Natural Sciences had done its best to hinder Finnish-speaking researchers. Professor of Chemistry Adolf Ossian **Aschan** (1860–1939) and Elfving replied to this charge by bringing action against Leiviskä for slander. Leiviskä denied that he meant Achan and Elfving (*Svenska Pressen* 249, 28.10.1926). The most ruthless attack on Elfving came from Professor **Liro** (Anonym 1930). Elfving had opposed Liro's election as assistant professor of plant physiology and pathology in 1909. As a result of all this, Kaarlo **Linkola** was chosen as extraordinary professor of botany in 1925, whose task was to teach botany in Finnish.

It is also said that Elfving could not stand incompetence. Linkola stated about Elfving: "there were a lot of people in the garden when you didn't have to be afraid of meeting him" (Pesola 1966: 68).

Elfving held species identification exams at the Botanic Garden. He was not short on sarcasm. It is said that, at the end of one exam, Elfving picked a rose and handed it to a female stu-

dent and welcomed her back the following year, when the roses would be flowering again (Collander 1943).

Elfving was very distant and difficult to approach, even though he was a great lecturer. Therefore, he did not have many graduate students. Elfving also blindly trusted his psychological eye when it came to students, which sometimes resulted in nasty overreactions. Collander (1943) described Elfving as having an "accurate instinct for reality" at the annual meeting of *The Finnish Society of Sciences and Letters*.

### Honors

Elfving received several awards during his career. For a total of 34 years, he worked as a professor of botany, concurrently acting in several scientific societies.

He was elected an honorary member of *Societas* in 1921 and as honorary chairman on 13 May 1934, when he turned 80 (Palmgren 1935). At the celebrations, Elfving gave a thank-you speech (Elfving 1935b).

When he turned 70, Elfving's students commissioned a commemorative medal, which was handed over to him in 1924. The reverse side of the medal depicts the main building of the Botanical Institute in Kaisaniemi (today the Botanical Museum) with the text MEMORIAM PRECEPTORIS SEPTUAGENARII AUCTORIS INSTITUTI BOTANICI IN AERE INCIDENDAM CURAVERUNT DISCIPULI, meaning "In memory of the seventy-year-old teacher and founder of the Botanical Institute, engraved in bronze by the students".



Commemorative medal of Elfving at his 70s.

Likewise, on the 70th anniversary, the current and former students commissioned a bronze relief of Elfving, which is placed in the entrance hall of the Botanical Museum. It was revealed on 9 December 1924. The celebration speech was given by Widar **Brenner**. In his thank-you speech to Elfving, he pointed out that Elfving's career remained fragmented due to the rapid development of plant physiology, and as he was the only professor responsible for teaching and managing the Botanic Garden, he was unable to form a research community (Pesola 1939). Volume 55 of *Acta Societatis pro Fauna Flora Fennica* was dedicated to Elfving on 13 May 1924, on his 70th birthday. Already his father, Johan Fredrik had been the accountant of the *Societas* in 1829–1830.

PhD Hanna Lappalainen, student of Elfving, asked Albert **Gebhard** to paint a portrait of Elfving already in the early 1930s. Lappalainen kept it at her home until it was revealed in 1946 (*Luon-*



Bronze relief of Elfving at his 70s. It is placed in the entrance hall of the Botanical Museum.



Fredrik Emil Wolmar Elfving  
\*1854 †1942  
Professor botanicæ  
1892 – 1926

Portrait of Elfving is on display in the gallery corridor of the Botanical Museum.

*non Ystävä* 50: 63). It is on display in the gallery corridor of the Botanical Museum.

Elfving was a member of *The Finnish Society of Sciences and Letters* in the years 1892–1934, an accountant in 1904–23, chairman in 1923, and its secretary in 1924–34. *Commentationes Biologicae* 1924 of the *Society* was dedicated to him. In 1911–1926, Elfving published 11 articles in the *Society* series, three of which were the *Society*'s annual reports (Pipping 1927). Elfving (1938a, b) compiled the *Society*'s centennial history, and he was elected an honorary member of the *Society*.

Elfving was a member of the boards of several other societies, such as the *Swedish Literary Society* from its founding in 1885 until 1903, the *Helsinki City Public Library* 1884–85, 1891–1907, the *Delegation of Scientific Societies* 1896–1909, chairman of the central board of the *Concordia Association* 1896–1912, *Åbolänningar i Helsingfors* ("People of Aboensis Region in Helsinki") (*Västra Finland* 24, 26.2.1924), *Tvärminne hembygds- och ungdoms förening* ("Tvärminne regional and youth association") (*Västra Nyland* 66, 21.8.1908), *Arbetets Vänners västra filial* ("The Western branch of the Friends of Labour") (*Aftonposten* 94, 26.4.1897), and several foreign scientific organizations. He was a founding member of the *Finnish Agricultural Society* on 2 December 1909 (Cajander 1912).



On 28 January 1918, Elfving founded the *Botanical Club*, which operated for a few years (Saalas 1946: 216).

### Birthdays congratulations, obituaries, and personal histories of Elfving

Anonym 1914, 1924, 1934, Collander 1943, 1944, 1955, Hufvudstadsbladet 338, 9.12.1914, Kalliola 1942, Kotilainen 1924, Nordenskiöld 1914, Palmgren 1944.

### Eponyms

Taxa that have been named after Elfving include the polypore genus *Elfvingia* P.Karst. (1889), the lichen taxa *Rhizocarpon grande* f. *elfvingii* Vain. (1922), *Aspicilia elfvingii* Vain. (1931), and *Cedidium varians* subsp. *elfvingii* Räsänen (1944), the algae *Cosmariium elfvingii* Raciborski (1885), and *Diploneis elfvingiana* C.W.Fontell (1917), *Hieracium elfvingii* Norrl. (1904), and the wasp *Phygadeuon elfvingi* (Hellen, 1967).

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