

Carl Niclas Hellenius – Demonstrator in Botany at old Åbo Akademi, later Professor in Economy and Natural History*

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Carl Niclas Hellenius was the Demonstrator in Botany at old Åbo Akademi 1778–1786, as nominated title Professor 1780–1793 (with the salary since 1786), Professor in Natural History 1793–1816 until retirement. As a Demonstrator, his main duty was to instruct medical students on the subject of medicinal plants. In his research, he was the first in Finland to focus on taxonomy, inspired by Carl von Linné and Carl Peter Thunberg in Sweden. He described as new to science vascular plant taxa *Hippuris maritima*, *Hisingera nitida* (also a new genus), *Tropaeolum quinatum*, *Turraea pubescens*, and also a beetle *Serepalpus striatus* and a liver parasite of *Lota lota*, *Taenia lotae*. As a director, his major achievements were building the Botanical Gardens and Herbarium. Collections of the Åbo Akademi were destroyed in the Great Fire of Åbo in 1827, but at least 435 specimens once at his private herbarium have been preserved, as part of Professor Carl Reinhold Sahlberg's private collection, to whom Hellenius donated specimens. Those specimens are today part of Herbarium Antiquum, Finnish Museum of Natural History, Botanical Museum (H). The era of utility is a term used of the era of freedom in Sweden. It marked the rise in the appreciation of natural sciences in relation to classical sciences. The period is often limited to the years 1718–1772. However, Hellenius continued this school until his retirement. This was due to repeated famine in Finland and the establishment of *Suomen Talousseura* "Finnish Economy Society". This society was established to enhance the Finnish agriculture and forestry, e.g. the cultivation of potato. As Professor, Hellenius particularly encouraged research and education in this field, following the development initiated by his predecessor Pehr Kalm. However, Hellenius must be regarded as the first taxonomist in Finland.

Introduction

Carl Niclas (Carolus Nicolaus) Hellenius (ennobled in 1816 as von Hellens) (Fig. 1) was born at Kärkölä, southern Finland, on 1 August 1745. His parents were secretary of the Infantry Regiment Carl Hellenius (1701–1762) and Brita Katarina Strandén (1712–1780). His great grandfather Anders Hellenius had moved from Sweden to Finland in 1600's. Carl Niclas von Hellens died in Åbo (Turku), on the 16 January 1820.

*The Royal Academy of (Åbo) Turku (Regia Academia Aboensis, in Swedish Åbo Akademi) was founded in 1640 when Finland was still a part of Sweden. Main languages of Åbo Academy were Latin and Swedish. 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 Åbo in 1827, an Imperial decree laid down that the Academy was to be transferred to Helsinki as the Imperial Alexander University of Finland. The name University of Helsinki was adopted after Finland became independent in 1917. Swedish version of Åbo Akademi is used in this article.

Herbarium acronyms follow Index Herbariorum.

In 1783, Hellenius married **Anna Charlotta von Mell** (1763–1795), the daughter of Pharmacist's Lars Henrik von Mellin. They had six children. The eldest son, Vice President in Court of Appeal, **Lars Gustaf Hellenius** (1787–1850), was married to Hedvig **Dorothea Elisabeth Prytz** (1794–1882), the brother of whom **Lars Johan Prytz** (1789–1823) was Demonstrator in Botany in 1810–1813 (Väre 2014b).

Half-sister of Anna Charlotta's, **Fredrika Lovisa von Mell** (1770–1792) was married to **Gabriel Erik Haartman** (1757–1815) (later ennobled von Haartman), who became the Professor of Anatomy in the Åbo Akademi in 1784. Thus, through his marriage, Hellenius became connected with the Akademi's influential families already before the appointment as Professor. From the career point of view, social circles were the most important.

Study years

Åbo

Hellenius began his graduate studies at Porvoo grammar school in 11 April 1760. He graduated from Åbo secondary school 22 February 1765. Thereafter he studied natural sciences until 6 June 1769 at the Åbo Akademi.

Hellenius specialised in natural sciences and medicine under the supervision of **Pehr Kalm** (1716–1779), Professor in Economics and Natural History from 1747–1779, and under the supervision of **Pehr Adrian Gadd** (1727–1797), Professor in Chemistry from 1761–1787. Hellenius defended his Pro Exercitio -dissertation "*Evaporation of minerals*" (Gadd & Hellenius 1766). Between 1766 and 1770, Hellenius assisted Gadd at the chemistry laboratory as an amanuensis and received support from Märten Segercrantz's scholarships. The chemistry laboratory was just completed.

Hellenius obtained his Phil. Cand. Degree on 9 December 1786. He defended his Pro Gradu -dissertation "*Insects harmful to coastal fishing*" (Gadd & Hellenius 1769) to Gadd on 26 June 1769, and obtained his Phil. Mag. degree in 6 July 1769. Gadd served as promoter in promotion (Sahlberg 1840).



Fig. 1. Relief of Carl Niclas von Hellenius.

Uppsala

To complete his postgraduate studies, Hellenius visited twice Uppsala Akademi, Sweden, on 19 June 1771 and 3 May 1774. Between the visits, Hellenius stayed at Åbo and was named a Docent of chemistry, economics and zoology in 1773. Professor in Medicine **Johan Johansson Haartman** (1725–1787), got Hellenius interested in medicine. Haartman later generously promoted Hellenius' career at the Åbo Akademi.

In 1774, in Uppsala Hellenius followed lectures by Professors in Medicine **Carl von Linné** (1707–1778) and **Jonas Sidrén** (1723–1799) and by Professor in Anatomy and Surgery **Adolph Murray** (1751–1803) (Sacklén 1822: 530, 533). Archbishop **Carl Fredrik Mennander** (1712–1786), who wrote in 1775 to Linné that Hellenius was born to be a botanist, recommended him to Linné. At Uppsala Hellenius defended his dissertation "*De Hypericum*" (Fig. 2) under the supervision of Linné on 20 November 1776 (Linné & Hellenius 1776) and obtained his Licenciatus in Medicine -degree in 1777. The dissertation was the last one Linné directed, but Linné the Younger led the actual dissertation event. The dissertation was published in the same year in the dissertation series "*Amoenitates Academicae*" delivered by Linné. As new species to science were described *Hypericum guineense* and *H. mexicanum*.

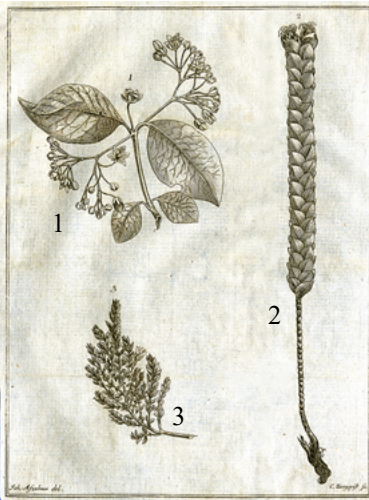
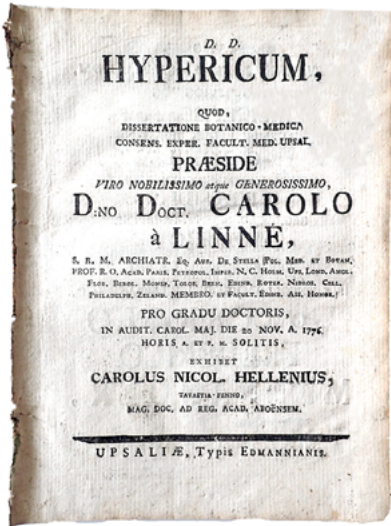


Fig. 2. The dissertation *De Hypericum* Hellenius defended under the supervision of Carl von Linné. 1. *Hypericum guineense*, 2. *H. mexicanum*, 3. *H. aegyptiacum*.

Altogether, the dissertation gives the characteristics of 35 species, including e.g. *H. kalmianum*. At the end of the dissertation, medicinal use of *Hypericum*'s are given. Only *H. perforatum* was useful. Hellenius was promoted as absent in Uppsala on 14 June 1780 as Doctor of Medicine.

Career

Home teacher in 1770 on Selkee estate, owned by Pori Regiment Commander, Major General **Carl Constantin de Carnall** (1711–1773). After the Licentiate's doctoral dissertation, the doctor of

the Serafine Hospital in Stockholm in 1777. The Demonstrator in Botany at Åbo Akademi 1778–1786, Professor extraordinarius 1780–1793 (with the salary since 1786), Professor in Natural History 1793–1816, until the retirement.

The re-founder of Åbo Akademi Botanical Gardens, Professor Kalm was willing to set aside his duties as garden's superior. Therefore, Consistory introduced the Chancellor on June 8 1775 to set up a position of Demonstrator for the care of the garden, who would also teach *materia medica*, to the students of the medical faculty. Linné wrote Archbishop Mennander a letter of recommendation for Hellenius on 8 November 1775. Haartman was planning to donate that post to the Åbo Akademi, which did not please Kalm (letter 71 to Mennander on 28 May 1777) (Hjelt & Hästesko 1914). The Consistory's proposal was renewed on 3 June 1777 and the Demonstrator's post was set up, based on donation by Haartman and "mining counsellor" **Johan Hisinger** (1727–1790), the owner of Fagervik ironwork in southern Finland (Gadd & Böning 1778, Hjelt 1911, Kerkkonen 1936: 253). Thankfully, Hellenius dedicated a doctoral dissertation *Sistens hortum Academiae Aboensis* to his patrons (Hellenius & Mollin 1779). King Gustav III supported his task by granting 6 000 thaler annually to the garden for a six-year period (Hjelt 1911: 105).

As a Demonstrator, his main duty was to instruct medical students on the subject of medicinal plants. However, the teaching of medicine was negligible. Hellenius' life work was mostly related to botany but also to zoology. An important task was to improve the Akademi's Botanical Garden and to maintain scientific collections of Botanical and Zoological Museums.

Towards a professorship

Linné clearly appreciated Hellenius. On November 8 1775, Linné wrote to Archbishop Mennander of Hellenius: "a mature, powerful man who is dedicated to medicine and botany" (Hjelt 1892: 179). When Professor Kalm died in 1779, Hellenius applied for professorship in Economics. However, Chancellor Count **Ulrik Scheffer** (1716–1799) appointed the lawyer **Salomon Kreander** (1755–1792) in 1780, whom Kalm had recommended as his successor. Consistory

had voted for Professor Gadd, placing Hellenius in second position. Especially Professor Haartman regretted what happened.

As a substitute for the appointment of unqualified Kreander, Hellenius received the title of Professor in 1780, and was appointed Chief of Staff of the Åbo Akademi Botanical Gardens.

When Kreander died, Hellenius was elected on 16 April 1793 as his successor at age of nearly 50 years. The title was changed to the professorship in Economics and Natural history, with a specialty in botany. However, Hellenius's most active career as taxonomist was already over.

As a researcher

During Hellenius career, the field of biology developed rapidly, e.g. Count **Georges Leclerc de Buffon** (1707–1788), **Carl von Linné**, Professor **Jean-Baptiste Lamarck** (1744–1829) and many others were pioneers in systematics reform. Hellenius tried to keep up with this development, but it was difficult from Åbo. Professor in Medicine, **Carl Peter Thunberg** (1743–1828) at Uppsala was the most important colleague; the correspondence was continuous (Fig. 3). With the aid of Thunberg, Hellenius tried to acquire new literature. For example, in a letter dated May 26 1805, he asked for the new edition of *Genera Plantarum* (Hjelt 1896: 335).

As a researcher, Hellenius was the most active in 1770–1790. At that time, he taught at the Åbo



Fig. 3. Portrait of Carl Peter Thunberg, (1743–1828).

Akademi's Botanical Gardens and directed taxonomic doctoral dissertations. Altogether, Hellenius guided 31 doctoral dissertation, of which 19 botanical ones. With the exception of some zoological research, all the dissertations that appeared after 1783 were typical of the Era of utility, with quite modest content. In the series of the Swedish Royal Academy of Sciences, there were nine Hellenius writings; some of them re-published in the *Hushållnings Journal*.

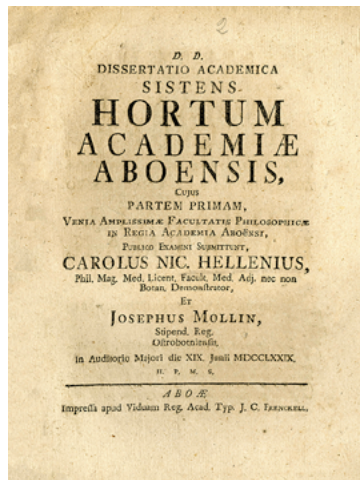
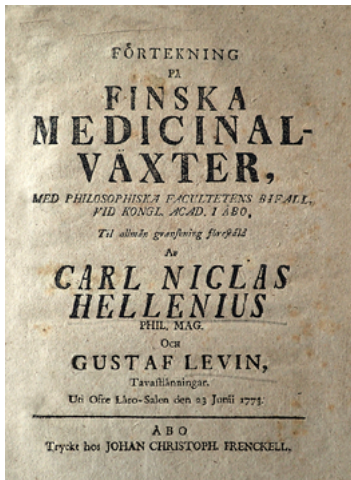
Botany

Applied botany

"Notes on Finnish medicinal plants" (Fig. 4) was the first dissertation supervised by Hellenius (Hellenius & Levin 1777). It mentions 138 Finnish medicinal plants, with scientific, Finnish and Swedish names, the Finnish ones mainly following Haartman (1765). The dissertation mentions the location of several plants. Forthcoming Vicar of Kiikala, **Gustaf Levin** (1753–1809), defended it.

Soon after becoming Demonstrator in Botany, Hellenius began to compile a thorough description of the history of the Åbo Akademi Botanical Gardens, released in series of dissertations titled "*Research on the Garden of the Academy of Åbo*" (Hellenius & Mollin 1779) (Fig. 5). The first part lists all (388) plants in Pehr Kalm's Åbo Akademi gardens and Sipsalo garden. Of these 106 were alive. The entire area of the garden was 147 cubit in length and 114 in width and approx. 67 000 square feet ($1 = 0.093 \text{ m}^2$) in surface area. The dissertation also contains a list of plants Gustav III donated to the Åbo Akademi greenhouse. The plants came from the Royal Gardens of Drottningholm and Ulricksdal (Gadd & Böning 1778). Forthcoming Vicar of Karkku, Dean **Joseph Mollin** (1756–1810), defended it. This series of dissertation consists of eight parts, the last one published in 1814 by Demonstrator in Botany, **Lars Prytz** (Väre 2014b).

Dissertation "*Phenological flower and animal calendar of Åbo*" (Fig. 6) is a summary of the phenological observations made by Hellenius in 1780–1785. Ca. 150 plant species were followed, including also some local indigenous rari-



Figs. 4–6. Title pages of the dissertations “Notes on Finnish medicinal plants”, “Research on the Garden of the Akademi of Åbo” and “Phenological flower and animal calendar of Åbo”.

ties like *Cornus suecica* and garden plants (Hellenius & Justander 1786). Forthcoming Demonstrator in Botany, **Johan Gustav Justander** (1764–1833) (Väre 2015b), defended it.

The doctoral dissertation “*Weeds of Orivesi, Häme*” presents 42 weedy species and their ecology. Many species were provided Finnish name, many of which are very rare today, like *Agrostemma githago*. “One needs to be able to identify weeds and recognize their ecology so that they can be effectively eradicated from crop fields”. The weed was also defined: “weeds are plants that grow in the fields against the will of the peasant”. Weeds can be best avoided by selecting the right growing place for crops. The fields must be sufficiently dry, moist soil is often too sour. The manure must be allowed to burn properly to avoid spreading weed seeds. Great attention must be paid to seed cleaning. The seeds of several weeds are smaller than those of grains, making it easier to remove them. There may be a weed seed bank in the soil, which will germinate when the soil is ploughed. Due to the extensive root system, perennial weeds are difficult to eradicate. Of the Orivesi weeds, 28 were annuals, 4 biennials and 13 perennials (Table 1). All are given instructions for disposal (Hellenius & Salovius 1789). Forthcoming Chaplain of Akaa, **Anders Salovius** (1767–1809), defended it. He had collected the dissertation material himself.

Table 1. Weeds of Orivesi, their scientific (the one given intheses in parentheses), Finnish and Swedish names (Hellenius & Salovius 1789).

Annuals	<i>Thlaspi arvense</i> (maannousemisen ruoho, penningegräs)
<i>Agrostemma githago</i> (ohrankukkanen, rödklint)	<i>Vicia (Ervum) hirsuta</i> (klotlins)
<i>Apera (Agrostis) spica venti</i> (kaste heinä, åker hven)	<i>Vicia monanthes</i>
<i>Atriplex patula</i>	<i>Vicia sativa</i> (vickern)
<i>Bartsia rubra (Euphrasia odontites)</i>	Biennials
<i>Brassica campestris</i> (Åkerkål)	<i>Anthemis arvensis</i> (hvitört)
<i>Bromus secalinus</i> (luste, råg lofta)	<i>Anthemis tinctoria</i> (keltakukkanen, letblomster)
<i>Camelina foetida</i> (koiran pellava, dädra)	<i>Trifolium arvense</i> (pellon apilas, flåspräs)
<i>Capsella (Thlaspi) bursa pastroris</i> (lutukka, näldynor)	<i>Verbascum thapsus</i> (köhkä ja peitsiruoho, kongljus)
<i>Centaurea cyanus</i> (ruiscukkanen, blåklint)	Perennials
<i>Chenopodium album (viride)</i> (savi heinä, mjölgräs)	<i>Achillea millefolium</i> (pyörtänä ruoho, rölleka)
<i>Fallopia (Polygonum) convolvulus</i> (Binda)	<i>Cirsium (Serratula) arvense</i> (nikayrti, åkertistel)
<i>Fumaria officinalis</i> (linnunherne, jordrök)	<i>Cirsium (Carduus) palustre</i> (suonohdake, kärtistel)
<i>Galeopsis tetrahit</i> (peipponen, pillicka)	<i>Elytrigia (Triticum) repens</i> (valkeat juuret, qvickrot)
<i>Galium aparine</i> (Snärje-gräset)	<i>Equiseta</i>
<i>Lamium amplexicaule</i>	<i>Gagea (Ornithogalum) luteum</i> (våsserdagslök)
<i>Lamium purpureum</i> (blindnäsla)	<i>Lamium album</i> (peipponen, blindnäsla)
<i>Lapsana communis</i> (hare-kål)	<i>Mentha arvensis</i> (horsmynta)
<i>Lithospermum arvense</i> (verevä juuri, horletta)	<i>Prunella vulgaris</i>
<i>Lolium temulentum</i> (Dårrepe)	<i>Pteris aquilina</i> (kanerva, kananjalka, ormbunke)
<i>Matricaria chamomilla</i> (sautna kukkanen, camilleblommar)	<i>Ranunculus repens</i> (krypande solöga)
<i>Papaver somniferum</i>	<i>Rumex longifolius (acutus)</i> (hevon hirikka, häst-syran)
<i>Spergula arvensis</i> (fryle)	<i>Vicia cracca</i> (nätkimät, fogelvisker, musärter)

Plant taxonomy

In botanical dissertations describing *Calla*, *Cichorium*, *Hippuris*, *Euonymus*, *Hippophaë*, *Tropaeolum* and *Phragmites australis*, some new species to science were described. Some species Hellenius described in the series of the Royal Academy of Science. The order of the content of articles is usually identical. First, the genus or species are presented with earlier nomenclature and systematic opinions, secondly the genus and species are described, thirdly, biology and ecology are sorted out and usually articles end with a chapter that treats the potential use or toxicity of the plants.

Turraea pubescens Hell. (Fig. 7), *Meliaceae*, is described in the monograph of *Turraea*. The specimen was collected by Fagraeus at the island of Hainan, China. The sample ended up in the natural collections of Hans Christian Pentz in Alingsås, and later to Demonstrator in Botany, Anders Dahl (Hellenius 1788). When Dahl moved to Åbo to act as the Demonstrator, he brought his extensive herbarium with him (Väre 2015a). *T. virens* is also presented with an engraving.

In the dissertation *De Calla*, this genus is described according to *Genera Plantarum* by Linné. Two species were recognised, *Calla palustris* and *C. [Zantedeschia] aethiopica*. The biology

and ecology of *C. palustris* were characterised in detail. The main difference between these species is, that in *C. palustris* spadix is covered evenly by stamens and pistils, while *C. aethiopica* is basigynous. *C. palustris* was used as a surrogate food during hunger years (Hellenius & Sacklén 1782). Forthcoming Vicar of Hämeenkyrö, **Johan Fredrik Sacklén** (1756–1830), defended it.

In the dissertation *De Hippuris*, this genus is presented. Two species were recognised, *Hippuris vulgaris* and *H. maritima* [*tetraphylla* L.f.]. Anders Johan Retzius placed this genus to class Gynandria, but according to Hellenius, it belongs to Monandria; there were only one pistil and stamen in each flower. Leaves were radially arranged, Hellenius interpreted, that this was to protect the flowers, which did not have perianth (Hellenius & Brander 1786). The engraving (Fig. 8) of *H. maritima* is the lectotype of this name. **Paul Usteri** (1768–1831) published it in Switzerland (Hellenius & Brander 1790). Forthcoming farmer, **Carl Reginald Brander** (1765–1831), defended it.

In the dissertation *De Euonymus*, this genus is presented and the morphology of *E. japonicus*, *E. europaeus*, *E. verrucosus*, *E. [Pittosporum] tobira*, *E. americanus* and *E. latifolius* are characterised, *E. europaeus* in details. Also flowering bi-



Fig. 7. Engraving of *Turraea pubescens* (*Meliaceae*) described by Hellenius in 1788, and of *T. virens* L., published in Kongl. Vetenskaps Akademiens Nya Handlingar.



Fig. 8. Engraving of *Hippuris maritima* (*Plantaginaceae*) described by Hellenius in 1786, published in the dissertation *De Hippuridae*.



Fig. 9. Engraving of *Euonymus japonicus* (Celastraceae) published by Hellenius in 1786 included in the dissertation *De Evonymo*.

ology, seed set, medical properties and the economic properties associated with wood are given. Birds, *Fringilla* and *Loxia*, spread seeds. The scent of the plant was unpleasant. Climate of Åbo was too harsh, even though *E. europaeus* was indigenous close, in southern Sweden (Hellenius & Ascholin 1786). Usteri published it in Switzerland (Hellenius & Ascholin 1790). Forthcoming Chaplain of Jurva, **Carl Ascholin** (1760–1831), defended it. Hellenius had written to Thunberg on 19 July 1785 that the reason to make this dissertation was the purgative effect of the bark of *E. europaeus*, which Hellenius had discovered. Hellenius asked Thunberg to produce an engraving of *E. japonicus* (Fig. 9). Later Hellenius paid for it (Hjelt 1896: 356).

In the dissertation "*Asparagus and its medical ointments*" nomenclature, systematics and morphology are given in detail (Hellenius & Pryss 1788). The dissertation describes in depth the history of usage of *Asparagus* and its pharmaceutical properties since ancient Greeks. *Asparagus* was encouraged to be grown mainly in urban gar-

dens. Several species could be used as suitable surrogates (Table 2).

Forthcoming Assistant Physician at the Army Military Hospital, **Ulric Pryss** (1767–1791) (Sacklén 1823: 103), defended it.

In the dissertation "*De Hippophaë*", two taxa are characterised; *Hippophaë rhamnoides* and *H. [Shepherdia] canadensis*. The genus included dioecious species, which were classified either to Linnaean class Tetrandria, or in a natural system to class Calycifloris. Kalm had found *H. canadensis* as new to science in Canada. *H. rhamnoides* was indigenous in the SW coastal Finland, between Rauma and Uusikaupunki. Its berries remained in the bushes long through the autumn and became sourer through the winter, making the bush a valuable useful crop. The cider production is described. It was diuretic and purgative (Hellenius & Stenberg 1789). It was defended by forthcoming komminister [a permanent assistant priest] of Umeå, Sweden, **Peter Stenberg** (1758–1824). In a letter dated on 12 October 1787 to Thunberg, Hellenius inquires about his opinion as to how to classify *Hippophaë*. Hellenius considered that *Elaeagnus* and *Osyris* are the closest (Hjelt 1896: 357).

In the dissertation "*De Tropaeolo*", is stated that European "*Tropaeolomania*" resembled that of Dutch Tulipomania 1634–1637. The dissertation describes early, rather confusing perceptions of relationships with plant genera. For example, Professor in Botany Paul Hermann (1646–1695) at Leiden suggested *Viola* species to be close rel-

Table 2. Surrogates to *Asparagus* as food (Hellenius & Pryss 1788)

<i>Angelica archangelica</i>
<i>Arctium lappa</i> [probably <i>tomentosum</i>]
<i>Beta vulgaris</i>
<i>Brassica napus</i>
<i>Brassica oleracea</i>
<i>Campanulula rapunculosa</i>
<i>Chenopodium bonus-henricus</i>
<i>Cirsium palustre</i>
<i>Dryopteris filix-mas</i>
<i>Epilobium angustifolium</i>
<i>Eryngium maritimum</i>
<i>Humulus lupulus</i>
<i>Lactuca alpina</i>
<i>Onopordum acanthium</i>
<i>Polygonatum odoratum</i>
<i>Scorzonera humilis</i>
<i>Tragopogon pratensis</i>

atives with *Tropaeolum*. Six species are characterised; *T. minus* L. 1753, *T. magnum* [? *T. majus* L. 1753], *T. hybridum* L. 1753, *T. peregrinum* L. 1753 and *T. quinatum* Hellen. (Fig. 10). The last one is described as new to science in the dissertation (Hellenius & Laurell 1789). Forthcoming doctor in Kuopio, **Axel Frederik Laurell** (1766–1823) (Sacklén 1823: 104), defended it.

The PoWo (<http://plantsoftheworldonline.org>) and Sparre & Andersson (1991) considers that Hellenius' taxon is synonymous to *T. pentaphyllum* Lam. 1785. Anders Dahl had brought his herbarium to Åbo from Sweden in 1786. According to IPNI (21.9.2018) and Hellenius & Laurell (1789: 12) type specimens were collected by P. Commerson in Argentina, and several types are stated to be available; lectotype LINN-SM, isolectotype BM, G, NY, P. Dahl's specimen was destroyed in the Great Fire of Åbo in 1827 (Väre 2015a).

In the dissertation "*De Cichorium*", *Cichorium intybus*, *C. endivia* and *C. spinosum* are presented. The name *Cichorium* is derived from the Arabic language; *Endivia* was at use in Western Europe. The flowers of *Cichorium* are open from 8 am to 16 pm and the plant was thus suitable to "*Horologium florum*". Professor in Chemistry **Johan Gadolin** (1760–1852) had investigated the chemical composition of *Cichorium*, the results of which are widely expressed in the dissertation. As a tonic, chicory was diuretic, it served as a salad and a coffee substitute. The end of the dissertation consists of fragmented information about chicory biology (Hellenius & Nellö 1792). Forthcoming Stralsund Naval Squadron Military Judge and the Deputy Mayor of Södertälje, Sweden **Henric Nellö** (1761–1822) defended it.

Hellenius (1792a) described Caribbean *Hisingera nitida* [*Bixaceae*] (Fig. 11) as a new genus and species to science, to commemorate his benefactor Johan Hisinger. Hellenius had received the specimen from **Olof Swartz** (1760–1818) amongst many others, collected on high mountains of Jamaica. It was not described in Swartz's *Prodromo descriptionum vegetabilium India Occidentalis*. According to PoWo, the currently used name is *Xylosma nitida* (Hell.) A.Gray ex Griseb.

Altogether, Hellenius described four species of vascular plants and one genus as new to science. Although the number was low, Hellenius was the first Finnish taxonomist.

Era of utility

The later production of Hellenius focused increasingly on the topics typical of the Era of utility, rural livelihoods, agriculture and forestry. Research topics included practical forestry, tree planting and grafting, field management, weeds, animal husbandry, brewery, phenology, surrogate food during hunger years and management



Fig. 10. *Tropaeolum quinatum* (*Tropaeolaceae*) described by Hellenius in 1789, published in the dissertation *De Tropaeolo*.

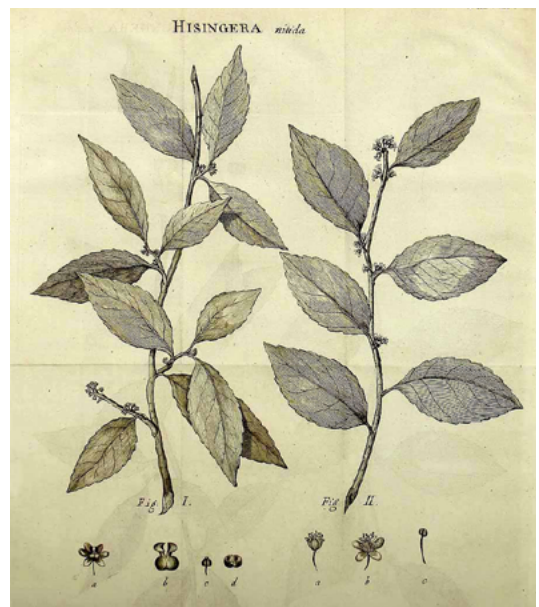


Fig. 11. Engraving of *Hisingera nitida* (*Bixaceae*) described by Hellenius in 1792 published in *Kongl. Vetenskaps Akademiens Nya Handlingar*.

of fruit trees and shrubs. *Suomen Talousseura* ("Finnish Economy Society") was established in 1797. Hellenius was one of the founding members, which was a major incentive for Hellenius' operations thereafter.

Dendrology

The dissertation, "*Scattered observations about management of fruit trees in Finland*" (Fig. 12) provides instructions about caretaking and breeding. Success was uncertain in Finland's cold climate, which required special gardening skills. Suitable planting sites are presented, harmful insects, soil quality, ditching, liming etc. Plant care has to take an example of nature; the best performing plants are not always the largest ones. When fruit trees are grafted, it is good to use cuttings that are hardy against winter (Hellenius & von Pfaler 1789). The dissertation guidelines are multidisciplinary and are still usable. Forthcoming Chaplain of Honkilahti and Kiukainen, **Eric Johannes von Pfaler** (1765–1818), defended it.

In the dissertation, "*Cultivation of berry bushes*" growing of *Ribes nigrum*, *R. spicatum*, *R. grossularia*, *R. reclinatum*, *R. uva-crispa*, *Berberis vulgaris*, *Rubus idaeus*, *R. fruticosus*, *R. caesius* and *Corylus avellana* is advised. New cultivars were born only by adding plants by seeds. It was fairly fast concerning these species, as plants fruited already after three or four years. Desired strains are thereafter increased by cuttings. The regular cutting of the bushes was a prerequisite for continuous harvesting (Hellenius & Forsbom 1789). Forthcoming Vicar of Rymättylä, **Johan Forsbom** (1763–1819), defended it.

In the dissertation, "*Thoughts on sapling production by means of cuttings*" there is a reference to famous bryologists Joh. Hedwig's morphological studies, where it is stated that while producing cuttings, tracheids must meet. Soft wood species like *Salix* are easy to increase by cuttings, but those of hard wood difficult. The best time is immediately after the ground frost had thawed. Rooting was most successful in a nutritious soil, so it was easiest to do on a seedling bench, where nutrition and moisture can easily be controlled by horse manure and straw (Hellenius & Solin 1802). Forthcoming Vicar of Eurajoki, **Henric Solin** (1780–1834), defended it.

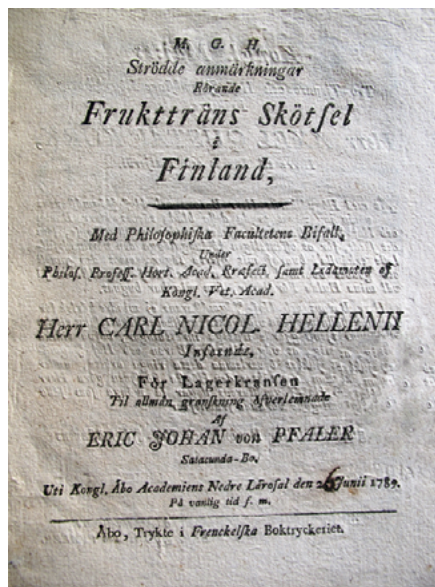


Fig. 12. Title page of the dissertation "*Scattered observations about management of fruit trees in Finland*" defended by Johannes von Pfaler under the supervision of Hellenius in 1789.

In the dissertation, "*Are lichens dangerous to trees*" is concluded that since lichens have no roots, they are not parasitic, as was often believed. Lichens depend on air moisture and protect trunks from drying. Most likely lichens are not harmful, and are completely natural on the trunks of trees (Hellenius & Sahlberg 1802). Forthcoming Demonstrator in Botany at old Åbo Akademi, later Professor in Botany and Zoology at Imperial Alexander University of Finland, **Carl Reinhold Sahlberg** (1779–1860) (Väre 2016b), defended it.

Forestry

The dissertation "*Observations of tree felling in Rauma and Uusikaupunki*" treats problems created by felling trees for special purpose in extensive areas. The small sized building woods of *Picea abies* and *Pinus sylvestris* were wanted especially in Denmark, Germany and the Netherlands, called lehterit in Finnish. Therefore, the logging needs to be properly planned. The balk produced was 15–20 inches long, the thickness of 4 × 4, 5 × 5 or 6 × 6 inches. Those were used especially in building the roofs. In order to be constant-

ly available, the forest should not be completely felled; seeding trees should be left in the woods to grow in peace. Rotation was relatively fast, trees could be felled at the ages of 25–30 years (Hellenius & Widqvist 1794). Forthcoming Vice Pastor of Kalanti, **Adam Reinhold Widqvist** (1770–1822), defended it.

The dissertation "*Notes on tree felling*" points out the facts of the highest wood quality: "The height growth had stopped and the annual rings were thinner than earlier". The trees were best to be felled in the autumn, when the wood material is dry, and the bark is dry for peeling which prevents rot (Hellenius & Winge 1795). The dissertation is of quite low quality. Forthcoming Mayor of Kokkola and Parliament's representative, **Hans Petter Winge** (1770–1836), defended it. This dissertation was published also in *Ny Journal uti Hushållningen* (Hellenius & Winge 1799).

The dissertation "*On tree planting*" consists of five parts each concerning one theme. 1. Soil quality, 2. planting time, 3. transplanting, 4. root injuries and 5., risks of wintertime transplanting. When transplanted, there must be enough soil protecting the roots from drying. Thick roots must be cut and wounds must be covered by protective kit (Hellenius & Castrén 1805). The dissertation is of quite low quality. Forthcoming Chaplain of Säräisniemi, **Zacharias Castrén** (1782–1818), defended it.

Agriculture

The dissertation "*Observations how common people brewed beer in Finland*" (Fig. 13) presents in the detail the process of how beer and home-brewed beer called sahti is brewed. Beer was considered health promoting: "By faster yeast drink becomes more rushing and is thus during wintertime more useful". The Finns were pioneers in brewing sahti, as common people had found that drinking water was less useful, though not directly disadvantageous. Purity and mixing yeast in plain water of correct temperature was particularly important. The rye has to sprout before the fermentation begins. Yeast was taken from old beer (Hellenius & Stierwald 1780). Forthcoming Vice Notary of the Åbo Court of Appeal, Secretary of the province of Kyminkartano and Head of the Chamber of Deputies, Government mem-

ber **Reinhold Wilhelm Stierwald** (1760–1815), defended it.

The dissertation "*Substitute bread of Finnish common people*" (Fig. 14) is mainly based on literature, but also on Hellenius' own observations made at Padasjoki, southern Finland. There were exceptionally harsh hunger years in the late 17th and 18th centuries. During severe hunger, the grain stems were ground for food, frozen grain was consumed, mash dried and used in baking bread. The text emphasizes that nature and its plants must be known well, in order to provide sufficient nutrition. The focus is on introducing domestic plants which could be used as substitute food, like *Arctostaphylos uva-ursi*, *Betula*, *Bistorta vivipara*, *Bryonia alba*, *Calla palustris*, *Calluna vulgaris*, *Dryopteris filix-mas*, *Juniperus communis*, *Lathyrus japonicus*, *Lathyrus tuberosus*, *Menyanthes trifolia*, *Nuphar lutea*, *Picea abies*, *Pinus sylvestris*, *Polygonatum odoratum*, *Polygonum aviculare*, *Pteridium aquilinum*, *Quercus robur*, *Rumex actosa*, *Symphytum officinale*, *Trifolium pratense*, *Trifolium repens*, *Triglochin palustris*, *Ulmus*, *Vicia sativa*. Also lichens, *Cetraria islandica*, *Cladonia rangiferina* and *Lobaria pulmonaria* and an algae, *Fucus vesiculosus* are mentioned (Hellenius & Wallenius

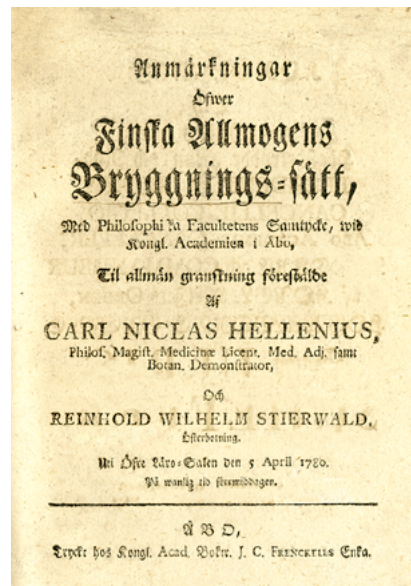


Fig. 13. Title page of the dissertation "*Observations how common people brewed beer in Finland*" defended by Reinhold Wilhelm Stierwald under the supervision of Hellenius in 1780.

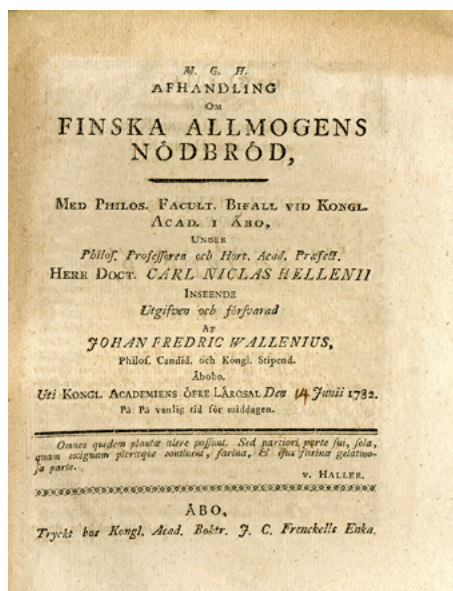


Fig. 14. Title page of the dissertation "Substitute bread of Finnish common people" defended by Johan Fredric Wallenius under the supervision of Hellenius in 1782.

1782). Forthcoming Professor of Eloquence, **Johan Fredric Wallenius** (1765–1836), defended it (Väre 2014a).

Hellenius (1791a) gave instructions on how to set up an *Asparagus* bench so that it is possible to harvest until the beginning of winter. On both sides of the *Asparagus* rows, furrows of some meters in depth are to be filled with unburned horse manure and covered with spruce or juniper branches. As a result, heat is generated on the bench and shoots will rise until late in the season.

In the dissertation "On *Phragmites australis*", this species is treated as *Arundo*, like *Calamagrostis arenaria*, *C. canescens* and *C. epigejos*. The Finnish name of *Phragmites* was "ruosko" or "rahilas" [both later forgotten]. It was common along the shores of lakes, rivers mouths and coastal bays. It also spread to nearby fields. The flowering was in August, and the mature blooms sunk to the bottom of water where the seeds germinated. It gave shelter to fish and to birds. The cow favoured young shoots, which increased the milk yield. The extensive utilization of the plant is widely described, like building roofs and as support material in walls, usage in dyeing textiles, and the poor people filled pillows and mattresses with inflorescence, (they had to be collected be-

fore the ripening of the seeds, otherwise the rats would appear and make their nest). The artillery used the stems as fire sticks. Cultivation methods are described (Hellenius & Lundén 1795). Forthcoming Vicar of Somero, **Michael Lundén** (1770–1829), defended it. This dissertation was published also in *Ny Journal uti Hushållningen* (Hellenius & Lundén 1799).

According to dissertation "Thoughts about tree leaves as fodder" wintertime lack of food was an obstacle to the development of Finnish livestock farming. One way to feed cattle was to dry the leaves for the winter. The best trees for this purpose were *Alnus*, *Betula pendula*, *B. pubescens*, *Populus tremula*, *Salix caprea* and *Sorbus*. Collecting leaves was usually done only after harvest, when the temperature had dropped below zero. The leaves were worth collecting from the tops of young trees. That increased branching, which improved later harvest. Materials and methods are described (Hellenius & Törnudd 1798). Forthcoming Chaplain of Temmes, **Matthias Törnudd** (1776–1823), defended it.

According to dissertation "Notes on fallowing the fields" in order for the field to produce the crop well, fallowing must be well timed. The purpose of the ploughing is to turn the topsoil of the field at a suitable depth so that the grain seeds have a suitable loose soil to root. At the same time, weeds, grain pests and acidity is reduced and airiness improved. The plowing was done in many places traditionally in the spring, but autumn would be more suitable (Hellenius & Lagus 1798). Forthcoming helper of Vicar at Laihia, **Johannes Jonas Lagus** (1776–1800), defended it. This dissertation was published also in *Ny Journal uti Hushållningen* (Hellenius & Lagus 1800).

The Finnish Economy Society ordered from Hellenius in 1799 a guidebook "On the emergency food to the cattle" (Fig. 15) to be distributed to common people. It was published both in Finnish and in Swedish in Åbo, and in Swedish in Linköping, Sweden (Hellenius 1799a, b, c). Hellenius introduces 17 surrogate plants. Especially the leaves of young trees were recommended, but also many spiny plants like *Arctium* were recommended. In the dissertation "Remarks on what should generally be taken into account in cereal cultivation" advice is given to how to maximize grain yield.



Fig. 15. Title page of the guidebook "On the emergency food to the cattle" published by Hellenius in 1799.

There had been serious years of famine in Finland. In the dissertation, "Notes about what, as a rule, at the seed for sowing to our fields should be taken into account". Emphasis is laid on ploughing, ditching and fertilization. There were opinions that winter grain was not worth to cultivate. However, Hellenius stressed that by properly draining the risk of loss is small. It was also important to use high quality seed. Sowing must be done evenly, under the right humidity and heat conditions. The better the soil, the denser the sowing. The spring sowing had to be done as early as possible, but only after frost had thawed. Good phenological signs were the arrival of migratory birds such as stone pocket, the breaking of alder and birch leaves. After sowing, the seed has to be moulded to the right depth. The larvae that attacked the grain shoots could be prevented by keeping the pigs in the field after each turn of the soil (Hellenius & Nordgren 1801). Forthcoming Parish Assistant of Tammela, **Adolph Nordgren** (1776–1823), defended it.

The dissertation "On wintertime management of grain fields" considers the damaging effects of winter, especially on cereal growth. The basic prerequisite for wintering is that the plants have a

strong root system. The worst thing to happen is the abundant snowfall before the soil freezes, because in warm soil growth can continue and rot may spread. If temperature drops below zero Celsius, snow can also make an ice cover. Therefore, snow should be removed from the fields. One way is to take the cattle to the field to break the snow cover. The melting water should be immediately released from the field by keeping ditches in good condition. Winter mould is a big threat in wet spring if the snow melts slowly (Hellenius & Castrén 1801). Forthcoming Vicar of Alatornio, **Eric Castrén** (1769–1846), defended it.

The dissertation "Notes on cattle management" a number of calf care instructions are provided. Keeping cattle was poorly managed in Finland, and in particular, the well-being of calves should be considered by greater care. The cattle could also be bred by allowing only the strongest to continue their family. Good warm birth conditions were needed for giving birth. The herd had to be protected from the beasts, the bear being the most dangerous (Hellenius & Alcenius 1802). Forthcoming Vicar of Kruunupyy, **Carl Fredrik Alcenius** (1776–1838), defended it.

Flax cultivation should be promoted in every way, so a guide was needed. Rich and loose soil was the best. If possible, turning soil should be done during winter to eradicate the roots of the weeds and again in spring when weed seeds begun to germinate. The best seed source was believed to come from Riga. However, that was not the case; fibre quality was not fine enough, even though the stalks grew long. Because the seeds were very oily, it was good to store them at home until dry. The best sowing time was when the flowering of *Prunus padus* was at its peak. Fibre quality was at best during the time petals were falling. The seeds were harvested later when the stems were yellowing and the leaves were falling. The stems were placed in the lake water for a few weeks so that the fibres could be released more easily. The fibre manufacturing to thread is described carefully (Hellenius 1802a,b). Hellenius wrote these anonymously published guidebooks (Saalan 1916). Later these were translated into Finnish (Hellenius 1814a,b).

In Finland, thousands of acres (1=0.49 ha) of peatland were ditched and cultivated. More were needed, as wet soils were frost nests. There were

differences in peatland quality suitable for draining to fields. Thick peat with decaying trees or ash was a sign of nutrition. A flat *Pinus sylvestris* growing peatland was better than those dominated by *Sphagnum* species were. Careful instructions are given to drainage and preparing of meadows or fields. First corn to be sown was rye (*Secale cereale*), first root rye, and then slash and burn type of rye. Thereafter the area should be prepared for the meadow. The peatland was burnt repeatedly for many years to cultivate corn. When the bottom was approached, *Alopecurus pratensis* and *Phleum pratense* were sown. Finally, cost calculations were presented (Hellenius 1802c). According to Saelan (1916) Hellenius wrote this anonymously published guidebook. Later these were translated into Finnish (Hellenius 1814c).

A literary review magazine *Allmän Litteratur-Tidning* was published at Åbo for one year, 1803. Preliminary announcement "On a need for a literary newspaper for Sweden, acknowledged by all interested in science" was published a year before (Anonymous 1802). Hellenius was one of the signatories. Hellenius (1803a) wrote to the magazine an anonymous review of F. C. Medicus' book "Cultivation of fodder plants" (W. Lagus 1875). The book was valuable, as it contained instructions on how to grow many fodder plants such as *Trifolium*.

Annual reports of crop yields

Hellenius wrote several reviews of the harvest seasons in Finland to magazine *Ny Journal uti Hushållningen* (Fig. 16), which was published in Stockholm, Sweden (Hellenius 1790bc, 1791b, 1792b, 1793, 1795a, 1796a,b, 1798a,b,c). Some reports were signed C.N.H. Few reports were published also in magazine *Åbo Tidningar* (Hellenius 1798d,e).

Botanical Gardens

As the Demonstrator in Botany Hellenius had the responsibility of the Botanical Gardens. Soon he planned to visit Thunberg at Uppsala, but the degraded garden prevented him from leaving (Hjelt 1896: 339). Kalm had been interested mainly in useful crops, and his successor Kreander did

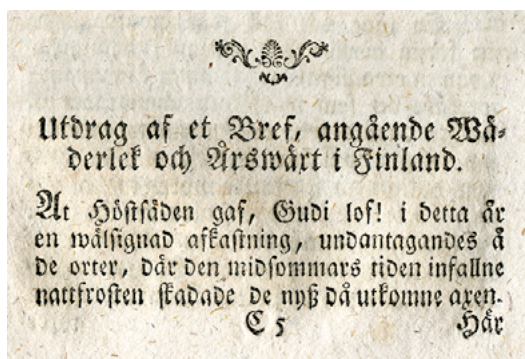
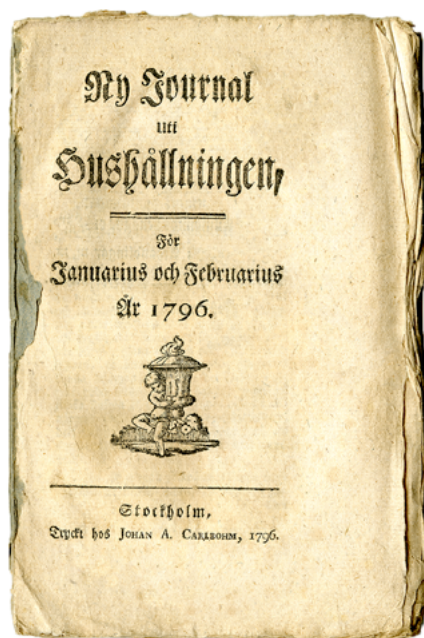


Fig. 16. Title page of *Ny Journal uti Hushållningen*, and title "Extracts from the letter regarding weather and harvest in Finland" by Hellenius. Hellenius wrote several reports of the harvest seasons in Finland to this magazine published at Stockholm.

nothing related to garden. Hellenius thought of the whole systematically and the renovation required a considerable contribution. Hellenius took up the plants planted by Kalm and planted them in a systematic order. Porthan wrote to Menander on 16 July 1780 that Hellenius intended to repair the gardens with his own and donor funds (Österbladh 1942: 449), and on 1 October 1782 that the garden had received 2000 copper coins in cash but it was inadequate (Österbladh 1942: 442). Professor of Practical Philosophy and His-

tory, Johannes Bilmark (1728–1801) wrote already on 21 April 1780 to Mennander, that thanks to Hellenius, the garden had risen from its state of decay; with a number of plant species now 2200, instead of 200 which Kalm left behind (Kerkkonen 1936: 272, Österbladh 1940: letter 34).

Hellenius continued to increase the number of plants and wanted to try new species. Especially Thunberg and Hellenius often exchanged plant specimens and seeds, but also Hellenius and Christian von Steven. Steven acted as the silk cultivation inspector in southern Russia, and he had been for a short time a pupil of Hellenius. Hellenius exchanged material also with **Fredrik Stephan** (1757–1814), the Professor of Medical School in Moscow (1786–1811), later Director of Forest Institute in St. Petersburg (1811–1813), and with **Friedrich Ernst Ludwig von Fischer** (1782–1854), the director of Count **Alexei Razumovsky's** (1748–1822) garden at Gorenki. Fischer sent Hellenius seeds of *Caldasia*, *Lespedeza* and *Smetenia* (Hjelt 1896: 337).

In 27 March 1785, Hellenius sent seeds and a catalogue of seeds available at Åbo to Thunberg (Hjelt 1896: 339). The seeds used to be collected annually for exchange. Hellenius asked Thunberg for living plants, especially the *Helenium autumnale*, because of its scientific genus name. Hellenius mentioned some garden plants in his letter to Thunberg: *Anthemis ovalifolia* [*Heliopsis buphthalmoides*], *Dracocephalum altaianum*, *Galanthus nivalis*, *Galinsoga triloba* [*Sogalgina triloba*], *Gypsophila capitata* and *Ranunculus frigidus*. In 1804, Hellenius wrote to Thunberg, that Finnish students at Uppsala would collect seeds of *Androsace septentrionalis*, *Polygala* and *Pulsatilla* (Hjelt 1896: 344). Still in 1817, Hellenius asked Thunberg to remember the garden (Hjelt 1896: 341).

Tsar Alexander I awarded 960 silver coins in 1811 to garden and museum purchases (Hjelt 1896: 347). Chancellor of the new Imperial Academy of Åbo, **Mauri Kustaa Armfelt** (1757–1814) believed in the abilities of the Demonstrator in Botany, Carl Reinhold Sahlberg, student of Hellenius, and encouraged the Bishop and Vice Chancellor of Åbo Akademi, later Archbishop **Jakob Tengström** (1755–1832), to promote his career and opportunities to travel abroad (Kontkanen 1929). The new Imperial University re-



Fig. 17. *Anemonidium canadense* grows today by Hellenius family estate at Kaarina. Its origin is at Åbo Akademi gardens. It is likely that Pehr Kalm brought the plant from North America in 1751 to the Akademi Garden.

ceived new positions, and in 1813, Sahlberg was nominated as Associate Professor in Natural History and Museum Inspector. The same year Sahlberg followed the recommendation by Chancellor **Mikhail Speransky** (1771–1839) to visit St. Petersburg to obtain specimens to the Botanical Museum and Gardens, during which he also increased his personal biological collections. Sahlberg became familiar with many researchers. Travel to St. Petersburg was fruitful, 1 500 species of seeds, 240 roots and cuttings was received to Åbo Botanical Gardens. Sahlberg succeeded Hellenius as Professor in 1816 (Väre 2016b).

Anemonidium canadense is still growing in the Hellens' family farm at Kaarina. It has later been transplanted elsewhere (Fig. 17). It is supposed that Pehr Kalm collected this plant in North America. It was cultivated in the Åbo Akademi Botanical Gardens and brought by Hellenius to their family estate Rävånäs in Kaarina.

Edvard Daniel Clarke (1759–1822) visited Åbo Akademi in 1800. He wrote kindly about Hellenius: "We cannot say why we most admire

him, because of his open, friendly, generous and hospitable nature or because of his versatile talent for which we saw in him one of the most talented scholars in his country". Clarke gave the garden a high rating despite the small size. The greenhouse had plants from the Cape of Good Hope. He considered the whole university as the best in Sweden (Clarke 1838).

Hortus Academiae Aboensis

Hellenius started the dissertation series *Sistens Hortus Academiae Aboensis* (Fig. 5), continued by the later Demonstrators. Eight dissertations appeared. Thanks to them, there is a lot of information on species cultivated.

Botanical Museum

Johan Lindwall (1740–1796) wrote a letter in 1772 to **Bengt Bergius** (1723–1784), a bank director, that Åbo Akademi had approximately 1 000 specimens in its herbarium. The collection had Pehr Kalm's collection of North American plants, and a collection donated by Olof Rudbeck the younger (1660–1740). J. J. Haartman donated 4 000 samples in 1781 (Hjelt 1896: 341). Hellenius wrote to Thunberg on June 20 1815, that he had received a beautiful collection from St. Petersburg, but its plants were unknown, such as the names *Harochia* and *Hastia* (Hjelt 1896: 343). Many other collections were donated to museum during Hellenius' era (Väre 2015a,c, 2016a,b). In 1799, there were 7 258 specimens in the collections (Elfving 1928). Hellenius acquired new specimens and the size of the collection was 10 000 to 12 000 in 1811 (Anonymous 1836, Hjelt 1896).

A lot of vascular plant specimens were collected from the Åbo Akademi Botanical Garden in late 1800th and early 1900th centuries, like that of *Verbena nodiflora* on 1794 (Fig. 18), of which nearly 200 was reported to be in the University of Helsinki Botanical Museum (H) collections (Väre 2016b). Since that publication (Väre 2016b), several new Akademi Garden specimens have been discovered during inventory of the collections. The current number of "Hortus Botanicus Aboensis" specimens is 725. Those were part

of the Professor Carl Reinhold Sahlberg's private collection, to whom Hellenius also donated specimens.

When Hellenius retired in 1816, the Akademi collection had ca. 15 000 species. Hellenius donated that year his herbarium to Akademi (Kukkonen & Viljamaa 1973). The Great Fire of Åbo destroyed the Akademi plant collection in 1827, likewise almost all other Akademi collections. Luckily, Hellenius donated (Fig. 19a,b) specimens also to his successor, Professor Sahlberg. Sahlberg's private herbarium was rescued (Väre 2016b). Hellenius and Sahlberg specimens are today part of "Herbarium Antiquum", Finnish Museum of Natural History, Botanical Museum.



ex H. Aboensis 1794.

Fig. 18. *Verbena nodiflora* collected at Åbo Akademi Garden in 1794. Year before, Hellenius was appointed Professor.

“Herbarium Hellenianum”

“Herbarium Hellenianum” (H) consists today of at least 435 specimens. Of those 66 were given to Hellenius by Anders Dahl, who moved in 1786 to Åbo to act as the Demonstrator in Botany. He brought his extensive herbarium of 6 000 specimens with him (Kukkonen & Viljamaa 1971). Number of existing specimens donated by Carl Peter Thunberg is 27. *Brachypodium distachyon* was given to Hellenius by Carl Wänman (1733–1797), *Bupleurum fruticosum* by Pehr Kalm. The latter had once belonged to Olof Rudbeck the Younger (1660–1740). Rudbeck had donated his herbarium to Kalm while Kalm studied botany at

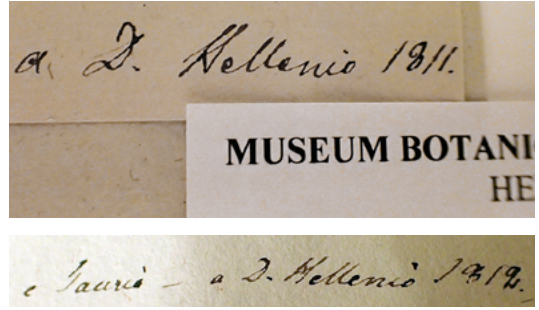


Fig. 19. Hellenius donated many specimens to his successor, Professor Carl Reinhold Sahlberg. His personal plant collection survived the Great Fire of Åbo in 1827. Åbo Akademi collections were destroyed.



Fig. 20. Some specimens of Herbarium Hellenianum: *Trapa natans*, *Eragrostis minor*, *Gentiana altaica*, *Syringa persica* and *Piper amalago*, which was collected probably by Paul Erdmann Isert (1756–1789) in the Caribbean.

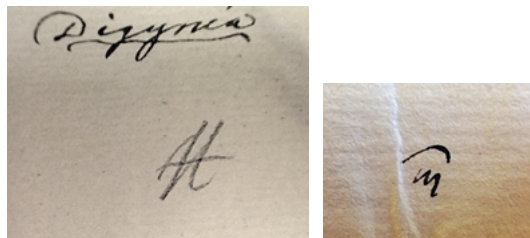


Fig. 21. Ownership the Hellenius specimens is indicated on back of the sheets by letter H or by a letter or number with arch above.

Uppsala in the 1740's (Hjelt 1896: 341). Pehr Löfling (1729–1756) gave to Kalm *Pappophorum alopecuroideum* [*P. philippianum*], which was further donated to "Herbarium Hellenianum". It was probably collected by Löfling in Venezuela. *Piper amalago* had once belonged to Paul Erdman Isert (1756–1789). He probably collected it in the Caribbean (Fig. 20). On back of the sheets ownership by Hellenius is indicated by H or by a letter or number with arch above (Fig. 21). Sven Schjerfbeck (1797–1833) organized Akademi Botanical Museum collections 1816–1821 while working as pharmacists at Åbo. He acquired a number of Hellenius' specimens, and probably marked those sheets with the letter H. Hellenius checked the whole herbarium in 1805, and used as reference Willdenow's *Species Plantarum* and the taxon numbering as reference, while Schjerfbeck used numbering of Persoon's *Synopsis Plantarum*. University of Helsinki bought the collection in 1834 (Kukkonen & Viljamaa 1973).

Zoology

Hellenius investigated many animal groups. Already his Pro Gradu -dissertation "Insects harmful to coastal fishing" was zoological (Gadd & Hellenius 1769). The dissertation was concerned with the problem with two animals that are harmful to fisheries; *Oniscus* [*Mesidotia*] *entomon* and *Cancer* [*Gammarus pulex*].

As a result of Linné's influence, natural history was increasingly focused on describing new species, but sometimes Hellenius studied also more general biological topics, like "Methods for hunting game in Häme" (Hellenius & Bonsdorff 1782) (Fig. 22). The most common game was rab-

bit. It was important to eradicate wolves, lynxes, foxes and bears because of the damage caused to domestic animals. In particular, the hunting of the wolf is described in details. The elk population was very small. Other prey species were the common otter, European mink, pine marten, ermine, badger, wolverine, common mole, rat, mouse, squirrel and flying squirrel. Forthcoming Professor in Medicine, **Gabriel Bonsdorff** (1762–1831), defended it.

In the description of the weasel (*Mustela nivalis*) is specified the characters how to distinguish this species from the ermine (*M. erminea*). An important feature was the blunt tail (Fig. 23) of the weasel and the white fur all year round (Hellenius 1785a).

Hellenius (1785b) described *Taenia lotae* (Plathelminthes), a 7 to 30 cm long parasite in the liver of burbot (*Lota lota*) as new to science. The parasite consisted of white segments and they were both inside and on the liver. Its abundance varied in Finland.

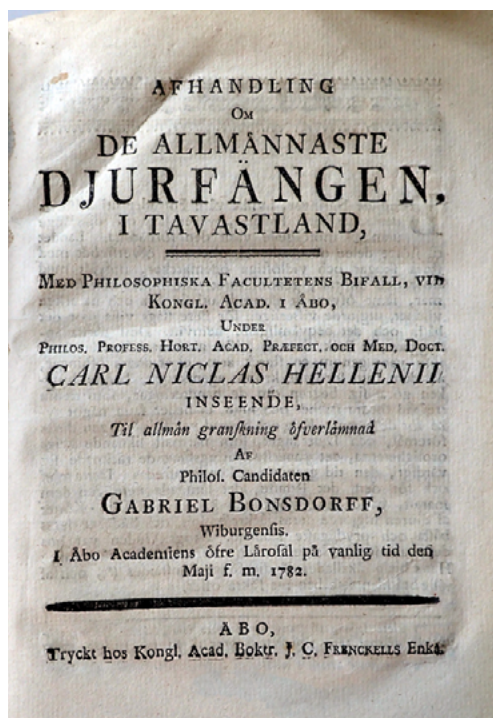


Fig. 22. Title page of the dissertation "Methods for hunting game in Häme" defended by Gabriel Bonsdorff under the supervision of Hellenius in 1782.

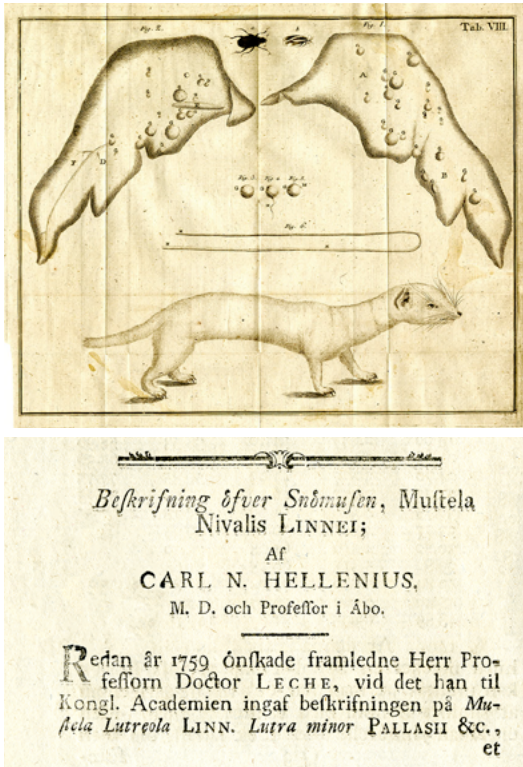


Fig. 23. Engraving of *Mustela nivalis* characterised by Hellenius in 1785. The planch was published in Kongl. Vetenskaps Akademiens Nya Handlingar.

Dissertation "*The phenological flower and animal calendar of Åbo*" (Fig. 6) is a summary of the phenological observations made by Hellenius in 1780–1785. It mentions migration times of ten bird species, five fish, 30 butterflies and of 20 other insects, predominantly beetles. New butterflies for Finland were *Papilio machaon* and *Argynnis aglaja* (Hellenius & Justander 1786). It was released by Usteri in Switzerland (Hellenius & Justander 1790).

Hellenius (1786) described a beetle, *Serropalpus striatus*, as new to science. Current valid name is *S. barbatus* Schaller 1783. It was found at Ruissalo, Åbo, on walls of old buildings. Hellenius also characterised another species, *S. laevigatus* [*Elater buprestioides*].

Hellenius describes in his description of the jay (*Garrulus glandarius*) their gender differences, breeding biology, and raising of chicks. Both sexes were migratory and they formed a couple immediately after arrival. One female is usually

competed by two or three male birds (Hellenius 1787).

Hellenius (1790a) stated that he had managed to cross *Cervus capreolus* and *Ovis ariete*. Cagliari Sea Captain gave *Cervus* to Hellenius. The offspring was fertile. Darwin (Natural selection: 426) and Lindroth (1967c: 449) rightly suspected Hellenius, and claimed Hellenius crossed the sheep with the Sardinian mouflon, called roe, a wild sheep. The Sardinian word roe means mouflon, while in English it means a roe deer. The females resembled their mother and were blackish brown, and the males were white like the father.

Hellenius further continued his crossing experiments with the offspring by crossing a male with a sheep (Hellenius 1794). Later he crossed the first four male offspring with sheep (Hellenius 1801). Their properties, such as wool quality and meat flavour, is described. Finally, Hellenius notes that when the offspring is crossed with sheep, the new generations remind more offspring than the sheep.

In the dissertation "*Examples of instincts how animals take care of their offspring*" it is shown that the most appropriate breeding time for animals is when food is best available. Only the strongest individuals pair. Rut and heat disappear after the breeding and the parents begin to make the nest. Especially birds' nests are described. Erroneously it was stated, that *Corvus corone cornix* and *Pica pica* nest in hollow trees (Hellenius & Juvelius 1792). Forthcoming Vicar of Kruunupyy, **Friderik Juvelius** (1769–1826), defended it.

According to the dissertation "*Thoughts of animal hybridisation*" hybrids are born only on exceptional circumstances, and even then parents must be closely related and genitals compatible. An example of crossbreeding is that of the horse and the donkey, the offspring being a mule. Crossbreeding between humans and animals is a product of imagination (Hellenius & Holmberg 1798). Forthcoming Vicar of Köyliö, **Jacob Johannes Holmberg** (1778–1823), defended it.

In the dissertation "*Some remarks on how bird colorations vary*" (Fig. 24) is given the well-known fact that in bird feathering there was often a significant difference in colour between the sexes. Sometimes the sexes were described as different species. There were also some exceptions to

the rule, such as a raven, oriole, cuckoo and crow. The colour of the feathers of young birds may also be deviating, as with galls. Albinism was a disease. Mating dances are also widely discussed (Hellenius & Cajan 1798). Forthcoming Military Chaplain, **Alexander Cajan** (1767–1810), defended it.

In the dissertation "*Notes of bird nests, based on observations gathered in Häme*" are described based on Hellenius' own findings, predatory birds nesting biology, nest structures, the number of eggs, their size and colour and appearance of the young birds. Studied birds were eagles, hawks, owls and shrikes (Hellenius & Idman 1802). Forthcoming Master of Laws, **Nikolai Johannes Idman** (1781–1851), defended it.

Geological and Zoological museum

Hellenius sought to set up a zoological museum. The animal and geological collections expanded with purchases and donations. Linné had donated samples to Åbo (Hjelt 1896: 345). From Pro-

fessor Thunberg, Hellenius acquired remarkable bird collections for his own account. The biggest donations were the 176 animal samples donated by Pharmacist Johan Julin (1752–1820) and the 460 birds donated by Swedish J. Wattrang. In addition, mammoth teeth were in the collections (Hjelt 1896: 347, 366).

Before Hellenius' period, bishop Mennander had bought fossils from Professor in Medicine, **Herman Diedrich Spöring** (1701–1747). The conch collection were considerably expanded in 1799 when Major P. Suther donated his specimens. Later, in 1806, Åbo Akademi bought And. Christopherson's 4664 shells, 126 corals and starfish. The collection also had 8977 minerals and 801 mineral preparations. According to Professor Gadolin, in 1824 the Akademi had up to 15 300 mineral samples.

The importance of Hellenius

Hellenius was the first in Finland to practice a Linnéan taxonomy. He described new plant and animal species to science. The description of the position was changed into a professorship of economics and natural history in 1793, with the emphasis on reducing the importance of economics. Nevertheless, Hellenius continued studies typical of the Era of utility, until the end of his career, partly due to famine in the country.

His merit was the reorganization of the Botanical Museum and Gardens, the increasing of the Åbo Akademi collection of animals and herbs and geological specimens, and the development of his own field concerning teaching.

After 1805 Hellenius did not conduct any dissertations, the career as a researcher was over. Hellenius was oldest amongst professors when Russia invaded Finland in 1808 and annexed our country into Russia the following year. The change may have mentally paralyzed an aging scientist.

Hellenius still lectured diligently. During the academic year 1812–1813, ca. 35 students listened to his lectures on forestry and horticulture and agriculture (Hjelt 1896: 365). Hellenius blinded four years before his death and thus he retired in 1816, at the age of 71. Hellenius was adorned with laurels to Jubileum Master of Sci-

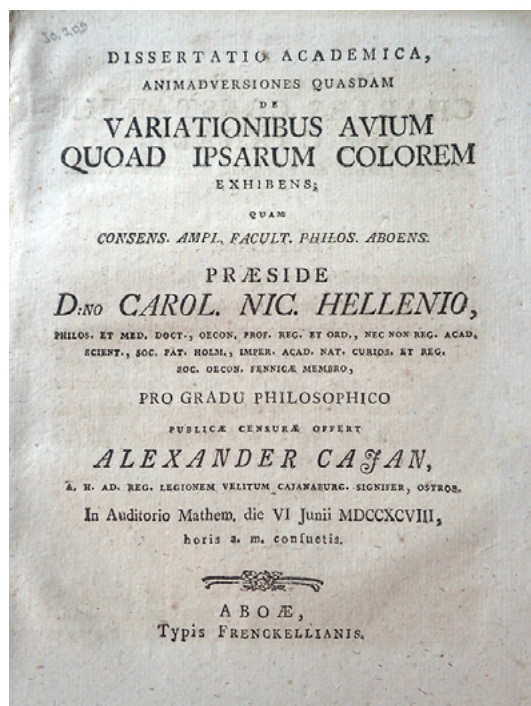


Fig. 24. Title page of the dissertation "*Some remarks on how bird colorations vary*" defended by Alexander Cajan under the supervision of Hellenius in 1798.

ence at the Åbo Akademi promotion on July 28 1819 (Sacklén 1823).

Hellenius felt isolated in the remote Åbo. Connections to foreign scientists were limited (Elfving 1928).

Within the academic community

There are four manuscripts from Hellenius' lectures. Three are kept in the National Library of Finland, one is in private library (Fig. 25). Of those in the National Library, one concerns pasture management written (278 pages) by Henrik Wörlund in 1793, one consists of notes on ornithology written (204 pages) by Nils Kynzell in 1805, and one concerns mammals written (120 pages) by Carl Jacob af Tengström in 1807

Hellenius was a member of the Consistory, the Åbo Akademi principal in 1789–1790 and 1802–1803 (Sacklén 1823). Rectorships followed by a Vice Rectors's duties. Hellenius organized a promotion in the Faculty of Philosophy on July 23 1795 and July 26 1798 (Sahlberg 1840). Hellenius worked as an inspector of the Häme students' club in 1794–1816 and was invited to honorary membership in 1818.

Speeches

Hellenius held several speeches in Åbo Akademi, many of which have been published (Hellenius 1790d,e,f,g, 1795b, 1798f, 1802d, 1803b,c,d).

- The subject of the closing speech of the Rectorship in 1789 was "On the natural operations which guides the animals to promote the welfare of their offspring" and in 1802 "About useful work by animals in nature" (Holmberg 1932).
- Hellenius held on 2 June 1789 a eulogy in the Royal Academy of Sciences of the Knight Hisinger (Sacklén 1823) and the same speech in 1791 at Åbo Akademi (Holmberg 1932). Hisinger had significantly promoted Hellenius's career.
- An invitation to the event where Professor Gabriel von Bonsdorff held a memorial speech of the late Baron Carl Hermelin (1707–1789) (Hellenius 1790d).

- Invitation to follow inauguration of prof. Jakob Tengström to his Professorship (Hellenius 1790e).
- A speech to investiture celebration of Professor of Greek and Hebrew, Pehr Olof Malmström (1758–1834) (Hellenius 1790f).
- Invitation to follow the transfer of rectorship on 22 June 1790 (Hellenius 1790g).
- A speech in the investiture celebration of Prof. in Theology, Jakob Tengström (1755–1832) (Hellenius 1790g, Holmberg 1932).

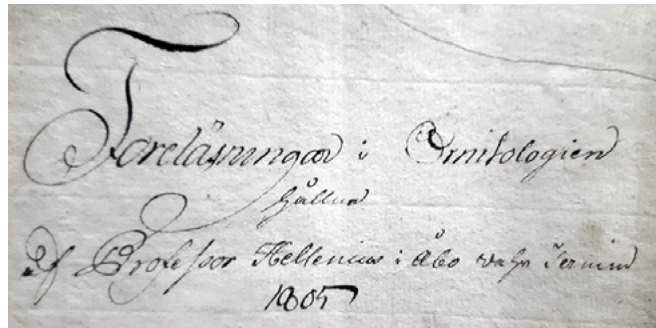


Fig. 25. Title page of lectures in ornithology by Professor Hellenius kept in 1805.

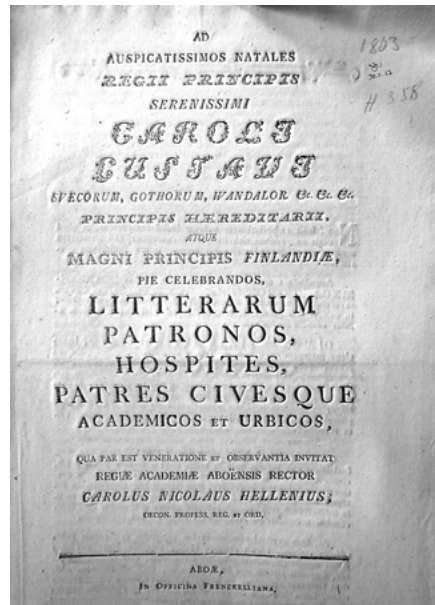


Fig. 26. Hellenius held several speeches at Åbo Akademi when he served as rector. In the title, a special honour is given to great benefactors of Akademi, but also citizens (urbicos) were welcomed to the events.

- A call for promotion on 23 June 1795 (Hellenius 1795b) and on 26 June 1798 (Hellenius 1798f).
- In 1802, an invitation to the event, where Professor in History of Literature, Frans Michael Franzén (1772–1847) would hold an encomium, when King Gustav IV walled the foundation stone of a new Åbo Akademi building (Hellenius 1802d).
- In 1803, a speech (Fig. 26) to inform of the future event, where Professor in Physics, Gustav Gabriel Hällström (1775–1844), and Associate Professor in Theology, Jacob Bonsdorff (1763–1831) held encomiums to honour the birth of Prince Carl Gustav (Hellenius 1803b).
- In 1803, a speech to inform of the future event, where Professor in Law, Matthias Calonius (1738–1817) would hold a eulogy of late Bishop Jacob Gadolin, in the presence of Chancellor Count Karl Adam Wachtmeister (Hellenius 1803c).
- Invitation to follow the transfer of rectorship on 9 March 1803 (Hellenius 1803d).

Memberships of science fellowships

Hellenius was elected a member of the Royal Swedish Academy of Sciences in 1788 (Rosenhane 1811: 355) and he continued as a foreign member in 1809 when Finland was annexed to Russia as an autonomous Grand Duchy. He was also a member of the Swedish Patriotic Society since 1789, since 1797 of *Erlang Academia Naturae Curiosorum*, since 1798 of *Suomen Talousseura* ("Finnish Economic Society"). Further, he was a member of Stockholmian *Sällskapet för Allmänna Medborgerliga Kunskaper* ("The Society of General Bourgeois Skills").

Hellenius published many articles in the series of the Royal Swedish Academy of Sciences. Especially active he was in the Finnish Economic Society, being member of its Preparation Committee, its Chairman in 1809, leading meetings also in 1810 and 1811 (*Åbo Tidning* 36: 1, 6.5.1809, Cygnaeus 1897). From time to time, he also served as a temporary secretary and he was a member of the Vaccination Committee established in 1804. During Hellenius' tenure as chairman, Tsar Alexander I granted an annual 2250

rubles to promote potatoe cultivation in Finland (Cygnaeus 1897)

Following the reorganization of the administration as a part of Russia, Hellenius was elected in 1812 as a representative of Åbo Akademi philosophical faculty to *Collegium medicum*. Among other things, it provided instructions on how pharmacy inspections should be performed and checking the validity of the drugs (G. E. Haartman et al. 1815).

Hellenius was also a businessperson. He bought and sold farms. In 1794 he rented Åminne estate in Piikkiö, in 1796 he sold Joensuu at Pälkäne, and in 1804 Lofsdal at Parainen.

Eponyms: *Zingiberaceae* genus *Hellenia* [*grandiflora*] Retz. in *Observationes Botanicae* 6: 18. 1791 (Fig. 27) "Carl Nils Hellenius, Ph. & Med. Doct. Hist. Nat. Prof. Aboens" (Lidbeck & Waldenström 1792) = *Costus speciosus* (J. Koenig.) Sm.; *Alpinia* sect. *Hellenia* K. Schum. in Engler's *Das Pflanzenreich* Heft 20 1904; bug species *Corixa Hellenii* C. R. Sahlberg 1819 = *Sigara hellensii* (C. R. Sahlberg) (Fig. 28). When Hellenius asked for retirement after a full term of service on April 29 1816, he was ennobled as von Hellens [*Åbo Allmänna Tidning* 1816(69)].



Fig. 27. Genus *Hellenia* [*grandiflora*] Retz. 1791 was described to honor Carl Niclas Hellenius. *Costus speciosus* J.Koenig 1791 is, however, earlier. Today *Cheilocostus speciosus* (J.Koenig) C.D.Specht. Photo: Hans Hillewaert, Wikimedia Commons CC BY-SA 4.0



Fig. 28. Amongst insects, bug species *Corixa Hellensii* C. R. Sahlberg 1819 was described to honor Carl Niclas Hellenius. Today *Sigara hellensii* (C. R. Sahlberg). It was described by Hellenius' successor Carl Reinhold Sahlberg.

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