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Pehr Kalm as a North American natural history source of the 18th century

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Contemporary natural historical depictions of North America are rare from the middle of the 18th century or earlier. One of the few authors who made first-hand observations was the Finnish-born Professor of Economics Pehr Kalm. He explored the eastern parts of North America, especially in 1748 and 1749 and early 1750. Travelogues and diaries written by him were published in Swedish. Further, Kalm wrote several important articles about his observations in Swedish. He also supervised dissertations presenting the economic benefit colonies in North America could provide. The writings have been discussed in various contexts and some have been translated into English. But no summary has been compiled of the natural history findings made by him.

Kalm's expedition was financed by the Royal Swedish Academy of Sciences. The instructions included not only writing down all natural history details, but also social and everyday life issues. The task was also to collect zoological and especially botanical specimens as well as seeds of economically useful plants to be tested in Sweden. The Academy's guidelines were part of the Swedish government's economic policy, the goal of which was to increase domestic production. Here, the Academy relied on the assessment of its founding member, Carl Linnaeus, of the benefits of the expedition. He had a strong additional motive to acquire new species for science.

In this article, we bring together botanical (including most economic botany), zoological, ecological and other natural historic observations made by Kalm and examples of how this unique amount of information has been used. The summary is based on Kalm's travelogues, diaries, articles, supervised dissertations and herbarium specimens collected by Kalm maintained at the Uppsala Museum of Evolution. The diaries have not been translated into other languages. They have much more information compared to the travelogues. In addition to this, we bring up a few additional topics, such as Kalm's observations on climate change, fossils, geology, northern lights, weather and phenological observations. Useful plants and alien species are written about in separate articles.

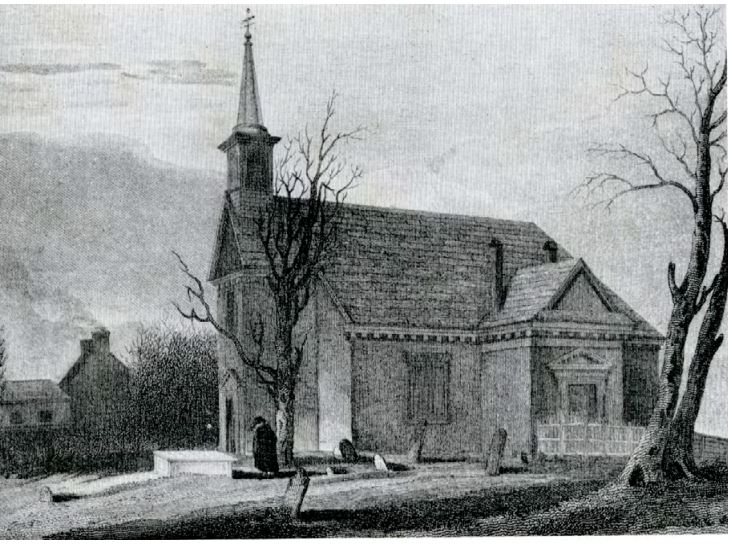
Introduction

Pehr Kalm (1716–1779, Fig. 1a) was the most famous Finn in the 18th century, one of the most important "apostles" of Carl Linnaeus. His fame is based on the natural science expedition he made to eastern North America in 1747–1751. For example, Kalm was the only Swedish scientist which Adam Smith cited in his book "The Wealth of Nations" (1776).

Henry Väre has written section Botanical observations by Pehr Kalm, Pekka Niemelä Vertebrate observations by Pehr Kalm (Benson 1987) and Seppo Koponen Invertebrate observation by Pehr Kalm.

Kalm was born in March 1716 in Ångermanland, Sweden, where his parents had fled from Ostrobothnia between Russia and Sweden during the Great Northern War of 1713–1721, when Russian troops conquered Finland including Ostrobothnia, causing great destruction and human suffering. His father, Gabriel Kalm (1680–1716), was the chaplain of Närpies (Korsnäs, Finland). His mother, Catharina Ross (1681–1765), returned to Vöyri in the Vaasa region of Finland after the Peace of Uusikaupunki (Nystad in Swedish) was signed in 1721. Pehr Kalm married Anna Margaretha Sjöman (1722–1787) in Pennsylvania in 1750, and their son Petter Gabriel Kalm (1752–1795) took up a military career. Kalm died on 16 November 1779 in Turku.

Fig. 1a. Portrait of an unnamed Royal Academy of Turku professor, probably by Johann Georg Geitel, 1764. The person is commonly assumed to be Pehr Kalm (1716–1779). The painting is in the Satakunta Museum, Pori, Finland. Kalm signed his book with the letters PKm.



Career

Kalm began his studies at the Royal Academy of Turku in 1735, from where he moved to Uppsala in Sweden in 1740, to study natural sciences in the university under the supervision of Professor Carl Linnaeus (1707–1778). Kalm was first appointed Professor of Economics at the Royal Academy of Turku the same year the journey to North America began. He acted as a professor until his death in 1779.

Linnaeus sent several of his students, often called ”apostles”, to different parts of the world to collect specimens for his taxonomic studies. Kalm’s supporters, Linnaeus, the vice-president of the Turku Court of Appeal, Baron Sten Carl Bielke (1709–1753) and the bishop of Turku Johan Browallius (1707–1755) arranged the travel financing to explore the nature of North America. The main purpose was to get him to an area that corresponds to Sweden climatically and to collect useful plants to be cultivated in Sweden. Observing nature and everything human and writing it down in a notebook was equally important.

Kalm explored eastern North America from 15 August 1748 to 27 February 1751. He made his observations especially in the surroundings of Philadelphia (Fig. 1b, c), where his base was in Racoon (now Swedesboro. Further, he made two long ex-

◄ Fig. 1b. Gloria Dei Old Swedes’ Church, Philadelphia, Pennsylvania was built in 1703. Drawing by Thomas Sully in Kalm (1937), untitled first page. Kalm preached in this church.

Fig. 1c. Main Street of Swedesboro, New Jersey, 1844. Published in Kalm (1937) between pages 174 and 175.

peditions (Map), first from Pennsylvania to Cap aux Oyes by the St. Lawrence River in Canada and the second to Niagara Falls. During the expeditions, he visited several cities, such as New York, Montreal, and Quebec. Kalm brought two maps from North America that Lewis Evans had drawn of eastern North America, which covered the area where Kalm had travelled (Jörgensen 1936).

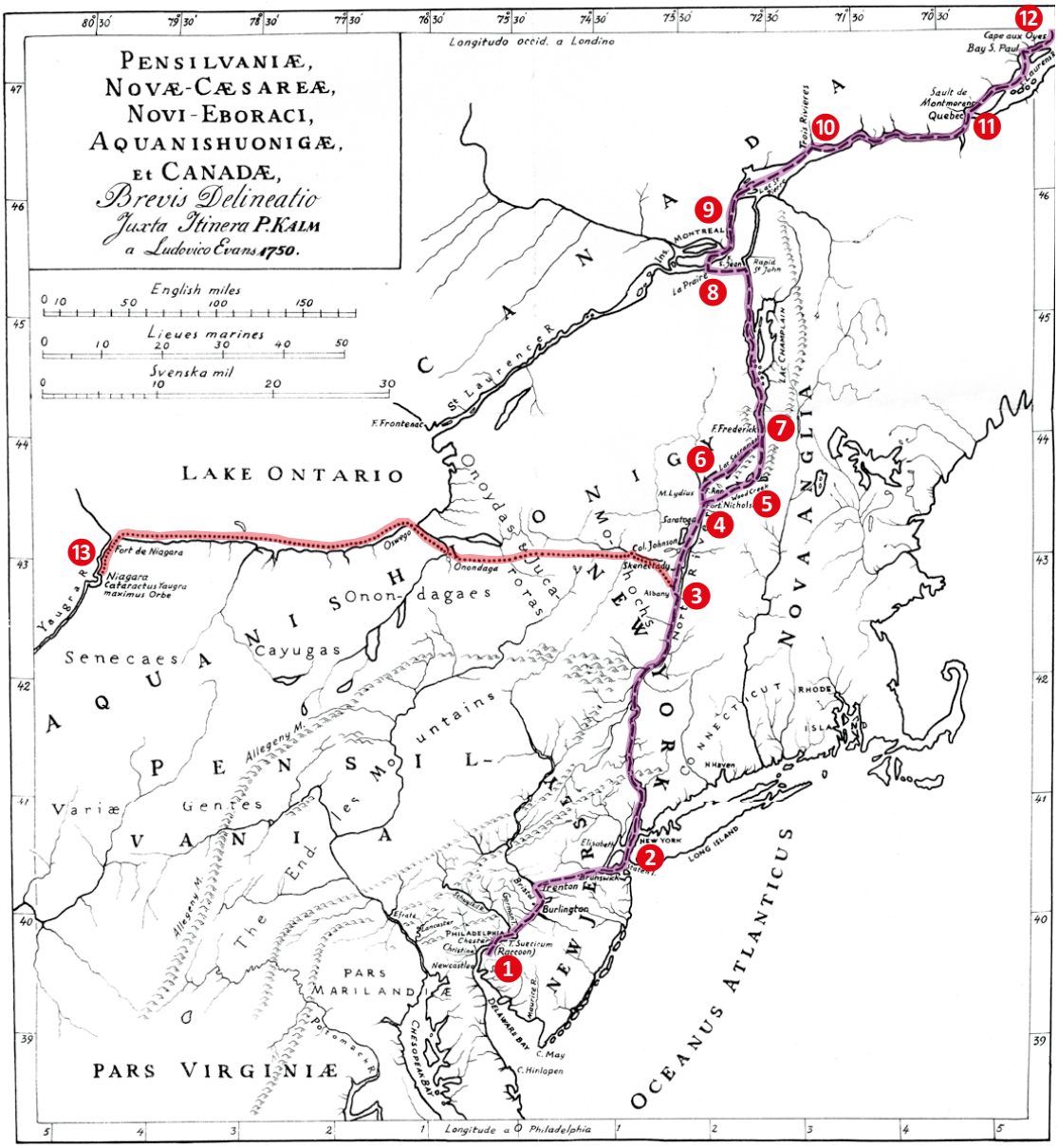
Kalm was particularly keen to talk to elderly settlers whose memory reached back to the last decades of the seventeenth century. Thus, Kalm received historical information from the settlers, the oldest of whom had already arrived in the 17th century. Kalm also got to know prominent scientists in Philadelphia of whom John Bartram (1699–1777) and Benjamin Franklin (1706–1790) were at the heart of the forthcoming independence. His work in Canada was financed by the French as a favour to Sweden. There he met the leading scientist, Jean-François Gaultier (1708–1756) and Governor La Galissonière (1693–1756). All supported Kalm to make the expedition a success.

The achievements by Kalm have been discussed in various contexts and several articles have been translated into English, especially by Ester Louise Larsen (1901–1994). But no summary has been compiled of the natural history findings made by him. In this article, we bring together mainly botanical (including economic botany), zoological and ecological observations, but briefly also climatological and geological ones made by Kalm and examples of how the results have been used. Useful agricultural plants, trees and alien species are written about in separate articles.

This summary is especially based on Kalm's diaries, travelogues, articles, dissertations, and the Uppsala Evolution Museum Kalm collection (UPS-Kalm). The diaries were written in Swedish, but have never been translated into other languages. They have considerably more information, especially concerning plants, compared to the travelogues.

According to Rydberg (1907), the travelogues are the best contemporary description of the region. Already Pulteney and Maton (1805) were very appreciative of Kalm's achievements.

► **Map. Kalm's itineraries in North America based on his travelogues and diaries. Kalm lived in Racoon, Philadelphia** ❶



Expedition to New York and Quebec in 1749

Philad. – NY – Delaware – Philad ..... 12.–31.5.
New Jersey – NY 2 ..... 42.–3.6.
NY – Albany 3 ..... 10.–13.6.
Albany – Saratoga 4 ..... 21.–24.6.
Saratoga – Ft. Nicolson 5 ..... 26.6.
Ft. Nicolson – Ft. Anne (Canada) 6 ..... 26.–27.6.
Ft. Anne – Ft. St. Frederic 7 ..... 29.6.–1.7.
Ft. St. Frederic – Ft. St. Jean ..... 19.–20.7.
Ft. St. Jean, Lac Champlain – Prairie 8 .. 23.7.
Prairie Magdeléne – Montreal 9 ..... 24.7.
Montreal – Trois Rivieres 10 ..... 2.8.
Trois Rivieres – Quebeck 11 ..... 4.–6.8.
Quebeck – Bay St. Paul ..... 29.–30.8.
Bay St. Paul – Terre eboullement ..... 30.–31.8.
Terre eboullement – Cap aux Oyes 12 ..... 31.8.
Cap aux Oyes, turning point, 75 miles N of QC
Cap aux Oyes–– Bay St. Paul ..... 31.8.–1.9.
Bay St. Paul – Petite Riviere – Quebeck 5.–7.9.
Quebeck – Trois Rivieres ..... 12.–13.9.
Trois Rivieres – Montreal ..... 14.–15.9.
Montreal – Sault aux Recollettes ..... 23.9.
Sault aux Recollettes – Montreal ..... 26.9.
Montreal – Chine ..... 29.–30.9.
Chine – Montreal ..... 1.–2.10.
Montreal – Prairie Magdalaine ..... 3.–10.10.
Prairie Magdalaine – Ft. St. Jean ..... 12.10.
Ft. St. Jean – Ft. St. Frederick ..... 15.–21.10.
Ft. St. Frederick – Saratoga ..... 21.–23.10.
Sar – Lac St. Sacrament – Hudson Riv ... 24.10.
Hudson Riv – Ft. Nicolson, Sar ..... 24.–26.10.
Saratoga – Albany ..... 28.–29.10.
Albany – NY ..... 2.–7.11.
NY – New Brunsvig – Trenton ..... 15.–16.11.
Trenton – Philadelphia ..... 19.–22.11.
Philadelphia – Racoon ..... 22.11.
Racoon 22.11.1749–11.1.1750

1750

Niagara 13 ..... 24.8.

Written sources – articles, dissertations, diaries and travelogues

Travels in North America

Kalm kept a diary, based on which he wrote travelogues entitled *En resa til Norra America* ("Travels in North America"). They were released in three volumes, totalling 1,600 pages (Kalm 1753c, 1756d, 1761). The first part (Fig. 2) described only Norway and England, the second England and North America, and the third North America only. Kalm landed in Pennsylvania on 15 September 1748 and the travelogues end on 5 October 1749, when Kalm was at Montreal. Sequels were also planned, but the writing progressed too slowly, and the travelogues remained unfinished.

Kalm wrote in Swedish, but due to the great interest the travelogues were soon translated into German (Kalm 1754b, c, 1757c, 1764b). Carl Ernst Klein translated the first volume into German in Leipzig in 1754 (Fig. 3) and Johann Philipp Murray in Göttingen the same year. Murray also translated the second (Kalm 1757c) and third (Kalm 1764b) volumes of the travelogues.

John Reinhold Forster (1729–1798), greatly assisted by his son George Forster (1754–1794), translated the travelogues (Fig. 4a) into English entitled *Peter* [Pehr] *Kalm's travels in North America* (Kalm 1770, 1771a, b) from Murray's German version, with commentaries. A second edition was published immediately (Kalm 1772a, b) and a Dutch editions in 1772 (Kalm 1772a, b). The image on its title page brought together topics that Kalm covered in his travelogues (Fig. 4b). J. Gibson engraved a map of Kalm's routes published in Forster's translation (Kalm 1770, 1771a). Soon thereafter, father and son went with James Cook on his second round-the-world voyage.

All these translations concern only the period Kalm stayed in North America.

Later editions

The first French translation appeared much later as a shortened version (Kalm 1880) and as complete concerning travels in Canada (Fig. 5), translated and richly commented by Rousseau and Béthune (Kalm 1977).

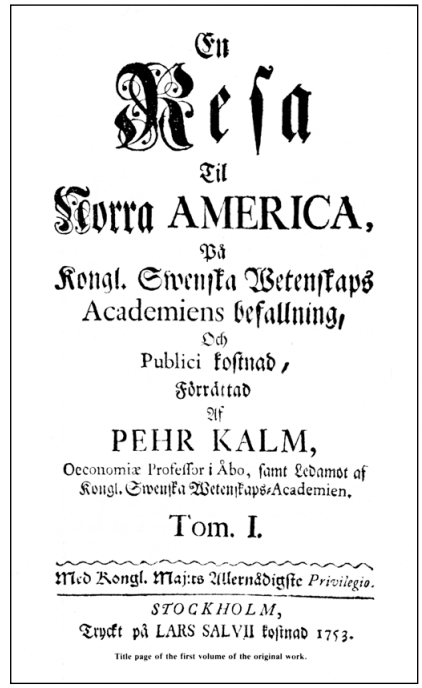
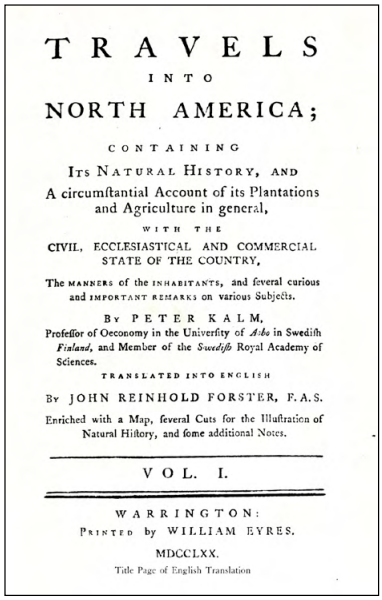

En
Resa
Til
Norra AMERICA,
På
Kongl. Swenska Wetenskaps
Academiens befallning,
Och
Publici kostnad,
Förrättad
Af
PEHR KALM,
Oeconomiæ Professor i Åbo, samt Ledamot af
Kongl. Swenska Wetenskaps-Academien.
Tom. I.
Med Kongl. Majrts Allernädigste Privilegio.
STOCKHOLM,
Tryckt på LARS SALVII kostnad 1753.

Fig. 2. First volume of Kalm's Travelogues in North America was published in 1753.


Reise
nach dem
Nordlichen America,
welche auf Befehl
der königlichen schwedischen
Akademie der Wissenschaften,
und auf allgemeine Kosten,
von
Peter Kalm,
öffentlichen Lehrer der Oeconomie zu Åbo, und
Mitglied der königlichen schwedischen Akademie
der Wissenschaften,
ist verrichtet worden.
Leipzig,
Bey Gottfried Kiesewetter.
1754.

Fig. 3. Carl Ernst Klein translated the first volume into German in 1754.

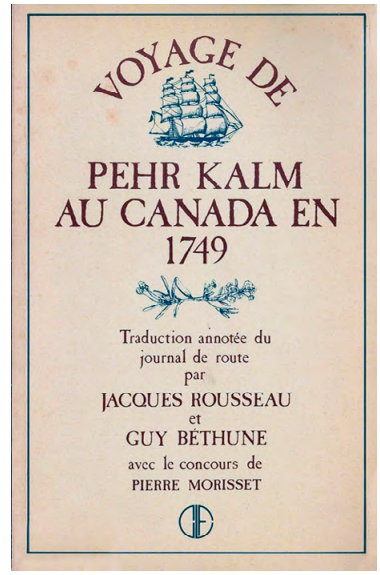


TRAVELS
INTO
NORTH AMERICA;
CONTAINING
ITS NATURAL HISTORY, AND
A circumſtantial Account of its Plantations and Agriculture in general,
WITH THE
CIVIL, ECCLESIASTICAL AND COMMERCIAL STATE OF THE COUNTRY,
The MANNERS of the INHABITANTS, and ſeveral curious and IMPORTANT REMARKS on various Subjects.
BY PETER KALM,
Profeſſor of Oeconomy in the Univerſity of *Abo* in Swediſh *Finland*, and Member of the *Swediſh* Royal Academy of Sciences.
TRANSLATED INTO ENGLISH
BY JOHN REINHOLD FORSTER, F.A.S.
Enriched with a Map, ſeveral Cuts for the Illuſtration of Natural Hiſtory, and ſome additional Notes.
VOL. I.
WARRINGTON:
PRINTED by WILLIAM EYRES.
MDCCLXX.

Title Page of English Translation

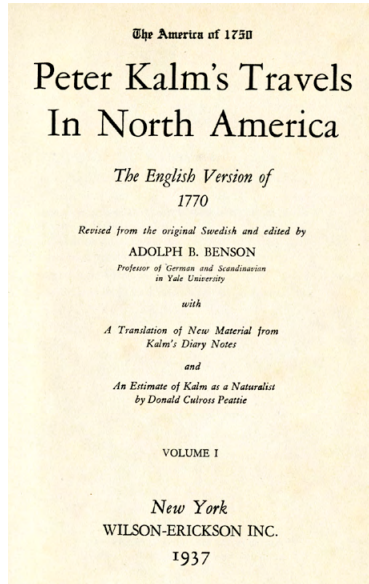
Fig 4a. John Reinhold Forster and his son George Forster, translated the travelogues into English entitled as Pehr Kalms travels in North.

Fig. 4 b. Dutch editions were published 1772. The cover image depicts topics that Kalm covered in his travelogues.



VOYAGE DE
PEHR KALM
AU CANADA EN
1749
Traduction annotée du journal de route par
JACQUES ROUSSEAU
et
GUY BÉTHUNE
avec le concours de
PIERRE MORISSET

Fig. 5. A complete French traslation concerning travels in Canada, were richly commented by Rousseau and Béthune (Kalm 1977).



The America of 1750
Peter Kalm's Travels In North America
The English Version of 1770
Revised from the original Swedish and edited by
ADOLPH B. BENSON
Professor of German and Scandinavian in Yale University
with
A Translation of New Material from Kalm's Diary Notes
and
An Estimate of Kalm as a Naturalist by Donald Culross Peattie
VOLUME I
New York
WILSON-ERICKSON INC.
1937

Fig. 6. Benson provided the Travelogue concerning the North America, based on Forsters translation, comparing it with Kalm's original travelogue and adding, among other things, a description of Niagara Falls (Kalm 1937).

Bartram had published Kalm's (1750b, 1751e) article on Niagara Falls as an appendix in the book *Observations made in his travels from Pensilvania to Onondago, Oswego and the Lake Ontario in Canada* (Kalm 1751f). It was also published in German (Kalm 1751d, 1782a) and Swedish (Kalm 1782b). The translation edited by Benson is the best known (Fig. 6).

Ralph M. Sargent edited an illustrated volume of Forster's translations (Kalm 1972), which received an excellent review (Jackman 1973): "Pehr Kalm is an old friend. He has been with us for more than two centuries, sometimes more present in our daily lives, but until recently he has been generally neglected – yet not forgotten, for he is still often mentioned in books about American life in the 18th century. This new and very handsome edition makes Kalm's work and the man himself familiar to new people and more familiar to old friends". Kalm's descriptions of life and plants, especially the beneficial use of plants as medicines, building materials, food, clothing, and dyeing, are the central features of the travel books. The ethnobotanical merit of the travel books is undeniable. In addition, details from the travel books have been extracted into wholes for numerous writings presenting the history of North America: from dentistry and winemaking to women's fashion and architecture, Kalm's views on the poor status of Native American tribes and slavery, the budding independence of the United States. Kalm was one of the first to use the term red for the indigenous peoples of North America and white for the settlers (Shoemaker 1997).

Diaries

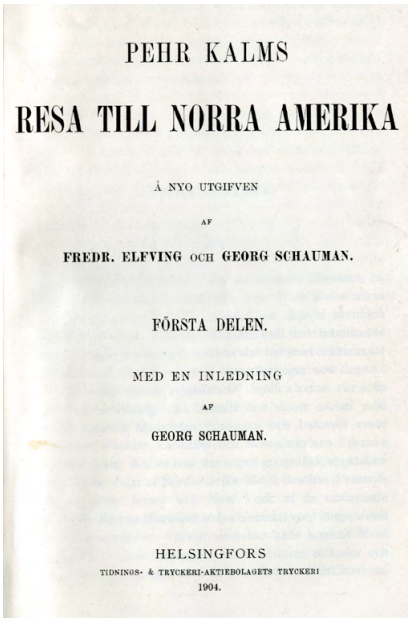
In 1899, Georg Schauman (1870–1930), Amanuensis of the Main Library of the Imperial Alexander University, today the University of Helsinki, found manuscripts (Fig. 7) of Kalm's travelogue in the Main Library (Schauman 1904). They were not exactly in accordance with the published parts and continued three months beyond what Kalm had been able to publish. The library's manuscript continued until 11 January 1750, and the last three months were published by Elfving and Schauman (1929). They also re-published (Fig. 8) the printed parts of the travelogues (Elfving & Schauman 1904, 1910, 1915), all in Swedish.

Much later, Svenska Litteratursällskapet i Finland ("Society of Swedish Literature in Finland") decided to publish the diaries (Fig. 9) in their entirety (Kerkkonen 1966, Kerkkonen & Roos 1970, Roos & Krogerus 1985, 1988). Kalm omitted several items from the published travelogue, like the Latin descriptions of the plants and animals, as well as the daily weather information. So, the diaries complement the travelogues. The diaries have never been translated into English or other languages.

In the travelogues (Kalm 1756d, 1761), there are about 950 mentions of plants concerning North America, estimated from Benson's (Kalm 1987) translation. This is little compared to the diaries. They have extensive lists of species, and nearly 200 species descriptions for the planned Canadian flora. The journals edited by Kerkkonen, Roos and Krogerus contain thousands of plant observations: Kerkkonen (1966) about 825, Kerkkonen & Roos (1970) about 825, Roos & Krogerus (1985) about 1 425 and Roos & Krogerus (1988) about 500, a total of about 3 575. The number of zoological observations is clearly smaller, but still considerable, e.g., about 180 mentions of animals in Roos & Krogerus (1985), vs 1 425 of plants.

The indexes of the diaries are excellent, considerably more comprehensive than those of the travelogues (Kalm 1937, 1987). They have the following directory entities: 1. Place name and personal name index, 2. Scientific observations and problems, scientists and amateurs, 3. Nationalities, ethnic groups, language, religion, politics, 4. Farming, gardening, animal husbandry, hunting, fishing, 5. Trade, crafts, industry, transport,

Fig. 7. Diaries are kept at The National Library of Finland, University of Helsinki.


PEHR KALMS

RESA TILL NORRA AMERIKA

Å NYO UTGIFVEN

AF

FREDR. ELFVING OCH GEORG SCHAUMAN.

FÖRSTA DELEN.

MED EN INLEDNING

AF

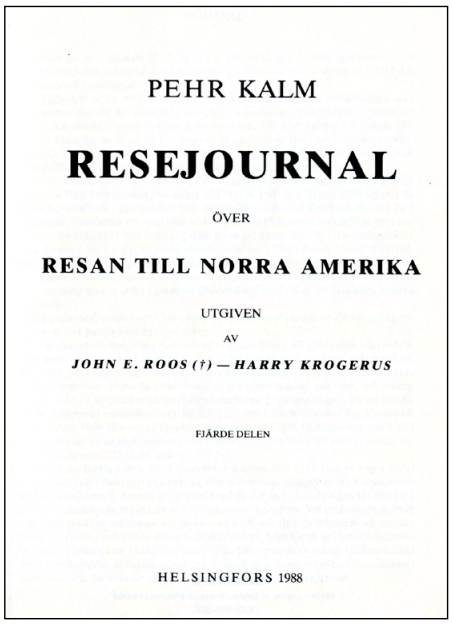
GEORG SCHAUMAN.

HELSINGFORS

TIDNINGS- & TRYCKERI-AKTIEBOLAGETS TRYCKERI

1904.

Fig. 8. Elfving and Schauman (1904, 1910, 1915, 1927) republished Kalm's Travelogue and added the last three months from the diaries, which were missing from the travelogues.


PEHR KALM

RESEJOURNAL

ÖVER

RESAN TILL NORRA AMERIKA

UTGIVEN

AV

JOHN E. ROOS (†) — HARRY KROGERUS

FJÄRDE DELEN

HELSINGFORS 1988

Fig. 9. Much later, diaries were publshed in their entirety (Kerkkonen 1966, Kerkkonen & Roos 1970, Roos & Krogerus 1985, 1988).

roads, 6. Buildings, building materials and household goods, 7. Food, drink, clothes, manners, 8. Diseases and health care, 9. Plants, animal, rocks, 10. The current nomenclature for plants mentioned by Kalm.

Only some of the observations in the diaries have been considered in later publications. They are referred to by the names of their editors (Kerkkonen, Krogerus, Roos), which distinguishes them from other published writings, most of which are available in English.

Articles

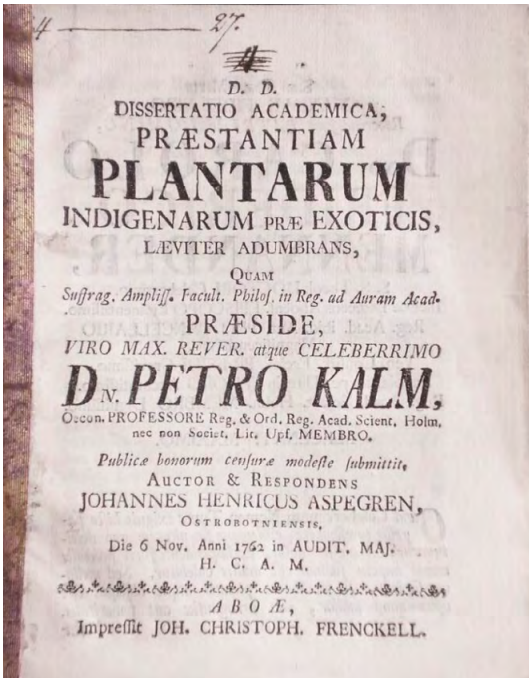
In addition to travelogues, Kalm wrote 19 articles concerning animals and plants of North America, for the Royal Swedish Academy of Sciences, such as on cultivars of corn (*Zea mays*), red mullberry (*Morus rubra*), rattlesnakes (*Crotalus horridus*), the passenger pigeon (*Ectopistes migratorius*), the 17-year locust or pharaoh cicada (*Magicicada septendecim*) and the lone star tick (*Amblyomma americanum*). Many of them are classics, the first publications in their field. Linnaeus soon described these species as new to science based on descriptions Kalm gave him.

Dissertations

Kalm also supervised dissertations presenting the economic benefits the colonies in North America could provide (Kalm & Backman 1754, Kalm & Chronander 1757, Kalm & Gowinius 1763, Kalm & Hollberg 1763). A translation to English was provided by Esther Louise Larsen for two of them (Kalm & Backman 1950, Kalm & Gowinius 1955), and several which dealt with the success of North American plants in the Botanical Gardens of the Royal Academy of Turku. They include some additional information about North America, e.g., Kalm & Aspegren (1762) (Fig. 10).

Herbarium

Kalm collected an extensive herbarium in North America. He divided it into three sub-collections. One was donated to the Queen of Sweden, Lovisa Ulrika, which was a collection of at least 386 specimens. The queen's collection was donated by King Gustav IV Adolf to the Uppsala University Museum (UPS) in 1803 (Lundqvist & Moberg 1993). Kalm gave Linnaeus one sample of all his specimens, about 350 in total. Linnaeus



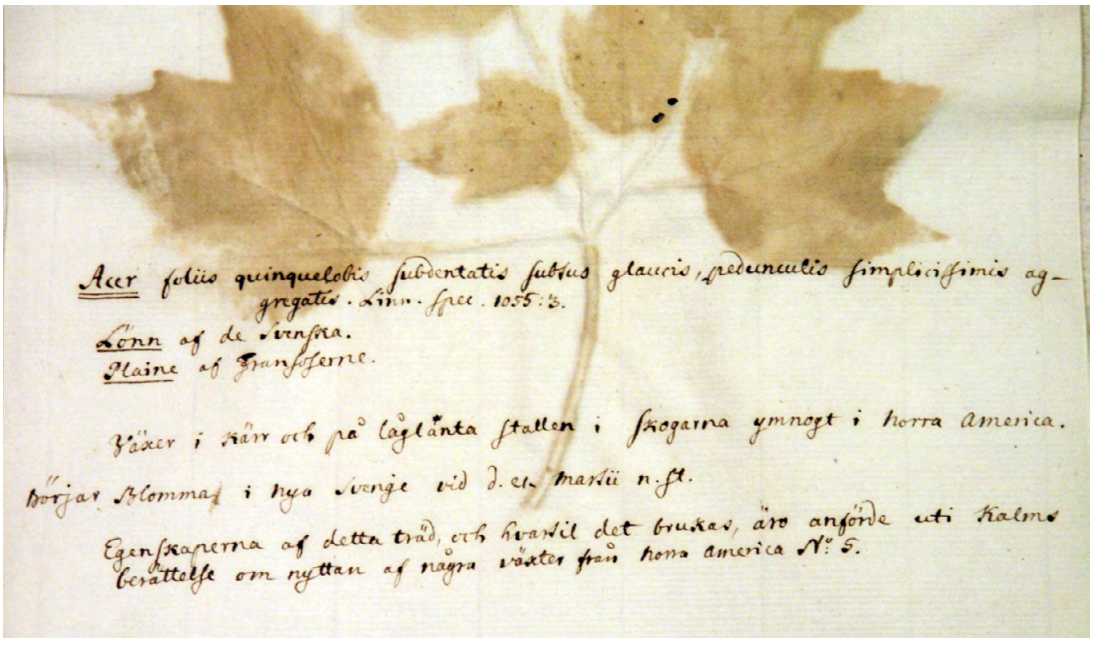
D. D.
DISSERTATIO ACADEMICA,
PRÆSTANTIAM
PLANTARUM
INDIGENARUM PRÆ EXOTICIS,
LÆVITER ADUMBRANS,
QUAM
Suffrag. Ampliff. Facult. Philof. in Reg. ad Auram Acad.
PRÆSIDE,
VIRO MAX. REVER. atque CELEBERRIMO
DN. PETRO KALM,
Oecon. PROFESSORE Reg. & Ord. Reg. Acad. Scient. Holm.
nec non Societ. Lit. Upf. MEMBRO.
Publicæ bonorum cenſuræ modeſte ſubmittit,
AUCTOR & RESPONDENS
JOHANNES HENRICUS ASPEGREN,
OSTROBOTNIENSIS,
Die 6 Nov. Anni 1762 in AUDIT. MAJ.
H. C. A. M.
ABOÆ,
Impreſſit JOH. CHRISTOPH. FRENCKELL.

Fig. 10. Kalm supervised dissertations presenting on the economic benefits the colonies in North America could provide, e.g. Kalm & Aspegren (1762).

Fig. 11. Kalm gave ecological and economic information about the plants on the back of the sheets kept at Museum of Evolution, Uppsala University's Natural History Museum.

marked these sheets with the letter K. The specimens given to Linnaeus are currently in the collections of the Linnean Society (LINN) in London. Kalm kept the third sub-collection for himself. It was destroyed in the fire of Turku in 1827 at the latest. Kalm's return from America in 1751 can be considered the founding of the Royal Academy of Turku herbarium, today the Botanical Museum, Finnish Museum of Natural History.

The Uppsala collection is particularly important. Kalm wrote ecological and economic information about the plants on the back of the sheets. Those notes have been translated into English (Lundqvist & Moberg 1993), e.g., *Sanguinaria canadensis* 3:202: "Blodros Suecis in America. Sang de Dragon by the French in Canada. Grows in good rich black soil in sun-spotted places in woods in North America. Begins flowering at the beginning of April. The root is red as blood inside; is excellently effective against contusions; also against 'mens. supress. mulier'. Some dye red with the root" and *Acer rubrum* 6:363: "Lönn by the Swedes. Plaine by the French. Grows in marshes and low-lying places in the forests in N. America, abundant. Begins flowering in New Sweden about March 21st n. st. The properties of this tree, and for what it is used, are stated in Kalm's report on the use os some plants from N. Amarica No. 5" (Fig. 11).



Botanical observations by Pehr Kalm

Economic botany

Edible plants

Kalm wrote about the edible plants of North America in several contexts, especially in the travelogues and diaries. Kalm's observations were already referred to early on (Havard 1895), e.g., "*Orontium aquaticum* L. or Golden Club, the 'Tawkee' or 'Tawkin' of the Native American tribes, is an aquatic perennial with deep, bulbous rootstock and large pea-like seeds. Both roots and seeds were much prized by the Native American tribes and, according to Peter [Pehr] Kalm, by some of the white colonists as well; the seeds specially being, after sufficient cooking, quite palatable".

Kalm was one of the first to describe the different varieties of corn (*Zea mays*) and how the indigenous nations used it as food (Kalm 1751c, 1752b). English translations by Esther Louise Larsen (Kalm 1935), as well as Margit Oxholm and Sherret S. Chase (Kalm 1974). Articles on maize were already early translated into German (Kalm 1755a, b, 1757a) and French (Kalm 1765b).

Some minor information has been published in various articles. Nützliche Samlungen (Kalm 1757b) picks out excerpts about North American coffee. Peter Kalm described mid-19th century Iroquois agriculture, writing: "After one or two weeks ... the Iroquois have planted corn, they plant beans in the same place. The corn thus serves as a support on which the beans can lean" (Kalm 1752b, 1935: 106). He provided detailed descriptions of the cultivation of corn, mainly by Euro-Americans. He stated that they planted corn on the hills in vertical furrows, 4–5 feet apart, but some more densely, every three feet or less (Kalm 1752b, 1935, Mt. Pleasant & Burt 2010).

In the travelogues and diaries there is still information about edible plants that has not received attention. For example, wapato (*Sagittaria latifolia*) was used by natives either boiled or roasted (Kerkkonen & Roos 1970: 173; Kalm 1987: 269). The natives as well as American Swedes used the name katniss/kåtniss for the plant. The root of the plant could be eaten both boiled and fried in ashes. The plant had disappeared in many places because it was the pigs' delicacy. The taste was reminiscent of potato (*Solanum tuberosum*). It grew in low moist meadows and muddy bogs in New Sweden (Kalm 1987: 259; UPS-Kalm 2: 121). The Swedes also ate roots when there were no Native Americans in the region, e.g., old settler Nils Gustafson liked them very much and had received them as a child. He knew that some native women travelled to Whitsun Island to collect them. The boars had destroyed the plant in some places, and the cattle ate the leaves at will. Kalm also thought the roots were tasty, potato-like, if a bit dry. *Peltandra virginica* was used in the same way (Kalm 1987: 67).

In total, Kalm made notes on about a hundred cultivated species. A summary of useful plants is written separately.

Medicinal plants

The information collected by Kalm on medicinal plants is a significant source for the early use of natural medicines in North America. According to Bigelow (1821), the first information on North American ethnomedicinal botany was recorded by Kalm. This historic source has only been treated occasionally.

Linnaeus supervised a dissertation on Canadian medicinal plants. It mentions many of the species that Kalm had collected (Linnaeus & Coellin 1756). Allerneueste Mannigfaltigkeiten (1778) published information on the use of the 'lacquer tree', i.e., poison sumac (*Toxicodendron vernix*). Goerke (1963) has compiled Kalm's information about diseases in North America and the herbs used in their treatment from the travelogues. Arnason et al. (1981) summarized the use of plants for food and medicine by the native people of Eastern Canada, and included some information Kalm collected.

Kalm (1752c) was the first to describe the rattlesnake (*Crotalus horridus*), its venom and plants to be used as antidotes, in three articles (Kalm 1752c, 1753a, b). Kalm mentions several medicinal plants: *Actaea racemosa*, *Aristolocia serpentaria*, *Collinsonia canadensis*, *Hedeoma pulegioides*, *Polygala senega*, *Ranunculus abor-*

tivus, *Sanguinaria canadensis*, *Sanicula canadensis*, *Solidago canadensis* and *Vernonia noveboracensis*. English translation by Esther Louise Larsen (Kalm 1957) (Figs. 12a–d).

Comptonia peregrina and *Samucus canadensis* were was used for toothaches (Kalm 1987: 221), as was also *Juglans cinerea*, the bark of which was chewed (Kalm 1769).

Leonurus cardiaca grew between Albany and Saratoga. Cattle did not eat it (Roos & Krogerus 1985: 175, Kalm 1977). It was used as a heart medicine.

Lobelia siphilitica in Kalm's (1750a) article on the great blue lobelia was especially praised. Native Americans traditionally used it to treat respiratory and muscle disorders. It was once considered a cure for syphilis by early European settlers, which is where the scientific name for the species originates. Venereal diseases arrived with European immigrants. The importance of the work is evident from the fact that it was printed while Kalm was still in North America. Albrecht von Haller published it in its entirety in Latin (Kalm 1758a).

Figs. 12a-d. Kalm often wrote about medicinal plants, such as Bloodroot (*Sanguinaria canadensis*, 12a), Canadian goldenrod (*Solidago canadensis*, 12b), Sweet fern (*Comptonia peregrina* 12c) and Blue cardinal flower (*Lobelia siphilitica*,12d).

Photo Henry Väre

Panax quinquefolius, indigenous to North America, was one of the plants Linnaeus used to justify the usefulness of Kalm's American expedition (Skottsberg 1951: 93, Kerkkonen 1959: 64). Suitable as a medicinal plant (Linnaeus & Beyerstén 1752 Gingseng).

Polygala senega, Kalm collected a specimen in North America. It grows in rich soil in the forests of Pennsylvania, but not in the northern part of the range. Blooms at the end of May. The root is an excellent aid for rattlesnake bites, as well as for cystitis. The English call the plant Senega Rattle Snake Root (UPS-Kalm 4: 239; Juel & Harshberger 1929, Lundqvist & Moberg 1993). A medicine made from the root was effective for rattlesnake bites, pleurisy and pneumonia (Kalm 1752c, 1753a, b 1762b, Kalm & Aspegren 1762). The plant was common in Senega country. In his writing about the rattlesnake and the antidotes used in the treatment of bites, Kalm (1752c, 1762b) doubted Linné's claim that the rattlesnake "hypnotizes" its prey with its stare so that it eventually ran into the snake's open mouth. Suitable as a medicinal plant (Linnaeus & Beyerstén 1752).

Podophyllum peltatum, the root is strongly laxative, but lethal in excessive doses (UPS-Kalm 3: 204 Juel & Harshberger 1929; Lundqvist & Moberg 1993).

Verbascum thapsus, The Swedes called it wild tobacco, but were not sure if the Native American tribes smoked it. They tied it to their limbs if they had an ague (fevers at three- or four-day intervals). Some made tea from the leaves to treat dysentery. A decoction was made from the roots, which was used to expel worms (probably *Oestrus ovis*) from wounds that cattle had (Kalm 1987: 69; Kerkkonen & Roos 1970: 167).

Dye plants

According to the dissertation "North American dye plants", dyes were needed, among other things, especially to dye soldiers' uniforms. American savages, i.e., Native American tribes, also used dye plants. Among other things, they kept some kind of shirts that they never washed. Women wore knee-length blue or red clothes. Most dye plants were used to decorate the body. Dye plants are briefly listed, 26 different species with their use. Some of the information was from literature, but most of it was information obtained by Kalm through discussions with locals (Kalm & Hollberg 1763). English translation by Esther Louise Larsen (Kalm & Hollberg 1954).

Forster (1772) applied Kalm's information when describing the qualities of the dye plants *Asperula tinctoria* and *Coptis trifolia*.

Acer rubrum: Kalm (1753c, 1761) noted that the European settlers of New England made a dark blue dye of red maple. That was probably a variation of a technique learned from First Nation peoples. Red maple bark also gave black colour (Kalm & Hollberg 1763).

Black colour was obtained from the juice of the charred alder (*Alnus*), the ripe berries of smooth sumak (*Rhus glabra*), poison ivy (*Toxicodendron radicans*), and from sheep or field sorrel (*Rumex acetosella*). Alder was used by natives to make permanent tattoos on their bodies (Kalm & Hollberg 1763). In Albany, the bark was used to dye black (Kalm 1769).

Babtisia tinctoria: yellow wild indigo: the American Swedes called the plant wild indigo because it produced a very good blue dye, better

than true indigo (UPS-Kalm 2: 136, Kalm 1751c). Also used in Racoon for black dyeing (Kalm & Hollberg 1763, Kerkkonen & Roos 1970: 360). It produced blue and black dyes, but was not considered high quality (Kalm & Hollberg 1763).

Carthamus tinctorius, safflower, was grown in the Salem area. It was not as good as English or French, but perhaps it improved with years of storage like tobacco. It gave an orange colour (Kalm 1987: 294; Roos & Krogerus 1985: 41).

Galium tinctorium: the French of Canada used the name Tisavojaune rouge for the plant. It was common in the St. Frédéric region, thriving in finely divided moist soil. Native Americans dyed porcupine quills red with the roots of the plant. They used thorns in their various handicrafts. The sun hardly faded the colour. French women dyed clothes with the roots (Kalm 1987: 380). Grew in Canada at Fort St. Frédéric (Roos & Krogerus 1985: 237; Kalm 1977).

Indigofera tinctoria, Fabrics were dyed blue with indigo in North America (Kalm 1987: 185; Kerkkonen & Roos 1970: 247).

Photo Henry Väre

Fig. 13. Wax myrtle (*Myrica cerifera*) was a multipurpose plant, it could be used to make e.g. candles, lacquer and soap.

The Inuits and useful plants

During his visit to Canada, Kalm collected fragmentary information about the Inuits, including a short list of words they used. The bark of birches (*Betula*), chestnuts (*Fagus*) and elms (*Ulmus*) was used to make canoes. The Inuits used raspberry (*Rubus idaeus*) and blueberry (*Vaccinium myrtillus*) berries (Kalm & Indrenius 1756).

***Myrica cerifera* – a specific example of economic use**

On the herbarium sheet (UPS-Kalm 6: 343), Kalm mentions that the plant (Fig. 13) has been described in more detail elsewhere, referring to Kalm (1751h: no. 90). Green wax was boiled down from the fruit, which was used to make candles, lacquer, soap and more. Green wax was also very popular for plasters (Kalm 1751h). Virginia-born dendrologist Mr. Mitchel told Kalm in London how to make candle wax from the berries (Kalm 1753c: 384). The settlers made wax or tallow from the plant's berries. It was dioecious and fruited abundantly. They were collected in the fall when ripe and put in boiling water, causing the fat to come off. Boiling was continued until all the fat had been recovered. It was a dirty green in colour. It was boiled repeatedly until the colour was translucent green. It was more expensive than tallow but cheaper than wax. Candles were made from tallow by mixing it with regular tallow. The candles are durable and do not melt in the summer heat, burn better and slower without smoking, spreading a pleasant fragrance. In general, mostly the poor used them nowadays, because due to the difficulty of collecting the berries, candles were presently mostly made from animal fat. The berries also made soap, which was of the best quality for shaving (Kalm 1987: 101. The fruits and seeds yielded a yellow pigment for dyeing, in the Garde Angien, Quebec (Roos & Krogerus 1988: 22). Today it is used less than before (Kalm 1987: 665; Roos & Krogerus 1988: 202). Details continue in the 2nd part of the travelogues (Kalm 1756d: 312).

Economically important trees

There are numerous notes of these plants in the travelogues and diaries. Kalm wrote several ex-

Photo Henry Väre

Fig. 14. Sugar maple (*Acer saccharum*) was a very important source for producing sugar and syrup (Kalm 1751a).

tensive articles on eastern North American tree species that he considered to be of significant economic value.

Sugar maple (*Acer saccharum*) (Fig. 14) was a very important source for producing sugar and syrup (Kalm 1751a). English translation by Esther Louise Larsen (Kalm 1939b). Canadian hemlock (*Tsuga canadensis*) was used to make tea and beer (Kalm 1751b). It was soon translated into French (Kalm 1765a) and later translated into English by Larsen (Kalm 1948).

Black walnut (*Juglans nigra*) was a valuable utility plant. It was found in Pennsylvania, New Jersey, Maryland, Virginia, and the Carolinas (Kalm 1767b). English translation by Esther Louise Larsen (Kalm 1942) and Joachim Friedrich Plappart (1778) in his medical dissertation. Nikolaus Joseph von Jacquin (1781) published Kalm's writing in Latin in Austria. A second print has been taken from the previous one (Plappart 2011).

White walnut or butternut (*Juglans cinerea*) wood was pale, while black walnut was brownish. It was called olive tree or butternut in North America. It was common in the forests of the East Coast states of the United States, although rarer than the black walnut in Pennsylvania. It thrived best on riverbanks in dry, loose soil. In Philadelphia, it blooms in late April and the leaves emerge a few days later. Nuts ripen in late September in Canada and a little earlier in the south. They are long ovals, unlike other walnut nuts in the country. The seed is full of oil, has a bad smell and taste. The wood material is white and hard, not popular except in gear wheels. In Albany, the bark was dyed black and chewed when the tooth ached. Roots were the biggest benefit. The root was very fatty, and the Native American tribes greased their hair, hands, and skin with it (Kalm 1769). English translation by Esther Louise Larsen (Kalm 1942).

The fan-leaved hawthorn (*Crataegus flabellata* var. *grayana*) (Fig. 15) had succeeded in Turku for 21 years without winter damage, succeeding better than *C. oxyacantha* (Kalm 1773). English translation by Esther Louise Larsen (Kalm 1945b).

According to a letter dated 16 October 1748 in Philadelphia, red mulberry grew in forests all over northern New England up to 42 degrees latitude. The governor of New York had produced silk from his own yard for the needs of the whole family (Letter to Linnaeus 14 Oct 1748, Hulth 1922: 38 letter 1596, Kalm 1749). The red mulberry (*Morus rubra*) was a common native tree in the forests of the East Coast states, becoming rare in New York. It thrived in dry highlands, sometimes also in swamps where Atlantic white ce-

Photo Henry Väre

Fig. 15. Fan-leaved hawthorn (*Crataegus flabellata* var. *grayana*) is one of the few plants brought by Kalm to Finland that have thrived. It is still commonly planted.

dar (*Chamaecyparis thyoides*) grows. In Pennsylvania it was a troublesome weed in fallows. The berries were very tasty, and the yield was best in open places. The yield was huge, one could find berries three fingers wide under the tree. The Iroquois dried them for food. The wood material competes in quality with black walnut. Kalm also explains their planting and care (Kalm 1776). English translation by Esther Louise Larsen (Kalm 1950).

In Kalm's time, hickory (*Carya*) taxonomy was unclear, so Kalm's (1778) article on hickory may refer to a combination of four species. In Kalm's opinion, three varieties of hickory grew from Virginia to Canada. The ecology, phenology and properties of hickories are explained. Descriptions fit best the downy hickory (*C. tomentosa*). They did well in temperate hardwood forests, even on barren lands. The flowering was at the beginning of May, the leaves burst earlier. The fruits ripened at the turn of September – October when the leaves also started to fall. The oldest tree had 142 annual rings. As it easily rots, the wood is not suitable for logs or boards, but it was good firewood, even if the smoke stung the eyes. Wood was not suitable for brick ovens because it produced too much ash. The wood was also not suitable for coke. The nuts are edible, and the leaves can be used as a tea. The squirrels appreciated the nuts. The Native American tribes made milk and flour from the nuts. The bark was used such that the Iroquois made bark boats from it. English translation by Esther Louise Larsen (Kalm 1945a).

In total, Kalm made notes on about a 233 indigenous woody species, and of those he collected 143 specimens (LINN, UPS) (see Table 3 in Väre 2016). A separate article will be written on these.

Construction material

Kalm made numerous observations about how different tree species were used in construction. For example, of the evergreen Atlantic white cedar or southern white cedar (*Chamaecyparis thyoides*). The wood was very commonly used as roof timber in New Jersey and Pennsylvania, due to its lightness and rot resistance. Some used the bark as a substitute for tea (Kalm 1987: 20, Kalm 1987: 48, Kerkkonen & Roos 1970: 149, Kalm 1751g, f: no. 39). It was also used to board buildings (Kalm 1987: 82) and build floors (Kerkkonen & Roos 1970: 221). Craftsmen preferred it in Wilmington, Delaware (Kalm 1987: 220, Kerkkonen & Roos 1970: 275).

The canoes were made of white cedar, red juniper (*Juniperus virginiana*), chestnut (*Fagus castanea*), white oak (*Quercus alba*) and tulip tree (*Liriodendron tulipifera*) in Wilmington. The first two mentioned were the best, as they float lightly upon the water and because they lasted 20 years (Kalm 1987: 85, Kerkkonen & Roos 1970: 276). In Philadelphia, the white cedar was used to build fences (Kalm 1987: 238). Further, it was used for roof shingles, siding, and dishes (Kerkkonen & Roos 1970: 362).

The wood of white cedar is particularly resistant to decay and is therefore used for making fences (Fig. 16), although less so than juniper. It also makes good barrel rims and bows, because the wood is thin and flexible. Barrels are made from big trees. Houses made of this wood are more durable than those made of oak. There were many of them in Rapaapo, New Jersey.

Kalm travelled to Rapaapo to see where the Atlantic white cedar grows. The tree thrives here in the swamps, as it does elsewhere in North America. The name "white spruce" was used for it. The trunk of the old tree resembles the common juniper (*Juniperus communis*), but the leaves were different, the trunk was straight, and the wood is white. The English call it white ce-

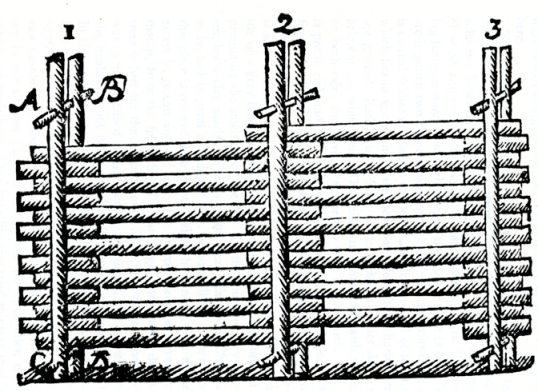


Fig. 16. Kalm payed a lot of attentions on the different ways of building fences . Published in Kalm (1937) between pages 420 and 421. It was included also in the original Travelougues.

dar because the boards made of it are like cedar. The growing areas are so watery that it is difficult to walk in them. The trees also grow on the hills. It used to be abundant, but the number has decreased. In thinned forests the trees become large, and the trunks are larger than those of the firs (*Abies*). The tree is evergreen, and the lower part is branchless in older trees. Cedar swamps are common in New Jersey, some places in Philadelphia and New York. The northernmost deposit is in Goshen, New York, at 41°25′ latitude.

In case of fires, personal injuries were less due to the lightness of the wood of Atlantic white cedar, and the fire was also easier to put out because the wood absorbed a little water. On the other hand, the oiliness of the wood protected it from moisture because it dried quickly. Burnt wood spreading into the environment does not ignite easily and is therefore called dead coal. It follows from all this that the wood is particularly sought after, and the roofs of famous houses and people are made of this wood.

In the state of New York, logs are taken to areas where no trees grow. All this results in the loss of the tree, because people think only of themselves, not of the future. Only young trees have been preserved, and due to their slow growth, it will take almost a hundred years before the wood can be used again. Kalm had counted the rings. An 18-inch-thick tree had 108 annual rings.

Even though the shingles were light and the walls therefore thinner, this also had its downside. During hurricanes, shingles fly into the sky. With the loss of wood, roofs can no longer be built from such a light material, and the walls are then no longer worth the roof.

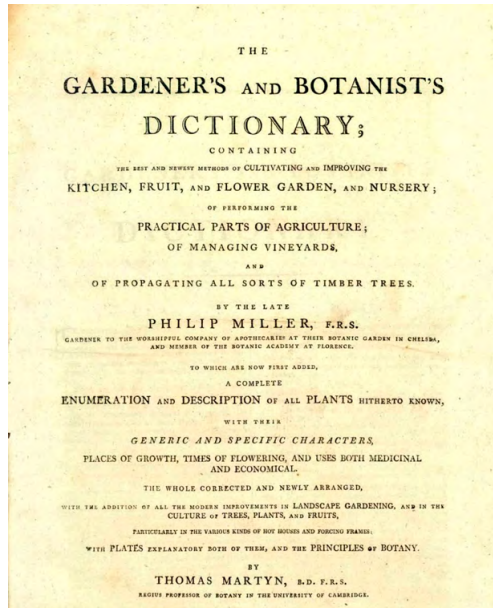
Some brewed tea from wood chips. According to the locals, the water from the Atlantic white cedar was healthy and improved the appetite. That is why people medicated themselves with its water. The reason was thought to be resin dissolved in the water. The water was therefore yellowish. The water was also constantly cool due to the shade. Bartram had planted the tree on dry land to die. Cuttings rooted well in bogs (Kalm 1761: 114, Roos & Krogerus 1985: 54; Kalm 1987: 298). The wood was rot-resistant (Kalm & Lithander 1753).

Ester Louise Larsen translated the parts about the structure and construction of fences from the travelogues. The construction of fences was of crucial importance, with the aim of preventing domestic animals from trampling crops, and also being significant in shaping the landscape (Kalm 1947b). Kalm's findings are the oldest in the field.

Based on Benson's edition (Kalm 1937), a review was published in Agricultural History where Kalm explained the great importance of the port of New York for the colony's foreign trade. The timber trade was particularly significant (Anonymous 1967).

Ornamental plants

Philip Miller (1691–1771) was an English botanist and gardener. He was chief gardener at the Chelsea Physic Garden for nearly 50 years from 1722 and wrote the highly popular The Gardeners Dictionary (Fig. 17). Miller's garden encyclopaedias' different editions have numerous excerpts from Kalm's travelogues. They refer to Kalm's writings about 140 times (Miller & Martyn 1807); e.g., *Kalmia angustifolia*: This shrub is a native of Carolina, Virginia, and other parts of North America; Pennsylvania, New Jersey, New York.


THE

GARDENER'S AND BOTANIST'S

DICTIONARY;

CONTAINING

THE BEST AND NEWEST METHODS OF CULTIVATING AND IMPROVING THE

KITCHEN, FRUIT, AND FLOWER GARDEN, AND NURSERY;

AS ALSO OF PERFORMING THE

PRACTICAL PARTS OF AGRICULTURE;

OF MANAGING VINEYARDS,

AND

OF PROPAGATING ALL SORTS OF TIMBER TREES.

BY THE LATE

PHILIP MILLER, F.R.S.

GARDENER TO THE WORSHIPFUL COMPANY OF APOTHECARIES AT THEIR BOTANIC GARDEN IN CHELSEA, AND MEMBER OF THE BOTANIC ACADEMY AT FLORENCE.

TO WHICH ARE NOW FIRST ADDED,

A COMPLETE

ENUMERATION AND DESCRIPTION OF ALL PLANTS HITHERTO KNOWN,

WITH THEIR

GENERIC AND SPECIFIC CHARACTERS,

PLACES OF GROWTH, TIMES OF FLOWERING, AND USES BOTH MEDICINAL AND ECONOMICAL.

THE WHOLE CORRECTED AND NEWLY ARRANGED,

WITH THE ADDITION OF ALL THE MODERN IMPROVEMENTS IN LANDSCAPE GARDENING, AND IN THE CULTURE OF TREES, PLANTS, AND FRUITS,

PARTICULARLY IN THE VARIOUS KINDS OF HOT HOUSES AND FORCING FRAMES.

WITH PLATES EXPLANATORY BOTH OF THEM, AND THE PRINCIPLES OF BOTANY.

BY

THOMAS MARTYN, B.D. F.R.S.

REGIUS PROFESSOR OF BOTANY IN THE UNIVERSITY OF CAMBRIDGE.

Fig. 17. Millers Garden famous Ensyclopedia, The Gardener's and Botanist's Dictionary, refer to Kalm's Travelogues about 140 times (Miller & Martyn 1807).

Common names

In the travelogues, Kalm gave Swedish, English and/or French names to 155 plant species (McAtee 1941), e.g. *Kalmia latifolia*: ”Laurel by English. Skedträd by the Swedes”. Rousselot de Surgy (1768) lists about 65 tree species mentioned in Kalm’s travelogues in his history of Pennsylvania. This early history of Pennsylvania refers to Kalm more than twenty times and also gives the French names of the plants mentioned by Kalm.

Ecological remarks

Kalm was particularly keen to talk with elderly settlers whose memory reached back to the last decades of the seventeenth century. Based on the histories of these elderly people and his own observations, Kalm was able to assess the changes in nature.

Kalm had noted the careless use of trees in Sweden, including Finland and other Nordic countries; the forests had thinned out rapidly in the vicinity of settlements (Kalm & Lithander 1753). This concern also applied to North America (Dahllöf 1966). According to Charles van Ravenswaay’s (1972) interpretation, Kalm meant pitch pine (*Pinus rigida*), when he mentioned that the forests of New Jersey were in poor condition due to excessive felling of trees (Kalm 1756d, 1937: 28). Ravenswaay (1972) also collected the historical data of the travelogues when examining the utilization of conifers in the eastern parts of North America. Kalm (1753c, 1756c, 1761) was one of many who complained about their disregard for the future by devastating their resources. McIntosh (1961) thought Kalm’s description of storm damage to forests and their ecological consequences was very up to date. Kalm’s writings reveal numerous observations about species extirpation, degeneration, soil exhaustion, and the deterioration of the climate. The prodigious abundance of animals and plants that had met the first colonists had greatly diminished. Large-scale deforestation was the main reason for the deterioration of environmental conditions. Jonsson’s (2015) summary is a good overview of the topic.

A great deal of tar was burned in St. Paul’s Bay along the St. Lawrence River. Other coniferous trees (fir) in the area were not suitable for the purpose (Kalm 1987: 492 2.9.1749). According to Kalm, tar was burned in Canada and New Jersey just like in Finland, except that dead trees were used there. However, the American red pine ’pin rouge’ was not the best possible tar tree, but pitch pine (*Pinus rigida*) was. However, this tree was even more valuable as sawn timber. The best production area was Carolina (Roos & Krogerus 1988: 5, Airaksinen 1996).

A large amount of tar of jack pine (*Pinus banksiana*) was burned, but otherwise the wood of that species was almost useless (Kalm 1756d: 429). For example, as fence posts, they soon rot. As soon as the tree is cut, the larvae take it over. Where no other wood was available, it is used as firewood and made into charcoal. In hot summer weather, cattle prefer to shelter under this pine rather than the deciduous trees of the Racoon area. The reason is thought to be the attractive smell of the pitch (Kalm 1987: 176). When fishing for sturgeon, the torch was made of jack pine (Roos & Krogerus 1985: 181, 183).

Kalm’s elderly informants reported the winters had been shorter and the summers hotter. Now spring often came later, and the weather on the whole was less constant, prone to sudden changes from cold to heat. Such variability bred fevers and crop failures. The Swedish-American clergyman Abraham Lidenius in Racoon, New Jersey, reckoned that the primeval forests of America had sheltered the land from the northern wind in the past. By cutting down so many trees, the colonists risked a reversal of fortune, making winters colder than before (Jonsson 2015).

Environmental historians will find in Kalm not just a certain kind of conservationist sensibility but also a precocious understanding of large-scale climate change. He was one of the first Enlightenment savants to suspect that the climate could change on a global scale (Jonsson 2015).

Kalm’s writings contain extensive distribution information, especially about trees. Based on Kalm’s data, Cook et al. (1952) partly outlined the former distribution of American red pine (*Pinus resinosa*) (Fig. 18a) in New York State. Another example is jack pine (*Pinus banksiana*) (Fig. 18b): Occurring in Quebec (Roos & Krogerus 1985: 321), there were stands between Quebec and Bay St. Paul (Roos & Krogerus 1985: 394), in Canada near Cap aux Oyes (Roos & Kro-

gerus 1985: 409), near Lac St. Sacrement (Lake George) (Roos & Krogerus 1988: 138, Kalm 1987: 589), near Lake George between Fort St. Frédéric and Saratoga on thin Sandy soils and rock crevices (Roos & Krogerus 1988: 141). Grown between Albany and Saratoga (Roos & Krogerus 1985: 181, 183). Similar distribution data can be compiled for several tree species.

Photo Henry Väre

Figs. 18a, b. Kalm's writings contain much distribution information especially about trees, like Red pine (*Pinus resinosa*, 18a) and Jack pine (*P. banksiana*, 18b).

Photo Henry Väre

And concerning white oak. It was a common forest plant (UPS-Kalm 5: 323). Even before landing, Kalm notes that an oak grows on the coast of Philadelphia (Kalm 1987: 7, Kerkkonen & Roos 1970: 132). A common forest tree in Philadelphia (Kalm 1987: 37, Kerkkonen & Roos 1970: 139), it grew between Wilmington and Philadelphia (Kalm 1987: 84), between Albany and Saratoga (Roos & Krogerus 1985: 183), was common in northern New York state between Saratoga and Fort Nicolson in the thickets (Roos & Krogerus 1985: 200), very common in upstate New York on the prairies between Fort Nicolson and Fort Anne (Roos & Krogerus 1985: 202), in Canada between Fort Anne and Fort St. Frédéric (Roos & Krogerus 1985: 211).

Oaks became rare in the Montreal area (Roos & Krogerus 1985: 304), and in his letter of 30 Aug 1749 to Linnaeus, Kalm wrote that they ran out a few miles before Quebec (Skottsberg 1951: 142). No oaks grew along the St. Lawrence River (Kalm 1987: 486, 31.8.1749). They grew by Lac St. Sacrement (Lake George) (Roos & Krogerus 1988: 137, Kalm 1987: 587) and near Lake George between Fort St. Frédéric and Saratoga (Roos & Krogerus 1988: 141, Kalm 1987: 593). Similar distribution data is given for many other plant species, especially woody ones.

Kalm wrote in a letter that *Verbascum thapsus* grows in North America (Hulth 1922: 44 letter 1597), up north between Albany and Saratoga (Roos & Krogerus 1985: 175). It was common on roadsides, hedgerows, dry fields and sandy meadows. The drought was severe north of Albany and only *Verbascum* was green on the hills (Kalm 1987: 350, Roos & Krogerus 1985: 173). It tolerated drought extremely well (Roos & Krogerus 1985: 176, 178, Kalm 1977). Native to Europe.

Black walnut (*Juglans nigra*) is a strong nutrient competitor and outcompetes most plants in late successional stages. Other plants did not thrive under its canopy, because the absorption of nutrients and water by the black walnut was so efficient (Kalm 1767b).

Similar examples on plants are numerous in the diaries.

According to Kranck (1969), the geological description of Quebec and the surrounding areas in the travelogues was one of the first of its time and of a good standard for its time.

Niagara Falls

Kalm did pioneer work in describing Niagara Falls (Benson 1933). Benajmin Franklin was first to publish Kalm's (1750b) description of the falls in Pennsylvania Gazette number 1136 on 20 September 1750 (Fig. 19). The letter also appeared in the Gentleman's Magazine (Kalm 1751e) and the Virginian Gazette. Bartram published Kalm's (1751g) writing as an appendix in the book Observations made in his travels from Pensilvania to Onondago, Oswego and the Lake Ontario in Canada. There was a sketch of Cohoes Falls (Fig. 20) in the travelogue. It is a located on the Mohawk River shared by the city of Cohoes and the town of Waterford, New York.

Northern lights

Kalm also made regular weather observations in North America and wrote a summary of them in the travelogue. About the very southern northern lights in North America, Kalm (1752a) prepared a special article. At the very end, it was stated that they coincided in time with the Scandinavian ones. A summary was published in Göttingen (Kalm 1755c) and in Analecta Transalpina (Kalm 1762a).

Weather observations

The diaries, for each day that has notes, have the weather information for the day at the beginning of the notes. Additionally, Kalm included meteorological and phenological observations made in Quebec from October 1744 to December 1746 by D. Gaulthier in the diaries. Esther Louise Larsen translated information about Pennsylvania's natural history and climate from the travelogues into English (Kalm 1943).

Phenology

Kalm observed the timing of the flowering and leaf bursting and wilting of almost a hundred plant species. Observations have been recorded in the diaries and travelogues and herbarium

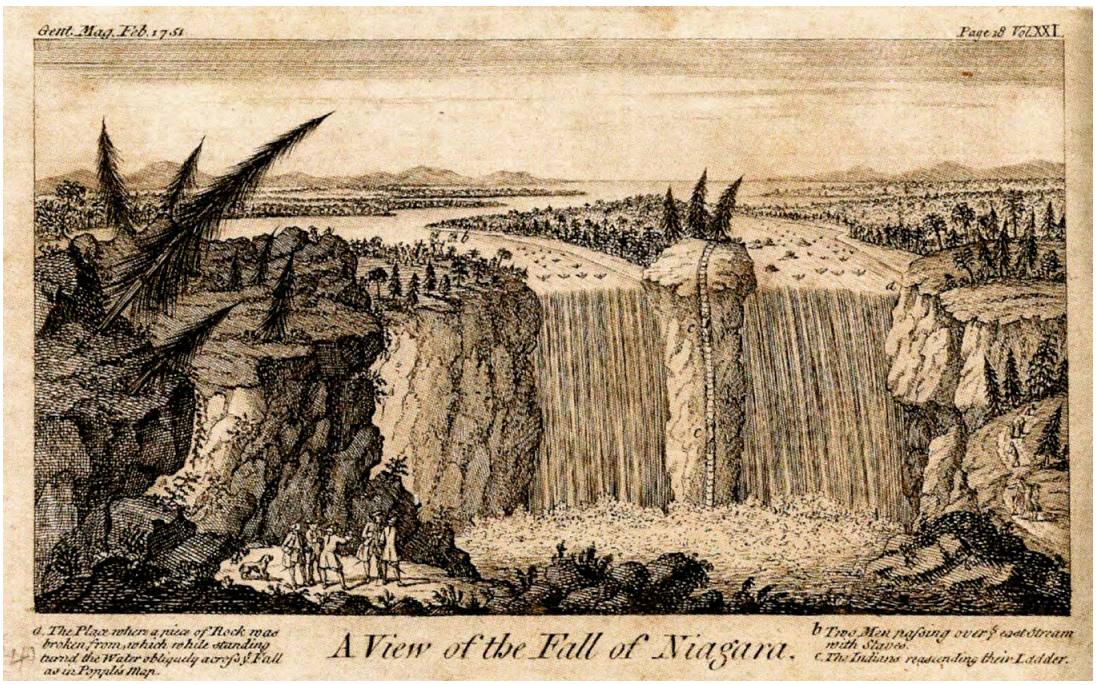


Fig. 19. Kalm was the first who described Niagara Falls (Benson 1933). Benajmin Franklin publish the description of the falls in Pennsylvania Gazette number 1136 on 20 September 1750.

Fig. 20. Kalm (1761: 200) included in the Travelogues a drawing of Cohoes Falls located on the Mohawk River.

sheets (Fig. 21) deposited at Uppsala according to the current chronology. Sweden switched to the current Gregorian calendar on March 1, 1753. In North America, he recorded his notes according to the Julian system.

As an example, red maple (*Acer rubrum*) phenology: Flowering started in New Sweden on 21 March 1749 (UPS-Kalm 6: 363; Lundqvist & Moberg 1993), in Philadelphia at the end of March (Elfving & Schauman 1915, Kalm 1987: 263; Kerkkonen & Roos 1970: 395) and the flowering was at its best in Racoon marshes on 3 March 1749, where the trees glowed with red flowers (Kerkkonen & Roos 1970: 407).

And another example, tulip tree (*Liriodendron tulipifera*) phenology: Flowering began in New Sweden on 23 May 1748 (UPS-Kalm 3: 203; Lundqvist & Moberg 1993). The leaves were still green between Wilmington and Philadelphia. It was common on hillsides, roadsides, low fields and fences (Kalm 1987: 84). On the way from Racoon to Penn's Neck, Kalm found the tree already turning green, one of the earliest in North America (Kalm 1987: 288; Roos & Krogerus 1985: 27). The flowering was at its peak on May 25, 1749. The flowers are scentless, but beautiful, resembling tulips (Kalm 1987: 318; Roos & Krogerus 1985: 91).

One of the most important tasks of Kalm's North American research was to find new useful plants for Sweden. Kalm soon came to realize that the North American climate did not favour useful plants that could succeed in Finland or Sweden. September and October were as warm

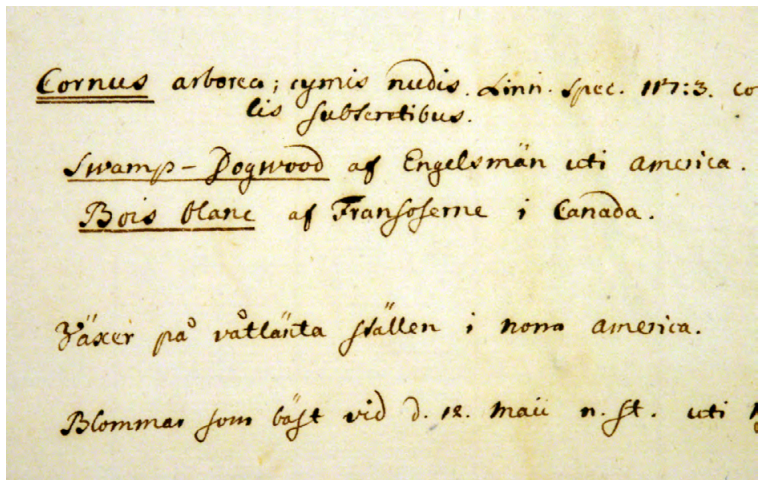


Fig. 21. Kalm did a lot phenological observations, some of which are available on the sheets kept at Museum of Evolution, Uppsala, Sweden, like of *Cornus amomum*.

as the warmest months in Sweden, and the plants bloomed much earlier than domestic plants and would therefore suffer frost damage and not produce ripe fruit before the frost overtakes them (Kerkkonen 1959: 145, 1966: 57).

Fossils

According to Åke Helm, roots and mussel shells were often found when digging wells (Kerkkonen & Roos 1970: 203). A Swede named Måns Kee showed Kalm a reed (*Phragmites australis*) and a chestnut (*Castanea dentata*) that had been excavated from an oceanic deposit at Racoon (Benson 1987: 187). Mr. King in Racoon confirmed the matter (Kerkkonen & Roos 1970: 323–324). Further, at Racoon, there were rush (*Juncus*), Virginian flax (*Linum virginianum*) and blue toadflax (*Nuttallanthus* [*Linaria*] *canadensis*) in the oceanic deposits (Benson 1987: 188).

Kalm reported fossils of marine invertebrates during his trip to Canada (at Fort St. Frédéric) mentioning ”petrified snail horn called ammonite, petrified shells called scallops”, and corals (Kalm 1987, Roos & Krogerus 1985: 411).

Botany

Kalm’s collections from North America significantly supplemented Linne’s knowledge of the flora of the eastern states. Leonhard Chenon’s doctoral dissertation includes an overview of individuals who had collected in North America before Kalm (Linnaeus & Chenon 1751).

Before the publication of *Species Plantarum* in 1753, only a few species overviews had been published from the region. One of the first or the first one was J. Cornut’s (1626–1651) *Canadensium plantarum aliarumque nondum editarum*, which mentions 40 Canadian plants that had been planted in Paris (Cornut 1635). Cadwallander Golden had sent Linnaeus seeds raised at Uppsala and described by Linnaeus (1749, 1751). In the articles are listed 237 species. A more comprehensive list of Virginian plants was compiled by John Clayton but published by Jan Frederik Gronovius (1739).

Linnaeus

Kalm mailed Linnaeus seeds before his return from North America, which Linnaeus planted in the Uppsala Botanical Garden. Based on these introductions, both narrow-leaved Kalmia (*Kalmia angustifolia*) and broad-leaved Kalmia (*K. latifolia*) (Fig. 22) were described for the first time along with several other plants (Linnaeus & Chenon 1751). The type species of the genus is broad-leaved Kalmia. Kalm collected it from Racoon, New Jersey. Racoon’s Swedes used the name ”spoon tree” because the Native American tribes made spoons from its hard wood. Kalm wrote in his travelogues: ”The English call the tree laurel because its leaves resemble *Laurocerasus*”. Broad-leaved Kalmia is the state flower of Connecticut and Pennsylvania.

About 200 North American species are mentioned in the description of the plants of the Uppsala Botanical Garden (Linnaeus 1748). In the dissertation *Demonstrations plantarum*, where the plants of the garden are presented again, 270 species from North America are already mentioned, of which 70 were arranged by Kalm either as herbarium specimens or as seeds (Linnaeus & Höjer 1753).

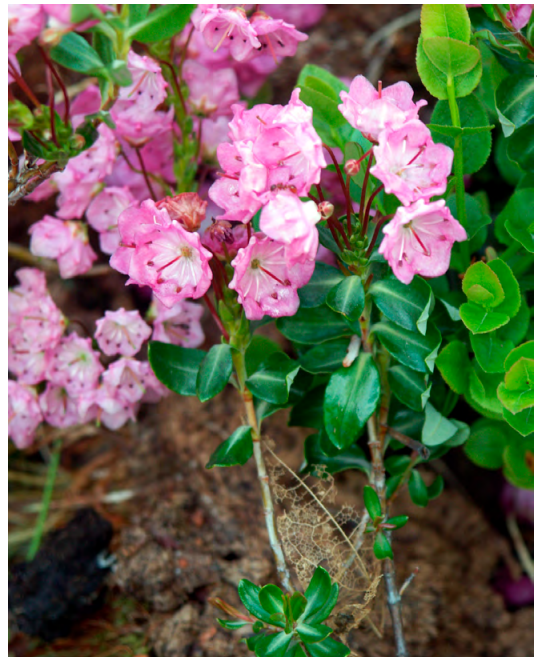


Photo Henry Väre

Fig. 22. Linnaeus described *Kalmia latifolia* to honour Pehr Kalm and his achievements in North America.

Immediately after returning to Finland, Kalm announced that seeds of 126 plant species collected in North America were available for free. Cultivation instructions were given for each species (Kalm 1751h). The announcement was published in the newspaper (Kalm 1751f). English translation by Esther Louise Larsen (Kalm 1939a).

In *Species Plantarum* are described about 700 North American species (Linnaeus 1753). Including later articles (e.g., *Systema naturae* 10th ed. 1759, *Species plantarum* 2nd ed. 1762–1763, *Mantissa* 1767 and *Mantissa II* 1771), Linnaeus knew about a thousand North American plants.

Hans Oscar Juel (1920) estimated that the descriptions of about 90 of the North American plants by Linnaeus were based on those collected by Kalm. Of those, 60 were new to science, and of these about 50 names were still in use at his time (Juel 1920). Juel's estimate is way too low. About 190 of Kalm's collections are lectotypes of names given by Linnaeus, in addition, about 100 species were in Linnaeus's possession when making species descriptions. The numbers are compiled from Charlie Jarvis (2007), which includes all the plants and fungi described by Linnaeus and their type specimens. Almost all lectotype specimens are in the collections of the Linnean Society (LINN) in London.

In summary, it can be stated that Kalm's contribution to the investigation of the flora of eastern North America is very significant.

Phycology

Kalm was probably the first to make observations on algae in continental North America (Fig. 23). He discovered *Ascophyllum nodosum* and *Fucus vesiculosus* at Cap aux Oyes, Canada (Roos & Krogerus 1985: 410, Thunberg & Hasselhun 1810, Rousseau & Béthune 1977). The place was the northernmost Kalm visited in North America.

Kalm also collected *Chorda filum* (Thunberg & Hasselhun 1810), *Cladophora aegagrophila* (abundant at Bay St. Paul by the St. Lawrence River) (Roos & Krogerus 1988: 6; Kalm 1977, 2.9.1749), and *Laminaria* by the Petit Rivier (Roos & Krogerus 1988: 18; cf. Kalm 1977).

Kalm collected a specimen (UPS) of all these algae (Lundqvist & Moberg 1993).

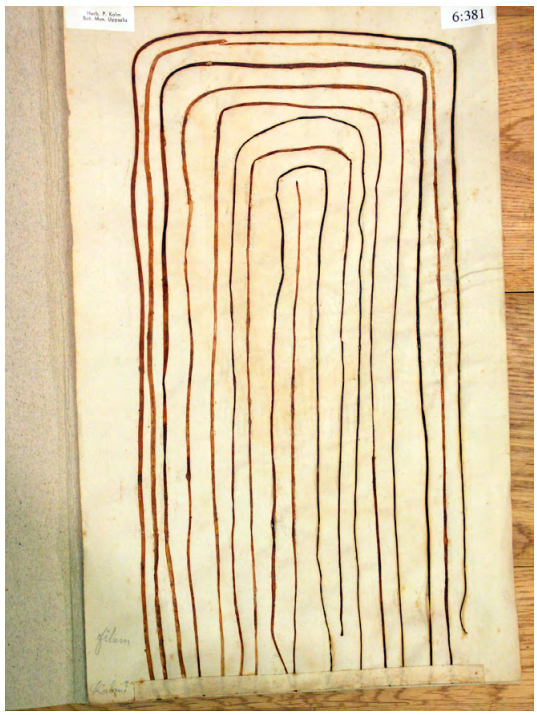


Fig. 23. Kalm was probably the first to make observations on algae in continental plate of North America. *Chorda filum* collected by him (UPS).

Zoology

In the zoological chapters of the travelogues and in separate publications, Kalm gave much ecological information about animals, like the passenger pigeon (*Ectopistes migratorius*), the rattlesnake (*Crotalus horridus*), wood ticks (*Amblyomma americanum*) and several insect species.

Kalm also took note of population trends. He described the reason for the decrease in the number of animals, birds and fish in New Sweden. Kalm argues that this was due to the habitat and forest losses because of agriculture (Kalm 1987: 152–153). The same has happened in Canada because of overhunting (Kalm 1987: 576).

Descriptions of domestic animals and birds include American bison (*Bison bison*), white-tailed deer (*Odocoileus virginianus*), beavers (*Castor canadensis*), racoon (*Procyon lotor*), turkey (*Meleagris gallopavo*), wild geese (probably Canada goose, *Branta canadensis*) and partridges (probably Bobwhite, *Colinus virginianus*) (Kalm 1987: 110–112).

Vertebrate observations by Pehr Kalm (Benson 1987)

Kalm reported the occurrence of many vertebrate groups, mainly mammals and birds with economic importance and their use as food. He also took note of their ecology and geographic distribution.

Mammals

Within mammals and fishes Kalm mentions porpoises (*Phocoena phocoena*) together with sturgeon (*Acipenser oxyrinchus*): ”About twelve miles from New York (along the Hudson River) we saw sturgeon leaping up out of the water, and on the whole passage we met porpoises in the river”. (Kalm 1987: 326). He also observed porpoises catch eels (*Anguilla rostrata*) and mentions that porpoises are hunted with harpoons. Eels and sturgeon are fished in October when they swarm into rivers (Kalm 1987: 494–495).

Kalm mentions that bears (probably *Ursus americanus*) are very common and do much mischief by killing cattle (Kalm 1987: 63). Bears are common in Canada too (Kalm 1987: 379). Kalm does not specify species but mentions that ”the American bears, however, are said to be less fierce and dangerous than the European ones” (Kalm 1987: 63). Bear meat is used for several purposes: ”Their meat is prepared like ham” (Kalm 1987: 63). ”Native American tribes make oil from the fat of bears against the bite of gnats” (Kalm 1987: 329).

Kalm notes that beavers (*Castor canadensis*) are very common (Kalm 1987: 241) and have been made tame (Kalm 1987: 110). A larger description of their ecology follows (Kalm 1987: 534). Kalm also mentions that Catholics eat beaver ”on their feasting days; for his Holiness the Pope has, like many of the old zoologists, classified the beaver among the fishes, since he spends most of his time in water” (Kalm 1987: 543).

Kalm mentions two species of foxes: grey (*Urocyon cinereoargenteus*) and red (*Vulpes vulpes*). The grey fox is common. The red fox is rare, probably introduced from Europe. (Kalm 1987: 148–150).

Kalm also mentions moose (*Alces alces*), a large cervid with huge antlers like the extinct Irish elk (*Megaloceros gigantheus*) (Kalm 1987: 156–157). Obviously, Kalm never saw a moose himself and his descriptions are based on stories which he heard from several sources. Probably Kalm saw wapitis (*Cervus canadensis*) and mentions ”There are elks here, which are either of the same sort as the Swedish or a variety of them” (Kalm 1987: 157). Large moose antlers found in the soil made many people believe that Irish elk had lived in North America but then gradually became extinct. Kalm mentions that ”it has even been concluded that Ireland in distant ages either was connected to North America or that a number of little islands which are lost at present made a chain between them”. (Kalm 1987: 156).

Of common wild mammals, Kalm mentions muskrat (*Ondatra zibethicus*), which is also commonly hunted (Kalm 1987: 239–240), flying squirrels (*Sciurus volans* including its ecology description (Kalm 1987: 169) (Fig 24), chipmunks (Sciuridae) with their ecology description (Kalm 1987: 169–171), skunks (Mephitidae) (Kalm

Fig. 24. Kalm made a description of the Flying squirrel (*Sciurus) volans*) and Ground squirrel (*Tamias striatus*) and their ecology. Published in Kalm (1937) between pages 52 and 53.

Figs. 25a, b. Kalm made a description of the Racoon (*Procyon lotor*) and American pole cat (*Mustela nigripes*) (25a), and Passenger pigeon (*Ectopistes migratorius,* 25b) and their ecology. Published in Kalm (1937) between pages 110 and 111, and between 252 and 253.

1987: 144), racoon (*Procyon lotor*) (Kalm 1987: 53, 111) including ecology description (Kalm 1987: 242–243) (Fig. 25a) and squirrels (*Sciurus*). Kalm mentions the grey squirrel (*S. carolinensis*), which is very common. Kalm also mentions the black squirrel which is nowadays considered as a melanistic morph of the grey squirrel (Kalm 1987: 596). According to Kalm, the black squirrel is more common in Canada (Kalm 1987: 358).

Naturalist Count Georges Leclerc de Buffon (1707–1788) in his famous *Historia Naturelle* series considered the mentions of bison in Kalm's travelogues to support Buffon's own ideas about the use of bison.

Birds

The introduction of the passenger pigeon (*Ectopistes migratorius*) (Kalm 1759: 275–295) (Fig. 25b) was particularly meritorious (Svanberg 2006: 182), even more so when the bird became extinct, mainly due to hunting, about 150 years after Kalm's travels. In addition to the uncontrollable abundance of the bird, Kalm listed the migratory pigeon's food plants, and "Their flesh is the most palatable of any bird's flesh I have ever tasted" (Kalm 1987: 369). Acorns were important when the rest of the harvest was poor, which resulted in the death of migratory pigeons. Man proved to be more efficient than famine. The article was translated into English by Gronberger (1911).

Trotter (1903) compiled Kalm's bird observations from the travelogues. Trotter's attitude to Kalm's observations is dismissive. "Kalm's observations have little scientific value, but they possess a certain freshness that commends them to every lover of the wayside".

In addition to common bird species listed by Trotter, Kalm pays special attention to those species which are serious corn pests. Kalm mentions blackbirds as "corn thievers" *Monedula purpurea* and *Sturnus niger*. The common grackle (*Cracula quicuita*) and brown-headed cowbird (*Molothrus ater*) are discussed as serious corn pests (Kalm 1987: 153 248–250). Kalm mentions that there are eight species of woodpeckers (*Picus*) and says that one of them, namely, the red-headed woodpecker (*Picus erythrocephalus*) is destructive to corn fields and orchards (Kalm. 254–255).

Kalm also gives a detailed description of hummingbirds (*Trochilus columbris*) and their ecology. Hummingbirds used leaves of *Verbascum thapsus* for their nests (Benson 1987: 113). He mentions that they are also common in Canada in the Quebec area (Kalm 1987: 423).

Among game birds, Kalm mentions partridges (quail) which are very common (Kalm 1987: 112, 237) and Canada ptarmigan (*Lagopus lagopus*) (Kalm 1987: 404), wild turkeys (*Meleagris gallopavo*) (Kalm 1987: 111) and wild geese (probably Canada goose, *Branta canadensis*) (Kalm 1987: 111).

Amphibians

Frogs: *Rana ocellata*. Common. Detailed ecological description (Kalm 1987: 255–256). American bullfrogs (*Lithobates catesbeianus*) (Kalm 1987: 297–298). Common. Includes detailed ecological description. An abridgement of Kalm's Rapapoo frogs was published in Germany (Kalm 1775). Kalm tells a story about the running race between men of Native American tribes and bullfrogs (Kalm 1987: 298), and further: "I was told that some people eat the things and hind legs, and that they are very palatable" (Kalm 1987: 298). Tree toads. *Rana arborea* (Kalm 1987: 131–132). Very noisy.

Reptilians

Kalm (1752c) was the first to describe the rattlesnake, its venom and plants to be used as antidotes in three articles. It got considerable attention (Kalm 1755d, 1756a), and *Analecta Transalpina*, edited by Haller, published it in its entirety in Latin (Kalm 1762b). Before that, Haller (1758b) had published a compilation. English translation by Esther Louise Larsen (Kalm 1957). In the travelogues, the rattlesnake and its occurrence were mentioned a few times (Kalm 1987: 293, 362, 398).

Hagfishes

According to Jørgensen et al. (1997) Kalm's description of the Atlantic hagfish (*Myxine glutinosa*) on the coast of Norway is the first of the species (Fig. 26). Hagfish is a jawless vertebrate and related to lampreys. They form the superclass Cyclostomi under the phylum Chordata.

► **Fig. 26. Kalm's desribtion on the Atlantic hagfish (*Myxine glutinosa*) is the first of the species.**

By Gervais et Boulart / Wikipedia Commons

Invertebrate observations by Pehr Kalm

The following observations of invertebrates are based on Kalm's diaries (including comments by the editors: Kerkkonen & Roos 1970, Roos & Krogerus 1985, 1988) and in a few separate publications by Kalm. Some of these records have been published in English in Kalm (1987). Kalm described a great number of invertebrates, in Latin, in his diaries. These names are not valid, and, in many cases, it is not possible to recognize the species and sometimes even the genus.

Invertebrate observations by Kalm, a Professor of Economics, focused extensively on groups and species that are significant for humans. For example, Kalm reported harmful insects living in human dwellings, both in houses owned by Europeans and in huts of Native American tribes. He mentioned fleas (*Pulex irritans*), lice (*Pediculus humanus*), bed bugs (*Cimex lectularius*), cockroaches (*Periplaneta americana* and/or *Blattella germanica*), house crickets (*Acheta domesticus*) and houseflies (*Musca domestica*). Kalm wondered about the origin of these insects, whether they were native or imported. In most cases he left this question open (Kerkkonen & Roos 1970, Roos & Krogerus 1985, 1988).

Kalm commented on parasitic worms of humans, like tapeworms (Cestoda). He had interviewed various parties, such as doctors, about the presence of these parasites. He also told an interesting story by a shopkeeper of Swedish origin. His little daughter had been suffering from worms, and finally strong Madeira wine in small doses had helped; her parasite was probably the threadworm (*Enterobius vermicularis*) (Kerkkonen & Roos 1970: 186).

He also noted harmful outdoor arthropods, like horseflies (Tabanidae), black flies (Simuliidae), mosquitos (Culicidae) and ticks (Ixodidae). Kalm discussed the presence of mosquitos and especially of ticks and the great harm they cause in different destinations of his travels. He explained ways to avoid tick bites and colourfully described the effects of infected bites (Koponen 2024, 2025).

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Fig. 27. Larvae of the Forest tent caterpillar (*Malacosoma disstria*) moth are known as important defoliators of many deciduous tree species in eastern North America.

Kalm studied a lepidopteran species destroying fruit and forest trees, the forest tent caterpillar moth (*Malacosoma disstria*) (Fig. 27). He listed in a separate paper (Kalm 1764a) several deciduous trees and bushes as the food plants of these social caterpillars which are nomadic and forage as a group. The work was also soon published in German (Kalm 1767a) and translated into English two-hundred years later (Kalm 1951). Kalm mentions 14 plants which the larvae ate willingly, six which they ate somewhat and 18 which they did not eat. He also told in the diaries about damage caused periodically by larvae (”grass worms”) to meadows, fields and crops (Kerkkonen & Roos 1970); these were probably caterpillars of some noctuid moths.

Of beneficial insects Kalm mentioned honey bees (*Apis mellifera*) and thought they were imported from Europe. Bees had spread widely, also living in forests. They can be seen swarming and flying towards the south, to warmer places (Kerkkonen & Roos 1970: 234) – this is an interesting comment. In addition, Kalm said, based on Bartram, that the silk moth (*Bombyx mori*) was introduced to Connecticut where silkworms thrived and produced copious silk (Kerkkonen & Roos 1970: 166).

Within frequent beetle (Coleoptera) observations there are descriptions and mentions of species of many genera, e.g., *Carabus* (ground beetles), *Cicindela* (tiger b.), *Dytiscus* (diving b.), *Elater* (click b.), *Curculio* (weevils), *Meloe* (oil b.), *Scarabaeus* (dung b.) (Kerkkonen & Roos 1970), and *Cerambyx* (longhorn b.), *Chrysomela* (leaf b,) and *Coccinella* (ladybirds) (Roos & Krogerus 1985). In addition, Kalm dealt with fireflies and glowworms (under *Cassida*), and some beetles with an unclear identity (under *Dermestes* seemed to be e.g. a geotrupid dung beetle). (Kerkkonen & Roos 1970, Roos & Krogerus 1988).

Of other insect groups there are several mentions, for example, on grasshoppers and crickets (Orthoptera), flies, black flies, mosquitos, craneflies and horseflies (Diptera), true bugs, water striders, cicadas and aphids (Hemiptera), ants (including the big-sized carpenter ant, *Camponotus*), bees and different wasps (Hymenoptera), butterflies (e.g., under *Papilio*) and moths (Lepidoptera), and on some insect larvae. (Kerkkonen & Roos 1970, Roos & Krogerus 1985)

Anthills were rare wrote Kalm, he saw a few in forests when travelling from New York to Canada; according to him, the ants were ”absolutely our common ants” and nesthills were mainly built using small pieces of decomposed stone, ”because they had nothing else” (Roos & Krogerus 1985: 185). It was probably the mound ant (*Formica exsectoides*), a North American species.

Kalm described and named some spider (Araneae) and mite and tick (Acari) species and also reported other arachnids: pseudoscorpions (Pseudoscorpiones) and harvestmen (Opiliones). He told of a case report about a spider bite and its effects and treatments. Kalm also recorded a centipede, *Scolopendra* (Chilopoda), snails (Gastropoda) and earthworms, *Lumbricus* (Oligochaeta). Observations of *Lumbricus* are interesting (Kerkkonen & Roos 1970: 367) because it was not a native species; however, Kalm did not know or comment on that – this could have been a misidentification.

Of aquatic invertebrates, Kalm reported some mussel (including oyster) species (Bivalvia), crabs and lobsters (Crustacea) and told about their use as food, both by Native American tribes and local ”whites”, viz. settlers. He also reported that locally in Philadelphia shells were found deep in the soil, e.g., when digging wells (Roos & Krogerus 1985: 2).

At the end of the sea voyage from England, when approaching the coast of Delaware, Kalm observed marine animals, like jellyfish species, including the Portuguese man o’ war (*Physalia physalis*) (Kerkkonen & Roos 1970: 127).

Kalm described many insect and arachnid (spider and mite) species in detail in diaries and later papers (Kalm 1754a, 1756c, 1764a), and he also named many of them. Kalm compared his species with related ones presented by Linnaeus (1746) in his *Fauna Suecica*. However, Kalm used the old descriptive verbose ”pre-Linnean” names. Therefore, his names are not valid and have been forgotten. Linnaeus named some of Kalm’s species based on original descriptions, like the 17-year cicada *Cicada* (now *Magicicada*) *septendecim*, described by Linnaeus (1758) based on Kalm’s (1756c) pioneer report on this peculiar, periodical cicada (Fig. 28). English translation by Esther Louise Larsen (Kalm 1953).

Chris Simon / Wikimedia Commons

Fig. 28. The 17-year cicada, *Magicicada septendecim*, described by Carl Linnaeus as *Cicada septendecim* in 1758 based on Kalm’ s data. It is known also as the 17-year locust and pharaoh cicada.

Michael L Levin / Wikimedia Commons

Fig. 29. The tick species described by Pehr Kalm in 1754, *Acarus ovalis planus ruber, macula dorsali alba*. Based on his data Carl Linnaeus described it as *Acarus americanus* in 1758; in the present form *Amblyomma americanum*, the lone star tick, due to the dorsal white spot of female ticks. The species is well known for causing red-meat allergy in the United States.

Linnaeus (1758) also described and named the tick *Acarus americanus* (now *Amblyomma americanum*) in 1758. Kalm (1754a) had described and named it as *Acarus ovalis planus ruber, macula dorsali alba* (oval flat red mite, white dorsal spot), now known as the lone star tick (Fig. 29); an abridgment was translated into German

(Kalm 1756b). An English translation by Esther Louise Larsen was published two centuries later (Kalm 1955). Some recommend that the shoes and stockings be rubbed with what the English colonists call pennyroyal (*Hedeoma pulegioides*), to expel ticks (Kalm 1955).

The lone star tick is nowadays well-known in the northeastern USA, because it transmits bacteria that could lead to red-meat allergy. Due to their descriptions of the lone star tick, Kalm and Linnaeus can be considered pioneers of acarology in North America. It is worth mentioning that actual research on arachnids began in North America about half a century after Kalm's journey and publications, and the first noteworthy published data did not appear until the late 1830s (Underwood 1881).

Summary

Our review of the results of Kalm's travel to North America is based on his travelogues, diaries, articles, supervised dissertations and herbarium specimens collected by Kalm and maintained at the Uppsala Museum of Evolution. The travelogues have been translated, e.g., into English and the Canadian part of the excursion also into French. However, the diaries contain considerably more information compared to the travelogues, but nowadays it can only be read in Swedish. Historians and natural scientists will have access to overlooked original contemporary observations from eastern North America of the 1750s when the diaries are eventually digitized and translated into different languages.

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