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Author: Koponen, Seppo

Source: Arachnologische Mitteilungen: Arachnology Letters, 69(1) : 16-18

Published By: Arachnologische Gesellschaft e.V.

URL: https://doi.org/10.30963/aramit6905

Arachnid observations by Pehr Kalm during his journey to North America (1748-51)

Seppo Koponen

doi: 10.30963/aramit6905

Abstract. Pehr Kalm (1716-79) was a professor at the Royal Academy of Turku (Åbo) in Finland, belonging at that time to Sweden. Carl Linnaeus organized a research journey to North America where Kalm's base was near Philadelphia. He made two long, demanding and dangerous journeys to Canada and to the Niagara Falls. Kalm's main focus was on plants and their economic use, but he observed and collected all kinds of nature items, including arachnids. Kalm described and named five spider species in his travelogue. His species are, however, not valid due to their pre-Linnean descriptive names. Kalm also mentioned false scorpions, harvestman and several mite species. He described and named a tick in 1754, which Linnaeus named, based on Kalm's data, in 1758 as *Acarus americanus* (now in *Amblyomma),* the well-known Lone star tick.

Keywords: *Acari, Amblyomma americanum, Araneae, Opiliones, pre-Linnean names, Pseudoscorpiones*

Zusammenfassung. Spinnentierbeobachtungen von Pehr Kalm während seiner Reise nach Nordamerika (1748-51). Pehr Kalm (1716-79) war ein Professor an der Akademie zu Turku (Åbo) in Finnland, welche zu dieser Zeit zu Schweden gehörte. Carl Linnaeus organisierte die Forschungsreise nach Nordamerika, wo Kalm's Basis nahe Philadelphia war. Er unternahm zwei lange, anspruchsvolle und gefährliche Reisen nach Kanada und zu den Niagarafällen. Kalm's Fokus lag auf Pflanzen und deren ökonomischen Nutzen, aber er beobachtete und sammelte jegliche Art von naturhistorischen Objekten, Spinnentiere eingeschlossen. Kalm beschrieb und benannte fünf Spinnenarten in seinem Reisebericht. Diese Arten sind jedoch nicht valide, da sie vor dem Hauptwerk von Linnaeus erschienen sind. Kalm berichtete ebenfalls von Pseudoskorpionen, Weberknechten und einigen Milbenarten. Er beschrieb und benannte eine Zecke im Jahr 1754, welche Linnaeus, basierend auf Kalm's Ergebnissen, im Jahr 1758 als *Acarus americanus* (nun zu *Amblyomma* gehörend) beschrieb. Diese Art ist heute als „Lone star tick" wohlbekannt.

Pehr Kalm (1716-79) was a Finnish-born professor of economics at the Royal Academy of Turku (Åbo) in Finland, belonging at that time to Sweden (Fig. 1). He was an explorer, naturalist and economist, and one of the most important "apostles" of Carl Linnaeus. Linnaeus organized Kalm's research journey to North America where his base was in Racoon (now Swedesboro) near Philadelphia, in New Jersey. Kalm observed nature and culture, including the life and customs of indigenous people in eastern North America during two long, demanding and dangerous journeys. The first trip was directed towards Canada (extending north of Quebec City) and the second to the Niagara Falls (e.g. Kerkkonen 1959). His main focus was on plants and their economic use,

Fig. 1: A stamp in honor of Pehr Kalm was issued on the 200th anniversary of his death, with his portrait and the title page of the first volume of Kalm's travelogue (1753). Public domain according to the Section 9 of the Finnish Copyright Act.

This contribution was presented at the 34th European Congress of Arachnology, Rennes, France, 26–30. August 2024

Seppo KOPONEN, Zoological Museum, Biodiversity Unit, FI-20014 University of Turku, Finland; E-mail: sepkopo@utu.fi

Academic editor: Tobias Bauer

submitted 29.10.2024, accepted 04.03.2025, online 1.6.2025

but he observed and collected all kinds of nature items, including spiders and mites (Koponen 2024). Kalm spent two and a half years in America. He arrived in Philadelphia in September 1748 and left for Europe in February 1751.

Kalm wrote a travelogue based on a diary entitled *En Resa til Norra America* (in Swedish) in three volumes (Kalm 1753-61). J.R. Forster translated the travelogues into English, entitled *Travels into North America* (Kalm 1770, 1771a, b). An expertly edited version of the diaries in their entirety was published ca. 200 years later, consisting of four volumes in Swedish with descriptions in Latin (Kalm 1966, 1970, 1985, 1988). The present paper is mainly based on this diary. In addition to his published travelogue and diaries, Kalm wrote various articles for the *Royal Swedish Academy of Sciences*, e.g. about animals of North America. These included, for example, observations of the Timber rattlesnake (*Crotalus horridus*), Passenger pigeon (*Ectopistes migratorius*), 17-year cicada (*Magicicada septendecim*) and Forest tent caterpillar moth (*Malacosoma disstria*). Many of these were the first publications in their field. Linnaeus soon described several species as new to science based on Kalm's descriptions. Verbose descriptive species names by Kalm are not valid. In addition, Kalm made the first scientific description of the Niagara Falls.

Spider observations (Araneae)

In his diary Kalm described (Kalm 1970: 338-9, 388, 396) five spider species and gave information about their ecology and behavior. His rather detailed descriptions are in Latin, without any illustrations. Kalm often compared his specimens with similar species in *Fauna Svecica* by Linnaeus (1746). The descriptions by Kalm are so general that it is not possible to identify his species, but he described and named the following spider species.

1) *Aranea thorace pedibus pallide fuscis nitidis, abdomine nigro fusco nitido linea* (spider with thorax and legs pale brown and shiny, abdomen with shiny blackish brown line). Kalm thought it could be a variety of species 1215 in *Fauna*

Svecica or some common indoor species. The specimen landed on a thin silk thread in a house.

2) *Aranea nigra, macula alba in medio dorsi abdominis, maxillis viridibus, pedibus nigris, apice fuscis* (black spider, dorsally white spot on middle of abdomen, maxillas green, legs black, tip brown). It resembled species 1236 in *Fauna Svecica*, but did not seem to be able to jump like it.
However, Kalm thought it might be its variety. This specimen was also found indoors.
3) *Aranea oblonga, capite; thorace pedibusque pallide fuscis nitidis; abdomine nigro apice biseta* (oblong spider, head, thorax and legs pale brown, shiny; abdomen black with bisected tip). An individual found in poor condition on the ground; observations on spinnerets full of silk.
4) *Aranea corpore minimo rubro villoso, pedibus pallidis* (spider with tiny red hairy body, pale legs). Running quickly, although it was very small. Kalm wondered if this quickly moving small specimen belonged to spiders or mites. He thought it was probably a spider – however, the other option is quite possible.
5) *Aranea oblonga angusta pallida, striis duabus nigris longitudinalibus dorsi* (oblong narrow pale spider, two dorsal longitudinal black stripes). A fast moving spider. According to Kalm, it looked funny when not moving, due to the position of the legs on top of the carapax and frontal abdomen. It was found among flowers.
Kalm mentioned also a very large gray and hairy running spider, without any description. In addition to descriptions, Kalm recorded and copied a case report about a spider bite and its effects and treatments ("*A remarkable accident relating to the venom of spiders, in New England, by mr. Thomas Robie*")

Other arachnids (Acari, Opiliones, Pseudoscorpionida)

Kalm found an "insect", *scorpio-araneus,* which was no. 1187 in *Fauna Svecica.* He described the habitus and behavior of this pseudoscorpion, such as the ability to move quickly backwards. Kalm found it under the outer shells of the black walnut, and he mentioned that he found several false scorpions of various sizes. Kalm also reported a harvestman, however, according to the understanding at the time, as a mite: *Acarus pedibus omnibus longissimis* (a mite with very long legs), the species 1186 in *Fauna Svecica.* Kalm cut off its leg and noticed it moving for a while. The specimen was collected from a tree.

He reported a mite species *Acarus terrestris ruber, abdomine depresso* (red terrestrial mite, depressed abdomen) moving among grass roots. Kalm identified it as the species 1200 in *Fauna Svecica* ("it is completely the Swedish one"). Kalm recorded a mite from a scarab beetle he studied. He described this mite and named it as *Acarus scarabaei pallidus ovali-rotundus* (pale oval-round scarab mite). According to Kalm, its head resembled wood ticks, but the colouration of the species distinguished them.

Most of Kalm's observations and comments on arachnids dealt with ticks. He pointed out the harm caused by ticks, and colorfully described the problems that an infected tick bite may cause. Kalm reported the occurrence and abundance of ticks at most localities he visited during long inland expeditions. He described and named a tick as *Acarus ovalis planus ruber, macula dorsali alba* (flat oval red mite, white dorsal spot), and dealt with its occurrence and ecology (Kalm 1754). Finally, Kalm stated that Sweden has been spared of the great inconvenience that ticks cause compared to America, by the grace of God: "during my travels in America, this creature caused me to realize how unaware we are of blessings the good Lord has given Sweden". Kalm's study was published soon in German (Kalm 1756) and a translation into English by Esther Louise Larsen two centuries later (Kalm 1955). Linnaeus described and named it in 1758, based totally on Kalm's report, as *Acarus americanus* (now *Amblyomma americanum*), the well-known Lone star tick (Fig. 2).

Fig. 2: 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, the name is *Amblyomma americanum,* the Lone star tick, due to the dorsal white spot of female ticks. The species is known for causing red-meat allergy in the United States. Public domain, photo by Michael L. Levin

Kalm as an arachnologist

The arachnid species described and named by Pehr Kalm in his travelogue, or later in separate publications, are not valid due to their wordy descriptive names and publication years before the books by Carl Clerck and Linnaeus. These contemporary Swedish scientists did not use Kalm's spider descriptions in their publications (Clerck 1757, Linnaeus 1758, 1761, 1767), including altogether ca 120 spider species. The first Finnish-born arachnologists who used binomial nomenclature were Eric Laxmann (1770) and Peter Forsskål (1775) (Koponen 2010).

As the first describer of the Lone star tick, Kalm can be considered a pioneer in North American acarology, together with Linnaeus. It is worth mentioning that actual research on arachnids began in North America about a half of century after Kalm's journey and publications, and the first noteworthy published data did not appear until the late 1830s (Underwood 1881). Lewis Bosc was the first known arachnologist in North America, active at the beginning of the 19th century. His descriptions and drawings were published by Baron Charles A. Walckenaer. Also drawings of Georgian spiders by John Abbot were included in the same book by Walckenaer (1837) (Underwood 1881).

Acknowledgements

I am grateful to the Entomological Society of Finland for the travel grant for attending the congress in Rennes.

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