Scurvy and Cloudberries: A Chapter in the History of Nutritional Sciences¹,²

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Abstract

We translated two Latin texts about scurvy. One is by Ambrosius Rhodius, who in 1635 published his doctoral thesis on scurvy. This contains aspects of 16th- and 17th-century folklore medicine. The other is a 1593 letter by Henrik Høyer (Hoierus), a German physician in Bergen, Norway. The letter states that in Norway grew a plant, *Chamaemorus Norvegicus*, whose berries had curative abilities against scurvy. Rhodius lists symptoms of scurvy and suggests ingestion of fatty and smoked foods as etiological agents. He thought that a malfunction of the spleen was involved in this disease, so that the undigested parts of the chylus perturbed liver function. Plants with curative abilities were “those that abound in volatile salts.” He listed seven facilitating causes of scurvy and its therapies. These included blood-letting after laxatives and root extracts. The star of the show was the cloudberry, which had miraculous effects on scurvy patients. Palliative care included a bath containing decoction of brooklime, water cress, mallow, hogweed, roman chamomile, and similar plants. Before bathing, the person was to drink an extract of wormwood, scurvy grass, or elder. As medication for gums and teeth, Rhodius recommended rosemary, hyssop, bistort, sage, nasturtium, waterweed, creeping Jenny, and scurvy grass. He referred to medications described by Albertus, Sennertus, and in antiquity by Hippocrates and Galenus. We discuss the manuscripts by Høyer and Rhodius in light of earlier treatments and opinions about scurvy. J. Nutr. 141: 2101–2105, 2011.

Introduction

The Indian scientist Susruta described scurvy in 600 B.C. (1,2). The old Norwegian name for scurvy, skyrbjugr, was first used in the saga about Thorstein the White in 1000 (2). The Vikings thought the disease was due to intake of too much “skyr” (the old Norse name of sour milk), which they took on board as part of their drink and food on long sea travels. The old Norse name bjugr means edema. It was on long sea expeditions that the old Norse population knew that plants (cabbage, angelica, and leek) could prevent the disease scurvy. These plants were cultivated in kitchen gardens. The theft of these plants was punished according to old Norwegian laws (7).

In the old days, scurvy was common in Northern Norway among the people who had recently moved there and were not used to the diet. Lapps or Sami people had been using wild plants, scurvy grass (*Cochlearia officinalis*), and cabbage. They collected these plants and wild berries, both black crowberries and cloudberrys, during the summer and kept them in winter. They filled up casks with plants and berries and poured reindeer milk on them, which they drank in winter, because in traditional health advice, it was known that scurvy could be prevented and treated with several types of plants (8).

In the 16th century, Christian II, King of Denmark and Norway, invited Dutch farmers to settle near Copenhagen so they could teach Danes to grow vegetables in kitchen gardens (9). However, this royal initiative had little effect and was forgotten. Approximately 100 y later, King Christian IV was informed about the use of vegetables and berries for the treatment of scurvy. In 1618 he imported both berries and whole plants of the Norwegian cloudberry plant (Rubus chamaemorus) to Denmark (9). The plan was to cultivate them in Denmark, but this was unsuccessful. The background for the king’s initiative is the main topic of this article dealing with an interesting chapter of medical and nutritional history.

Henrik Høyer

In 1593 the German physician Henrik Høyer (Hoierus) came to Bergen. While in Bergen, he must have heard about how the...
population in northern Norway used cloudberry to treat scurvy. The merchants of Bergen and the fishermen from northern Norway were in close contact. These fishermen brought dried and salted codfish to Bergen and the merchants of Bergen exported fish to European countries. Høyer wrote to Petrus Pauwius in Leyden about the use of cloudberry and Pauwius contacted Carolus Clusius, Director of the Emperor’s Medical Garden in Vienna and later the Director of the Botanical Garden at Leyden University.

In 1596 Henrik Høyer brought both berries and plants to Clusius, who was then in Leyden. Høyer brought with him tulip onions back from Leyden to Bergen, and we know from the letters between Høyer and Clusius that in 1597 the first tulips flowered in Norway (10).

The history of the letters between Høyer and Clusius is in the illustrated Botanics, published in Antwerp in 1601 (11). Clusius named the Norwegian plant Chamaemorus norvegicus. The description of the plant and its use is relevant for understanding the early ways of preventing scurvy and therefore we translated the essential parts (from Latin; Book 1 of The History of Plants, The Norwegian Chamaemorus, chapter 85):

From a letter of the most learned man Henrik Høyer to the most valiant man D. Petrus Pauwius, a public professor in the Academy of Leyden, it could be understood that in Norway and in bordering regions grows a berry very similar to the Chamaemorus mentioned above. This man was sending both the preserved fruit toward the very end of the year 1593 as well as little branches, with leaves and the flowers placed between sheets of paper.

From the letter of Høyer I found out that this plant thrives in wet and humid places, and that its fruit ripens in June, July and August and that they are called Molteberren by the locals.

In addition, he was confirming to me the reasons to preserve this fruit, how admirable are its abilities, both from the letter of Høyer and from those (berries) which he himself submitted in person in the year 1596 in Leyden.

From this fruit, he says, the common folks from Norway and Finnmark every year make jam in this way:

‘They cook the berries in an earthen or metal pot to a soft consistency without adding other liquid, because the juices are rich and soft, and they do not want them to be diluted with other liquids. There are many who mix this jam with more tasty things, such as honey wine from the island Fyn (in which these Northern populations take the highest enjoyment). They then preserve this jam very carefully in appropriate vases, covered with melted healthy butter so that it is not spoiled by the air of the environment, and this jam is known and most well proven as a remedy for them against scurvy. And you would not easily believe the miracles these people in Norway make with this one medicine every day; indeed they absolutely swear that nothing has been celebrated with as many praises until now, not even either the scurvy grass (cochlearia), or the common chickweed, or water cress, and other plants of this type which the Germans brag of and use for themselves.

And indeed one has to praise the unique goodness of God because he wanted to provide this wonderful plant for remote Norway, a country that extends longer into the North and which has a lot of terrible diseases because of the roughness of weather and soil, and God wanted indeed to cure by indigenous remedies the harsh, decaying, melancholic diseases which are very prominent there.

Indeed, necessity taught the poor peasants various remedies, so that now any poor person in the most grave cases can take care of himself and of his family and know how to administer the cure.

Thus, everybody can effectively cure people suffering from scurvy in an effective manner, albeit laughed at by some, in this way:

They place the sick people in a neighboring island rich in these ripe berries, and the people are left there alone, and are not taken back home before they can return healed. And indeed those people, nearly excluded from all humanity, but (which is believable) desirous for life, are forced to eat these berries, if they want with this extreme remedy to regain the promised health, or as if they want to extinguish a thirst, from which they are suffering. And, if they do this to satiety, undoubtedly within a few days they convalesce in the village. Since in winter this is not possible, they utilize their own jam not less successfully, without knowing the dose, or without any supervision. Some during the entire period of therapy do not consume any other food. Hactenus Hosierus (According to Høyer).’

Ambrosius Rhodius

In 1635 the first Scandinavian doctoral thesis about scurvy and its treatment was published and defended (12). The thesis was written by Ambrosius Rhodius and presented to the famous Danish scholar (Fig. 1), Professor Ole Worm, at the University of Copenhagen. Ambrosius Rhodius probably considered himself a student of Ole Worm.

Because this is the first written Scandinavian academic report about scurvy, discussion about what they believed caused it, and its treatment, we considered it important to translate it into English. The entire text of the translated thesis is available as an electronic file. Here, we will mention the most relevant passages of the thesis as follows. The front page is shown in Figure 1.

“I will discuss and bring to light scurvy, a terrible disease indeed, and one that hides under different guises. And not undeservedly, since this is indeed a domestic enemy of this region, which many host within themselves and fear, which they nourish, which in many ways at times deceives by promising truce and at times lurks under the appearance of another disease; at times everywhere as immaterial ghost throughout the body shows up quite readily and debilitates and destroys the health of many, and feeds off vigor and beauty. You, God, who are our

**FIGURE 1** Front page of the thesis by Ambrosius Rhodius (12). The entire thesis is available in translation in the online Supplemental file.
physician and our health, and our life, be a guide and shine light on me against such a terrible enemy; so that its character, and violence becomes evident and once revealed, becomes well known, so that, once well known, it will be conquered.”

**Thesis**

I. “I define scurvy as a vicious and hidden entity or disposition of the entire body, but mainly of the viscera, and one caused by nutrition, which derives its origins from a peculiarly corrupted melancholy mood, and has varying symptoms, such as spontaneous exhaustion, the breakdown of the gums, the tightness of the chest, spots and many other things associated with it.”

II. “It is called by the inhabitants of inferior Saxony “Scorbod or Scorbud,” by the Dutch “Scharbed” because of the ruin of the mouth, by the Danes “Starbug” because of the torment and colic and sharp pains of the belly, so that they yell all kinds of things, that they would remove their skin and be torn to pieces, and for the intensity of their pain they don’t know where to turn, and about this writes Eugalenum Obs. 69. From here Hippocrates, “Liber de intern. Affection,” appears to have described this disease under the name “volvuli hematitis,” which however is disagreed upon by Wierker in his observation on scurvy. And indeed Sennertus Book 3. Pract. Part. 2. Sect. 2. c.1, and Horst Sect. 1. on scurvy with sufficiently clear reasons disagrees with the opinion of Hippocrates about scurvy.”

III. “So that the nature of scurvy will be better known, two things offer themselves to be first investigated: the nature of the liquid in scurvy, of the organ producing it and the way it forms; and the maladies and symptoms which frequently accompany scurvy. All in scurvy, of the organ producing it and the way it forms; and the maladies and symptoms which frequently accompany scurvy. All these things we will follow first from the food, so that they may become clearer.”

XVII. “And things that show sufficient curative abilities, when dissolved through medication, and abound in volatile salt, are things like scurvy grass (cochlearia), common chickweed (beccabunga), water cress (nasturtium), mustard plants (sinape) and others; and indeed opposite things are cured by their opposites, and something fixed is returned to volatile by a volatile substance, just as on the other hand, things that are volatile become fixed by fixed things and are returned to their solid state as per Sennertus lib. de cons. & dib. Chym. & Arist, c. 12. However, it cannot be denied that, because something occult may hide in this condition, the same things also may in an unknown fashion fight against that corruption by scurvy and win over it.”

XIX. “As far as the facilitating causes, they are nothing else, other than six non natural things, so called not because they are not within the number of natural things, but because they are not pertinent to the constitution of our body, and as such are also outside of the natural, but among those which make up the human body, and beyond natural almost intermediate as Senh. lib. 2. Instit., part. 2, c.2. explains. Among these in first place the heavy and squilid ambient air is placed, which assimilated through inhalation, or through the pores of the skin admitted into the body contaminates blood and spirit, and permits the generation of undigested material, as Eugal. de scorb. pag. 2. and Albertus lib. de scorb. th. 44 state most correctly.”

XIX. “After the air, the ration of food is considered, which, if fat and muddy, contributes a lot toward the generation of scurvy. To this category belong fish of the lake and of the sea, such as sparrow fish, crawfish, anchovies, and others dried out either with smoke, or the heat of the sun, or by freeze-drying, and rendered stiff such as bovine, goat meats previously marinated in salt and brine, or smoked, and all those things which abound in dark juice. In comparison with the other things, smoke functions as a carrier, as if supplying a fueling juice. For through fumigation the meat is imbibed with many exogenous qualities, which, when the good and innate juice evaporates away, become the cause of the melancholy juice. An acidic liquid is also formed which is trapped with bad consequences, for as death from cholera so is the life with melancholy disease, as in Hipp. lib. 3. in acut. deict. rat. t., 38.”

XXIV. “And, before we start therapy, a few things will have to be known on prognosis. And indeed, so that we don’t deceive ourselves, in making a prognosis, it is necessary to act cautiously and with circumspection after considering well all circumstances. And, even though the pulse rather often is so weak that Eugalenus wrote in observ. 35. that Italus ignorant of these things, would be surprised, because with such a pulse a man could not only live, but also walk around, and take care of his business at home; however, it is not possible to right away predict death.”

XXV. “And if this disease occurred recently, it can be removed easily with appropriate medications. If one removed the root causes but the scurvy juices have influenced the function of liver and spleen, especially if it (scurvy) has been transmitted by inheritance from the parents to someone, it is hardly ever removed totally, as Albertus stated.”

XXVI. “The old ones are more in danger than the young ones, women more than men.”

XXVII. “As the disease gets more serious, it usually progresses to dropsy and cachetisa, because blood generation is impaired when liver and spleen are debilitated and a large amount of serious humor is formed.”

XXIX. “The flesh of the gums, if appropriate medications are not applied to it promptly, decays to the bones, and the teeth fall off.”

XXIX. “Spots in the legs because they tend to become livid and dark, for that reason they signify a bigger danger and they attest to the big malignancy of the humor. And if they go into ulceration, they are harder to heal. This is as far as the prognosis.”

XXX. “In those who are otherwise favorably disposed toward this disease and want to prevent it, prevention would be if they follow a ration of food favoring their nature and contrary to scurvy. And because all dietary mistakes can hardly be avoided during the winter and in the fall, the poisonous humours must be emptied from the body.”

XXXIII. “Having accomplished the cut of the vein, it is necessary to progress to the preparations, which diminish the brown earthly liquid, by incision, and dry out through dispersion, as Solomon Albertus says which are the roots of belenium, polypody, vipers grass, rhubarb; the outer barks of capers; and the leaves of fumitory, agrimony, germander, speedwell and similar. And if the juice of these or similar plants will have been prepared, and the channels are open, lighter laxatives, as Albertus informs and Severinus Eugalenus warns of dosage, are to be used, since scurvy does not allow strong laxatives.”

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XXXIV. “The body having been evacuated in this way, of necessity those means must be used which more strongly open up obstructions to fight some peculiar characteristics of the person affected by scurvy. And as it is known from what has been said above, the collection of liquid in scurvy from bad digestion and evaporation of the salt, which originates from fatty food left in the body from those foods which abound in volatile salt, and fight the peculiar characteristic of the decay caused by scurvy, the medicaments must be composed of things such as scurvy grass, common chickweed, watercress, horseradish, mustard which also, and not without merit, is added to meats hardened with brines and smoke as condiments.”

XXXV. “Before the rest of them is favored the fruit of a certain Chamaerubus, which Carolus Clusius describes under the name of Chamamorus of Norway in his “Hist. plant rarior. lib. I. C.5.” and he brings many things worthy of notice from the letter of Dr. Henrik Høyer, among which he has the following, ‘Because you would not easily believe which miracles these people in Norway make with this one medicine every day; indeed they absolutely swear that nothing has been celebrated with as many praises until now, not even either the scurvy grass, or the common chickweed, or water cress, and other plants of this type which the Germans brag of and use for themselves.’ And year by year from Norway into the regions of Denmark, as I hear many vases full of this fruit are brought, and they are added to food in lieu of preserves with great advantage to health.”

XXXVI. “And also the matters that induce perspiration, such as decoctum guaiachi, china, sarsaparilla, bezoardicum minerale, which can be made available externally and within the body, should be discussed and are not to be neglected. Let a bath be prepared, and put in the water decoct of brooklime, water cress, Roman chamomile and similar plants. And before the sick person goes into the bath he should drink extract of mallow, hogweed, and inhibit the corruption, in part with drying and astringent actions are put together. First against bleeding and weakness a certain powder is prepared according to Albertus, containing granis Juniperi, rosemarinus, raphanus agrestis, flores sambuci, salvia, chamamelum, sismibrium, medicum alumen, etc.”

XL. “And if in reality the large tumors are close to the legs, Albertus prescribes lotions of the following ingredients cooked in lye or in sea water to dry and destroy the stanchly tumors. These ingredients are bacca Juniperi, rosemarinus, raphamus agrestis, flores sambuci, salvia, chamamelum, sismibrium, medicum alumen, etc.”

XL. “Bloody and infected spots are removed with solvents, such as a cooked potion of seeds of Juniper, scurvy grass, honey, etc.”

XLI. “Finally it is appropriate that for the ulcers for which we said above to be healed with greater difficulty, that the best means should be tried. Albertus first spreads syrup from dry roses on the ulcer and covers it with a leaf of Broadleaf Plantain. And afterwards he applies rose honey and sugar syrup of Thomaem, which clean up with a gentle application. Sennertus says in lib.3, Pract. P. S. L. C.8. that beccabunga cooked by itself in beer, and applied twice a day to a large and bone-deep ulceration of the leg, occupying nearly the entire length of the tibia, was able to cure it. Whoever wishes more details about the therapy of these ulcerations should consult Gal. lib. 4. meth. Mcl. and lib. 2. artis curativa ad Glaucotenon, ut & Paraenum lib. 12. chirurg. Aquaepend. lib. 3. de ulc. c. 4.”

Discussion

The two translated Latin texts describe views about scurvy and its treatment ~400 y ago in Northern Europe. The two authors had a distinctly different approach to the disease and its treatment, because Høyer was a physician and Rhodius an academic scientist.

Henrik Høyer was born in Stralsund, Germany around 1565. He studied medicine at Rostock University and in 1593 he came to Bergen, Norway, where he practiced as a physician. He was very interested in Norwegian history and translated some Viking sagas from Old Norse to Latin and German (11). The letter written by Henrik Høyer and cited in the classical Rarorum plantarum historia (History of more unusual plants) by Carolus Clusius (10) gives a picture of a doctor who was concerned about treatment of patients with scurvy. Henrik Høyer believed in the curative effect of cloudberries. He sent plants to Leyden and traveled the long route from Bergen to Leyden with plants and berries to convince the great botanical scholar Clusius and thereby the rest of scholarly Europe about the remarkable curative effect cloudberries had for the treatment of scurvy. We get the impression of Høyer as a concerned and practical doctor, who among other things wrote:

Because you would not easily believe which miracles these people in Norway make with this one medicine every day; indeed they absolutely swear that nothing has been celebrated with as many praises until now, not even either the scurvy grass, or the common chickweed, or water cress, and other plants of this type which the Germans brag of and use for themselves.

Ambrosius Rhodius was born in 1605 in Kemberg, Sachsen, Germany. He studied medicine, natural sciences, and astrology in Wittenberg. In 1635 he went to Copenhagen and took his doctoral degree about scurvy (12,13). The text by Ambrosiust Rhodius is a typical doctoral thesis of that time. Such printed Latin documents were not a description of experiments but
reviews of certain topics. The thesis was an academic demonstration of knowledge and was used as a gateway to academic or other high-ranking positions. The thesis by Rhodius gives us a good picture of how the physicians of that time regarded the pathogenesis of scurvy and the treatment of the disease.

Rhodius’s discussion of the therapy of scurvy starts with “restoring” the channels of the body with cutting veins and by light laxatives or gentle enema. It is interesting that he advocates that the laxatives and fluid of the enema should be made from plants, which we now know to have relatively high contents of vitamin C. After such a treatment, he advocates medicaments consisting of plants like scurvy grass, common chickweed, watercress, and horseradish, all of which contain some vitamin C. But then he especially advocates the use of cloudberry and refers to Henrik Høyer, as mentioned above and indeed the vitamin C content of cloudberries as given in reference 1, Table 10.2, is 80 mg/100 g of cloudberries compared to 48 mg/100 mL of orange juice. These figures should give a perspective for cloudberries as therapeutic agents against scurvy.

While Høyer was using the cloudberries in the active treatment of patients with scurvy in western Norway, Rhodius made his thesis not because of treatments of patients but as a means for academic recognition and in order to get a higher position as a scholar and physician in Denmark.

In spite of the letter from Høyer cited by Clusius and the thesis of Ambrosius Rhodius about the treatment of scurvy, the disease was at that time serious in Denmark and Norway (7–9). The Danish king Christian IV wrote in 1645 to the Medical Faculty of the University of Copenhagen and asked for advice on how to treat the disease. He ordered the faculty to publish a popular booklet about how to prevent and treat scurvy. The booklet with only 16 pages was published later the same year. In the publication it was said that scurvy was due to an unhealthy diet (bread of rotten grains, dried meat, and rancid fish). It was also noted that lack of vegetables and inactivity could be important for getting scurvy, which then was considered both a hereditary and infectious disease. However, the faculty advocated the use of local plants. The Norwegian cloudberry was also mentioned as an effective remedy against scurvy (14). Some of the information in the small booklet published by the Medical Faculty at the University of Copenhagen was likely from the Ambrosius Rhodius’ thesis. Because of the advice to use plants against scurvy, the king determined that a book should be published about Danish and Norwegian plants.

This led to the famous three books on Flora Danica edited by Simon Paullus (15). The first of the three books came out in 1648. The Norwegian cloudberry was described in the third book and reference is made to both Clusius and Høyer about treatment of scurvy. Another and more famous hand-colored edition of Flora Danica was published in 1766 by G.C. Oeder (16). It is probably not by chance that the first plant described in this Flora Danica was the Norwegian cloudberry.

Notwithstanding all of the above and the knowledge that cloudberries could cure scurvy, scurvy was the most common disease in the Nordic countries from about 1500 until the end of 1700 (17). It only ended when potatoes came to these countries (1).

It is noteworthy that the treatment of scurvy with berries and fruits has been noted several times before (1); Knut Fægri (5) mentions that in Arabic literature, it is noted that Vikings coming south to the Mediterranean region carried barrels of cloudberries on board with them to prevent diseases like scurvy.

The discovery by James Lind (18) that other sources of “acid” do not necessarily have the same potency as citrus fruits was a landmark in medical history, but this treatment was almost forgotten, even after 100 y of use of citrus fruits onboard English ships.

Thus, in the middle of the 19th century, most scientists thought that scurvy was caused by rotten meat (19). Therefore the polar explorer Fridtjof Nansen carried on the ship “Fram” dried or canned meat. And they indeed did not get scurvy, increasing their conviction of the connection between clean and fresh meat and scurvy prevention. But the reason for the prevention of scurvy at that expedition was that they had also had an ample supply of cloudberries (20).

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Literature Cited

15. Paulli S. Flora Danica. København; Melchior Martzan; 1648.
17. Rasmus J. Norriges beskrivelse. København; Gyldendal; 1873.
19. Torup S. Forhandlinger i Det Medicinske Selskab i aret 1907, Steenske Trydes Forlag; 1916.