

## Article

# Peasant Food Provision Strategies and Scientific Proposals for Famine Foods in Eighteenth-Century Sweden

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**Abstract:** The peasant diet during the Little Ice Age in Sweden was mainly grain-based (bread, gruel, and porridge), and the country was heavily dependent on grain imports to meet the population's needs for food. During the eighteenth century in particular, when famines were frequent following failed harvests, Swedish peasants utilized a range of locally available resources to survive. Bark bread made of cambium (phloem) from *Pinus sylvestris* was, for example, commonly used as famine food. Scientists of the Enlightenment period and the state authorities tried to alleviate hunger and poverty through the introduction of new food resources and cooking techniques, including wild or agricultural plants such as lichens or potato, and the use of protein sources different from the traditional ones, such as horse meat. However, many of these proposals encountered strong resistance from the peasantry, and only at the end of the 1800s famines ceased to cause suffering in Sweden. Scientific studies have so far focused mainly on mortality, malnutrition, demography, and official responses to famines; yet the question of what the starving peasants gathered, prepared, and consumed is important for the understanding of the historical situation. Also, the difference between the scientific proposals and peasants' decisions and choices must be clearly distinguished. This historical study using an ethnobiological approach discusses peasant subsistence strategies in Sweden in the eighteenth century using contemporary sources, which provide an opportunity to study how the population obtained foodstuffs, adapted their diet to available ingredients, and the interaction and conflicting views of peasants and scientists about new, science-based nutrition proposals.

**Keywords:** emergency food; food security; gastronomic ethnobiology; hunger; subsistence crisis



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## 1. Introduction

### 1.1. Background

Eighteenth-century Sweden was a poor and hungry country, very much unlike the affluent society of today. Although the state authorities and scientists made considerable efforts to alleviate suffering and ensure food security, provision of sufficient foodstuffs for the population was far from guaranteed: food crises and starvation constantly lurked around the corner despite large grain imports. Peasants in certain areas experienced subsistence crises almost yearly: excess mortality (equivalent to a doubling of normal Crude Death Rate) occurred in connection with reported harvest failures in 1717 in the north and west, 1740 in the central parts, 1743 in the northern and central parts, and 1773 in central Sweden [1]. The peasantry's ability to obtain sufficient food and resist diseases as well as governmental actions failed conspicuously on these occasions.

Food security is usually defined by the availability of nutritious food in a country [2]. Research on human nutrition and food security is carried out in several academic disciplines [3]. Through historically orientated ethnobiological approaches, it is possible to study how people in the past, such as the present case of preindustrial Sweden, utilized and managed locally obtainable biological resources for survival during the periods of reduced food availability and crises, and how they reacted and acted upon proposals by scientists trying to introduce new ingredients and culinary practices. Crop failures were

common and recurrent in Sweden from the fifteenth century until the latter half of the nineteenth century [4], and most severe during the Little Ice Age [5]. The majority of scholarly studies on the eighteenth-century food crises focus on mortality, malnutrition, demographic changes, and how authorities dealt with food shortages, yet they overlook the peasantry's own food provision strategies and the impact of natural science [4]; these are, however, of utmost importance to understand the historical situation.

Some 250 years ago, the sociocultural context, local knowledge, and survival skills of the rural population were widely different from today. Subsistence was characterized by traditional agriculture, based on the peasants' ability to cultivate the soil and exploit local resources using relatively primitive techniques. Around the mid-1700s, some 90 percent of the population earned their living in the countryside [6]. Most were small-scale farmers, who through diverse ecological adaptations to the local environment made ends meet [7], often combining agricultural work with seasonal migration for clearing and harvesting in other districts [8]. We are probably not even aware of all aspects due to a lack of sources. More detailed reports emerged only in the Enlightenment period. These were written by an emerging group of scientists, who provided information about the different provinces and climate regions in Sweden.

### 1.2. Crop Failures and Food Safety

Subsistence crises in eighteenth-century Sweden, in the freezing grip of the Little Ice Age, had many natural causes: drought, hail, or a premature autumn frost could destroy crops, and mass invasions of rodents would lead to a wasted harvest [9]. In mountainous regions, Norway lemmings, *Lemmus lemmus* (L., 1758), sometimes appeared in such large numbers that the complete harvest was lost [10,11]. Rainy or cold weather in the autumn brought about food shortages the following spring, and prolonged winters forced the peasants to keep their animals indoors until late spring or even early summer. The restricted feeding of animals had a detrimental effect on their health, which in turn affected humans [12].

Severe food shortages were a recurring phenomenon, but they reached mass starvation levels only occasionally. However, periodic famines were followed by diseases and high mortality rates. In the second half of the eighteenth century, the annual number of deaths fluctuated in general, but malnutrition and disease caused mortality to peak after crop failures. The 1772 failure, for instance, doubled the mortality rate in Sweden in the following year [4,13].

The Swedish peasant diet was mainly grain-based with bread, porridge, and gruel as basic foods. This preference for grain over a more varied diet such as vegetables, which were better adapted to local conditions, aggravated the situation. Similar human-induced factors were recognized by the new natural scientists of the Enlightenment period. Therefore, both their and our question is the following: when crops failed and no grains were available, what did the people consume, and why?

In the diaries from his youthful travels, the famous biologist and physician Carl Linnaeus (1707–1778) wrote extensively on how ordinary peasants learned to cope with stressful situations, and the fact that they rarely had sufficient grain harvests. The people in central and northern Sweden were much less dependent on agriculture, being largely herders and fishermen, yet they too felt the shortages of grain and tried to compensate with vegetables. Northern survival strategies were actually more diversified than those in the south, as subsistence in the north already included fishing, gathering, and hunting activities [14].

Food safety emerged as an important subject during the Enlightenment period in Sweden; it engaged Linnaeus, his colleagues, and disciples to a high degree. Linnaeus attached particular importance to flour substitutes and emergency bread, porridge, and stew ingredients [15], but he was also interested in wild plants for food and documented whenever possible their uses. This was a free resource, yet often ignored for different reasons [16]. Linnaeus saw his scientific research project as an essential contribution to

improving the food supply, need for medicinal plants, and development of craftsmanship in the country [15].

The knowledge of history, human strategies, nutrition, and different conditions of the past is important for understanding why society has become what it is today. In the case of Sweden, scholars like Linnaeus acted to counteract starvation; he did not solve it, but he and his colleagues set processes in motion which ultimately, together with other factors and actors, brought an end to hunger, not only in Sweden and other countries, but raised combating famine to a global priority. We cannot escape history; we have to relate to it, and try to understand why, who, and how, in order to navigate in the contemporary world. Famines are still occurring in conflict areas and under totalitarian regimes. By studying historical events, survival strategies, measures taken, and effects, we can not only learn about and analyze food shortage and crisis management in a larger perspective, but maybe even offer some solutions to global issues relating to hunger in the present time.

This study explores the complexity governing human ability to cope with hunger and food shortages by contributing a case study from eighteenth-century Sweden. Many more studies from other parts of the world and different historical periods are needed to create a broader picture, but they are outside the scope of this article. Climate, political, economic, scientific, legal, and ecological conditions are important, but also social structures, preferences and attitudes, communication, and dialogue between different groups in a given society. The work of various actors on many levels, including globally influential individuals like Linnaeus and his colleagues who made an impact and changed history, nutrition habits, and food traditions must be studied, when mapping out the multiple factors contributing to historical processes.

## 2. Sources and Methods

This historical study, based chiefly on printed sources from the eighteenth century, written primarily in Latin, Swedish, French, English, and German, highlights how very differently peasants and the educated elite in Sweden handled the lack of food. It also discusses what kind of provision strategies were actually used, especially to substitute cereals during food shortages, in contrast to recommended practices by authorities and scientists. We focus here on the core area of Sweden; a broader comparison with other countries is outside the boundaries of this local case study due to space limitations, and due to the divergent circumstances even in neighboring countries (Norway, Denmark, Russia), including issues like access to hunting and forest resources, or the freedom of peasants. Also, the situation in Sweden's eastern province of Finland (ceded to Russia in 1809) stands apart due to the harsher and colder climate, different cultural influences on subsistence traditions, and usage of forest resources.

For modern scholars, especially ethnobiologists and nutritionists, Linnaeus's and his disciples' detailed writings on food from nature offer a wealth of information. They provide a unique opportunity to study what strategies poor and starving peasants used to cope with food crises, and how the Enlightenment period scientists answered to the challenges of food safety. In particular, Carl Linnaeus's comprehensive authorship is highly useful for ethnobiological research, as he describes both the situation during the food crises in Sweden, and simultaneously provides suggestions on how to improve the peasant diet. The international scientific network Linnaeus created around the middle of the eighteenth century of colleagues and students, who like their teacher made extensive journeys and wrote in detail about their observations, offer important sources, too [17].

Historical use of natural resources belongs to a field which is notoriously difficult to explore. Frequently, it is not feasible to formulate one single research question, or to limit the scope of research to a specific method or even a few clearly distinguishable methods. Human life, topics of subsistence or utilization of natural resources, and the relationship between humans and nature are so complex, intricate, entangled, and multi-dimensional, that we must leave questions and ends open, and modify research to follow the realities we discover, instead of trying to force history into models and methods where it does not fit.

Therefore, historical ethnobiology uses many different methods and data from other fields, among others, ethnography, human geography, linguistics, history, and biology, and combines broad ranges of data from various sources [18]. A historical ethnobiologist can often gather just a couple of scraps from notes or a single piece of data while sifting through large amounts of material, usually ranging from several dozen to hundreds of sources of different kinds, often in many languages, depending on the topic. The researcher must look for information hidden between or behind all kinds of narratives (criteria of the rare evidence), for example, observations, linguistic data, toponyms, geographical reports, material culture, local knowledge, folk beliefs, and so forth. This flexible, receptive, and responsive approach is also the way to proceed when we want to study famine and food provision strategies of the past.

Validation of the data from the eighteenth century is impossible today; there are no informants we can ask, nor can we be sure that our interpretations of the sources would be perceived as “correct” in the eyes of those who lived 250 years ago; probably not, as their world view was very different from ours. Thus, the question is not of correctness or validity, but of perceptiveness, understanding, and the capacity to view historical sources as multidimensional informants. Therefore, source criticism must also take into account the attitudes and views, conditions and environment, experience, and interpretations by the historical researcher [19].

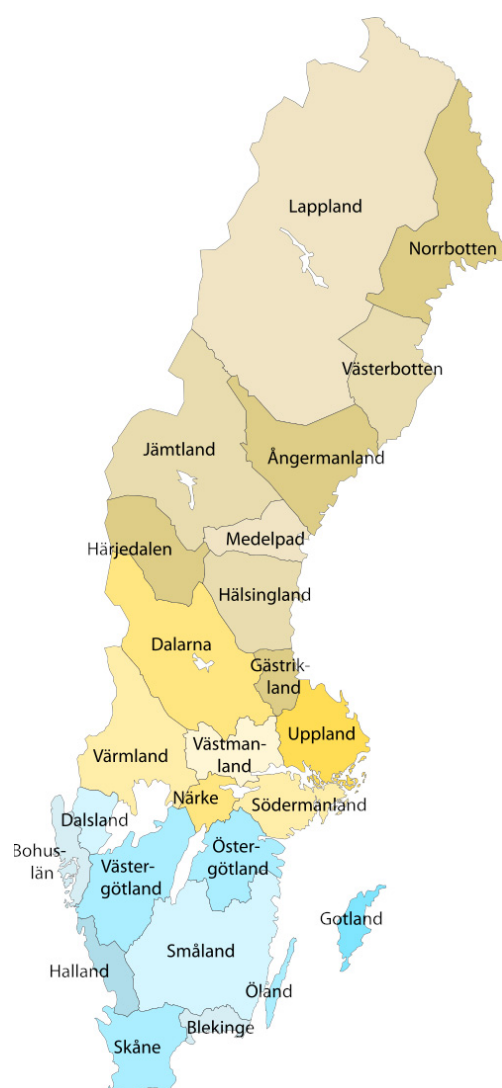
### 3. Results

#### 3.1. Historical and Sociocultural Context

Sweden is an extended country, stretching for 1572 kilometers from south to north (Figure 1). Five vegetation zones have been identified in modern times. Cultivation possibilities vary greatly, and eighteenth-century solutions to food deficiency differed depending on the region [20]. In more productive areas, chiefly in the south and central parts, peasants grew cereals like rye, *Secale cereale*, wheat, *Triticum aestivum*, barley, *Hordeum vulgare*, and in certain parts oats, *Avena sativa*. Peas, *Pisum sativum* var. *arvense*, rutabaga, *Brassica napus*, turnips, *Brassica rapa* ssp. *rapa*, various types of cabbage, onions, and occasionally other vegetables were also cultivated. Herbs and medicinal plants grew along nitrogen-rich village streets, and sometimes on turf roofs of cottages. In the southern regions, planted fruit trees became common in the eighteenth century [21,22]. Agricultural activities were usually combined with animal husbandry: oxen and horses were kept for ploughing and transport; cattle, sheep, and goats provided meat, skins, wool, and milk [11,22]. In some regions, proto-industrial activities (bog iron forging, horn spoon making, knitting of socks for the military) were carried out and sold at markets [23]. In northernmost Sweden, where agriculture was and remains difficult due to low temperatures and short summers, hunting and fishing were crucial parts of livelihoods. In Sápmi (Swedish Lappland), in addition to fishing and hunting, various forms of reindeer nomadism were practiced. The degree of self-sufficiency was relatively high among the rural population, although in some regions significant portions of grain requirements were purchased from abroad. Salted herring was also bought and traditionally an important element in the peasant diet [22].

#### 3.2. Food Crises, Reactions, and the State

The Swedish peasantry lived with narrow margins, and crop failures challenged the sustenance especially in winter and spring. During the Little Ice Age, successful harvests were extremely uncertain. The most critical years were 1695–1701, 1708–1709, 1725, 1731, 1740–1742, 1754–1755, 1759, 1770–1773, 1777, 1783–1784, and 1798–1799 [24]. In the northern parts, above the so-called *limes norrlandicus* (the biologically well-defined transition zone in central Sweden separating boreal forest from the temperate or cold temperate forest), annual grain harvests for bread were usually too small to feed a household. The people subsisted to a greater extent on livestock husbandry, often combined with fishing and hunting [22].



**Figure 1.** The provinces of Sweden (Wikimedia, CC BY-SA 2.5).

Although few crises led to widespread famines, on community and regional levels lost harvests sometimes produced dramatic results. In a letter from 17 March 1772 to his close friend, the physician Abraham Bäck (1713–1795), Carl Linnaeus wrote about the situation in his hometown Uppsala during the spring of that year. He tells the gruesome story about a woman who cut her child's throat, because she had been forced to watch the child suffering "in hunger and tears" [25]. In Grangärde parish, inhabited by Forest Finns in Dalarna province, the same famine was reported to be so severe during winter that many starved to death in their cottages. In isolated settlements, the hungry people made a last effort to mitigate their distress, and many were found with their mouths full of hay and straw. Others attempted apparently to hunt on skis, but the corpses were found later in the forest, often badly mauled by predators [26].

In addition to the cold climate during the Little Ice Age, which limited the variety of grains and plants possible for cultivation, another reason for hunger and starvation was that peasants were accustomed to grains and conservative in agricultural and food ways. In towns, wealthy merchants and immigrants from other parts of Europe kept a varied table, and new foodstuffs, menu suggestions, and cookbooks rich in ingredients and cooking techniques started appearing by the end of the eighteenth century [27]. Therefore, an important question is the following: why did the state not react promptly and adequately,



considering that crop failures occurred recurrently, and they kept a network of local priests, teachers, and other officials who sent in reports and calls for help?

Public debates and suggestions for solutions for diminishing the consequences of famine and relief work by providing starving peasants with grain had already begun in the eighteenth century. Since the 1700s, holding on to traditions was seen both by state and scientists as the most serious obstacle for introducing new food ingredients, but other factors played a role as well. Only in the nineteenth century was the state able to implement efficient measures, which reached even the farthest corners of the country, and by 1870, famines had disappeared in Sweden. Conservatism among peasants was broken by then, but not completely; traces can still be discerned. In rural areas, people eat more foods considered to be traditional in comparison with urban dwellers. Several factors contributed to the end of famines, including the stable and warmer weather conditions after the Little Ice Age waned, improvement of road infrastructure, construction of railways, industrialization, and urbanization. From the middle of the nineteenth century, foodstuffs could be transported easily to remote regions, the last to suffer from hunger [28]. Also, the fact that Sweden did not participate in any wars since 1809 advanced the end of famines; armed conflicts regularly drained the state treasury during the previous centuries.

### 3.3. Famine Foods, Definition, and Cultural Barriers

Detailed documentation about emergency food items exists in Sweden from the end of the sixteenth century, when the first recorded famines struck the country. In different sources such as topographical documents and travel reports, a number of traditional staples and famine foods can be found. Yet, ordinary people would commonly use the same ingredients they normally ate but changed the proportions. As the ethnologist Nils Keyland emphasized in 1919, “famine food” is a relative term [29]. If there was a shortage of grain, more emphasis had to be placed on fishing. If there was no prey from hunts, domestic animals had to be slaughtered. Any attempt to find a feasible definition for emergency bread (Swedish *nödbröd*, as Keyland points out, runs aground on the fact that the meaning of this concept shifts depending on place and time. Bark bread, for example, appears to have been normal food in northern Dalarna and Härjedalen during the eighteenth century, but was used as emergency food in other regions. By the latter half of the nineteenth century, when flour became more easily available throughout the country, tree bark flour was still used, but only in exceptional situations for emergency bread in northern Dalarna [29,30].

Only in the event of a serious famine, when no other means were available, people had to broaden their scope of ingredients, and try to feed on what could be eaten at all, thus using more resources than usual. Animals that otherwise formed no part of the diet were consumed, also pets and pests. Bones were ground into flour, skins were cooked; even old shoes were used when the need was dire. Also, severe famine could force people to eat meat from animals like dogs, foxes, wolverines, various rodents, etc., which were otherwise considered to be taboo [31].

Simultaneously and paradoxically, some cultural barriers could not be overcome, even when people faced death from hunger: horse meat, for instance, was hardly eaten at all [32], although horses were mainly used for transport and agricultural work, but did not provide milk or skins, and thus in principle could be spared. Nor could the peasants be convinced that the Icelandic lichens, *Cetraria islandica* (L.) Ach., were useful as a bread ingredient, despite several attempts by the government and natural scientists to spread knowledge about its usefulness as food [29,31,32]. Survival cannibalism data are absent in Sweden [33]. Famines sent many people out into the roads, however, to beg for food (Figures 2 and 3).



**Figure 2.** Images of poor and starving people are uncommon from the eighteenth century, but there are a few exceptions, such as the wash drawings by the artist Elias Martin. Old man begging (Courtesy of National Museum of Fine Arts, Stockholm).



**Figure 3.** Poor old woman trying to trade her glasses for a piece of bread. Eighteenth-century wash drawing by Elias Martin (Courtesy of National Museum of Fine Arts, Stockholm).

### 3.4. Gathering Activities

The subsistence diet of Swedish peasants was simple overall and not very varied, dominated by carbohydrate-rich porridge and bread, sometimes with added fat or fish for increased energy content. The high proportion of cereals signified that the diet was bulky; it created a feeling of satisfaction (full stomach) and provided for most of the energy intake of the eaters. Dairy products, fish, and sometimes meat were the main protein supplements [16,34].

Therefore, gathering activities provided important supplementary foods, especially in the north, where peasants combined different food provision strategies: eggs from wild waterfowl were widely harvested in spring [35], nestlings were caught and consumed [36],

and in early spring the large flocks of snow buntings, *Plectrophenax nivalis* L., provided an essential source for protein [37]. Most freshwater fish species were captured and utilized as food, and eaten fresh, dry, or fermented. Northern peasants used their surrounding landscape extensively and for multiple purposes, far more than the southerners, although wild plants played a rather small role in their diets [16]. Instead, their livestock were fed with some wild plants. The cattle grazed in the forest, mountains, and meadows in the summer, and the winter feed consisted largely of collected leaves, lichens, various types of bark, and hay, *Carex* spp.; *Equisetum fluviatile* L., from wet meadows [11,16,38].

Women and children in particular collected tender leaves in the spring to cook a vegetable stew; the species utilized depended on availability and ecological conditions, often varying according to region. Linnaeus described in his travelogues this practice at several locations: peasants in the southern island of Öland, he noted in 1741, collected wild rocambole, *Allium scorodoprasum* L., to make stew. When he passed through the central province of Östergötland, Linnaeus observed that nettles, *Urtica dioica* L., were “picked for vegetable stew, as is generally done in Sweden in the spring, as long as this nettle is tender and not yet reaches a finger’s length” [39]. Regarding common bugloss, *Anchusa officinalis* L., Linnaeus stated that the tender plant was cooked in the central province of Uppland in the spring. The leaves of white nettle, *Lamium album* L., were also collected in this season, together with nettle, for stews [40].

Seeds of *Chenopodium album* L. were widely gathered, dried, ground, and mixed into flour for baking bread during crop failures in northern Sweden. Linnaeus observed in the province of Dalarna in 1734 that the locals used the grains of *Avena fatua* L. for flour. Minorities such as the Sami people in the far north, and the so-called Forest Finns (Swedish *skogsfinnar*) in central Sweden, subsisted on a more pronounced gathering economy, but even among them only a few species of wild plants were used as regular foodstuffs [29,41]. The Finnish-speakers in northern and central parts of Sweden used the rhizomes of *Bistorta vivipara* (L.) Gray, ground into flour, when baking unleavened bread [16,29].

Wild apple, *Malus sylvestris* Mill., and wild pear, *Pyrus communis* L., were used by the peasantry in the island of Gotland and other parts of southern Sweden. Apples were used for soup, and in some locations regarded as food only for poor people and beggars. Other fleshy fruits and berries used in the kitchen were wild cherry *Prunus avium* L., bird cherry, *Prunus padus* L., hawthorn, *Crataegus* sp., black currant, *Ribes nigrum* L., and Nordic currant, *Ribes spicatum* E. Robson, and Swedish whitebeam, *Scandosorbus intermedia* (Ehrh.) Pers. These fruits and berries were dried and used as additives in pancakes or in bread, and often salted and then consumed [16,40,42].

Sugar was still expensive and rare until the beginning of the nineteenth century. Wild berries did not form a substantial part of the diet anywhere in Sweden; most are sour in taste, and increased in popularity only after sugar became cheaper and widely available. Some berries were dried, ground with flour, and baked into breads, however. Cloudberry, *Rubus chamaemorus* L., and lingonberry, also called cowberry, *Vaccinium vitis-idaea* L., were used locally by peasants and Sami in the north. Forest Finns utilized large quantities of *V. vitis-idaea* berries in a gruel they called *hillo* (today the word *hillo* means “jam” in Finnish). Linnaeus noted that berries were mostly consumed by children directly on the spot in the fields and forests: bird cherry, *Prunus padus* L., was appreciated by Norrland boys, and the berries could also be sprinkled with salt and then eaten. In a similar way, bunch berries, *Cornus suecica* L., bog bilberry, *Vaccinium uliginosum* L., and the berries of Swedish whitebeam, *Scandosorbus intermedia* (Ehrh.) Sennikov, were consumed in the northern boreal forest area [16,40,42,43].

In southern and central Sweden, hazelnuts, *Corylus avellana*, were harvested in large quantities in some areas, either for sale or household consumption. The nuts were specially appreciated by farm servants as entertainment for Christmas. Local regulations controlled the harvesting of hazelnuts, and in Öland, the poor hill cottage squatters (Swedish *backstugusittare*), the landless rural inhabitants, plundered yellow-necked mouse, *Apodemus flavicollis* (Melchior, 1834), nests for the collected winter supply of hazelnuts, which were of



excellent quality. This ancient way of raiding rodent nests has occurred in many places in the world, including Siberia [16,44].

Children made use of acid leaves and sweet plant parts as snacks, and perhaps a vitamin supplement, but these were seldom a significant part of the diet in summer and autumn, except possibly for young shepherds. Sorrel, *Rumex acetosa* L., rhizomes of polypody, *Polypodium vulgare* L, and fresh needles from Scots pine, *Pinus sylvestris* L., are examples of plants that children liked to collect and eat until recently. They would suck nectar from the flower pipes of other species, too [16,40,43]. The sweet sap of Scots pine, *Pinus sylvestris*, and the birch, *Betula* sp., were particularly popular with children [45].

3.5. Flour Substitutes for Emergency Bread

To cope with grain shortages, peasants in Sweden developed various strategies: the most common was to make flour last longer through the addition of other edible food items, such as chaff, dried berries, or roots. During the eighteenth century, it was almost the norm for peasants and common people in many regions to mix other substances into grains towards the end of spring, when supplies began to run out. Linnaeus noted in late spring 1732 in the province of Ångermanland that flatbread was baked from one barrel of barley and three barrels of chaff [46]. The provost Olof Broman wrote about the province of Hälsingland around 1720 that no peasant could utilize pure grain flour, but always had to add chaff when grinding flour [47].

When famines struck in earnest, it was no longer sufficient to “dilute” the flour. The peasants had to help themselves to a series of other ingredients. They would grind and chop much that was actually unfit for bread, including mash, chaff, flax seed husk, bark, hazel buds, nettles, leaves, hay, straw, white moss, nut shells, vetch, etc. Consuming these non-nutritious foods made people weak and their bodies bloated and fragile. Thus, countless people died from malnutrition. A report from northern Sweden stated that in harsh years, straw, clover, *Trifolium pratense* L., sorrel, *Rumex acetosa* L., and fireweed, *Chamaenerion angustifolium* (L.) Holub., bones of cattle and birds, etc. were chopped, dried and ground, and mixed with flour [29,43]. Beggars, who could access even fewer food stores than peasants, searched for bones from slaughtered mammals to cook soup [32].

Numerous wild plants were used to sift out the flour, or substitute porridge and gruel, which formed an essential part of the peasant diet (Table 1). Linnaeus noted in Västerbotten in 1732 that gruel was made of the roots of bogbean, *Menyanthes trifoliata* L. It was widely used by peasants in northernmost Sweden as a flour substitute. Also, the root of bog arum, *Calla palustris* L., especially in times of crop failures, was much utilized in northern Sweden for bread [16,29,32,43] (Figure 4). A French traveler, Abbé Reginaud Outhier, visiting Tornedalen in the late 1730s, was served a bread made of half barley, *Hordeum vulgare*, flour, and half straw. Hunger caused him to view this bread as delicious [48].

Table 1. Famine food plants in eighteenth-century Sweden.

Scientific Name	Plant Part Used	Purpose
<i>Pinus sylvestris</i> L.	cambium	bread
<i>Picea abies</i>	cambium	bread
<i>Calla palustris</i> L.	rhizomes	bread
<i>Menyanthes trifoliata</i> L.	rhizomes	bread
<i>Nuphar lutea</i> (L.) Sm.	rhizomes	bread
<i>Bistorta vivipara</i> (L.) Gray	rhizomes	bread
<i>Elytrigia repens</i> (L.) Desv. ex Nevski	rhizomes	bread
<i>Corylus avellana</i> L.	buds, shells	bread
<i>Chamaenerion angustifolium</i> (L.)	spring shoots	bread, stew
<i>Aegopodium podagraria</i> L.	leaves	stew
<i>Allium oleraceum</i> L.	leaves	stew
<i>Allium schoenoprasum</i> L.	leaves	stew

Table 1. Cont.

Scientific Name	Plant Part Used	Purpose
<i>Allium scorodprasum</i> L.	leaves	stew
<i>Anchusa officinalis</i> L.	leaves	stew
<i>Anthriscus sylvestris</i> (L.) Hoffm.	leaves	stew
<i>Tripolium pannonicum</i> (Jacq.) Dobrocz.	leaves	stew
<i>Avena fatua</i> L.	grain	bread
<i>Barbarea vulgaris</i> R. Br.	leaves	stew
<i>Cirsium palustre</i> (L.) Scop.	leaves	stew
<i>Cirsium helenioides</i> Hill	leaves	stew
<i>Crambe maritima</i> L.	leaves	stew
<i>Galeopsis bifida</i> (Boenn.) Fries	leaves	stew
<i>Campanula latifolia</i> L.	leaves	stew
<i>Hypochoeris maculata</i> L.	leaves	stew
<i>Lamium album</i> L.	leaves	stew
<i>Lamium purpureum</i> L.	leaves	stew
<i>Ribes uva-crispa</i> L.	leaves	stew
<i>Sinapis arvensis</i> L.	leaves	stew



**Figure 4.** Ground starchy rhizomes of bog arum, *Calla palustris*, were regularly used for bread by the peasantry in northern Sweden in the eighteenth century. During grain shortages, their use increased (Illustration by J.W. Palmstruch, *Svensk botanik*, 1815).

Some of these species were used locally, while others were used as emergency food in large parts of Sweden. Sources: [16,29,31,32,39,40,42,43,47].

### 3.6. Bark Bread

A popular substance added to flour, abundantly available in forest-covered parts of Sweden, was tree bark, specifically the cambium layer or phloem of pine, *Pinus sylvestris* L. Traces of bark have been found in prehistoric bread from archaeological sites [4,16,29,49]. Bark bread does not leaven as pure grain bread because of the bark content; the more bark to flour rate, the slower the leavening, so bark bread was often baked as a simple flat bread. Bark flour could also be used for porridge, but it has a bitter taste, and was more popular for bread [29,32,34]. In northern Sweden, pine bark was a common addition to flour also in “good” years, but in the nineteenth century, it fell from use and was employed mostly as a

flour substitute during times of famine [29,34,50]. In modern times, bark bread has been revived by people interested in historical culinary practices.

The energy content of bark flour is 82 kcal per 100 g. Due to the increasing economic importance of timber, state authorities were eager to replace bark with other substances like lichens in the eighteenth century. Propaganda efforts were intensified during crop failures, but the peasants rejected lichens and mushrooms as cattle fodder. The Sami in the far north harvested bark from pine trees, but for another reason than bread: the inner bark was wrapped in birch bark, and heated in fire to make it a sweet snack. This kind of harvesting of pine bark has been documented from late medieval times until the nineteenth century in Sweden [39,43,50,51].

#### 4. Scientific Proposals for Famine Food

##### 4.1. Grain Substitution

Linnaeus's travels in northern Sweden in 1732 and Dalarna in 1734 caused him to become aware of the periodic food shortages affecting people in northern and western forest and mountain regions. Consequently, he began compiling lists of plants that could be used as substitutes for cereals. In a surviving manuscript, he lists no less than 29 plants whose roots or leaves could be used for flour or vegetable stew [52].

Several writings by Linnaeus deal with the subject. In *Ceres noveboracensis* (Ceres of the North, 1732), he writes, "when there is famine and grain shortage, the peasant must bake bread with little or no grain, without losing his health". Linnaeus offers detailed information about how to prepare oat bread, mixed bread, chaff bread, mash bread, pea bread, potato bread, bread of yellow star-of-Bethlehem, *Galium lutea*, bark bread, bog arum bread, water clover bread, alder and hazel bud bread, pine trunk bread, red clover bread, field pearl bread, seaweed bread, bean bread, and fish bread [53].

Linnaeus also presided over many students' dissertations, which he had written himself (though they had to add footnotes, print, and defend them), on locally available flour depressants and emergency bread substances. In 1748, he collected notes into a dissertation, *Flora oeconomica* (Economic Flora), which was published in Swedish the following year by the respondent, in order to make it available to a wider readership [54]. In addition to the plants listed in *Ceres*, the *Flora* mentions the roots of couch grass, *Elytrigia repens*, and scented Solomon's seal, *Polygonatum odoratum*, seeds of docks, *Rumex* spp., berries, acorn, and beech nuts [16,55,56]. The *Flora* also mentions several emergency bread varieties.

In 1754, another thesis on wild plants as food, *Plantae Esculentae Patriae* (Native Plants of the Country [Sweden]) was published, and a translation into Swedish appeared the same year. Additional plants suitable for bread-making were included, among them the roots of sea clubrush, *Bolboschoenus maritimus*, Alpine bistort, *Bistorta vivipara*, dropwort, *Filipendula vulgaris*, marsh woundwort, *Stachys palustris*, viper's grass, *Scorzonera humilis*, chicory, *Cichorium intybus*, seeds of rye brome, *Bromus secalinus*, floating sweet-grass, *Glyceria fluitans*, darnel, *Lolium temulentum*, common knotgrass, *Polygonum aviculare*, black bindweed, *Fallopia convolvulus*, buckwheat, *Fagopyrum esculentum* Moench, and also field cow-wheat, *Melampyrum arvense*, bear-berry, *Arctostaphylos uva-ursi*, hawthorn berries, *Crataegus laevigata*, rowan berries, *Sorbus aucuparia* L., and rose hips, *Rosa* ssp. About field cow-wheat, we are told that its seeds "serve also for emergency bread, although it turns black and slightly bitter" [57]. Finally, in 1757, the treatise *De pane diaetetico* (About diet bread) was published, a review of different types of bread [56].

##### 4.2. Linnaeus's List, Social and Political Reverberations

Linnaeus had several reasons to return in the 1750s to the issue of emergency bread. Starvation had not been eliminated, the state seemed helpless to alleviate the suffering of the people and to curtail the numbers of famine deaths, and the peasants did not heed to his proposals for grain substitutes. The harvest failure of 1756 prompted him to send to King Adolf Frederick a list of useful domestic plants and substances. He was obviously skeptical about some of the substitutes the peasantry used: the list was justified, in Linnaeus's view,

because thousands of poor citizens were threatened with the “terrible scourge of hunger, from which they must not only perish themselves, but also, what is still more horrible, to hear their little children’s wailing, distress and fear of death for want of food, without being able to help them, when they have spent all their meager possessions on food and are in the end unable to obtain nutrition” [58].

Linnaeus mentioned also that poor peasants were forced to resort to hazel and oak buds, as well as many other “unnatural” foods, which added to their misery. *Collegium Medicum*, the medical authority in the capital Stockholm, did not object to Linnaeus’s suggestions, as they did not harm or contain any dangerous substances for the human body. The authorities recommended publication of the list, and “an appropriate amount of it should be sent out for public information” (Table 2).

**Table 2.** Bread substitutes and emergency foods recommended by Linnaeus (1757).

Scientific Name	Plant Part Used	Purpose
<i>Bistorta vivipara</i> (L.) Delarbre	rhizomes	bread
<i>Polygonatum odoratum</i> (Mill., Druce)	rhizomes	bread
<i>Chamaenerion angustifolium</i> (L.) Holub.	rhizomes	bread
<i>Carum carvi</i> L.	rhizomes	bread
<i>Scorzonera humilis</i> L.	rhizomes	bread
<i>Tragopogon pratensis</i> L.	rhizomes	bread
<i>Calla palustris</i> L.	rhizomes	bread
<i>Elytrigia repens</i> (L.) Desv. ex Nevski	rhizomes	bread
<i>Gagea lutea</i> (L.) Ker-Gawl.	rhizomes	bread
<i>Daucus carota</i> L.	rhizomes	bread
<i>Cichorium intybus</i> L.	rhizomes	bread
<i>Glyceria fluitans</i> (L.) R. Br.	seeds	bread
<i>Trifolium pratense</i> L.	buds	bread
<i>Onopordum acanthium</i> L.	spring shoots	bread
<i>Arctium lappa</i> L.	stem	cooked
<i>Blitum bonus-henricus</i> (L.) Rchb.	stem	cooked
<i>Primula veris</i> L.	leaves	stew
<i>Sinapis arvensis</i> L.	leaves	stew
<i>Sonchus oleraceus</i> L.	leaves	stew
<i>Anchusa officinalis</i> L.	leaves	stew
<i>Ranunculus ficaria</i> L.	leaves	stew
<i>Cardamine pratensis</i> L.	leaves	stew
<i>Barbarea verna</i> (Mill.) Asch	leaves	stew
<i>Malva pusilla</i> Sm.	leaves	stew
<i>Taraxacum</i> sp.	leaves	stew
<i>Cirsium palustre</i> (L.) Scop.	leaves	stew

Sources: [15,59].

Based on information collected by Linnaeus himself during fieldwork, and from international botanical literature, mainly in Latin, German, French, and English, this list describes domesticated plants which could be used for food, and especially for bread. Linnaeus stated that most emergency plants for bread are rhizomes, which cannot be used in the same way as cereals, because they disintegrate during fermentation. They should instead be “baked on an iron [pan] without yeast, like the thin bread of the Norwegians or the hard cakes of the Southerners” [57].

With the exception of bog arum, *Calla palustris* L., and fireweed, *Chamaenerion angustifolium* (L.) Holub., both of which were often used in bread-baking in northern Sweden, the other plants were not emergency ingredients used by the peasantry, but plant species which Linnaeus had discovered from different sources, and learned that they could be used for food. The information on *Bistorta* among the Samoyeds, for example, is taken from Johann Georg Gmelin’s (1709–1755) *Flora siberica* (Siberian Flora, 1747–1749) [60], while the benefits of scented Solomon’s seal are based on an account by the bishop Carl Fredrik

Mennander (1712–1786), who reported that the inhabitants of Satakunta in central Finland prepared emergency bread from its root [61].

Theological objections to Linnaeus's lists were not slow in coming: famine was a divine punishment, and the natural scientists in Uppsala should not oppose God's will. Some claimed it was also not entirely clear how scholars could contribute to improve human conditions with their ideas for public information. The criticism stopped after a while, as Linnaeus was thoroughly convinced, and convincing, in his understanding that it was through knowledge of the benefits of plants and animals that prosperity should be built. It was God's intention that humans should draw from nature's infinite storehouse, he maintained. All that remained to be done was to figure out how to use this diversity: "Whoever knows the plants will never have to suffer from the lack of growth in our country", Linnaeus declared during a lecture in 1763 [25].

The exploration of emergency food and the dissemination of knowledge became an important part of the Linnaean project. Many of his contemporaries felt compelled to contribute data, and this project was also supported by the Royal Swedish Academy of Sciences. Several of Linnaeus's disciples devoted themselves to the subject: in connection with the crisis years of 1757 and 1773, for example, the industrious Peter Jonas Bergius (1730–1790) published studies on useful bread ingredients. Johan Peter Falck (1733–1774), who traveled in Russia and Siberia in the 1770s, noted together with his team member Johann Georgi (1729–1802) several Siberian foodstuffs for emergencies. Petrus Holmberger (1745–1807), otherwise an unnoticed priest in Östergötland, studied under Linnaeus in the 1760s, and between 1774 and 1782 published a series of articles on the domestic uses of wild plants [62].

The publications by Linnaeus and his students aimed at improving food availability and removing misery, starvation, and poverty. These publications should be seen as examples, in the context of the Enlightenment period, as writings about utilization of wild plants for food, which came to characterize much of the efforts to improve conditions for the populations throughout Europe [32,62].

#### 4.3. *New Substitutes: Potatoes, Horse Meat, and Lichens*

During the eighteenth century, several attempts were made by the state through local priests and teachers to make the Swedish peasantry try new food items, in order to improve their agricultural production and vary their diet. These efforts were intensified in conjunction with famine years, and different foodstuffs became the subject of campaigns with varying results; among the most intense were the efforts to introduce potatoes, horse meat, and lichens.

Potatoes were a suitable crop to grow in Sweden, but despite persistent attempts by educated large landowners, clergymen, teachers, and district governors, it took a long time before the starchy tubers were accepted at all as food by the peasantry [63]. Today, potatoes are an indelible part of Swedish cuisine, just like in many other countries, but its introduction was long delayed because of peasants' suspicions against the new crop.

The antipathy towards horse meat was widespread as well: only the Sami and some marginal groups traditionally utilized the meat [64]. In order to transform prejudices, the aristocrat Adam Germund Cederhielm (1740–1804), with a few others from the same social class, became an enthusiastic advocate for horse meat in the 1780s, but they faced strong opposition from members of the Academy of Sciences, who strongly criticized the project [65].

A further failed attempt by scientists and authorities during this period of emerging relief work was a campaign to teach peasants to eat lichens. Sweden was not unique in trying to introduce lichens as human food; the same occurred in many countries, including France, Germany, Norway, and Russia. However, lichens became a little part of the human diet in those countries as in Sweden. Despite this, many efforts were made, for example, by the provincial physician Johan Hesselius (1685–1752), whose article was published in



1775 on reindeer lichens, *Cladonia rangiferina* (L.) F. H. Wigg, promoting lichens as a suitable substitute for flour when crops failed [32].

The botanist and economist Samuel Liljeblad (1761–1815), famous for his floral works published at the end of the century, defended a thesis about famine bread in 1788. During a tour in northern Sweden, while collecting botanical specimens, he encountered “everywhere” starving peasants. He kept a diary throughout the expedition, providing later generations with an opportunity to follow his journey and work. The crops had failed the previous year, and the local people were severely afflicted by famine. When he arrived in the province of Ångermanland, he was so deeply moved by the situation that his botanical tour was converted into an expedition in applied science and propaganda. Using his knowledge in economic botany, Liljeblad advocated the use of lichens as food. He gathered Icelandic lichens, and with the help of the clergymen’s wives, he prepared gruel and bread, which he served to the local people, simultaneously teaching them how to cook lichens [32].

Liljeblad himself and his travel companions sustained themselves on the nourishing lichens, and he documented in great detail in which parishes he demonstrated their use and the reaction of the peasantry. Some people did not accept lichens at all, while others gratefully received instruction. Liljeblad recommended others to repeat his experiment; indeed, he had several successors. Promotion of lichens continued throughout the nineteenth century; many booklets were published and several people tried to teach peasants to substitute flour with lichens. During the last severe famine in 1867–68, multiple campaigns were arranged to convince the peasantry to use them as food. The attempts to introduce a new, freely available food utterly miscarried, however. For the peasants, lichens remained feed for livestock, not for humans [32]. Even today, when many people in Sweden gather berries and mushrooms, lichens are no part of the activities [16].

## 5. Discussion

How did Swedish peasants survive harvest failures during the eighteenth century, and what did they substitute for their usual foods consisting mostly of grain? From the data and sources discussed above, it becomes clear that they mainly used the foods and substitutes they knew, often relying on the information transmitted from previous generations. In the first phases of starvation, they “extended” grain flour by adding other ingredients depending on the availability of grain. Yet, why were peasants focused mainly on grain substitution, and not, for instance, on enriching their diet with wild plants freely available from the surrounding forests and fields? Considering the forests were full of berries, mushrooms, and other possible edibles, why did peasants remain faithful to grains and substitutes for cereals?

One reason was identified already during the Enlightenment period: conservatism among peasants, and their strong adherence to traditions. Scientists and state authorities obviously focused on grain substitutes because the peasants’ main food was bread and porridge, but the higher social classes tried other foodstuffs as well. The divide between the educated urban dwellers and large landowner class versus the rural inhabitants was wide; international trends trickled down only gradually to the countryside, especially to settlements in the farthest northern provinces, mountainous or deep forest areas, where both non-local foodstuffs and news traveled slowly [32].

Another reason for keeping to traditional knowledge about emergency food, even on the verge of starving to death, in times when one would eat anything just to survive, was possibly a perceived security: if earlier generations could survive on these foods, we can manage, too. Furthermore, there were various beliefs among the peasantry causing them to avoid certain new foods, or taboos like the one against horse meat. Some foods were associated with animal fodder, like lichens, and specific proposals were rejected simply because they were new and unknown, like potatoes. Certain plants used for emergency food traditionally were actually toxic and caused some damage to health; however, this did not hinder their use by peasants [66].

The natural scientists' main problem was perceived by the scholars themselves as the distribution of information about new edible plants to starving peasants in remote regions. The only reliable channel was demonstrations by academically trained priests, whose task was to teach their parishioners not only religion, but also other skills like reading, horticulture, medicinal practices, or hygiene [67]. How efficient priests were in teaching the local people and cooperating with natural scientists, and on the attitudes of the clergymen and their wives, were influential factors in the success in conveying new ingredients and preparation methods to peasants.

Possibly the scientific suggestions were too theoretical and "foreign" even for some local priests and teachers. Scholars in the eighteenth century collected empirical data in the field extensively, but they also added literature from other countries and contexts. Linnaeus kept up a large correspondence with scholars throughout the world, and he received or bought and sent abroad copious amounts of natural science literature, seeds, roots, and diverse parts of plants or animals. The scholars remained, however, a separate group from priests and teachers, who chiefly focused on local issues and had less access to international data.

The economic literature written during the Enlightenment period in Sweden is very important for researchers today, as it provides insights on one hand into what people actually consumed as food and emergency substitutes, how they viewed nutrition and food, both daily food and emergency food, and on the other hand how the emerging Swedish scientists concluded what plants or resources had the potential to be used in different vegetation zones in the country. Unfortunately, some modern authors confuse these two categories; the descriptions and prescriptions must be clearly kept apart.

An important question we must leave to historians to answer in greater detail is why the state failed in supporting its people with food supplies during the eighteenth century. Sweden was heavily dependent on grain imports from the European continent. Linnaeus, his disciples', and colleagues' engagement for finding alternatives to cereals and new famine foods shows that natural scientists tried to fill the gap between the majority of the population—the starving peasants—and a state which was incapable of taking care of the needs of its citizens. The scholars were also concerned about the national economy, seeing money flowing out of the country, and identified an important mission in working for self-supporting subsistence in Sweden through the discovery of all kinds of economic resources in the local environment. In a sense, the modern Nordic Cuisine is a follow-up to Linnaeus's mission, encouraging the use of local wild plants and ingredients from nearby nature.

The repeated fiasco of the state during famines certainly did not raise or create trust among the peasants. Distrust towards the state and anybody seen as its representatives, natural scientists included, is probably a further reason why peasants did not adopt with great enthusiasm any of the scientific proposals. The lack of confidence in authorities in the eighteenth century stands in stark contrast with the modern state of Sweden, which enjoys an exceptionally high degree of trust among its citizens. Seemingly the state has managed to build faith among its citizens also in terms of food security after famines were removed at the end of the 1860s.

Finally, the question of how feasible the scientific proposals were must be discussed. Not all wild plants grew everywhere in Sweden, and not all cultivation plants could be grown in the whole country. It is not clear if specific wild plants were abundant enough to feed all people in a given environment. Furthermore, to use a specific plant, the peasants had to know it by sight, smell, and feel, and to discover where it was available (local environmental knowledge), gather in large enough amounts, yet with a minimum waste of precious energy while starving, and know how to prepare it. The work in gathering and preparing wild plants for food could also be perceived as excessive in comparison with the resulting quantity of grain substitute. In other words, would the gathering activities yield an economically sustainable harvest from the point of view of hungry people? Probably not.

In addition to economy, another factor must be considered: filling up bread flour with bulk like bark, husks, seeds, etc., provides despite the “dilution” more energy than wild plants or mushrooms with low energy density. The energy profit of wild plants is poor, and it was far too meager for charcoal burners or forestry workers, for example, who had to work outside in freezing temperatures of  $-30^{\circ}\text{C}$  and lower. The heart-rending reports by Linnaeus and his colleagues about children wailing for food reflect the reality: children have smaller stomachs and need to eat more often to get enough energy. The rationale behind focusing on bread substitutes and grain was not only tradition, beliefs, perceptions, or lack of trust, but also the question of energy, which preferably should be complemented with proteins from meat or fish, and fats.

The food strategies of peasant populations in historical times have received little attention so far in research, but without them, the picture remains incomplete. Studies of pre-modern famines and subsistence crises in neighboring countries, including during the Little Ice Age, primarily consider political and social factors, and particularly focus on causes and demographic aspects such as higher mortality [68]. There are studies from other countries distant from Sweden, but because of ecological and especially political and temporal differences, comparisons are hardly meaningful. For example, an interesting study of what people ate during the Dutch Hunger Winter in 1944–1945 [69] or the studies available from contemporary Africa [70] can be used for a broad discussion, but the conditions are clearly different from eighteenth-century Sweden. Anthropologist Paul E. Minnis has recently published a book, which is a comparative study of famine foods, using ethnobotanical data to survey foods that people turn to in times of food shortage [71]; but most significant, especially for the Nordic countries, is Eidlitz’s work, albeit partially outdated, about conditions in the circumpolar region.

Interestingly, ethnographer Kerstin Eidlitz emphasizes a kind of sequence of foods and other edibles that people resort to in a food crisis. First, they eat larger quantities of food they would in normal conditions consume in smaller quantities, or not fully utilize. Then, they turn to vegetables and fish they would not eat as everyday food, and animal parts that they would not usually touch as food. The next step is to eat domestic animals that they would not consume if they had other foods. Then come skins, shoes, and other items otherwise not considered food. In case of extreme distress, carcasses, soil, sawdust, and other things that fill the stomach are eaten. In most extreme cases, they eat human corpses. Such an extreme situation is not described from Sweden in the source material available to us, not even from the most extreme years of famine in the 1770s [31].

These questions should be researched in depth, and analyses about famines also must take cultural beliefs, taboos, attitudes and understanding, preferences, traditions, stress, and local knowledge, among many other factors, into account. Even in the context of food crises, cultural considerations exist in people, and although they are under stress and try to cope with difficult situations, they do not necessarily take positively to any new proposal for their increased well-being; in fact, they might react negatively because they are under strong pressure. People primarily eat what is reasonable to eat, that is what is already part of the diet, but in crises, those ingredients become even more important than usual. It is only when the crisis intensifies that the boundaries of what can be eaten are broken. The natural scientists and the state authorities in the eighteenth century believed that people who are starving will accept anything they are offered, but this was not the case, for a simple reason: in order to learn, the recipients of any teaching should not be under stress, and they need to have enough nutrition so that their brains can function normally.

## 6. Conclusions

Eighteenth-century Swedes lived not only in severe climate conditions, but also in a breaking point in time. An earlier understanding about food and nutrition gave way before a radically new Enlightenment period, with a scientific approach about what the human body needs, and about cooking and eating. International writings about food resources in nature were permeating into the world of scientists and state authorities in

Sweden. Linnaeus took up the challenge of finding locally applicable solutions for the recurring famines during the Little Ice Age. But it took more than a century until the multiple campaigns he and his colleagues and students started and authorities instituted had any visible effect on the rural population in Sweden.

The warming climate improved cultivation conditions in the nineteenth century, and industrialization and increased urbanization also affected the change in the Swedish diet, transforming it from mainly grain-based dishes like bread, porridge, and gruel, to a more varied and nutritious cuisine. Urban menus gradually became more international, and gastronomy appeared as a concept which city and town dwellers appreciated, while the peasants continued with traditional foods until far later, and still do so until today to a larger degree than urban inhabitants. Many Swedes continue, however, to eat porridge or gruel especially in the mornings, as they are seen as healthy. Bread is also common food. The other daily ingredients and foodstuffs are often international; travels to other countries, and the high degree of immigrants, contribute to the availability of a wide range of different foods and dishes from all over the world in restaurants, food stalls, and supermarkets.

This article set out to answer two main questions: what food strategies Swedish peasants used during famines, and how the natural scientists in the eighteenth century viewed and suggested to solve the problem of starvation in the country.

On the *descriptive* side, Linnaeus and his colleagues and disciples documented the emergency foods they discovered or heard about from peasants, while working in the field during their extended journeys and stays in different parts of the country. When no alternatives were available or foods that were perceived as edible, like wild plants or fish, or no expected cereals from relief works reached a starving region, people were willing to eat what was usually understood to be inedible such as chaff or straw, although these ingredients were not nutritious. They were mostly added to flour and baked into bread. Some ingredients, such as cambium from pine and roots of bog arum, were part of the normal diet for many people, especially in the north of Sweden, while others consumed them only as emergency food; regional conditions could vary greatly.

On the *prescriptive* side, Swedish natural scientists, with Linnaeus at the forefront, and the state authorities tried to campaign in different ways for the introduction of new foodstuffs among the peasantry, with the goal of improving agriculture and diet, and to remove the threat of recurring famines. This propaganda intensified in conjunction with famine years, because then perspectives to obtain enough food were darkest. The educated class in Sweden offered, as they thought, satisfying solutions to the peasants. Yet, these refused the novelties: the three foodstuffs which became the special subjects of intensive propaganda campaigns to alleviate starvation required a century to be accepted to at least some degree. Of the three, only one, potato, became a staple food. Although these “newfangled” food items, as viewed by the rural population, were nutritionally quite adequate, they were not taken up by the peasants, among others, for cultural reasons and conservative views about what is human food, and distrust towards authorities. We would also argue it was because the peasants could not process new information, being malnourished during stressful times of famine, and for energy considerations that they continued to rely—with mixed results—on traditional famine bread and food substitutes.

As early as the first half of the eighteenth century, the potato appeared on the menu of the Swedish elite, but because of rural resistance, it was not until a century later that farmers began to grow potatoes in order to make their flour last longer. Horse meat was less successful: although there were several advocates during the second half of the eighteenth century, it was not accepted as food until the end of the nineteenth century, with emerging industrialization and urbanization, but it is still not popular in Sweden. In the late eighteenth century, pamphlets advocating the use of lichens as food were published, but this freely available food resource was never accepted by peasants. The promotion of lichens continued also through the nineteenth century, together with campaigns for mushrooms as food, but did not achieve much success; mushrooms, on the other hand, became popular.

At the beginning of the nineteenth century, the worst years of hardship were over for Sweden, and the dependence on grain imports from abroad to meet the country's bread needs was reduced. The widespread cultivation of potatoes in the nineteenth century contributed much to a better food supply when grain was scarce. Poor growth continued to affect the country for several decades, but mortality rates fell dramatically after the worst emergency years and severe crisis years of 1810–1811. Improved political measures, transportation and communication infrastructure, and the fact that Sweden enjoyed a long-lasting peace after 1809 removed the threat of famine completely after a final hunger crisis in the north during 1867–1868. Future research can, for example, deepen the temporal or spatial aspects, or discuss in more detail folk beliefs, attitudes, or other elements we have highlighted in this article.

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