

EDIBLE PLANTS OF THE ARCTIC†

A. E. Porsild*

Introduction

PLANTLIFE, everywhere in the Arctic, is too sparse, dwarfed, and poorly developed to make any considerable contribution to the food supply of man. Only a few arctic plants produce edible and nourishing roots or stems, and only near the southern fringe of the Barren Grounds are there some that regularly produce small, edible fruits. All plants, however, no matter where they grow, have some food value, and many, especially those that are green, are potential sources of vitamins, besides containing variable amounts of fat, protein, sugar, or starch.

Primitive man in the Arctic, however, has probably always been carnivorous, securing his food by hunting, fishing, or in some instances from domesticated animals, and only to a very small extent has he ever supplemented his food directly from the vegetable kingdom. Possibly he first came to use plants as food by accident, as a last resort when other sources of food failed him; perhaps he gradually developed a taste for some of the plants he had experimented with in this manner; or conceivably, he may have observed that some carnivorous animals, as for example, the polar bear, at certain times of the year "loosens its bowels by eating grass". Although he often starved when hunting and fishing failed, his food habits, from a dietary point of view, must always have been highly satisfactory, for not until he began to substitute "white man's" food for his own, did he begin to suffer from nutritional deficiencies.

Not so with white men living in the Arctic, for the narratives of many early arctic expeditions contain tragic accounts of ravages caused by scurvy; and even in recent times there are numerous instances when white men wintering in the Arctic have suffered, or even died, from lack of vitamins.

Different food habits are the cause of this. By preference arctic aborigines, whether by intuition or by experience, have always eaten the internal organs of animals that we now know have the highest vitamin content, whereas white men have generally disdained those parts of the animals, preferring instead the "choice" meaty cuts that make good roasts but contain little vitamin.

The recent investigations by Rodahl (1944) and others, of the vitamin content of arctic plants, have demonstrated too, that it is just those arctic plants that are eaten by preference by nearly all arctic tribes, that have the highest content of ascorbic acid as well as of thiamine, and that the methods of

†This paper was written for the *Encyclopedia Arctica* and is published with Dr. Stefansson's permission. The drawings were made by Dagny Tande Lid, Oslo, Norway.

*Chief Botanist, National Museum of Canada.

preparation and of storing of vegetable foods used by these people are perhaps the best possible in the circumstances for the preservation of vitamins.

Although in the aggregate, the amount of vegetable food used by arctic aborigines has always been small, they have, nevertheless, made use of a large number of different species. One factor limiting the amount they could use is that most arctic plants are available for a very short time only each year, and that primitive man in the Arctic has never learned to cultivate any species; nor has he learned to take advantage of the fact that many arctic plants respond to manure, as can be easily observed by their abundance and luxuriance near human habitation, bird cliffs, and animal burrows. This is perhaps not strange considering that most of these people are nomadic, and that, among primitive peoples, the gathering of roots and berries is the work of women and children. It is surprising that even the Chukchi, who make such extensive use of plants, have not learned to cultivate any species. Primitive man in the Arctic has, however, learned to gather and to store plant food for winter use, and to improve the palatability of some species by cooking, and even, if perhaps not at first intentionally, by a crude form of fermentation.

Among the Eskimo—the most widely distributed race of arctic aborigines—the dependence on vegetable food varies from group to group according to tradition and according to what plants are available in the area occupied by them; thus, to the most northerly tribes the use of vegetable food is purely incidental and largely limited to the partly fermented and pre-digested content of the rumen of caribou and muskoxen, whereas in the diet of the Eskimo of southwestern Greenland, Labrador, and western and southwestern Alaska, vegetable food constitutes a regular, if not very large, item. In northeastern Siberia, Kjellman (1882) noted that vegetable matter formed an important part of the food of the Chukchi. "Although the flesh of reindeer, seal, walrus, and bear, besides blood, blubber, fish, and other animal food forms the bulk of their diet, it cannot be denied, and must not be overlooked, that not only the nomadic reindeer Chukchi but also the hunting tribes living along the sea coast, utilize and have a definite taste for vegetable food. When available, vegetable food constitutes a regular part of at least their principal meals, and is eaten eagerly, and certain kinds even with avidity; furthermore, they consider these foods important enough each year to gather supplies that will last them through the long, grim winter".

In the matter of providence the Chukchi differ from the Eskimo, to whom the large scale gathering and storing of food is not a common or universal practice. Kjellman related that the inhabitants of Pitlekaj and the surrounding Chukchi villages, at the beginning of the winter of 1878, had accumulated stores of vegetables that were fully comparable with their stores of meat and blubber. So large, says Kjellman, were some of these stores that a reindeer Chukchi, whom he visited in March, still had on hand considerable quantities of vegetables that had been gathered in the course of the preceding summer and autumn. The collection of such large quantities of vegetables would entail an amount of planning and perseverance which is, indeed, unusual among arctic peoples.

W. Bogoras (1904) who, first as a member of Sibiryakoff's party and later of the Jesup North Pacific Expedition, spent many years among the Chukchi, has confirmed Kjellman's observations on the food habits of the Chukchi, but found that: "On the whole, vegetable food is much more used by women and children than by men" (p. 199).

The rather extensive use which the Chukchi make of vegetable food does not seem to be conditioned by local abundance of edible plants or by the lack of animal food. In physiography, as well as in flora and fauna, the Poluostrov Chukotski (Chukotsk Peninsula) is certainly comparable with northwestern Alaska where plant food plays a far less important role in the diet of the Eskimo. Kjellman thinks that the habit has been preserved from a time when the Chukchi lived farther south, in a climate more productive of vegetable matter.

It is of interest to note that, although native plants have never been extensively used by whites living in the Arctic, those eaten—mostly in emergencies—have generally been different species from those used by the aborigines, and, in the light of our present knowledge of vitamins, of lesser value. Thus there are numerous examples in the narratives of arctic expeditions of the uses made of lichens—especially "rock tripe" or "tripe-de-roche" of the early Canadian Voyageurs—besides mushrooms, puffballs, and scurvy grass (*Cochlearia*), none of which is ever eaten by aboriginal tribes. Likewise, berries such as the mountain cranberry or cowberry (*Vaccinium Vitis-Idaea*), bilberry or whortleberry (*Vaccinium uliginosum*), and to a lesser extent baked-apple (*Rubus Chamaemorus*) are perhaps among the most frequently and most readily used vegetable foods of white men living in the Arctic, whereas these fruits are generally ignored by aboriginal peoples who prefer the crowberry (*Empetrum*) which, in turn, is not favoured by whites.

The use and preparation of arctic food plants

Generally speaking no truly arctic plant is poisonous, nor are there known to be poisonous mushrooms, roots, or berries anywhere beyond the limit of trees, where, in fact, it is safe to eat any vegetable produce that appears at all edible. In the northern forest, on the other hand, there are a few plants that are definitely known to be poisonous. Those chiefly to be on guard against are the roots of water hemlock or musquash root, Fig. 7d, (*Cicuta* spp.), the fruits of red baneberry, Fig. 7a, b, c, (*Actaea rubra*), the death-cup toadstool (*Amanita phalloides*), and the almost equally poisonous fly amanita (*Amanita muscaria*). The latter, however, is in great demand among the Chukchi and other arctic tribes of eastern Siberia who chew the dried fungus as a narcotic or intoxicant (Bogoras, 1904).

At first glance, it might appear that the arctic aboriginal races use any plant, or any part of a plant that happens to be available, and is not too unpalatable. Such a conclusion, however, would be entirely erroneous. Thus, certain circumpolar species of plants are used by nearly all arctic tribes,

whereas other, and closely related ones, are not. Furthermore, an examination of the long list of plants used by Eskimo and Chukchi, shows that the preference for certain species is not dictated by local abundance. Kjellman (1882), for example, found that one of the principal food plants of the Chukchi was a certain willow, which was very common near the winter quarters of the *Vega* and supplied the bulk of the vegetable food collected. Other, and equally palatable plants, that to all intent and purpose were just as common and could have been collected without effort and in equal quantity, were completely ignored. In this connection it is of interest that Rodahl (1944) found that the ascorbic acid content of the leaves and buds of arctic willows exceed that of all other arctic plants examined by him.

Some plants, on the other hand, that were far less common and, on account of their scarcity and small size, had relatively small food value, were collected with an eagerness and perseverance that, in view of the general indolence of these people, astounded Kjellman. One such plant is *Polygonum viviparum*, which, according to the Chukchi must be collected immediately after the snow leaves the ground and before the first leaves appear. Only the rhizome, which is of the size of an unshelled peanut, is used; but to find and collect it in early spring certainly is no easy task. Nevertheless, even full-grown people, according to Kjellman, engaged in the collecting, and with surprisingly good results.

Kjellman noted that the flowering stems of the much less common, *Rhodiola rosea*, and especially the root tubers of the vetch, *Hedysarum obscurum*, were also considered choice and much favoured delicacies. As regards preparation of vegetable food, he found that only a few plants were consumed raw; the bulk were eaten boiled in soup cooked with meat or blood, and often after first having been made into a form of "sauerkraut". Roots, leaves, and stems of plants collected for winter use were tightly packed into sealskin bags, as a rule each kind by itself. In the process of storing such plants underwent some sort of fermentation. By their texture, smell, and taste Kjellman was able to recognize several kinds of "sauerkraut". One of them consisted entirely of the small twigs and leaves of *Salix kolymensis*; a second was composed largely of the leaves of *Petasites frigidus*, mixed with a variable quantity of leaves of *Saxifraga punctata*, leafy twigs of *Salix kolymensis*, the flowering axes of *Senecio congestus*, and leaves of *Oxyria digyna*; while a third consisted entirely of the succulent green leaves and stems of the knotweed, *Polygonum alaskanum* (*P. polymorphus*). Other forms of "sauerkraut" were prepared from the flowering stems of several species of fernweed (*Pedicularis* spp.) and from the leafy stems of seabeach sandwort (*Arenaria peploides*).

Although several kinds of berries grew in the region and were known to the Chukchi by name, Kjellman found that none was used to any great extent and that only crowberries (*Empetrum*) were eaten occasionally.

Among Eskimo the amount of plant food used varies from group to group but nowhere assumes the importance ascribed to it by Kjellman for the Chukchi. Thus Weyer (1932) estimated that in the diet of the Eskimo of the Bering Sea region vegetable food constituted no more than 5 per cent;

among the Central Canadian Eskimo Stefansson (1914) and Jenness (1928) noted that it was scarcely used at all; in Greenland the part played by vegetable food has always been unimportant, except from a dietary point of view.

Probably, in any particular group, the greatest use of plant food is today made by those who make the least use of imported "white man's" food; those who have easy access to trading posts very soon give up the practice of gathering native plant food and use increasing amounts of imported plant food in the form of flour, sugar, fats, preserved fruits, and jams. Among the more sophisticated Canadian Eskimo and Indians it is not uncommon to find an apologetic attitude, or even a certain amount of condescension, toward the less "enlightened" and "backward" among their countrymen who still maintain "native" customs and habits. Some years ago, while waiting for the arrival of the mail aircraft at a trading post on the lower Mackenzie River, I noted a large patch of wild raspberries "loaded" with excellent and fully ripe fruit. A group of native children were playing "hide and seek" among the raspberry canes but did not appear to pick the fruit. When commenting on this to the mother of one of the children-I was told that "*she* bought raspberry jam for her children in the store, where there was lots".

In the use and preparation of plant food, Eskimo practices differ only slightly from those of the Chukchi, the chief difference being, perhaps, that more extensive use is made of berries, and that such roots, stems, and leaves of plants as are used, are not infrequently stored mixed with blubber. Although oil from the blubber may to some extent act as a preservative, some fermentation undoubtedly takes place as with the "sauerkraut" prepared by the Chukchi. Twenty-five years ago, I found that only a small number of plants was used by the Eskimo of northwestern Alaska. Among the more important were the leaves of *Saxifraga punctata*, the leaves and flowering axes of marsh-fleabane (*Senecio congestus*) and coltsfoot (*Petasites frigidus*), all of which were made into a form of "sauerkraut" mixed with blubber; the root tubers of Eskimo potato (*Claytonia tuberosa*) and those of the vetch (*Hedysarum alpinum*) were gathered in considerable quantities and used during the winter cooked as a vegetable with meat. Of the several kinds of berries used, cloud-berry or baked-apple (*Rubus Chamaemorus*) and crowberry (*Empetrum*) were the most favoured. Both were eaten fresh or preserved frozen in sealskin bags.

In modern west Greenland only a few native plants are regularly eaten by the Greenlanders as seasonal delicacies, but from a dietary point of view they may, nevertheless, be of considerable importance. The more primitive east Greenlanders, on the other hand, make considerable use of plant food.

In the southern parts of east and west Greenland the *kvan* (*Angelica Archangelica*) is common along brooks, and in sheltered spots in the fiords may grow to a height of 6 feet. The tender, young leaf-stalks and flowering stems are considered a great delicacy and, when available, are eaten raw in great quantities. Because the *kvan* does not grow near the open sea coast, where most Greenland towns and villages are situated, and because this vegetable is in such great demand, long journeys are regularly undertaken

by the Greenlanders to obtain it. The *kvan* is equally relished by the Danish residents who generally eat it cooked and creamed.

Incidentally, the frequency with which the word *kuaneq* occurs in Eskimo place names antedating the present colonization of Greenland, shows that the Eskimo borrowed the Scandinavian word *kvan* from the language of the medieval Norse settlers of Greenland. Since the ancestors of the present Greenland Eskimo arrived in Greenland after the Norse, they could have had no previous knowledge of the *kvan*, and clearly adopted both the word and the eating of this plant from the Norse. This is of particular interest because it shows that some, at any rate, of the early Norse-Eskimo contacts were not hostile.

Of importance equal to that of the *kvan* is the crowberry (*Empetrum*), which is common everywhere in Greenland where it fruits abundantly at least to latitude 70°N. In 1857 Rink estimated that more than 1,000 barrels were consumed annually in southwest Greenland by the 6,100 Eskimo, and that during the autumn months, when the berries were ripe, they formed a regular part of the Greenlander's diet. The berries are either eaten fresh, when picked, or served with fresh and uncooked seal blubber. They keep well when frozen and in this state may be stored throughout the winter. In places where *Empetrum* is common, they may even be gathered under the snow. The frozen berries are scooped with a special scraper into a sieve made of sealskin, through which the snow, leaves, and other impurities are sifted.

The flowering stems of roseroot (*Rhodiola rosea*) and the fernweeds, *Pedicularis hirsuta* and *P. lanata*, find a limited use as potherbs. The mountain cranberry or cowberry (*Vaccinium Vitis-Idaea*) is of local occurrence in Greenland whereas the bilberry (*Vaccinium uliginosum*) has a distribution similar to that of the crowberry. While not favoured by the Greenlanders, both are in great demand by Danish residents. Several species of seaweed are eaten by Greenlanders and have recently been found to be an important source of ascorbic acid.

The fermented and half-digested content of caribou rumen, and also that of the muskox is considered a delicacy by all Eskimo who hunt these animals. This vegetable food is eaten raw or added to soup made from meat or blood. It is frequently preserved frozen for winter use. According to Bogoras (1904) the content of the reindeer rumen is eaten by the Chukchi and by other reindeer nomads of northeastern Siberia. In Greenland, where ptarmigan are hunted extensively for sale to Danish residents, the content of the crop is usually eaten at once by the hunter.

In the light of Rodahl's findings (1945) that the arctic willow and ground birch, both in summer and in winter, are rich sources of ascorbic acid, and that the latter also is an important source of thiamine, the dietary value of the content of both caribou rumen and ptarmigan crop is probably high. Although the bulk of the winter food of caribou and reindeer is lichen, twigs of willow and ground birch form a not inconsiderable addition, and these plants, summer and winter, are the principal source of food for both muskoxen and ptarmigan.

SOME COMMON EDIBLE PLANTS OF THE ARCTIC

Fruits and berries

In late summer several kinds of small fruits may be found in abundance, especially near the southern fringe of the Arctic. Without exception those found north of the limit of trees are edible and wholesome. Several kinds are not damaged, and many even be improved in flavour, by freezing. Some may be collected under the snow, or when the snow disappears in spring. In order of abundance and palatability the more important are as follows:

Black Crowberry or Curlewberry. *Empetrum nigrum*. Fig. 1h.

Depressed and matted, freely branching, evergreen shrub. Leaves linear, spreading, resembling those of spruce or juniper. The flowers are inconspicuous and solitary in the axils. The purplish black and shiny fruits are very juicy and sweet but contain a number of large hard seeds.

The crowberry is circumpolar and is found throughout the arctic regions, in eastern North America south to mountains of the New England States, in the west, south to California. It prefers sandy, rocky, and acid soils and reaches its perfection in a rather moist climate.

Because of its abundance and hardiness, the crowberry or curlewberry, although not as well-flavoured as some other berries, is easily the most important fruit of the arctic regions, and, apart from the cloudberry or baked-apple, is the only one regularly eaten by the natives of the Arctic. The berries are eaten when picked or stored frozen and eaten with seal blubber or oil. According to Rink (1857) a sparkling white wine may be produced by fermentation of the juice.

Cloudberry, Salmonberry, or Baked-Apple. *Rubus Chamaemorus*. Fig. 1i.

Herbaceous, low perennial from a creeping rootstock. Leaves round or kidney-shaped, five- to nine-lobed, stalked. Flowers solitary, terminal $\frac{1}{2}$ to 1 inch broad, and white. The immature fruits are first reddish, then amber, and when fully ripe become pale yellow and very juicy. Sir John Richardson (1851, p. 293) aptly described them: "perhaps the most delicious of the arctic berries when in perfection, but cloys if eaten in quantity" whereas Fernald and Kinsey (1943, p. 236) praised them with less reserve saying: "The ripe, fresh berries of Baked-Apple eaten without sugar or cream are delicious, but with the addition of these dressings are positively luscious". The Eskimo, lacking such refinements, serve them in a mixture of seal oil and chewed caribou tallow which has been beaten to the consistency of whipped cream. This culinary treat in Alaska is known as "Eskimo ice cream".

Bilberry or Whortleberry. *Vaccinium uliginosum*. Fig. 1g.

Low, branching, erect, or decumbent shrub with small oval, deciduous leaves. Flowers small, urn-shaped, pale pink, in the leaf-axils. Berries, blue to black with a bloom, ripen early in August.

The bilberry is common throughout all arctic countries and, in the southern part of the Arctic usually produces an abundance of sweet, delicious

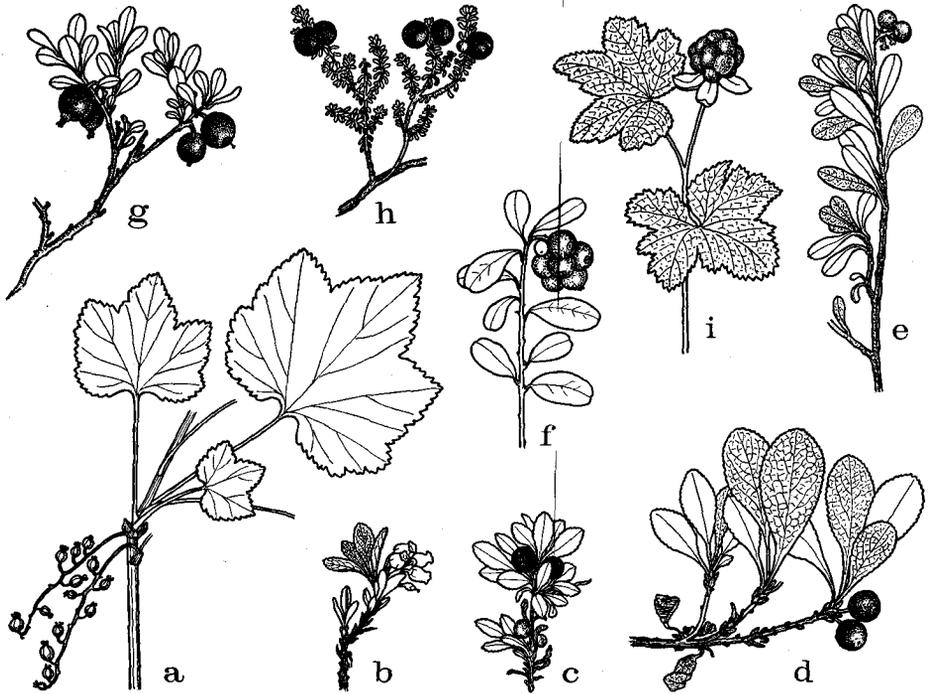


Fig. 1. Fruits and berries. a, Northern red currant (*Ribes triste*); b, c, Alpine bearberry (*Arctostaphylos alpina*); d, Red bearberry (*A. rubra*); e, Bearberry (*A. Uva-Ursi*); f, Mountain cranberry (*Vaccinium Vitis-Idaea*); g, Bilberry (*V. uliginosum*); h, Black crowberry (*Empetrum nigrum*); i, Baked-apple or cloudberry (*Rubus Chamaemorus*). X 2/5.

berries. It grows in acid soil in open places, and inhabits dry as well as moist places.

Although to the European palate of better flavour than the crowberry, the bilberry is not much esteemed by Eskimo who believe it is liable to cause dental decay.

Lingon, Mountain Cranberry, or Cowberry. *Vaccinium Vitis-Idaea*. Fig. 1f.

Low, creeping shrub with dark, leathery evergreen leaves. Flowers bell-shaped, white or pink, in small, nodding, terminal clusters. The shiny, dark red berries ripen in August and September, but remain on the vines throughout the winter, and the following spring, when the snow disappears, are sweeter, and even better than in the autumn.

The mountain cranberry is widely distributed throughout arctic countries occurring north at least to the arctic coast, but does not, as a rule, produce berries far north of the tree-line. It prefers acid soil and is found in moist as well as in dry, rocky places. It reaches its perfection, however, in open birch or willow thickets, where in some years the vines may be red with the fruit.

When gathered in the autumn the tart berries, if frozen, will keep until next spring. They are considered better flavoured than the southern true

cranberry, and are excellent for jams and jellies. A very refreshing beverage may be made from the diluted, sweetened juice.

Alpine and Red Bearberry. *Arctostaphylos alpina* and *A. rubra*. Fig. 1b,c,d.

Low, trailing shrubs with shreddy bark, and deciduous, obovate or oblanceolate, and finely serrated leaves. The flowers are small and appear in clusters toward the end of the branches in early spring before the leaves unfold. In *A. alpina* the berries are black and shiny; in *A. rubra* they are red, juicy but rather watery and insipid. Although eaten greedily by bears and ptarmigan, the berries are unattractive to most people, but, according to Fernald and Kinsey (1943, p. 310): "in the absence of more attractive berries this fruit is apparently wholesome and one soon acquires a taste for it".

Bearberry or Kinnikinnik. *Arctostaphylos Uva-Ursi*. Fig. 1e.

Trailing evergreen shrub with small, bell-shaped, pink flowers in nodding, terminal clusters. The coral-red and somewhat mealy and dry berries are rather tasteless when raw, but quite palatable when cooked. The powdered dry leaves are occasionally used by natives as a substitute for tobacco, or mixed with it.

Northern Red Currant. *Ribes triste*. Fig. 1a.

The northern red currant occurs throughout the wooded parts of the Arctic but only extends a short distance into the Barren Grounds. The berries are almost indistinguishable from cultivated red currants in flavour and appearance; they ripen in August but last only a short time.

Potherbs

The leaves and flowering stems of a large number of arctic plants may be used in soups, as potherbs, pickled as "sauerkraut", or in salads. Descriptions, together with brief notes on their occurrences and uses, are given below.

Woolly Fernweed or Louse-wort. *Pedicularis lanata*. Fig. 2b,c.

Perennial herb with a well-developed tap root terminating in one or more dense rosettes of pinnately lobed leaves, that resemble the fronds of certain ferns; the leafy, 5- to 10-inch high flowering stem terminates in a dense, white, woolly spike of rose-pink, scented flowers. Toward maturity the stems elongate, and in winter often protrude through the snow. The root, which is lemon yellow and sweet, like young carrot, may be eaten raw or cooked; the flowering stem may be eaten boiled as a potherb. Eskimo children pick the flowers and suck the sweet nectar from the base of the long corolla tube.

The woolly fernweed is one of the earliest spring flowers on the arctic tundra. It is circumpolar and of arctic range.

Arctic Fernweed. *Pedicularis arctica*. Fig. 2a.

Similar, but with less woolly and more open spikes of pale, pink flowers. The root is pale yellow and more spindly. *Pedicularis arctica* is a North American species which ranges from northwestern Greenland to the north coast of Alaska.

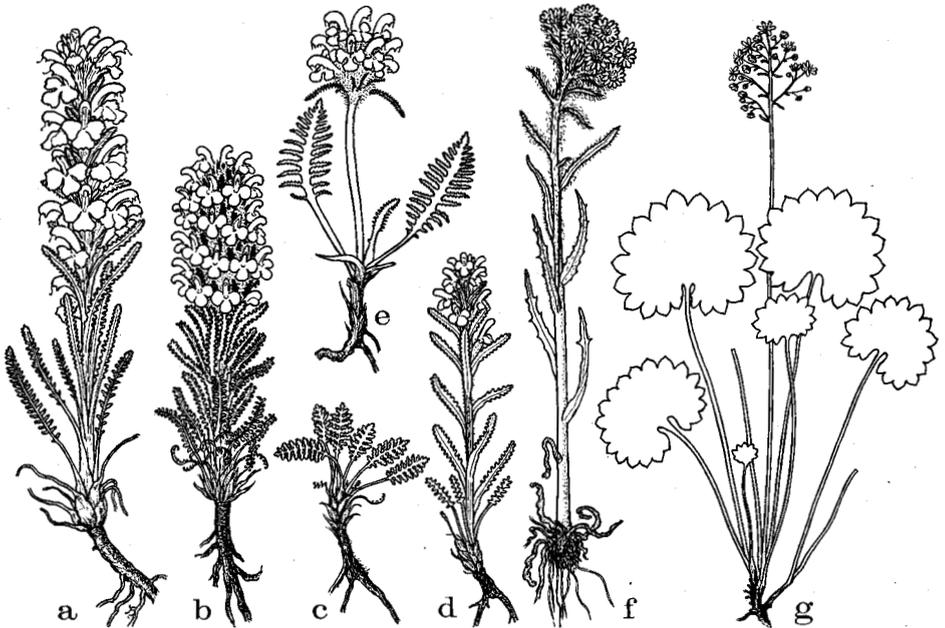


Fig. 2. Potherbs. a, Arctic fernweed (*Pedicularis arctica*); b, c, Woolly fernweed (*P. lanata*); d, Hairy fernweed (*P. hirsuta*); e, *P. sudetica*; f, Marsh-fleabane (*Senecio congestus*); g, Round-leaved saxifrage (*Saxifraga punctata*). X 2/5.

Hairy Fernweed. *Pedicularis hirsuta*. Fig. 2d.

Similar, with still paler flowers in a shorter spike. Like the preceding species, the hairy fernweed is of arctic or high arctic range, but limited to western Asia, Europe, Greenland, and the Eastern Canadian Arctic.

Fernweed. *Pedicularis sudetica*. Fig. 2e.

Circumpolar, glabrous perennial with dark-coloured leaves and stems, from a slender, freely branched rootstock. The flowers are dark red, in a dense spike which elongates as the seeds mature.

According to Kjellman the Chukchi prepare a "sauerkraut" from the flowering stems and eat the boiled rootstocks in soup.

Mountain Sorrel. *Oxyria digyna*. Fig. 3d.

Low and glabrous, somewhat fleshy perennial with erect, simple stems from a large, chaffy rootstock. Leaves are mostly basal, kidney-shaped in outline with from 1- to 2-inch wide blades on long, slender stalks. Flowers small, red or green, in a terminal plume-like raceme.

The mountain sorrel is a circumpolar, arctic-alpine species, ranging on the Barren Grounds from the north tip of Ellesmere Island south to the limit of trees, and in high mountains even south into California. It prefers somewhat shaded slopes and ravines, where snow accumulates during the winter and provides moisture that lasts throughout the growing season. In such places the fresh green leaves of the mountain sorrel may be found all summer. It



Fig. 3. Potherbs. a, Broad-leaved willow-herb (*Epilobium latifolium*); b, Northern sweet coltsfoot (*Petasites frigidus*); c, Roseroot (*Rhodiola rosea*); d, Mountain sorrel (*Oxyria digyna*). X 2/5.

responds wonderfully to manure, and in the rich soil under bird cliffs and near Eskimo dwellings may form large luxurious beds.

The succulent, juicy leaves and young stems are edible. When raw they are somewhat acid, but most refreshing and thirst-quickening; when cooked their flavour and appearance resembles spinach. In Greenland a very tasty dish, not unlike stewed rhubarb, is prepared from the sweetened juice thickened with a small amount of rice- or potato-flour.

The Eskimo of Greenland and Alaska eat the fresh leaves of the mountain sorrel, mixed with seal blubber.

Broad-leaved Willow-herb. *Epilobium latifolium*. Fig. 3a.

Erect, glabrous, simple or branching perennial herb from 6 to 18 inches high, with lanceolate, dark green and somewhat glaucous, sessile, and fleshy leaves. The flowers are purple, very large and showy, in leafy racemes. The long and narrow seed pods contain four rows of seeds bearing long, silky, tufts of white hairs at their summits.

The willow-herb is circumpolar in range and is common and even abundant throughout the Arctic on sandy or gravelly, well watered soils such as are found on gravel bars in rivers and on flood plains.

The flowers—the largest in the Arctic—may be eaten raw as a salad; the fleshy leaves are edible when cooked and in taste resemble spinach. In Greenland the fresh leaves and the flowers are occasionally eaten raw with seal blubber.

Eskimo Rhubarb. *Polygonum alaskanum* (*P. alpinum* v. *lapathifolium*).
Fig. 4b.

Freely branching perennial herb from a stout, fleshy rootstock several inches thick, bearing leafy stems from 3 to 6 feet high. The stems are reddish with thickened, sheath-covered joints from which rise the 2- to 8-inch long lanceolate-attenuate leaves. The flowers are small and greenish, in large, plumose axillary panicles.

Eskimo rhubarb is common in eastern Asia, Alaska, the Yukon, and east to the Mackenzie and extends north slightly beyond the limit of trees. It prefers moist, alluvial or open soil such as is found along river banks, and on fresh landslides in the permafrost area it may form pure stands several acres in extent.

The young, finger-thick, bright red, and juicy stems appear soon after the snow melts; in flavour they resemble rhubarb and may be used as stewed "rhubarb" and as a pie-filling. The sweetened juice makes a very refreshing beverage.

Kjellman (under *P. polymorphum* f. *frigida*) reports that the Chukchi cook the sliced rootstock with meat and prepare "sauerkraut" from the green stems and leaves.

Arctic Sourdock. *Rumex arcticus*. Fig. 4c,d.

Glabrous perennial with erect, simple stems from a stout, fleshy rootstock. Leaves mostly basal, the blades dark green and somewhat fleshy, oblong-oval to narrowly lanceolate, 3 to 12 inches long and 1 to 2 inches wide, entire-margined and with long and slender stalks. Flowering stems 1 to 3 feet high, terminating in a simple or short-branched panicle of small, reddish flowers.

The arctic sourdock is common in rich, alpine or arctic meadows, ranging from arctic Europe and Asia over Alaska to the Mackenzie District, but does not reach Hudson Bay.

The mildly acid leaves of young stems may be eaten raw as a salad, or cooked as spinach.

Northern Sweet Coltsfoot. *Petasites frigidus*. Fig. 3b.

Extensively creeping perennial herb with a slender rootstock; the flowering stems which precede the leaves and appear soon after the snow leaves the ground, are stout, fleshy and cobwebby, from 8 to 18 inches high, with scaly and much reduced leaves, and terminate in open, racemose corymbs of creamy white scented flowers. The basal leaves are triangular in outline, 2 to 3 inches long, coarsely dentate, green and glabrous above, white-tomentose beneath, on long, slender petioles. Common in wet tundra ranging from northern Europe through Asia, western Alaska, and western Canada almost to Hudson Bay.

The young leaves and flowering stems of the northern coltsfoot may be eaten raw as salad, cooked as a potherb, or made into a "sauerkraut". According to Kjellman this plant is a favourite of the Chukchi, who, from the mature leaves, prepare a special variety of "sauerkraut".

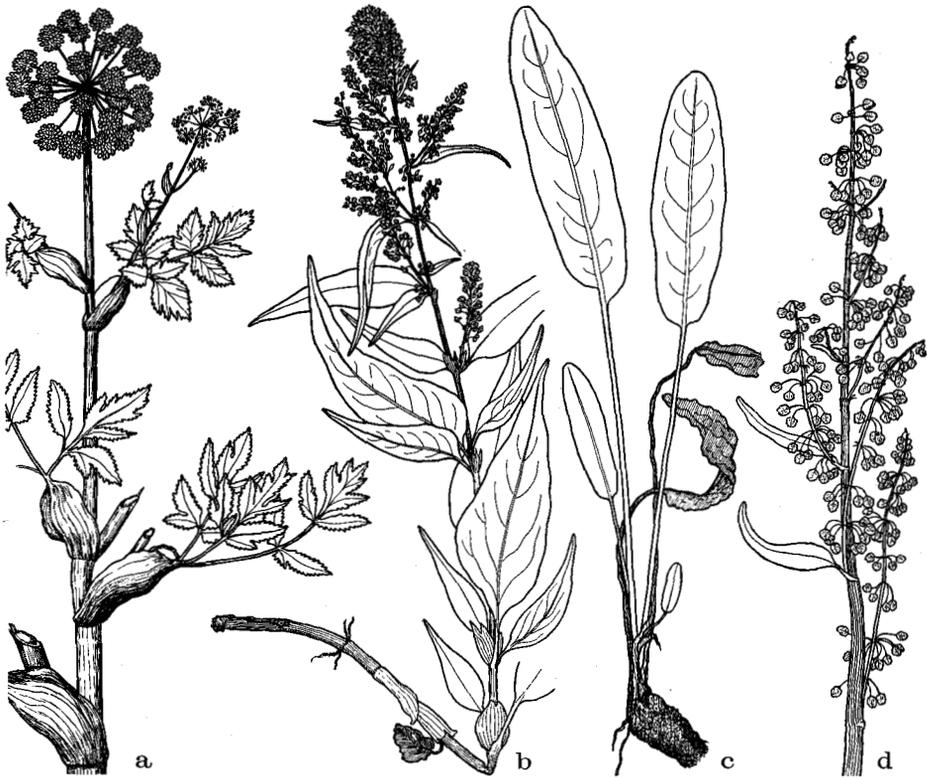


Fig. 4. Potherbs. a, *Angelica* or *kvan* (*Angelica Archangelica*); b, Eskimo rhubarb (*Polygonum alaskanum*); c, d, Arctic sourdock (*Rumex arcticus*). X 1/3.

Marsh-fleabane. *Senecio congestus*. Fig. 2f.

Biennial with hollow and easily compressed stout, simple stems from 1 to 4 feet high, terminating in a dense corymb of pale, yellow-flowered, woolly heads; leaves ascending, linear to oblong-lanceolate, undulate, dentate, or more or less pinnatifid.

Circumpolar and common in swampy places on the arctic tundra or by the edge of lagoons, but attains its best development on open soil such as landslides in the permafrost area, and on manured soil near human habitations.

The young leaves and flowering stems may be eaten cooked as a potherb, as a salad, or made into "sauerkraut".

Marsh Marigold or "Cowslip". *Caltha palustris s. lat.* Fig. 5c.

A marsh plant of the buttercup family with yellow flowers and glabrous, rather large, roundish or kidney-shaped, dark green and somewhat fleshy tender leaves which may be eaten raw as a salad, or cooked.

There are several races of the circumpolar "cowslip"; one dwarf and creeping race inhabits the high arctic tundra whereas a taller and more robust plant extends far south into the forested region.



Fig. 5. Potherbs. a, Sea purslane or seabeach sandwort (*Arenaria peploides*); b, Dandelion (*Taraxacum arcticum*); c, Marsh marigold or "cowslip" (*Caltha palustris*); d, Willow (*Salix pulchra*); e, f, Scurvy grass (*Cochlearia officinalis* ssp. *arctica*). X 2/5.

Roseroot. *Rhodiola rosea* and *R. integrifolia*. Fig. 3c.

Tufted, succulent perennials, with large, thick and fleshy rootstocks with a fragrance reminiscent of roses. The stems are 6 to 12 inches high and bear numerous, fleshy greenish or pink, oblong, toothed leaves. The flowers are pale yellow or pink, in a terminal cluster.

Two closely related species of roseroot are found in the Arctic. The first is common in northern Europe, south Greenland, and eastern North America; the second is found in eastern Asia and western North America. Both grow in moist places on cliffs and by brooks, often near the sea; in manured soil below bird cliffs or near human habitations they attain lush and profuse growth. The succulent young stems and leaves may be eaten raw as a salad, or cooked as a potherb.

Angelica or Kvan. *Angelica Archangelica*. Fig. 4a.

A coarse and glabrous plant, with very large compound leaves on long, hollow, green stalks; the leafy flowering stalks, from 3 to 6 feet high, bear numerous round-topped umbels of small, greenish-white, sweet scented flowers.

An Old World species of alpine-boreal rather than arctic range which extends from Scandinavia west to Greenland, where it is found as far north as Disko Ø (Disko Island). In North America the closely related Purple Angelica (*Angelica atropurpurea*) and Seacoast Angelica (*Coelopleurum lucidum*) are found.

The tender young leaf-stalks and the peeled young flowering stems are eaten raw by Lapps and Greenlanders who consider the *kvan* their choicest vegetable delicacy. To the European palate the raw *kvan* is rather strongly flavoured, but when cooked and creamed it is considered delicious. *Angelica atropurpurea* and *Coelopleurum lucidum* are still more strongly flavoured than the *kvan* and can be eaten only when cooked.

Sea Purslane or Seabeach Sandwort. *Arenaria peploides*. Fig. 5a.

A circumpolar, somewhat fleshy perennial of the chickweed family, common on sandy sea beaches and dunes where it often forms dense carpets or large hummocks.

The succulent young stems and leaves may be pickled as "sauerkraut" or eaten as a potherb.

Dandelion. *Taraxacum*. Fig. 5b.

Several species of dandelions are found in the Arctic where, especially on moist ledges below bird cliffs, or near human habitations, they respond to manure by lush growth. The tender, young leaves of all species, especially when blanched, make an excellent salad, and throughout the summer the leaves may be used as a potherb.

Round-leaved Saxifrage. *Saxifraga punctata*. Fig. 2g.

Low, stemless mostly glabrous perennial from a creeping rootstock. The leaves are erect dark green or reddish with a roundish or kidney-shaped blade on slender stalks; flowering stems 6 to 10 inches high terminating in a short raceme of white or yellowish flowers.

The leaves of this and similar species that are native to eastern Asia and northwestern America are eaten raw with seal blubber or as "sauerkraut" by the Chukchi and the western Eskimo.

Willow. *Salix* spp. Fig. 5d.

According to Kjellman (1882) the leaves of the eastern Siberian willow *Salix kolymensis* (*S. boganidensis*) which was very common around Pitlekaj, furnished perhaps the largest amount of vegetable food consumed by the Chukchi, who, from the young leaves and tender young shoots, prepared a much relished "sauerkraut". Bogoras (1904) adds that the inner bark of willow roots at one time was an important source of food to the Chukchi. The leaves of several arctic willows, including those of the closely related tundra willow, *S. pulchra*, of Alaska and northwestern Mackenzie are equally palatable. Weyer (1932) states that the Eskimo of Alaska eat the young leaves of willow. According to Rodahl (1944) the buds and leaves of arctic willow are exceptionally rich in vitamin C.

Scurvy Grass. *Cochlearia officinalis*. Fig. 5e,f.

Biennial, sea-shore plant with succulent, wintergreen, kidney-shaped, bright green and glabrous, slender petioled leaves. The flowers are inconspicuous, white, in few-flowered racemes; the seed pods are globular, containing a few large seeds.

The scurvy grass is circumpolar and is common along arctic beaches and sea cliffs but is rarely found inland. On well manured moist soil under bird cliffs and near human dwellings it becomes tall and lush.

The somewhat peppery flavoured leaves when eaten raw as a salad, or when cooked, are considered a valuable antiscorbutic and as such are mentioned in the narratives of numerous arctic expeditions; the scurvy grass is not eaten by either Eskimo or Chukchi.



Fig. 6. Roots and root tubers; beverage plants. a, Licorice-root (*Hedysarum alpinum* s. lat.); b, c, Eskimo potato (*Claytonia tuberosa*); d, Alpine bistort (*Polygonum viviparum*); e, Shrubby cinquefoil (*Potentilla fruticosa*); f, g, h, Labrador tea (f, *Ledum groenlandicum*; g, h, *L. decumbens*). X 2/5.

Roots and root tubers

Root tubers, of several arctic plants, because of their high content of starch and sugar, rank high in food value but owing to their small size, can rarely be obtained in large quantity.

Licorice-root or Masu. *Hedysarum alpinum* s. lat. Fig. 6a.

A non-climbing perennial of the pea family with branching, erect 1- to 2-foot high, leafy stems, with axillary, long-peduncled racemes of showy but rather small, deflexed pinkish-purple flowers. The seed pods are linear, flat, 1 to 2 inches long, formed of several roundish net-veined joints. The leaves are short-petioled, odd-pinnate, with 11 to 21 oblong or oblanceolate leaflets. The half-inch thick root tubers are sweet and taste somewhat like young carrots; they mature in August but may be gathered until the ground freezes. In spring, before the new growth starts, they taste even better than in the autumn, but soon become tough and woody. The root tubers during spring

and early summer form the principal food of brown and black bears; and several kinds of meadow mice in autumn harvest and store the tubers for winter use. In order to obtain a supply of this much favoured vegetable, the Eskimo of Alaska rob the mice "caches" which they locate by means of a dog specially trained for this purpose. Bogoras (1904) reports that this method is also practiced by the Chukchi.

The species, which includes several geographical races, is circumpolar, and from the arctic tundra ranges south far beyond the tree-line; it is common in loamy soil along the banks of rivers and lakes where it often forms large clumps.

Eskimo Potato. *Claytonia tuberosa*. Fig. 6b,c.

The roundish tubers of this Asiatic spring-beauty, found in eastern Siberia and northern Alaska, when boiled are very palatable and nutritious. Kjellman states that along the north coast of the Poluostrov Chukotski this is one of the best known and most used vegetable foods and that even in late spring as much as a barrelful of the tubers might be found in the storehouses of the more provident Chukchi. In 1926 the Eskimo potato was popular also with the Eskimo of Little Diomedé Island and northwestern Alaska (Porsild, 1938).

Alpine Bistort. *Polygonum viviparum* and *P. Bistorta* ssp. *plumosum*. Fig. 6d.

Low perennials with a short and thick, tuber-like rootstock and willow-like, green shiny leaves. The small white or pink flowers appear in a rather showy terminal spike. *P. viviparum*, below the flowers, bears numerous small bulbs that take root when detached. The rootstocks, although slightly astringent, are rich in starch and have a sweet, nutty flavour.

Beverage plants

Shrubby Cinquefoil. *Potentilla fruticosa*. Fig. 6e.

A 1- to 3-foot high, much branched shrub with shreddy bark, large yellow flowers, and numerous rather small compound leaves, each formed of from 5 to 7 silky, pubescent leaflets. The shrubby cinquefoil is common throughout the Subarctic, in muskegs as well as in rocky places but is not found far beyond the limit of trees. The dried leaves may be used as a substitute for tea.

Labrador Tea. *Ledum decumbens* and *L. groenlandicum*. Fig. 6f,g,h.

Low, branched, strongly aromatic shrubs with evergreen, leathery, canoe-shaped leaves covered beneath by a dense, rust-coloured felt; the flowers are white, strongly aromatic and spicy, in umbrella-shaped clusters. One or another of the several closely related species occurs throughout the Arctic in muskegs or wet tundra. The leaves may be gathered throughout the year and, after drying, may be used as a substitute for tea.

Spruce Tea.

An infusion made by steeping young twigs and leaves of spruce, hemlock, balsam fir, pine, or birch in boiling water, has long been known to be of value as an antiscorbutic. "Spruce tea", especially if made from the young leaves of balsam fir, is a rather agreeable drink when served hot with sugar.



Fig. 7. Poisonous plants (see p. 17). a, b, c, Red baneberry (*Actaea rubra*); d, Water hemlock (*Cicuta mackenzieana*). X 2/5.

Lichens

“About the last sources of food we should ordinarily think of are the dry, juiceless, gray, drab or brown lichens, often mistakenly called ‘mosses,’ which carpet sterile ground or expand their flat or crisped surfaces on rocks,

fences or trees" (Fernald and Kinsey, 1943, p. 406). Nevertheless, among the various edible plants occurring in the North, the greatest potential food value should, perhaps, be assigned to these uninspiring plants, because they occur so abundantly that 4 to 5 tons may sometimes be harvested from one acre.

Lichens are low, variously shaped gray, yellow, brown, or black plants that, in many parts of the Arctic (and elsewhere), are important components of the vegetation. Botanically they are curious dual organisms composed of a fungus that receives its nourishment from primitive green or blue-green algae that are completely enveloped by, or diffused through, the hyphae of the fungus.

Many different kinds of lichens are found in the Arctic and while none is poisonous, only a few are palatable to man. Most lichens contain an acid substance that may cause nausea or severe internal irritation, unless removed or neutralized by parboiling in water to which has been added a small amount of baking soda.

Among the most easily recognized edible lichens are certain rock lichens of the genera *Gyrophora* and *Umbilicaria*—commonly known as "rock tripe" or "tripe-de-roche"—and a few species of *Cladonia* and *Cetraria*, often mistakenly referred to as "moss" or "reindeer moss".

The former, as the name implies, grow on rock or boulders to which their irregularly shaped, saucer-like, leathery, brown, green, or black fronds are attached by the centre. When dry they are hard and brittle, but in damp weather become soft and cartilaginous and in this condition are easily detached from the rocks. The "mossy" kind grow on the ground, often among other plants, and sometimes form dense and almost pure carpets. The most important of these are the Iceland moss (*Cetraria islandica*), said to contain 80 per cent "lichen-starch", besides some protein and fat, and "reindeer moss" (*Cladonia rangiferina*, *Cl. sylvatica*, and *Cl. alpestris*). These are low, bushy, coral-like lichens. The first is dark brown, its fronds strap-like, crisply ciliated on the edges while the fronds of "reindeer moss" are more coral-like, composed of round, hollow gray or greenish-gray, branches. These lichens, too, are brittle when dry and are best collected when moist.

After parboiling with soda, the lichen should be dried, preferably in an oven, until brittle and then powdered; this may be done by rubbing between the palms of the hands, or by pounding, or better yet by a grist mill.

The powdered lichen, if put to macerate in water overnight, will jell when boiled with water or milk. One pound of powdered Iceland moss will produce four quarts of jelly similar to blancmange and is considered very nutritious and digestible. In Iceland and in northern Scandinavia, Iceland moss is used in puddings and in soups; and formerly, in times of scarcity, flour prepared from this and other lichens was added to the bread-flour. The moistened lichen-flour will not form a dough unless mixed with a small quantity of wheat-flour. Very tasty biscuits may be prepared from equal parts of lichen- and wheat-flour.

The starch-like substance contained in the lichen may be fermented, and in Scandinavia formerly found a limited use in the manufacture of alcohol.

Mushrooms

Many different kinds of edible mushrooms and puffballs occur throughout the Arctic, especially near the southern fringe of the tundra where, in mid-summer and early autumn, bushels of these fungi may be collected. Thus far no poisonous species have been detected north of the tree-line although the deadly toadstool (*Amanita phalloides*) has been found in the wooded parts of the upper Mackenzie basin and in the Yukon.

Seaweed

A number of edible species of seaweed or marine algae occur along rocky shores of the arctic seas and several are used regularly, if mostly in times of scarcity, by the Eskimo. In Greenland, several species, including *Rhodomenia palmata* and *Laminaria* spp. are eaten raw, dipped in boiling water or with seal oil. Rodahl (1950) estimated that 50 per cent of the vitamin C intake of the east Greenland Eskimo is derived from marine algae.

References

- Birket-Smith, Kaj. 1924. 'Ethnography of the Egedesminde district with aspects of the general culture of west Greenland'. *Medd. om Grøn.* Vol. 66, 484 pp.
1936. 'The Eskimos'. London: 250 pp.
- Bogoras, W. 1904. 'The Chukchee', in Jesup North Pacific Expedition, Vol. 7, esp. pp. 197-9. *Mem. Amer. Mus. Nat. Hist.* Vol. 11, 733 pp.
- Brown, R. N. Rudmose. 1927. 'The polar regions'. London: 236 pp.
- Fernald, M. L. and A. C. Kinsey. 1943. 'Edible wild plants of eastern North America'. Cornwall-on-Hudson, N.Y.: 452 pp.
- Jenness, Diamond. 1922. 'The life of the Copper Eskimos'. *Rep. Can. Arctic Exped.* 1913-18, Vol. 12 (1923) 277 pp.
1928. 'The people of the twilight'. New York: 247 pp.
- Kjellman, F. R. 1882. "Om tshuktschernas hushållsväxter", in A. E. Nordenskiöld, 'Vega-Expeditionens Vetenskapliga Iakttagelser', Vol. 1 pp. 353-72, (quotations translated from the Swedish text).
- Porsild, A. E. 1937. 'Edible roots and berries of northern Canada'. *Nat. Mus. Can.* 17 pp.
1938. 'Flora of Little Diomedé Island in Bering Strait'. *Trans. Roy. Soc. Can.* Vol. 32, Sec. 5, pp. 21-38.
1945. 'Emergency food in arctic Canada'. *Nat. Mus. Can. Spec. Contr.* 45-1, 20 pp., mimeo.
- Richardson, Sir John. 1851. 'Arctic searching expedition: journal of a boat-voyage through Rupert's Land and the Arctic Sea'. London: 2 vols., 413 + 426 pp.
- Rink, H. 1857. 'Grønland geografisk og statistisk beskrevet'. Copenhagen: 2 vols. 202 + 218 pp.; 421 + 172 pp.
- Rodahl, Kaare. 1944. "Content of vitamin C (1-ascorbic acid) in arctic plants". *Trans. and Proc. Bot. Soc. Edinb.* Vol. 34, pp. 205-10.
1945. "Vitamin B1 content of arctic plants and animal tissue". *Trans. and Proc. Bot. Soc. Edinb.* Vol. 34, pp. 244-51.
1949. 'Vitamin sources in arctic regions'. *Norsk Polarinst. Skr.* No. 91, 64 pp.
1950. "Arctic nutrition". *Can. Geogr. J.* Vol. 30, pp. 52-60.
- Stefansson, V. 1913. 'My life with the Eskimo'. New York: 538 pp.
1914. 'The Stefansson-Anderson Arctic Expedition of the American Museum of Natural History. Preliminary ethnological report'. *Anthro. Pap. Amer. Mus. Nat. Hist.* Vol. 14, pp. 1-395.
1944. 'Arctic manual'. New York: 556 pp.
- Weyer, E. M. 1932. 'The Eskimos'. New Haven: 491 pp.