

## Diachronic and Cultural Variations in Chukchi Ethnobotany

### Les variations diachroniques et culturelles dans l'ethnobotanique tchouktche

### Диахронические и культурные вариации в чукотской этноботанике

Olga Belichenko, Valeria Kolosova, Kevin Jernigan et Maria Pupynina

Volume 45, numéro 1-2, 2021

Tchoukotka : Comprendre le passé, les pratiques contemporaines et les perceptions du présent  
Chukotka: Understanding the Past, Contemporary Practices, and Perceptions of the Present

URI : <https://id.erudit.org/iderudit/1090320ar>

DOI : <https://doi.org/10.7202/1090320ar>

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Éditeur(s)

Centre interuniversitaire d'études et de recherches autochtones (CIÉRA)

ISSN

0701-1008 (imprimé)

1708-5268 (numérique)

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Citer cet article

Belichenko, O., Kolosova, V., Jernigan, K. & Pupynina, M. (2021). Diachronic and Cultural Variations in Chukchi Ethnobotany. *Études Inuit Studies*, 45(1-2), 315–340. <https://doi.org/10.7202/1090320ar>

Résumé de l'article

Même si l'ethnoécologie des Tchouktches a longtemps intéressé les chercheurs, nous manquons grandement d'une description systématique de l'historique de l'utilisation des plantes incluant des informations comme les noms dans la langue locale, le mode de récolte et de préparation ou l'adéquation de son utilisation avec l'âge et selon les situations. C.H. Merck a apporté la première étude des plantes alimentaires à la fin du XVIII<sup>e</sup> siècle lors de l'expédition Billings-Sarychev. Cependant, la première information relatant l'usage traditionnel de plantes médicinales n'a été publiée que récemment, après des siècles de contact. Pendant notre travail de terrain de 2014 à 2015, nous avons interrogé 56 Tchouktches dans les districts de Tchoukokta et d'Ioultine en Tchoukokta pour obtenir du matériel sur les plantes locales les plus courantes. Nous avons également réuni des données sur l'ethnobotanique tchouktche à partir des ressources publiées disponibles. De légères différences ont été remarquées entre les Tchouktches éleveurs de rennes et les Tchouktches côtiers, ces derniers dépendant plus des ressources végétales. Les problèmes d'accès aux ressources (par exemple, les algues) sont ainsi réduits par les échanges effectués entre les groupes. Le déclin de la consommation de racines récoltées dans les nids de campagnols (*petqumret*) est compensé par une augmentation de la récolte de baies (par exemple les mûres arctiques, camarines noires, airelles des marais et airelles rouges). Nos résultats montrent aussi que l'usage médicinal principal des plantes cible la prévention de maladies, même si certaines pratiques sont empruntées à la phytothérapie popularisée pendant la période soviétique.

# Diachronic and Cultural Variations in Chukchi Ethnobotany

Olga Belichenko,<sup>i</sup> Valeria Kolosova,<sup>ii</sup> Kevin Jernigan,<sup>iii</sup>  
and Maria Pupynina<sup>iv</sup>

## ABSTRACT

Although the ethnoecology of the Chukchi has long been the focus of researchers, a systemic description informing the history of plant use, including local names or modes of harvesting and preparation, suitability for different ages, and different occasions, is largely lacking. C. H. Merck provided the first account of food plants at the end of the 18th century, during the Billings-Sarychev expedition, however, the first information regarding traditionally used medicinal plants was published only recently, after centuries of contact. During our 2014-2015 fieldwork, we interviewed 56 Chukchi people in the Chukotskii and Iultinskii districts of Chukotka to collect material on the most common local plants. We also gathered data on Chukchi ethnobotany from all available published sources. Slight differences were observed between maritime and reindeer Chukchi, with the former relying more on plant resources. Access limitations (e.g., algae) are reduced by exchanges between the two groups. The decline in the consumption of roots gathered from vole nests (*peṭqumret*) is compensated by an increase in berry harvesting (e.g., cloudberry, crowberry, bog blueberry, and lingonberry). Our results also show that the main medical uses are aimed at disease prevention, though some are borrowed from scientific pan-Russian herbal medicine popularized during the Soviet period.

## KEYWORDS

Chukchi, traditional knowledge, ethnobotany, herbal medicine, wild food plants, cultural change

## RÉSUMÉ

### Les variations diachroniques et culturelles dans l'ethnobotanique tchouktche

Même si l'ethnoécologie des Tchouktches a longtemps intéressé les chercheurs, nous manquons grandement d'une description systématique de l'histoire de l'utilisation des plantes incluant des informations comme les noms dans la langue locale, le mode de récolte et de préparation ou l'adéquation de son utilisation avec l'âge et selon les situations. C.H. Merck a apporté la première étude des plantes

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i. Ca' Foscari University, Venice. [olga.belichenko@unive.it](mailto:olga.belichenko@unive.it)

ii. Institute for Linguistic Research RAS, Saint Petersburg. [chakra@eu.spb.ru](mailto:chakra@eu.spb.ru)

iii. University of Fairbanks. [kjernigan@alaska.edu](mailto:kjernigan@alaska.edu)

iv. Institute for Linguistic Research RAS, Saint Petersburg. [pupynina@gmail.com](mailto:pupynina@gmail.com)

alimentaires à la fin du XVIII<sup>e</sup> siècle lors de l'expédition Billings-Sarychev. Cependant, la première information relatant l'usage traditionnel de plantes médicinales n'a été publiée que récemment, après des siècles de contact. Pendant notre travail de terrain de 2014 à 2015, nous avons interrogé 56 Tchouktches dans les districts de Tchoukokta et d'Ioultine en Tchoukokta pour obtenir du matériel sur les plantes locales les plus courantes. Nous avons également réuni des données sur l'ethnobotanique tchouktche à partir des ressources publiées disponibles. De légères différences ont été remarquées entre les Tchouktches éleveurs de rennes et les Tchouktches côtiers, ces derniers dépendant plus des ressources végétales. Les problèmes d'accès aux ressources (par exemple, les algues) sont ainsi réduits par les échanges effectués entre les groupes. Le déclin de la consommation de racines récoltées dans les nids de campagnols (*pełqumret*) est compensé par une augmentation de la récolte de baies (par exemple les mûres arctiques, camarines noires, airelles des marais et airelles rouges). Nos résultats montrent aussi que l'usage médicinal principal des plantes cible la prévention de maladies, même si certaines pratiques sont empruntées à la phytothérapie popularisée pendant la période soviétique.

### **MOTS-CLÉS**

Tchouktches, savoir traditionnel, ethnobotanique, phytothérapie, plantes alimentaires sauvages, changements culturels

### **АННОТАЦИЯ**

#### **Диахронические и культурные вариации в чукотской этноботанике**

**Ольга Беличенко, Кевин Джерниган и Мария Пупынина**

**Валерия Колосова**

Хотя этноэкология чукчей уже давно находится в центре внимания исследователей, в значительной степени отсутствует системное описание истории использования растений, включая местные названия, методы сбора и приготовления, пригодность для разных возрастов и разных случаев. Карл Мерк представил первый отчет о пищевых растениях в конце XVIII века, во время экспедиции Биллингса-Сарычева, однако, первая информация о традиционно используемых лекарственных растениях была опубликована только недавно, после столетий контакта. Во время полевой работы в 2014-2015 гг. мы опросили 56 чукчей в Чукотском и Иультинском районах Чукотки в ходе сбора материала о наиболее распространенных местных растениях. Мы также собрали данные по этноботанике чукчей из всех доступных опубликованных источников. Небольшие различия наблюдались между прибрежными и тундровыми чукчами, причем первые больше полагались на растительные ресурсы. Ограничения доступа (например, водоросли) преодолеваются за счет обмена между двумя группами. Снижение потребления корнеплодов, собранных из гнезд полевки (*pełqumret*), компенсируется увеличением сбора ягод (например, морошки, водяники, голубики болотной, брусники). Наши результаты также показывают, что в основном медицинское применение растений направлено на профилактику заболеваний, хотя некоторые способы традиционного лечения заимствованы из научной общероссийской фитотерапии, популяризированной в советский период.

### **КЛЮЧЕВЫЕ СЛОВА**

Чукчи, традиционное знание, этноботаника, траволечение, дикие съедобные растения, культурные изменения

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**D**espite the fact that much work has been dedicated to Chukchi ethnography and ecological knowledge, few studies have addressed the complex description of ethnobotany (Bogoras 1904; Krupnik 2002; Krushanov 1987; Leont'ev 1973). Indeed, research has mostly concentrated on such key activities as reindeer herding and sea mammal hunting, while plant collection—a primarily female occupation—has remained in the background. Existing descriptions are quite fragmentary and often lack either local names, a proper botanical description, or crucial information on folk plant identification and harvesting, as well as details regarding preparation, storage, and their role in Chukchi culinary traditions. Medicinal properties of plants have only been addressed in one monograph (Godovykh, Dokhnova, and Tyneny 2005) that provides an extensive account of medicinal uses, but fails to ethnographically contextualize the tradition or distinguish changes and recent acquisitions.

The Chukchi people constitute a culturally and economically heterogeneous (maritime vs. reindeer herding) yet linguistically uniform group inhabiting the northeastern extremity of Eurasia. For a long time, they resisted occupation by the Russian Empire, who considered this territory to be “not thoroughly subdued” until the beginning of the 20th century (Bogoras 1904, 14). However, this did not stop the initiation of trading between both sides by the end of the 19th century. At the same time, American trade companies established their branches in Northern Eurasia, developing trade relationships with the Chukchi, Siberian Yupik, and other local peoples.

Strengthened trade activities led to the introduction of new products, notably sugar, tea, flour, tobacco, and alcoholic drinks. Later, the traditional economies of the Chukchi were transformed to align with the Soviet economic system, with collective reindeer herding farms and maritime hunting brigades. This was a painful and destructive period for both the maritime and reindeer Chukchi cultures as well as the Chukchi language, and as a result, people became more and more detached from their traditional life.

A massive public education campaign was launched in the region in the 1930s and 1940s, when a vast network of boarding schools was established in Chukotka. In these boarding schools, children spent most of the year far from their parents and were thus unable to properly acquire traditional skills and values. By the end of the 1930s, 54.9% of the children were engaged in the education process (Talyzin 2008, 134).

In the mid-twentieth century, the Soviet administration initiated forced migrations of maritime Chukchi and Siberian Yupik from their small settlements to bigger villages that had a built-in infrastructure. This migration, commonly referred to as ‘relocation’, is extensively discussed in the literature (on Sireniki village, see Kerttula 1997; on Chaplino village, see Nielsen 2007; for a general review of different relocations, see Krupnik and Chlenov 2013).

Following the collapse of the Soviet Union in 1991, the reindeer herding and hunting economy was restructured. Several attempts to organize small individual businesses generally failed, with the other former *sovkhoses* retaining their collective structure by adding ‘enterprise’ to the former name (see Gray 2000). However, even these post-Soviet enterprises could not survive as owner-operated farms. Under the circumstances, the locals had no choice but to return to hunting as well as gathering wild edibles (ibid., 34). Since 2000, the enterprises have been receiving government subsidies but what the people receive is not enough, as they must continue to rely on hunting and gathering local plants and mushrooms for subsistence.

According to the Survey of Living Conditions in the Arctic, Chukotkans tended to rate various aspects of their well-being lower than did other Arctic peoples. Indeed, the researchers revealed a widespread dissatisfaction in Chukotka with such things as the cost of living, job opportunities, and the availability of goods in local stores (Andersen, Kruse and Poppel 2002). The latter makes a study of changes in uses of plants as food and medicine that much more important.

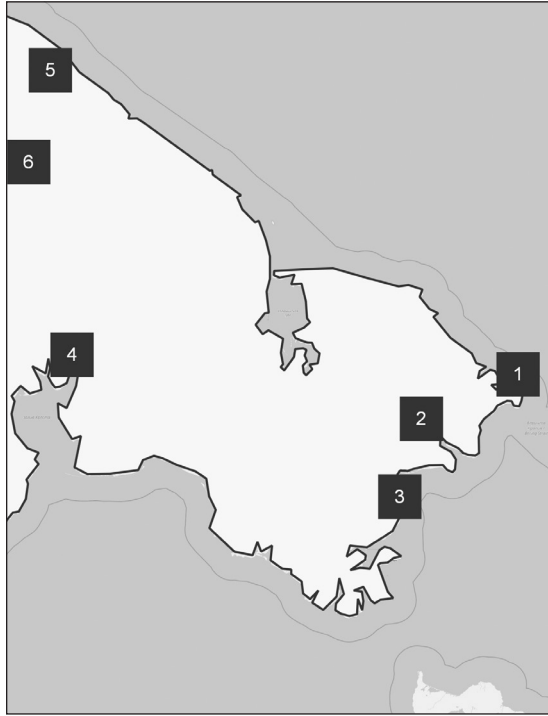
In this article, we lay the groundwork for a complex description of Chukchi ethnobotany by documenting the cultural and diachronic variations in traditional knowledge related to the use of wild plants. We argue that better documentation is needed to take into account not only scientific but also proper ethnographic descriptions of the plants being used. To reach this objective, we have documented the current wild plant use in our ethnographic fieldwork, with emphasis on recent uses. We have also enlisted all available data from previously published sources on the indigenous use of wild plants to better understand the content and mechanisms of the transformation. We also focus on the distribution of uses according to geographical and cultural factors, such as the differences between maritime and reindeer Chukchi.

The methodology of this paper was inspired by an approach combining ethnographic data and recent fieldwork (see Łuczaj et al. 2013; Pieroni et al. 2013). We thus acknowledge the limitations of our methodology, which proposes the juxtaposition of our field data with previously collected data recorded in different contexts using a different methodology (early fragmentary records vs. comprehensive studies).

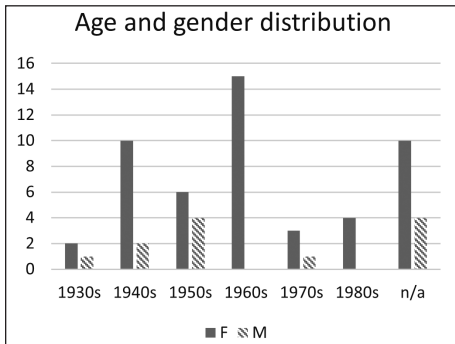
## **Materials and Methods**

Interviews were conducted in July–September of 2014 and 2015 in the Chukotskii and Iultinskii districts of Chukotka in the following villages: Egvekinot, Lorino, Lavrentiya, Ryrkaipiy, and Uelen (Figure 1). We interviewed 56 Chukchi residents born between 1932 and 1980 (Figure 2).

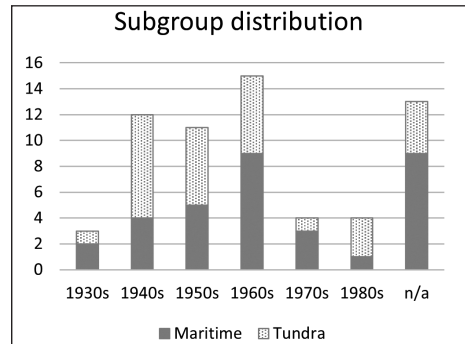
Several interviews were also conducted in the town of Anadyr' and in the reindeer brigade camp assigned to the *Pioner* reindeer herding enterprise and the *Plamennyi* way station.



**Figure 1.** Study area: 1. Uelen; 2. Lavrentiya; 3. Lorino; 4. Egvekinot; 5. Ryrkaipiy; 6. Plamennyi, Pioneer. Map base: Wikimedia Commons).



(a)



(b)

**Figures 2a and 2b.** Demographic characteristics of the sample organized by age cohorts.

Our field research was carried out in compliance with the requirements of the International Society of Ethnobiology ethical guidelines (2006) (ISE Code of Ethics 2006, with 2008 Additions). All participants in the study gave their informed consent prior to the interview.

In the initial stage of the fieldwork, we collected voucher specimens of the most common local plants. The participants, found using convenience sampling and snowball methods (Cabanting and Perez 2016), were asked to describe all known uses of the voucher specimen and/or plants in high-quality photographs. In most cases, both photo and voucher specimens of the same plant were shown to the participants. All additional plants not present in our sample of specimens but mentioned by the interviewees were recorded and added to the list of voucher specimens for the next round of interviews.

The interview data were organized in the following categories: plant name, type and temporality of use, and distribution of uses across the traditional economy types (tundra or maritime) (Table 1). We used the plant definitions in their broadest sense, following the practices of our interviewees, and we also included algae, lichens, and fungi, despite the fact that these are generally not considered by botanists as ‘plants’.

To contextualize the field data, we also collected plant names and uses from all available published sources describing traditional uses of plants by the Chukchi: (Bogoras 1904; Bogoraz 1901; Godovykh, Dokhnova, and Tyneny 2005; Merck 2014; Svanberg 2014; Argentov 1862; Afanasieva and Simchenko 1993; Sokolova 1961; Tikhomirov 1958; Krushanov 1987; D’iachkova 2001; Ainana and Zagrebina 2008). We did not include publications dedicated to both the Chukchi and Yupik cultures, such as Avtonova (1992) and Menovshchikov (1974). Despite much similarity between the traditions, these texts focused primarily on Yupik uses and only sparsely listed Chukchi plant names.

## Previous Research

One of the first descriptions of wild edibles of Chukotka belongs to German doctor Carl Heinrich Merck (1761–1799), who served in Irkutsk and traveled there with the Billings-Sarychev expedition (1785–1795) launched by Catherine II. His work was guided by the botanic, zoologic, and ethnographic questionnaires of naturalist Peter Simon Pallas, and his interaction with the locals was facilitated by Nikolai Daurkin and Ivan Kobelev (Titova 1978).

The next contribution was an outcome of the Vega expedition (1878–1879) by Swedish botanist Frans Reinhold Kjellman (1846–1907) who was assisted by Chukchi consultant Notti (Svanberg 2014). Because drifting ice had interrupted the expedition for the winter period, Kjellman asked the locals to bring voucher specimens of any plants that they knew of and particularly algae. He observed the exchange of algae between the nomadic



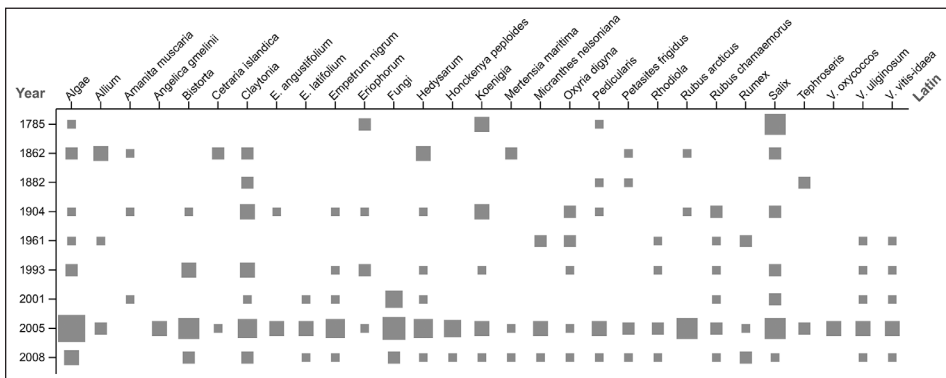
interior of Chukchi and the coastal dwellers and described how the plants were stored and consumed during the winter. During this expedition, a plant list was compiled by Finnish ichthyologist Oscar Nordqvist (Nordqvist 1882).

The seminal work of Bogoras (1904), written after the Jesup North Pacific Expedition, also included information about edible plants as well as notes on the social status of different foods, such as, for example, those consumed mainly by children or only poor people.

During the Soviet era, the focus of research shifted to strictly botanical exploration. The initial goal was to find new useful plants that could serve on an industrial scale (Vasil'ev 1930). Later, however, as the idea of preserving the natural habitats moved to the forefront (Kozhevnikov 1978), policies and practices were not always in line. That said, some ethnobotanical descriptions of the Chukchi were also made by ethnographers (Menovshchikov 1974) and botanists (Sokolova 1961; Tikhomirov 1958).

In contrast, post-Soviet studies closely examine the uses of plants by Chukotka indigenous peoples. Afanasieva and Simchenko (1993), who worked in the villages of Chaplino, Provideniya, Enmelen, Nunligran, Neshkan, and Nutepel'men, and D'iachkova (2001), whose field was located more to the south, in Vaegi, provide additional details regarding the use of food plants, while Ainana and Zagrebin, who worked in Chaplino and Sireniki, provide a list of Chukchi plant names (Ainana and Zagrebin 2008). Figure 3 presents a summary of previously recorded edible plants.

Until recently, herbal medicine was considered absent from Chukchi traditions. We found no mention of consistent herbal remedy uses in any of the past published sources that we accessed. In 2005, Godovykh, Dokhnova, and Tyneny published the first account of medicinal plants of Chukotka



**Figure 3.** Existing records of plants used by Chukchi. The square size corresponds to the number of described uses. 1785—Merck (Billings-Sarychev expedition). 1862—Argentov. 1882—Kjellman (Vega expedition). 1904—Bogoras (Jesup expedition). 1961—Sokolova. 1993—Afanas'eva. 2001—D'iachkova. 2005—Godovykh, Dokhnova, and Tyneny. 2008—Ainana and Zagrebin.



region. Quite a detailed picture of uses is given in this monograph, along with botanical descriptions and medical uses accounted earlier in the publications by Soviet and Russian pharmacists (see the description of this problem in Söukand et al. 2020). The authors listed the medicinal uses of 179 plant species, including three types of lichens and four types of algae. Although each description is accompanied by a vocabulary of Chukchi medicinal terms, the medicinal categories used throughout the book appear to be borrowed from official Russian medical nomenclature (e.g., ‘respiratory diseases’, ‘diseases of the digestive tract’), therefore a plant use description becomes a fusion of indigenous know-how and the explanatory power of Western medicine. Judging from the inclusion of certain, more temperate species (including rowan and alder, among others), the monograph appears to describe the traditions of southern Chukotka. At the same time, neither the geography of their field research nor the interview methods were stated, thus we could not implement a proper comparison with our field materials.

A compilation of Beringian medicinal uses by Anadyr'-based biologist Nikolai Zheleznov-Chukotskii and botanist Svetlana Chastukhina, with supplementary materials on healthy lifestyle and diet, was implemented in the same spirit of fusion of Western and Indigenous (Chukchi, Yupik, Yakut, and others) traditions (Zheleznov-Chukotskii and Chastukhina 2005). Although field materials were declared to have been used, the co-authors provided no geographical attribution for the data, nor did they distinguish them from the scientific medical recommendations incorporated into the text.

## Food and Medicinal Plants: An Overview

The majority of the wild food plants recorded in the earlier literature are still present in the current Chukchi diet. In our fieldwork sample and in the sample based on the literature data, 41 taxa of plants are used for food overlap. Seven additional species are found in our data, while eight species not overlapping with our data are recorded in the literature.

The use of berries was recorded by Bogoras, with a note that they were not numerous on the tundra nor did the locals use them much (Bogoras 1904). However, concerning food-related traditions, he had more data on Chukchi nomads than on maritime settlements<sup>1</sup>. According to our data in the coastal settlements, large quantities of berries are harvested, more so than greens. Only berry plants, namely, *rəttət* (cloudberry), *ləyuun'ət* (crowberry), *linlət* (bog blueberry), and *wəriwəç'ət* (lingonberry), were unequivocally

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1. Bogoras visited the maritime Chukchi only during his second expedition and spent only springtime there (April–June 1901). During his travels along the coast, he studied maritime Chukchi life and spent some time in Yupik villages but did not have an opportunity to witness the main vegetation period (Vdovin 1991).

recognized by all of our study participants in the voucher specimens and photos. The names of berries are well-remembered by both maritime and nomadic Chukchi, together with the general word for berries: *uun'ət*.

One of the most cherished foods is *kiwlet*, a porridge made with the roots of various plants, including *p'op'oq<sup>2</sup>* (tuberous springbeauty) and *mijmij* (sweetvetch), which our participants also referred to as ingredients.

In regard to edible mushrooms, Argentov stated in 1862 that the locals had “an aversion” to them (p. 357), which is in line with Yamin-Pasternak’s (2007) observation that the Chukchi did not gather them before the 1950s. Confirming this idea, late 20th and early 21st century records declare mushrooms, such as aspen bolete *Leccinum* sp., russula, button mushroom *Agaricus* sp., woolly milkcaps and other *Lactarius* spp., and honey mushroom *Armillariella* sp., as being part of the Chukchi diet (Godovykh, Dokhnova, and Tyneny 2005; D’iachkova 2001). During our fieldwork, we observed local people going to pick mushrooms in the tundra and we saw not only their harvest but also photos of their past harvests.

Our data and literature sources both highlight the importance of *pelqumret*, mouse roots,<sup>3</sup> whose collection was regulated by many rules, such as leaving some food or something precious in its place (see Afanasieva and Simchenko 1993; Jernigan et al. 2019). One participant who spent her childhood in the village of Neshkan remembered that her grandmother nudged her to collect more Arctic springbeauty roots herself, but also to keep the mice caches intact: “Grandma said, “Don’t be lazy, the mouse will die because of you, if you steal her food” (f, Lavrentiya, 1959).<sup>4</sup>

According to our field data, local medical knowledge has traditionally focused on disease prevention and obtaining enough vitamins from the greens by consuming them fresh in summer and storing them for winter, thus placing them between functional foods and food as medicines (Jernigan et al. 2017; Pieroni and Quave 2006). Said one participant about picking Arctic dock:

For some reason, we did not store enough of it for winter, though I do now. I need everything so that I don’t spend money on vitamins; I need to have my own. (f, Egvekinot, 1949).

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2. The nouns are given in the nominative case plural, because this is how plant names are frequently used.

3. Roots and rhizomes of sweetvetch *Hedysarum bedysaroides* (L.) Schinz and Thell, common cottongrass *Eriophorum angustifolium* Honck, bistort *Bistorta officinalis* Delarbre, Arctic springbeauty *Claytonia acutifolia* Pall. ex Willd, and other plants traditionally obtained by Chukchi and Yupiit from *Microtus oeconomus* vole caches and used for food (see also Jernigan et al. 2019).

4. For the interview quotes, we provide the participant’s gender (m, f) as well as the place and year of birth.

No special preparations are made regarding their treatment, as all beneficial plants are already known, appear naturally in the diet, and are used as functional food.

Plants described as “vitamins” include those appearing on the tundra during spring and early summer: mountain sorrel, chives and spring onion, Arctic dock, bistort, and wild rhubarb. Some participants also mentioned the high content of useful microelements, for example iodine in algae such as sugar kelp.

Another group of health-related plants, namely, natural astringents, are indispensable to the diet consisting of foods with high fat content. Greens preventing diarrhea are well known and are traditionally consumed as side dishes: *wətwət* (willow), *rəməwət* (wild rhubarb), and the root of *əp’et* (bistort). *Łəuun’ət* (crowberry) and *lɪnlət* (bog blueberry) were also sometimes mentioned as a preventative for diarrhea.

While most of the plants demonstrate stable popularity, *qluqet* (alpine bearberry, *Arctous alpina* (L.) Nied.) was marginally used but now appears to be transitioning from a food to a medicinal plant. Although it is still not used by the majority of our interviewees, those who do use it explain it in terms of its health benefits rather than by the need to use it to increase the volume of stocks in a post-harvest year. Our field data show that the use of alpine bearberry has been significantly transformed from being considered as an inedible berry used only in children’s games to becoming a filler additive for jams as well as a medicinal plant. Participants declared that although their parents forbade them from eating *qluqet* berries, children did use them to make necklaces—especially with unripe red berries—and some did taste them, finding their taste to resemble that of apples (m, Egvekinot, 1955). Other interviewees recalled that ripe alpine bearberries were taboo and were indeed tasteless and unpleasant. One person remembered that their teacher, a newcomer, had made jam from these berries “in a lean year” (f, Lorino, 1949), while another remembered that those who lived in settlements considered them edible (f, Lavrentiya, 1979). A third person declared that Russians used them to make a weakly alcoholic fermented drink (Rus. *braga*) (f, Lavrentiya, 1959). Most people using alpine bearberry in jams now add a small amount of this berry, especially when the yield of other berries is insufficient. A similar use is reported by Central Alaskan Yup’ik (Heller 1953).

Our participants also spoke of the beneficial medical properties of alpine bearberry, which vary from being generally good for health to being diuretic (this use is recommended in Zheleznov-Chukotskii and Chastukhina 2005) or being able to heal tumors. According to one person (f, Lavrentiya, 1961), “We did not pick it before but then they said that it was good for health.” By ‘they’, she most likely meant the newcomers, engaged in the medical system or the authors of books on the medicinal properties of local plants. Several people from the northern villages Ryrkaipiy (f, Anadyr’, 1960)

and Uelen stated that there was no rule against eating alpine bearberry but that they had only eaten it as a snack during their childhood:

They [settlement dwellers] make jams out of it, it comes thick, like jelly. They say it's good to cure something. In Neshkan, they pick it in big quantities. We made necklaces out of them in childhood and then ate them. They [parents] did not prevent us from collecting it. (f, Lorino, 1948)

## Diachrony of Food Uses

Our data show that, diachronically, edible plant uses are indeed evolving (see Table 1). Algae were described by Bogoras (1904) as being mostly children's food that was consumed by adults only when animal food was scarce. In our findings, algae are presented as widely used by all generations, at least the generation of the participants and their parents (84 use reports).

Traditional preservation techniques, such as fermentation, storage in fat, drying, and freezing, are being gradually replaced by preservation in sugar or salt, with larger volumes of freezing (in modern freezers instead of outside) and smaller amounts of fat storage.

Spiritual uses listed in Table 1 are usually associated with various celebrations of the reindeer breeding year cycle. Plants can be used for symbolic purposes; for example, bistort was taken to mark the place of ritual *yaranga* moving prior to *nenrir'un*, the autumn young reindeer slaughter, and eating reindeer-shaped figurines made of plant porridge is symbolically associated with making the herd grow in size. Plants in this category are also used to repel evil spirits in situations involving travel, sickness, or bad dreams.

**Table 1.** Modality and frequency of plant use recorded among maritime and tundra Chukchi.

Plant name	Type of use * 1 generation <u>Underlined</u> 2 generations <b>Bold</b> 3 or 4 generations	Maritime/Tundra The dots correspond to the frequency of use reports, each dot representing ten uses
<i>Alaria marginata</i> Postels and Ruprecht, Alariaceae məryomər, Sg. winged kelp	<b>Food</b>	M ••• T •
<i>Allium schoenoprasum</i> L., <i>Allium fistulosum</i> L. (tundra Chukchi only), <i>Allium</i> sp., Amaryllidaceae maj'oləlyəŋ, Sg. chives, spring onion	<b>Food</b> Medicine*	M •• T ••

Plant name	Type of use * 1 generation <u>Underlined</u> 2 generations <b>Bold</b> 3 or 4 generations	Maritime/Tundra The dots correspond to the frequency of use reports, each dot representing ten uses
<i>Alnus</i> sp., Betulaceae wirwir, Sg. alder	Medicine* <u>Household</u>	M • T ••
<i>Angelica gmelinii</i> (DC.) Pimenov or <i>Angelica lucida</i> L., Apiaceae Ikitut, Pl. wild celery	Food* <u>Medicine</u> <b>Spiritual</b>	M ••• T ••
<i>Arctous alpina</i> (L.) Nied., Ericaceae q̄luqet, Pl. alpine bearberry	<b>Food</b> Medicine* <u>Children games</u>	M ••• T ••
<i>Artemisia tilesii</i> Ledeb., Asteraceae t̄kewʹej, Sg. stinkweed or wormwood	Medicine* <b>Household</b> <b>Spiritual</b>	M •••• T ••
<i>Betula nana</i> L., Betulaceae w̄arw̄at, Pl. dwarf birch	Food* <u>Medicine</u> <b>Household</b>	M •• T ••
<i>Bistorta officinalis</i> Delarbre, Polygonaceae əpʹet Pl. bistort	<b>Food</b> <b>Medicine</b> <u>Spiritual</u>	M •••• T •••
<i>Caltha palustris</i> L., Ranunculaceae wilulʹət Pl. marsh marigold	<u>Food</u>	M • T •
<i>Cassiope tetragona</i> (L.) D.Don, Ericaceae kenʹut, Pl. arctic bell-heather	Medicine* <b>Household</b> <u>Spiritual</u>	M •• T •••
<i>Cladonia rangiferina</i> (L.) Weber ex F.H.Wigg., Cladoniaceae watap, Sg. reindeer lichen	<u>Food (emergency)</u> <u>Medicine</u> <u>Fodder</u>	M •• T ••

Plant name	Type of use * 1 generation <u>Underlined</u> 2 generations <b>Bold</b> 3 or 4 generations	Maritime/Tundra The dots correspond to the frequency of use reports, each dot representing ten uses
<i>Claytonia acutifolia</i> Pall. ex Schult., Montiaceae kəmçek, Sg. Arctic springbeauty or <i>Claytonia tuberosa</i> Pall. ex Schult., Montiaceae p'op'oq, Sg. tuberous springbeauty	<b>Food</b> <u>Medicine</u> <u>Spiritual</u>	M •• T ••••••
<i>Empetrum nigrum</i> L., Ericaceae ləyuun'ət, Pl. crowberry	<b>Food</b> <b>Medicine</b> <b>Household</b>	M •••••••• T •••
<i>Epilobium latifolium</i> L., Onagraceae weewət, Pl, wewewtət, Pl. dwarf fireweed	<b>Food</b> <b>Medicine</b>	M ••• T ••
<i>Equisetum arvense</i> L., Equisetaceae titiwtət, Pl. field horsetail	Medicine	M •• T •
<i>Eriophorum angustifolium</i> Honck., Cyperaceae qoçap, Sg. common cottongrass	<b>Food</b> <b>Medicine</b> Spiritual*	M •• T ••
<i>Hedysarum hedysaroides</i> (L.) Schinz & Thell., Fabaceae mijmij, Sg. sweetvetch	<b>Food</b> Medicine* Fodder	M ••• T ••
<i>Honckenya peploides</i> (L.) Ehrh., Caryophyllaceae mət'et, Pl, aŋqarəmawtət, Pl. sandwort	<b>Food</b>	M ••• T ••
<i>Koenigia tripterocarpa</i> (A.Gray) T.M.SchusT & Reveal, Polygonaceae rəmawət, Pl, rəmawtət, Pl. wild rhubarb	<b>Food</b> <b>Medicine</b> Spiritual*	M •••• T ••••
<i>Mertensia maritima</i> (L.) Gray, Boraginaceae mət'et, Pl, aŋqarəmawtət, Pl. oyster leaf	<b>Food</b>	M • T •

Plant name	Type of use * 1 generation <u>Underlined</u> 2 generations <b>Bold</b> 3 or 4 generations	Maritime/Tundra The dots correspond to the frequency of use reports, each dot representing ten uses
<i>Micranthes nelsoniana</i> (D.Don) Small, <i>Micranthes punctata</i> (L.) Losinsk., Saxifragaceae çip'et, Pl., çiw'et, Pl., rəłqəŋet, Pl. heartleaf saxifrage, dotted saxifrage	<b>Food</b>	M ••• T •••
<i>Oxyria digyna</i> (L.) Hill, Polygonaceae weçowtət, Pl. mountain sorrel	<b>Food</b> <b>Medicine*</b>	M •••• T ••••
<i>Pedicularis verticillata</i> L., Orobanchaceae r'orawtət, Pl. whorled lousewort	<b>Food</b> Spiritual	M •• T ••
<i>Petasites frigidus</i> (L.) Fr., Asteraceae ləmqut, Pl. Arctic coltsfoot	<b>Food</b> <b>Medicine</b>	M ••••• T •••••
<i>Rhodiola integrifolia</i> Raf., <i>Rhodiola rosea</i> L., Crassulaceae juŋew, Sg. roseroot	<b>Food</b> <b>Medicine</b>	M •••••• T ••
<i>Rhododendron tomentosum</i> Harmaja, Ericaceae neçequt, Pl. marsh Labrador tea	<u>Food</u> <b>Medicine</b> <b>Household</b> <u>Spiritual</u>	M ••• T ••
<i>Rubus chamaemorus</i> L., Rosaceae Rəttət, Sg. cloudberry	<b>Food</b> <b>Medicine</b>	M •••••••• T •••
<i>Rumex arcticus</i> Trautv., Polygonaceae ŋəryet, Pl. arctic dock	<b>Food</b> <u>Medicine</u>	M ••••••• T •••
<i>Saccharina latissima</i> (L.) C.E. Lane, C. Mayes, Druehl, and G.W.Saunders, Laminariaceae məryomər, Sg. sugar kelp	<b>Food</b>	M ••• T •••



Plant name	Type of use * 1 generation <u>Underlined</u> 2 generations <b>Bold</b> 3 or 4 generations	Maritime/Tundra The dots correspond to the frequency of use reports, each dot representing ten uses
<i>Salix</i> sp., Salicaceae wətwət, Sg. willow	<b>Food</b> <b>Medicine</b> <b>Household</b> Spiritual*	M ••••• T ••••
<i>Sphagnum</i> sp., Sphagnaceae witəwit, Sg. peat moss	<b>Medicine</b> <b>Household</b> Spiritual*	M ••• T •••
<i>Vaccinium uliginosum</i> L., Ericaceae lɪnlət, Pl. bog blueberry	<b>Food</b> Medicine*	M ••• T •••
<i>Vaccinium vitis-idaea</i> L., Ericaceae weriwəçʔət, Pl. lingonberry	<b>Food</b> <b>Medicine</b>	M ••••• T •••

The widespread availability of sugar, particularly during the Soviet era, impacted preservation techniques and perhaps also the scale of the harvesting of berries, which used to be stored in seal oil or were fermented with leaves (see also Davydova 2019). Berries, originally eaten raw, stored in seal oil, or added to fermented blood dishes, are today more frequently stored with sugar. Currently, *rəttət* (cloudberry), *ləyuunʔət* (crowberry), *weriwəçʔət* (lingonberry), and *lɪnlət* (bog blueberry), either alone or mixed, are transformed into jam, *mors* (a traditional Russian drink made from raw or boiled berries), *kompot* (sugary drink made of boiled fruit or berries), and *kiselʔ* (viscous drink made of fruit or berries with the addition of starch), as well as pie stuffing. Interestingly, one participant dated the onset of sugar preservation in the form of jam back to the contact with Russians in pre-Soviet times:

The Chukchi of Anadyr' district prepared it. They even have a word in Chukchi for it, *məlaçʔənʔ*<sup>5</sup>, 'stretchy' that is. That's because of better supplies and also Cossacks hanging around since the 17th century there in the Anadyr' district. (f, Egvekinot, 1949)

5. The dictionary definition is *məlaç*, meaning 'jam, juice, or honey' (Moll and Inènlik'èi 2005).

Among the acquired uses, the flowering tops of *weçowtät* (mountain sorrel) and *ηəryet*, (arctic dock) are also used to cook *kompot*, *kisel'*, and jams. Their leaves are used as pie stuffing or are added to soups such as *shchi* and *borsheb* (traditional Russian soups).

The consumption of roots, tubers, and rhizomes of wild plants appears to be diminishing in the maritime settlements. Despite the short revival of gathering *p'op'oq* (tuberous springbeauty) and *kəmçek* (Arctic springbeauty) during the economic hardships of the 1990s (when they were eaten instead of potatoes), they were hardly recognized by our study's participants in Lavrentiya and Lorino. There, we collected only 26 use reports for *Claytonia* spp., while in the tundra this number amounted to 58, including eight uses in rituals – something that was never reported in the coastal villages. Notably, two interviewees (f, Neshkan, 1979 and m, Billings, 1955) reported using it in the young reindeer ritual, and two others (f, Ryrkaipii, 1968 and f, Schmidt tundra, 1963) described its use as feeding the earth and the spirits before any rituals by throwing it in the direction of the East. One participant said:

This was used during bad weather or when something bad happened or if one learns that their child is sick in the boarding school. So that not to slaughter a reindeer, they offered this to gods, they slaughtered it like a real reindeer. [...] The rite was kept in secret [to anyone outside the clan]. And then the remaining part was eaten, although in tiny pieces but it was consumed entirely. (f, Egvekinot, 1949)

Rhizomes of common cottongrass and sweetvetch, traditionally obtained from vole caches, were usually described as something collected by grandmothers in the past.

## Diachrony of Medicinal Uses

Table 1 presents the temporal characteristics of the medical uses. Most of the medicinal uses were described by the participants as either current (187 out of a total of 381 use reports on plants used since childhood throughout their lifetime) or acquired during their lifetime (79 use reports).

One of the main plants in the category of current uses is *junew* (roseroot), an ethnotaxon that refers to *Rhodiola integrifolia* and sometimes also to *Sedum roseum*. It is eaten fresh during the summer and is fermented for the winter. Sometimes brine from this preparation is specifically given to children to treat a cold. It is also drunk by all family members as a general tonic and to quench thirst. The tradition of consuming *Rhodiola* belongs to the Chukchi Peninsula, as only there grows the right variety of the plant with purple flowers (*R. integrifolia*). One person born in Amguema told us that they have never harvested roseroot (f, Egvekinot, 1972), while another

participant originating from Uelen and living in Anadyr' indicated that the local variety, *Sedum roseum* (with yellow flowers) does not ferment properly and therefore is not suitable for storing (f, Anadyr', 1934). Many participants spoke of the root's useful properties and the fact that its tincture, valued by Russians, does not cause hangovers, unlike other alcoholic drinks. Other than these reports, no consistent practice of personal consumption was observed, although some people did mention that they had gathered it for Russian friends or to sell.

Some local plant-based remedies and preparations are either prescribed by newcomer doctors of Russian origin or learned from popular literature on local flora or periodicals on the subject of healthy lifestyle. When asked about local plants used for medical purposes, one participant referred directly to the book by Zheleznov-Chukotskii and Chastukhina (2005), a compendium of the medicinal properties of local plants addressed to the population of Chukotka. The most popular current/acquired uses are in the form of infusions: *lemqut* (Arctic sweet coltsfoot) and *rəttət* (cloudberry) against cough, *weriwəç'ət* (lingonberry) against hypertension, and *təkew'ej* (stinkweed) against gastrointestinal infections. *Witəwit* (peat moss) against skin irritations and stinkweed against joint problems were said to be applied topically.

Not all acquisitions come about through contact with Russians; some participants stated that they had started to use the purifying smoke of *ikitut*, seacoast angelica root, following the advice of Yupik acquaintances. *Lemqut* (Arctic sweet coltsfoot), for example, received its Russian name *mat'-i-machekba* because it resembles the similarly looking European species coltsfoot *Tussilago farfara* L. Its medicinal use was reported as a cough treatment. The Yupiit of St. Lawrence Island, who were not affected by Soviet rule, are said to use it the same way. This use has also been described for Inupiat in Jones (1983).

It appears that some plants or some of their medicinal properties were learned by the locals during the Soviet era; on this, our interviewees readily stated acquired uses. The majority of our participants agreed that the sepals of *rəttət* cloudberry for cough is a borrowed use. Another example is *weriwəç'ət* (lingonberry). One person originating from Neshkan said that their grandmother had never used its leaves (f, Lavrentiya, 1959), while another from Inchoun stated that although this plant had never been used for hypertension, they did currently use it for this purpose (f, Lavrentiya, n/a). One participant from Nuniamo said that only in Lavrentiya did they learn that *lemqut* (Arctic sweet coltsfoot) was also a medicinal plant that could be used to treat abscesses (f, Lavrentiya, 1961).

We identified two strategies describing the use of health-related plants. First, there are herbal treatments that are applied to cure an existing disease. These were often recognized by the participants as acquired (e.g., cloudberry

sepals or alpine bearberries; see section *Food and Medicinal Plants: An Overview*). Second, there are traditional foods that are effective in disease prevention, although they have not been described as such before the 2000s. We can only guess their status in the local knowledge system prior to contact with the newcomers. For example, our interviewees frequently mentioned that natural astringents are good when combined with meat dishes or should be taken as medicine for diarrhea. Another case is tonic roseroot (Panossian, Wikman, and Sarris 2010), which is stocked for the period of polar nights and is recommended by our participants as a “panacea”, a “vitamin drink” remedy for low blood pressure or the flu. Similar to the scenario of traditional knowledge transformation described by Krupnik and Vakhtin (1997), the new practical, health-related properties of Chukchi traditional foods are more prominent in our field data, while their role in the culinary system remains in place.

An ongoing scholarly debate (Júnior, Albuquerque, and Medeiros 2021; Leonti et al. 2020) concerns which factors most greatly influence the adoption of new species or medicinal uses in folk pharmacopoeias. Some scholars (Júnior, Albuquerque, and Medeiros 2021) have taken an approach influenced by ecological science to argue, for example, that people adopt species as medicines when they are more locally abundant, or that new medicinal uses will tend to fill therapeutic needs not already met. Others (Leonti et al. 2020) challenge these ideas by arguing that cultural and historical factors better explain why people adopt new medicinal uses. In the present case, the adoption of new medicinal uses of local flora appears to have been significantly influenced by a change in world views during the Soviet period from an earlier emphasis on spiritual etiologies for many illnesses (Bogoras 1907) to a later emphasis on naturalistic explanations and a corresponding borrowing of specific uses (Jernigan et al. 2017) from pan-Soviet herbalism.

## **Maritime vs. Tundra Plant Uses**

Two major groups of Chukchi are usually identified, based on their habitat, traditional economy, and lifestyle: maritime (settled) Chukchi who hunt sea mammals and reindeer herding (nomadic) Chukchi (see, e.g., Bogoras 1904). That said, the general distinction between maritime and nomadic Chukchi is not that straightforward. Indeed, many herding Chukchi groups reached the coast every summer, and as a result of constant exchanges, some maritime Chukchi even had small reindeer herds. Furthermore, some herding groups did not have access to the sea and therefore took their herds to the mountains for the summer (for a map of Chukchi groups described by Bogoras, see Pupynina and Koryakov 2019). Today, in terms of dialect, for example, tundra

and coastal Chukchi are rather homogeneous, especially when compared to their relatives, the tundra and coastal Koryaks (Pupynina 2018).

The Iultinskii and Chukotskii districts where we conducted our fieldwork both have access to the sea (Bering Sea and Chukchi Sea). This was an area of contact between maritime and nomadic Chukchi. In light of the observed differences, we split our sample into maritime (32) and reindeer (24) Chukchi. Of note, however, is that some coastal villages have reindeer brigades, and among reindeer breeders working for herding enterprises, some are former inhabitants of maritime villages. Thus, our categorization does not always correspond to the current location of our participants but rather reflects their prior experience of life in the tundra. For example, two persons from Lorino (a maritime settlement) were included within a reindeer group, as they were born and grew up in the tundra and therefore were immersed in a different environment and had acquired different traditional economic practices to interact with it, which was demonstrated during the interviews.

Greens of *wətwət* (willow), *wəçowtət* (mountain sorrel), *rəməwət* (wild rhubarb), *əpʲet* (bistort), *ləmqut* (Arctic sweet coltsfoot), and *çipʲet*, *çiwʲet*/*rəlqəŋet* (heartleaf saxifrage) are equally important for the maritime and reindeer groups. *Məryomər*; algae such as sugar kelp and winged kelp, were well recognized by the reindeer Chukchi through their contact with maritime Chukchi. One participant indicated that the algae, usually eaten with sea mammal meat, were harvested when reindeer herders stayed next to the coast (f, Ryrkaipiy, 1963). However, others stated that the habit of eating sugar kelp was borrowed from the maritime Chukchi when they moved to a coastal settlement, and that the midribs of winged kelp, which were usually dried and exchanged, were more delicious (f, Lavrentiya, 1947). This reflects the active interaction between the two groups, typical for the area in pre-Soviet and Soviet times (on the exchange of algae between reindeer and coastal dwelling Chukchi recorded by Kjellman, see *Previous Research* section).

In general, the maritime group is characterized by more variety and larger amounts of species gathered, particularly berries: mainly *ləyuunʲət* (crowberry) and *rəttət* (cloudberry) and much less *wəriwəçʲət* (lingonberry). They also named more uses for *ŋəryet* (arctic dock), *juŋew* (roseroot), and *wilulʲət* (marsh-marigold). Participants recognized nagoonberry as a plant that they do come across but never noticed that it gave fruit.

Certain plants are reported as used only with sea mammal meat and oil and never in dishes prepared with reindeer meat. One example is *wewewtə*, dwarf fireweed. One maritime Chukchi participant from Lorino claimed that willow leaves are only put with sea mammal meat and that putting them with reindeer meat “is not tasty and is actually shameful” (f, Lorino, 1959), while other interviewees mentioned no such restriction. Other plants, such as the berries of *ləyuunʲət*, crowberry, and aerial parts of *rəməwət*, wild

rhubarb, can be used with both reindeer and sea mammal products. The twigs and leaves of crowberry, on the other hand, are only used to cook or store whale fins and skin. Arctic springbeauty, tuberous springbeauty, chives, and spring onion were more frequently cited by the reindeer group than by the maritime Chukchi.

Health-related differences in plant use are more pronounced between the two groups than are food differences. While they use an almost equal number of taxa, namely, 33 species for maritime Chukchi and 34 taxa for tundra Chukchi, the former apply them more widely (248 uses) and the latter report almost twice as fewer uses (134). Probably the most popular tundra remedies are *rəttət* (cloudberry, sedative, colds), *juŋew* (roseroot, general tonic), *neçequet* (marsh Labrador tea, cough), and *witəwit* (peat moss, diapers, and hygienic pads). Various uses of *wirwir* (alder, alopecia, cold, and astringent) are exclusive to the tundra.

Generally speaking, the maritime and tundra groups possess a similar botanical lexicon. One of the exceptions is heartleaf saxifrage (name variants given from 37 participants). No one interviewed outside of coastal villages (7 participants) mentioned the word *çiw<sup>2</sup>et/çip<sup>2</sup>et* to describe it; the only word they used was *rəlqəŋet*. However, distribution of the names in the coastal Chukchi group was random.

We recorded more variety in both food and medicinal plant use among maritime Chukchi. Bound to settlements, maritime Chukchi were exposed to more intensive contact (and borrowed dishes like sugary preserves and soups) and had access to winter stocking facilities in the settlement dwellings. In contrast, the tundra Chukchi could avoid this intensive contact. Indeed, their practices, more minimalistic and adapted to the nomadic lifestyle (e.g., pressing the water out of the fermented leaves to decrease the volume of winter stocks), turned out to be more resistant to change.

## Conclusion

This study shows that although the list of traditional food plants has not changed dramatically, the popularity of various plants within the diet and the modes of use, storage, and consumption have been transformed, with a notable impact on the Chukchi living in coastal villages. Not only were they more exposed to contact with newcomers – thus new products and technologies—but as sedentary dwellers, they also had facilities for storage. In contrast, tundra Chukchi were bound to minimize the volume of winter stocks. New foods therefore had to be compact and ready for transportation to fit their lifestyle.

Conceptualization of the medicinal properties of local flora appears to have been affected by pan-Russian scientific herbalism popularized by newcomer Soviet doctors who took into account peculiarities of the local flora and in general Russian medicinal practices that relied heavily on phytotherapy (Shikov et al. 2014) and publications arriving from ‘mainland’ Russia. Isolating the historical uses is therefore quite problematic, as no proper description exists. During the process of transformation of the traditional knowledge system, the medicinal properties of traditionally used food plants have come to be recognized by the local Chukchi population (e.g., astringent greens), with new medicinal properties assigned to the others. This is particularly true for reindeer herding Chukchi. This finding is of great significance, as it challenges the view that contact with Western practices/colonial encounters caused the loss of medicinal plant knowledge (see, for example, Benítez, González-Tejero, and Molero-Mesa 2010; Giday, Woldu, and Teklehaymanot 2009).

As Chukchi medicinal plants have not been properly described before contact, we see potential in comparing available data with those of neighbouring cultures, including Koryak, Naukan Yupik, and Central Alaskan Yup’ik.

Numerous overlaps in major usages and plant names in the maritime and tundra Chukchi groups provide further evidence of an intensive contact and mutual exchange of food practices between these two economic groups in the studied area of Chukotka. We encourage further research on other regions of Chukotka to understand the extent of the convergence caused by the contact between maritime and reindeer Chukchi.

## Acknowledgements

The fieldwork for this research was funded by the National Science Foundation’s Arctic Social Science Program, grant number 1304612.

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