Atlas of Rare Endemic Vascular Plants of the Arctic

Technical Report No. 3



CAFF
Conservation of Arctic Flora and Fauna

About CAFF

The program for the Conservation of Arctic Flora and Fauna (CAFF) of the Arctic Council was established to address the special needs of Arctic ecosystems, species and their habitats in the rapidly developing Arctic region. It was initiated as one of four programs of the Arctic Environmental Protection Strategy (AEPS) which was adopted by Canada, Denmark/Greenland, Finland, Iceland, Norway, Russia, Sweden and the United States through a Ministerial Declaration at Rovaniemi, Finland in 1991. Other programs initiated under the AEPS and overtaken by the Arctic Council are the Arctic Monitoring and Assessment Programme (AMAP), the program for Emergency Prevention, Preparedness and Response (EPPR) and the program for Protection of the Arctic Marine Environment (PAME).

Since its inaugural meeting in Ottawa, Canada in 1992, the CAFF program has provided scientists, conservation managers and groups, and indigenous people of the north with a distinct forum in which to tackle a wide range of Arctic conservation issues at the circumpolar level.

CAFF's main goals, which are achieved in keeping with the concepts of sustainable development and utilisation, are:

- to conserve Arctic flora and fauna, their diversity and their habitats;
- to protect the Arctic ecosystems from threats;
- to improve conservation management laws, regulations and practices for the Arctic;
- to integrate Arctic interests into global conservation fora.

CAFF operates through a system of Designated Agencies and National Representatives responsible for CAFF in their respective countries. CAFF also has an International Working Group which has met annually to assess progress and to develop Annual Work Plans. CAFF is headed up by a chair and vice-chair which rotate among the Arctic countries and it is supported by an International Secretariat. When needed, CAFF also sets up specialist and experts groups to handle program areas.

The majority of CAFF's activities are directed at conserving Arctic biodiversity—the abundance and diversity of Arctic flora, fauna, and habitats—and at integrating indigenous people and their knowledge into CAFF. Some examples are: The development and assistance with implementation of conservation strategies and action plans for a Circumpolar Protected Areas Network (CPAN), for Arctic biological diversity, for circumpolar murres and eiders; work on a Circumpolar Arctic Vegetation Map (CAVM) and an Atlas of Rare Endemic Vascular Plants of the Arctic; report on Concerns and Long-term Threats to Arctic Biological Diversity; and mapping of Traditional Ecological Knowledge. Most of CAFF's work is carried out through a system of Lead Countries as a means of sharing the workload. Some projects are also assigned to the CAFF Secretariat. Whenever possible, CAFF works in co-operation with other international organisations and associations to achieve common conservation goals in the Arctic.

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Conservation of Arctic Flora and Fauna (CAFF)
Technical Report No. 3

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Contents

	Page
Tables	iv
Figures	iv
Abstract	1
Introduction	2
Background	2
Definition of Arctic	2
Concept of Rarity	4
Importance of Rare Arctic Plants	4
Methods	7
Development of the Species List	7
Taxonomic Considerations	7
Gap Analysis	8
Excluded Taxa	8
Results	9
Summary Statistics	9
Gap Analysis: Relationship Between Species Distributions and Habitat Protected Areas	9
Systematic List	13
Acknowledgments	37
Glossary	37
Literature Cited	38
Appendix I. Excluded Taxa	43
Appendix II. Location of Rare Endemic Vascular Plants of the Arctic by Country and Latitude and Longitude	47
Appendix III. Distribution Maps of Individual Rare Endemics	50

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Tables

Number		*Page*
1	IUCN (1994) Red List threat categories	6
2	IUCN Protected areas management categories I-V	8
3	Numbers of rare vascular endemics in each CAFF country	9
4	Numbers of rare vascular endemic taxa of the Arctic in each plant family	9
5	Numbers of rare vascular endemic taxa of the Arctic in IUCN Red List threat categories	9
6	Numbers of rare endemic taxa in each phytogeographic subzone	10
7	Numbers of rare endemic taxa in floristic provinces and subprovinces	10
8	Unprotected rare endemic vascular plants of the Arctic	13
9	Partially protected rare endemic vascular plants of the Arctic	13
10	Protected rare endemic vascular plants of the Arctic	14
11	Distribution of rare endemic occurrences in relation to IUCN protected areas management categories	14

Figures

Number		*Page*
1	Circumpolar map of the distribution of rare vascular plants of the Arctic in relation to phytogeographic subzones	3
2	Circumpolar map of the distribution of rare vascular plants of the Arctic in relation to floristic provinces and subprovinces	5
3	Circumpolar map of IUCN protected areas I-V	11
4	Circumpolar map of the distribution of rare endemic vascular plants of the Arctic in relation to IUCN protected areas I-V	12
5	*Artemisia globularia* var. *lutea*	16
6	*Douglasia beringensis*	20
7	*Erigeron muirii*	21
8	*Mertensia drummondii*	23
9	*Oxytropis wrangelii*	26
10	*Sisyrinchium groenlandicum*	33

Atlas of Rare Endemic Vascular Plants of the Arctic

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Abstract: The vascular flora of the Arctic was surveyed by specialists from eight Arctic countries to: (1) identify rare taxa endemic to the region; (2) establish an annotated list of these taxa; and (3) determine the level of protection currently afforded these plants. "Arctic" is defined as those lands beyond latitudinal tree line. Ninety-six rare endemic taxa were identified. Information compiled for each included taxonomy, geographic distribution, habitat preferences, biological characteristics, estimates of endangerment, and citations of supporting literature. Gap analysis determined the relation of rare taxa to areas of protected habitats. Taxa were grouped into three categories: (1) unprotected (no occurrences are within protected areas); (2) partially protected (some occurrences are within protected areas); and (3) protected (all occurrences are within protected areas). Results indicate that 47% of the rare endemics are unprotected, 23% partially protected, and 30% protected. According to IUCN Red List threat categories, 19% of the taxa are *vulnerable*, 29% *near threatened lower risk*, 26% *least concern lower risk*, 1% *endangered*, and 24% *data deficient*. The majority of rare endemic taxa, 61%, occur outside IUCN protected areas (categories I-V); 25% occur within strict nature/scientific reserves (IUCN category I); 12% in managed nature reserves/ wildlife sanctuaries (IUCN category IV); and 1.6% in national parks (IUCN category II).

Introduction

During the early decades of the 21st century, the Arctic will be strongly affected by forces within and from outside the region, including the impacts of global climate change, resource development, increases in permanent residents, and burgeoning tourism (Walker 1995). The relatively simple and often fragile Arctic ecosystems could become dramatically altered through changes to the vegetation, destruction of wetlands, and thawing of ice-rich permafrost, as well as through feedbacks of these effects to global hydrologic and atmospheric systems. It is therefore timely that rare arctic plant species be assessed for conservation, education, and land-use planning.

Data are becoming available to support the supposition that biological diversity ensures a healthy biosphere. To preserve plant diversity, conservation programs must be guided by the biological requirements of species and ecosystem components (Falk and Holsinger 1991). Knowledge of rare plants plays a role in recognizing and delimiting ecosystems that warrant protection. The objectives of this study were to: (1) identify rare vascular plant taxa endemic to the Arctic; (2) establish an annotated list of these taxa; and (3) perform gap analysis on the results.

The first steps, therefore, are to identify rare taxa and to provide geographic data, estimates of endangerment, habitat preferences, comments on biological characteristics, taxonomic status, and other related information. We have compiled data that we hope can guide program decisions, especially allocations of resources for protection and additional research. Large areas of the Arctic remain for which adequate data on the distribution of taxa are lacking, and we expect the annotated list herein to stimulate greater interest in these taxa, and possibly to enhance the discovery of additional localities for them.

The conventional approach to protecting biological diversity has been to proceed species by species and threat by threat, but these piecemeal approaches are not adequate by themselves to address the accelerating extinction crisis (Scott et al. 1993). A new tool, commonly referred to as "gap analysis," is now available for a more integrated and proactive ecosystem-level analysis. This technique is one of rapid appraisal to identify gaps in the protection of biodiversity by determining whether target species and ecosystems are adequately represented within the existing network of protected areas (Lysenko et al. 1996). For the Conservation of Arctic Flora and Fauna (CAFF), gap analysis should promote international collaboration, foster research by participating countries, and facilitate planning of the Circumpolar Protected Areas Network (CPAN). Once gaps are identified, the challenge will be to fill them through new reserves or changes in management practices. As stated by Holmgren (1979) and Rowe (1988), preservation of habitat is the only logical strategy to save rare taxa; hence we must learn as much as we can about the ecological requirements of the taxa in question. Toward these ends we have begun by providing this annotated list of rare taxa.

Botanical terms are defined in the Glossary.

Background

The list developed was begun at the first CAFF meeting in Ottawa, Canada. Since then, there has been strong, growing interest in rare vascular plants of the Arctic. A long list of candidate taxa was developed and then reduced by a stricter, ecological definition of the Arctic and by a concept of rarity with explicit criteria.

Definition of Arctic

Diverse definitions of the Arctic lead to confusion and cause problems, especially when data are compared among countries. Reduced to its essence, the Arctic can be described as a northern, treeless region, in which treelessness is a function of regional climate and not local edaphic conditions (Murray 1978). For ecological purposes, it is practical to limit the Arctic region southwards by using a boundary easily observed in the vegetation itself (Hustich 1979). Therefore, tree line or some portion of the tundra-taiga ecotone defines the southern boundary of the Arctic. For this project, Arctic and its subdivisions follow definitions of Yurtsev (1994) and Bay (1997; northern Greenland), although several of the boundaries are debated. Defined thus, Arctic has clear climatic and ecological boundaries.

Yurtsev (1994) divided the Arctic into six subzones (I-VI), which he united into two groups, Arctic (I-II) and Hypoarctic (III-VI)(Fig. 1). The two southernmost subzones (V-VI) are often considered as oceanic boreal

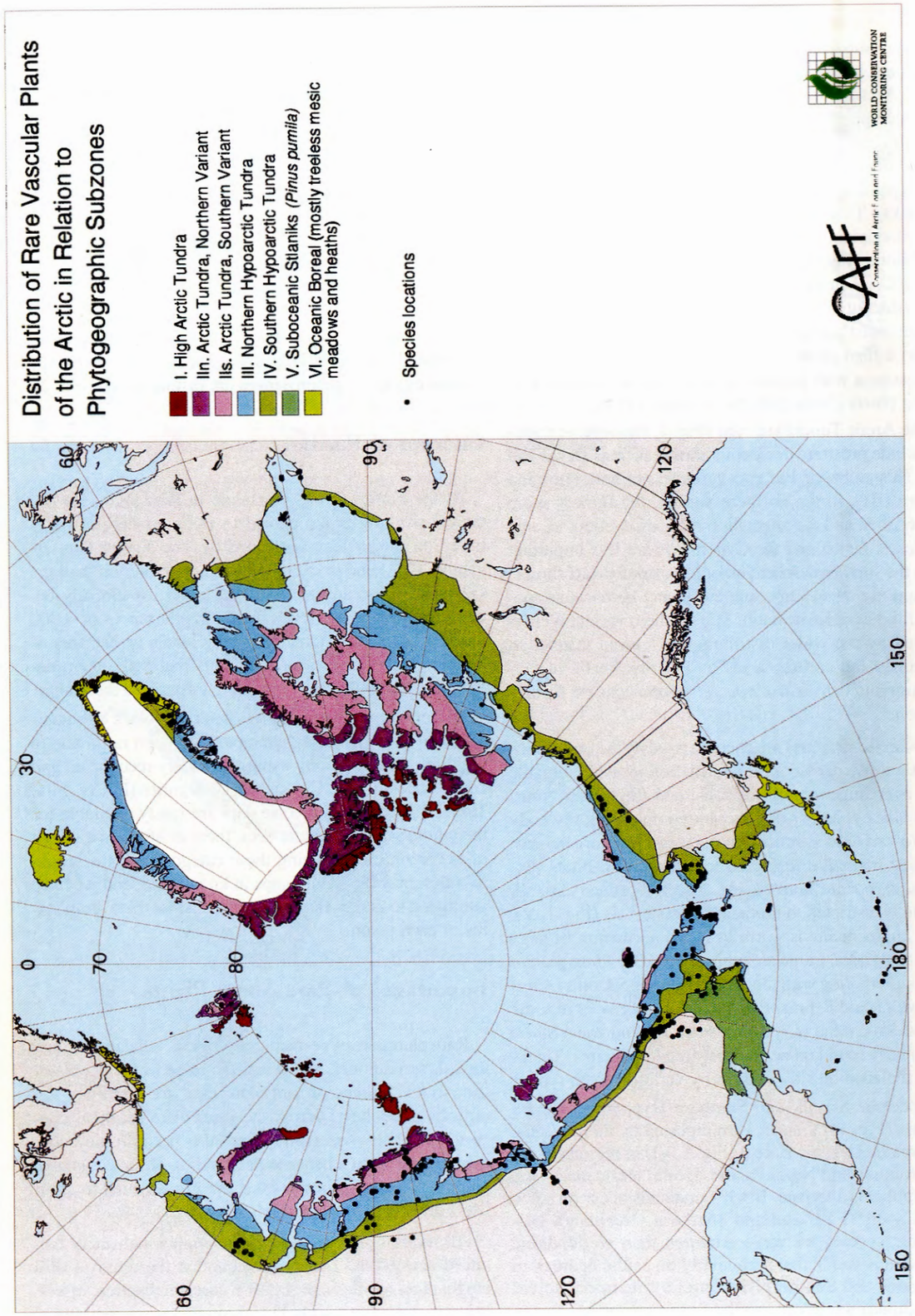


Figure 1. Circumpolar map of the distribution of rare vascular plants of the Arctic in relation to phytogeographic subzones (Yurtsev 1994) and Bay (1997; northern Greenland).

rather than subarctic treeless territories. The Arctic group of subzones is characterized by vegetation mainly of Arctic and Arctic-alpine species in which hypoarctic oligotrophic species are rare. Low shrubs are absent, and the tundra sod is thin and regularly perforated (as in frost boil and dry polygonal tundras), with the humus horizon being organic-mineral, and almost base-saturated, even on acid rocks. There is little difference between the vegetation of floodplains and interfluves. In the High Arctic Tundra subzone (Fig. 1, I), mean July temperature is maximally 2° C, prostrate shrubs are normally lacking, and plant cover is discontinuous ("herb zone" of Edlund 1990). Where soils are moist and relatively well-developed, the vegetation has a high cover of bryophytes, crustose lichens, or cyanobacteria with an admixture of rosette and cushion-forming plants ("semi-deserts" of Bliss 1981).

In the Arctic Tundra subzone (Fig. 1, II), dominant species include prostrate deciduous shrubs such as *Dryas* and *Salix*. This subzone has two variants, northern (IIn) and southern (IIs). In the northern variant, the flora is more impoverished and the vegetation more discontinuous, and the roles of *Dryas* and the Cyperaceae are less important than in the southern variant; among prostrate dwarf shrubs, *Salix* spp. are most important and many herbaceous species exhibit a pulvinate habit. The southern variant is characterized by the wider distribution of closed vegetation and sedges and cottongrasses on plakors; heath vegetation dominated by *Cassiope tetragona* can be locally common.

Hypoarctic subzones are characterized by the prevalence of continuous vegetation, the formation of acidic organic layers over mineral soil horizons, and the higher dominance of the hypoarctic oligotrophic complex of low woody plants (dwarf to low shrubs), mosses, and fruticose lichens. Eutrophic herbs are restricted to intrazonal habitats (except on carbonate landscapes). The Suboceanic Stlanik subzone is restricted to northeasternmost Asia (Fig. 1, V), where summers are as warm as in the northernmost taiga and forest-tundra. Large areas are covered by *Pinus pumila* thickets alternating with those of deciduous Stlaniks (*Alnus fruticosa* s.l. and *Betula middendorfii*), and groves of some arboreal Salicaceae (*Chosenia*, *Populus*, and some *Salix*) are regularly found on permafrost-free floodplains. Thickets are replaced on silty plakors by various tundra types.

Suboceanic Stlanik and Southern Hypoarctic Tundra subzones (Fig. 1, IV and V) are replaced by their oceanic counterparts, Oceanic Boreal (Fig. 1, VI) in regions of the North Atlantic and North Pacific. Heath, mesic meadows, and shrublands alternate. Birch woodlands occur on some islands such as Iceland and southern Greenland. Oligotrophic species are more common than arctic-alpine dwarf shrubs and herbs, particularly on acidic bedrock in the Stlanik and Southern Hypoarctic subzones. Boreal species contribute greatly to the flora, and shrubs occupy a significant part of the landscape.

Southern Hypoarctic Tundra (Fig. 1, IV) is characterized by the greater importance of shrub tundras. In sectors with milder, snow-rich winters, shrub tundras also occupy plakors; in the more continental subzones on silt they are confined to depressions and slopes; and on interfluves they are replaced by sedge-cottongrass tussock tundras. Northern Hypoarctic Tundra (Fig. 1, III) is characterized by the decreased role of low shrub associations (especially outside riparian sites), the increased role of arctic-alpine dwarf shrubs and herbs (as compared to IV), and the dwarf habit of *Betula nana* s.l.

Yurtsev (1994) further distinguished floristic provinces or longitudinal sectors in the Arctic based on the distribution boundaries of vascular plant species. Seven floristic provinces and 22 subprovinces are distinguished (Fig. 2).

Concept of Rarity

At the Fourth CAFF workshop in Reykjavik, the botanical working group agreed to use a concept of rarity based on the system developed by The Nature Conservancy (TNC) and to exclude taxa more common than the G2 rank. These are taxa that are imperiled globally because of their rarity (fewer than 20 occurrences or 3,000 individuals, or few remaining individuals or hectares of habitat), or because of other factors that make them demonstrably vulnerable to extinction throughout their range.

Discontinuous distributions often reflect lack of botanical knowledge. We have attempted to assign rarity and to highlight taxa at risk by using the widely recognized and easily understood IUCN Red List categories (IUCN 1994; Table 1). Given that precise data are rarely available for the whole range of Arctic taxa, there is often an element of uncertainty in applying these categories. Gaps in distribution may be merely gaps in knowledge, and we have attempted to make educated guesses about the overall status of each taxon.

Importance of Rare Arctic Plants

Rare plants are of aesthetic, ecological, educational, historical, recreational, and scientific value to the people of the Arctic. Studies of rare plant taxa are important not only because they address the immediate practical concerns of taxon conservation, but also because they contribute directly to a better understanding of the ecological and evolutionary processes that are fundamental to all of life's diversity (Falk and Holsinger 1991).

All living things are part of a complex, delicately balanced ecosystem. Theory predicts that the removal of a single plant species can set off a cascade reaction, affecting not just other plants but, through various pathways, also populations of insects and ultimately also birds and

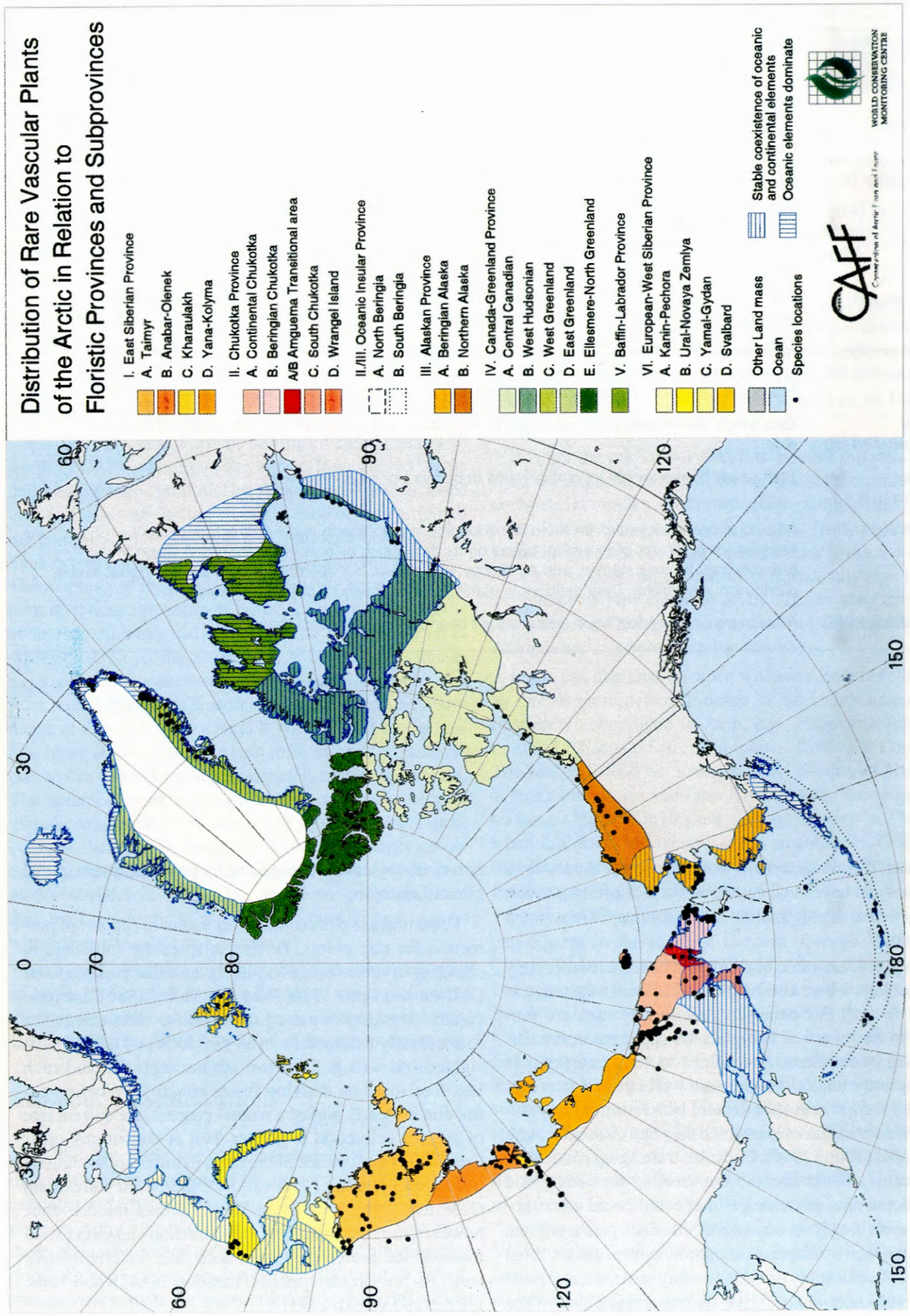


Figure 2. Circumpolar map of the distribution of rare vascular plants of the Arctic in relation to floristic provinces and subprovinces (Yurtsev 1994).

Table 1. IUCN (1994) Red List threat categories.

IUCN Category	Definition
Extinct (EX)	A taxon is extinct when there is no reasonable doubt that the last individual has died.
Extinct in the wild (EW)	A taxon is extinct in the wild when it is known only to survive in wild cultivation, in captivity, or as a naturalized population (or populations) well outside the past range.
Critically endangered (CR)	Taxa facing extremely high risk of extinction in the wild in the immediate future. None are recorded for the Arctic.
Endangered (EN)	Taxa not critically endangered but facing a very high risk of extinction in the wild in the near future.
Vulnerable (VU)	Taxa not as critically endangered or endangered but facing a high risk of extinction in the wild in the medium-term future.
Lower risk (LR)	Taxa that do not satisfy the criteria of critically endangered, endangered, or vulnerable. Taxa included in this category can be separated into three subcategories:
1. Conservation dependent (cd)	Taxa which are the focus of a continuing taxon-specific or habitat-specific conservation program targeted toward the taxon in question, the cessation of which would result in the taxon qualifying for one of the categories above. None are known in the Arctic.
2. Near threatened (nt)	Taxa which do not qualify for conservation dependent, but which are close to qualifying for vulnerable.
3. Least concern (lc)	Taxa which do not qualify for conservation dependent or near threatened.
Data deficient (DD)	A taxon is data deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data deficient is therefore not a category of threat or lower risk.
Not evaluated (NE)	A taxon is not evaluated when it has not yet been assessed against the criteria.

mammals. It is reasonable to wonder whether the loss of a rare plant can have such an effect, but it is presumptuous, in the absence of information to the contrary, to assume it would not.

Rare plants are often ecological specialists that occupy microhabitats where competition with zonal vegetation is absent or rare. For example, certain rare taxa are presumed to be relicts of late-glacial steppic environments. These are minor elements confined to xeric microsites in contemporary tundra, but they are well adapted to recapture their former area should there be a return to the environmental conditions under which they had once been more widespread (Young 1996). Under such changing conditions, these rarities could become the "seeds" for widespread vegetational changes, changes that could occur more rapidly by spreading from existing, albeit small, patches of rare vegetation than by dispersal or migration from distant zonal sources. Careful study of the taxonomy, genetics, and ecology of rare taxa should give us important clues to the nature of vegetation change during past and future global climate changes.

There is also a philosophical argument in support of protection for rare plants. Having adapted for millennia to changing environments, every living taxon has intrinsic value (Wilson and Peter 1988, Reid and Miller 1989). Intrinsic value is considered by many to be a self-evident truth; thus, to needlessly exterminate even rare forms of life is shortsighted and wrong. Taxa lost are not replaced, and each loss forecloses on deriving future benefits. Whereas extinction is clearly part of a natural process, the current rate of species extinction is greater than at almost any other time in the past, outside of the mass extinctions brought on by asteroids, comet showers, or increased volcanism (Jablonski 1991, Quammen 1996). Unlike these events, however, the current high rate of extinction and virtually all losses in the last century have been due, directly or indirectly, to human enterprises (Diamond 1984, Knoll 1984, Ehrlich and Wilson 1991).

Methods

Development of the Species List

Compiling the data on rare endemic arctic taxa has been a stepwise process. At the second CAFF meeting in Fairbanks, Alaska, a master list was developed from lists contributed by all of the CAFF countries. Some problems arose when integrating these data because of nomenclatural inconsistencies, rarity evaluated by various definitions (some were based on the total range, others on national and subnational zones or regions), and divergent conceptions of what is "Arctic."

Canada presented a list of 825 rare vascular plants to the third CAFF meeting in Reykjavik. It was based on the definition of Arctic proposed by Yurtsev (1994) and included taxa that were rare in the Arctic for each of the participating countries. Many of these taxa, although rare in one or more countries, were not rare throughout their total range. The mapping of the taxa on this extensive list would have permitted the recognition of centers of rarity in the Arctic, as in Eric Hultén's use of equiformal progressive areas (Hultén 1937). At the same time, it would have encouraged individual countries to take measures to protect rare flora within their own jurisdiction regardless of the abundance of those taxa elsewhere. It was decided by the parties, however, to restrict the taxa to be mapped to endemic taxa so that a report could be completed more expeditiously. The botanical working group sought to restrict the geographic concept of rarity to exclude those endemics more common than TNC G2 rank (see Concept of Rarity). Now excluded are taxa rare in one or more countries but common elsewhere in the Arctic, and those peripheral taxa that enter the Arctic at a few points from boreal regions where they are otherwise common.

A revised list of rare endemic Arctic taxa was presented at the fourth CAFF meeting in Moscow, which, following these new guidelines, had been reduced to approximately 100 taxa. That list formed the basis of the present document.

Taxonomic Considerations

As the list of the rare Arctic endemics was compiled, different species concepts of the taxonomists contributing candidate taxa became evident. Whereas it may be a surprise to many nonspecialists that there can be disagreement about the nature of species and their circumscriptions, the species concept has been at the heart of debate among systematists for a long time (Standley 1992, Zink and McKitrick 1995). While some of the Arctic taxa listed herein are widely recognized, there are many others for which formal rank is debatable. At this stage of our work, there remain significant differences in taxonomic philosophy and tradition among participating countries.

In some instances, current knowledge of a listed taxon is derived from a single specimen or from a few collections at a single locality. Others, in genera problematic by virtue of special mating or mixed mating systems, are most certain to be challenged. Whether these taxa will become accepted depends in part on what more can be learned from additional collections.

It is not the purpose of CAFF to resolve differences in competing species concepts; we recognize that certain taxa are by their complex natures subject to multiple interpretations. Rather than put these taxa aside for further work, we include them in the list to open the door to discussion of their status. Thus, we have acted pragmatically to compile the names of rare endemic arctic taxa as they are currently known. This list serves as a starting point for further dialogue and rigorous scientific scrutiny.

In the list, plant names when written in full are followed by one or more personal names; these author names are frequently abbreviated in form, e.g., *Papaver nudicaule* L. (for Linnaeus); *Salix stolonifera* Cov. (for Coville). The reader should be aware that the citation of Russian author names is inconsistent. For example, Yurtsev spells his name "Yurtsev" in English, but uses "Jurtzev" or "Jurtz." when Latinized and when used as an authority. Different translations or transliterations result in similar differences, for example "Tsvelev" and "Tzvel."

Eight CAFF countries and 31 individuals were active participants in the process: *Canada* (George W. Argus, Cheryl McJannet, and Susan Swan, National Museum of Canada; John McNeill, Royal Ontario Museum; Luc Brouillet, University of Montreal; Peter W. Ball, Erindale College, University of Toronto), *Finland* (Heikki Eeronheimo, Forest and Park Service, Northern Finland Park Area; Risto K. Heikkinen, Finnish Environmental Institute; and Pertti Uotila, Finnish Museum of Natural History), *Greenland* (Christian Bay, University of Copenhagen), *Iceland* (Eythór Einarsson, Islandic Museum of Natural History), *Norway* (Arve Elvebakk, University of Tromsø, David Henry, GRID-Arendal), *Russia* (Boris A. Yurtsev, Tatyana M. Koroleva [Zaslavskaya], Vladislav V. Petrovsky, Olga V. Rebristaya, Natalya N. Taraskina, Maria V. Sokolova, and Aleksander A. Korobkov, Komarov Botanical Institute), *Sweden* (Bente Eriksen, University

of Göteborg; Marianne Wetterin, Swedish Environmental Protection Agency; and the Swedish Threatened Species Unit, Uppsala), and the *United States of America* (Craig W. Greene, College of the Atlantic; David F. Murray, Alan R. Batten, and Carolyn Parker, University of Alaska Fairbanks; Robert Lipkin, Alaska Natural Heritage Program; Stephen S. Talbot, U.S. Fish and Wildlife Service, Anchorage; Sandra Looman Talbot, Alaska Biological Science Center, U.S. Geological Survey Biological Resources Division, Anchorage; Leila Shultz, Harvard University; and Stanley L. Welsh, Brigham Young University). Each country supplied data on taxonomy, geographical coordinates, ecology, distribution, taxonomic relationships, conservation status, and related literature. Participants from non-CAFF countries included: Czech Republic (Jan Kirschner, Praha), United Kingdom (Simon Blyth and Richard Luxmoore, World Conservation Monitoring Centre), and the Ukraine (Sergei L. Mosyakin, N.G. Kholodny Institute of Botany).

Gap Analysis

Gap analysis was used to assess the representation of rare plant taxa in areas managed exclusively or primarily for the long-term maintenance of populations of native taxa and natural ecosystems. The proximate goal of this approach is to determine which rare taxa fall within protected areas. The ultimate goal is to ensure that habitats with rare taxa are represented adequately among protected areas. To complete the process, legislation would be required by a country or countries to create new protected lands that would then encompass the previously unprotected taxa.

Mapping of taxa distributions was conducted at the World Conservation Monitoring Centre (WCMC) in Cambridge, United Kingdom. Spatial data were derived from material compiled previously for other CAFF purposes. The analysis was restricted to protected areas larger than 1,000 ha and ones assigned to IUCN Categories I-V (defined in Table 2; Conservation of Arctic Flora and Fauna [CAFF] 1994).

Excluded Taxa

Some taxa were submitted for consideration but did not meet criteria for inclusion; these were excluded and recorded in Appendix I. Further evaluation may reveal that they are worthy candidates in the future.

Table 2. IUCN Protected areas management categories I- V (IUCN 1978).

IUCN Category	Function
I Strict nature/ scientific reserve	To protect nature and maintain natural processes in an undisturbed state in order to have ecologically representative examples of the natural environment available for scientific study, environmental monitoring, education, and for the maintenance of genetic resources in a dynamic and evolutionary state.
II National park	To protect outstanding natural scenic areas of national or international significance for scientific, educational, and recreational use. These are relatively large natural areas not materially altered by human activity, where extractive resource uses are not allowed.
III Natural monument/ natural landmark	To protect and preserve nationally significant natural features because of their special interest or unique characteristics. These are relatively small areas focused on protection of specific features.
IV Managed nature reserve/ wildlife sanctuary	To assure the natural conditions necessary to protect nationally significant species, groups of species, biotic communities, or physical features of the environment where these may require specific human manipulation for their perpetuation. Controlled harvesting of some resources can be permitted.
V Protected landscapes and seascapes	To maintain nationally significant natural landscapes that are characteristic of the harmonious interaction of man and land, while providing opportunities for public enjoyment through recreation and tourism within the normal lifestyle and economic activity of these areas. These are mixed cultural/natural landscapes of high scenic value where traditional land uses are maintained.

Results

Summary Statistics

The distribution of taxa for each country is given in Table 3. Russia accounts for the highest number of rare endemic vascular plants (73%).

Twenty-one vascular plant families are represented (Table 4). Plant families with significant numbers of taxa (listed in descending order of importance) are Compositae (26%), Leguminosae (14%), Gramineae (Poaceae)(14%), Rosaceae (11%), Papaveraceae (7%), and Cruciferae (6%).

Distribution of the 96 rare vascular endemic plant taxa of the Arctic within IUCN Red List threat categories is shown in Table 5. Many taxa are classed as lower risk taxa (56%), including 30% that are near threatened and 26% of least concern. A significant number of taxa are vulnerable (19%). Only 1% are endangered.

Distributions of rare endemics in the phytogeographic subzones of Yurtsev (1994) show the highest number of occurrences in the Northern (26%) and Southern Hypoarctic Tundra (22%) and the Arctic Tundra, northern variant (26%; Table 6). In relation to the floristic provinces, a disproportionate number of taxa occur in the Chukotka Province (48%, Table 7). In this province, the most important subprovinces in terms of the number of taxa are Wrangel Island (17%), Beringian Chukotka (14%), and Continental Chukotka (12%).

Gap Analysis: Relationship Between Species Distributions and Habitat Protected Areas

Maps (Figs. 3 and 4) show areas of habitat protection and the distribution of taxa in relationship to these areas.

Table 3. Numbers of rare vascular endemics in each CAFF country.

Country	Number of taxa	Percent
Russia	70	72.9
USA	11	11.4
Russia/USA	4	4.2
Greenland	4	4.2
Canada	3	3.1
Canada/USA	2	2.1
Norway	2	2.1
Total	96	100.0

Table 4. Numbers of rare vascular endemic taxa of the Arctic in each plant family.

Plant family	Number of taxa	Percent of flora
Aspidiaceae (Dryopteridaceae)	1	1.0
Boraginaceae	1	1.0
Caryophyllaceae	1	1.0
Chenopodiaceae	2	2.1
Compositae (Asteraceae)	25	26.1
Cruciferae (Brassicaceae)	6	6.3
Ericaceae	2	2.1
Gramineae (Poaceae)	13	13.6
Iridaceae	1	1.0
Linaceae	1	1.0
Leguminosae (Fabaceae)	13	13.6
Papaveraceae	7	7.3
Plantaginaceae	1	1.0
Polygonaceae	1	1.0
Primulaceae	2	2.1
Portulacaceae	2	2.1
Ranunculaceae	3	3.1
Rosaceae	10	10.5
Salicaceae	1	1.0
Saxifragaceae	2	2.1
Scrophulariaceae	1	1.0
Total	96	100.0

Table 5. Numbers of rare vascular endemic taxa of the Arctic in IUCN Red List threat categories.

Category	Number of taxa	Percent
Endangered	1	1.0
Vulnerable	18	18.8
Lower risk		
Near threatened	29	30.2
Least concern	25	26.0
Data deficient	23	24.0
Total	96	100.0

Table 6. Numbers of rare endemic taxa in each phytogeographic subzone (Yurtsev 1994). Taxa may occur in more than one category. Percentage values are in parentheses. Key: I, High Arctic Tundra; IIn, Arctic Tundra, northern variant; IIs, Arctic Tundra, southern variant; III, Northern Hypoarctic Tundra; IV, Southern Hypoarctic Tundra; V, Suboceanic Stlaniks (*Pinus pumila*); VI, Oceanic Boreal (mostly treeless mesic meadows and heaths).

Phytogeographic subzone	Number of taxa		Number of occurrences	
I	0	(0.0)	0	(0.0)
IIn	32	(20.8)	139	(26.5)
IIs	13	(8.4)	34	(6.5)
III	50	(32.5)	139	(26.5)
IV	35	(22.7)	116	(22.1)
V	3	(2.0)	3	(0.6)
VI	7	(4.5)	51	(9.7)
Adjacent subarctic areas	14	(9.1)	42	(8.0)
Total	154	(100.0)	524	(≅100.0)

Table 7. Numbers of rare endemic taxa in floristic provinces and subprovinces (Yurtsev 1994). Taxa may occur in more than one province or subprovince. Percentage values are in parentheses; values for provinces are in bold font. Key: I, East Siberian (A, Taimyr; B, Anabar-Olenek; C, Kharaulakh; D, Yana-Kolyma); II, Chukotka (A, Continental; B, Beringian; C, Amguema Transitional Area; D, South; E, Wrangel Island); II/III, Oceanic Insular (A, North Beringia; B, South Beringia); III, Alaskan (A, Beringian; B, Northern); IV, Canada-Greenland (A, Central Canadian; B, West Hudsonian; C, West Greenland; D, East Greenland; E, Ellesmere-North Greenland); V, Baffin-Labrador; VI, European-West Siberian (A, Kanin-Pechora; B, Ural-Novaya Zemlya; C, Yamal-Gydan; D, Svalbard).

Floristic province or subprovince	Number of taxa		Number of occurrences	
I	**17**	**(12.2)**	**86**	**(16.4)**
A	8	(5.8)	61	(11.6)
B	4	(2.9)	18	(3.4)
C	4	(2.9)	6	(1.1)
D	1	(0.7)	1	(0.2)
II	**67**	**(48.2)**	**206**	**(39.3)**
A	17	(12.2)	31	(5.9)
B	19	(13.7)	47	(9.0)
C	4	(2.9)	5	(1.0)
D	3	(2.2)	8	(1.5)
E	24	(17.3)	115	(21.9)
II/III	**6**	**(4.3)**	**30**	**(5.7)**
A	1	(0.7)	6	(1.1)
B	5	(3.6)	24	(4.6)
III	**14**	**(10.1)**	**53**	**(10.1)**
A	9	(6.5)	32	(6.1)
B	5	(3.6)	21	(4.0)
IV	**9**	**(6.5)**	**59**	**(11.3)**
A	2	(1.4)	6	(1.1)
B	2	(1.4)	7	(1.3)
C	4	(2.9)	36	(6.9)
D	0	(0.0)	0	(0.0)
E	1	(0.7)	10	(1.9)
V	**0**	**(0.0)**	**0**	**(0.0)**
VI	**6**	**(4.3)**	**18**	**(3.4)**
A	0	(0.0)	0	(0.0)
B	3	(2.2)	10	(1.9)
C	1	(0.7)	5	(1.0)
D	2	(1.4)	3	(0.6)
Adjacent subarctic areas	**20**	**(14.4)**	**72**	**(13.7)**
Total	139	(100.0)	524	(≅100.0)

Distributions may be grouped into three categories of protection: (1) unprotected (no occurrences are within protected areas); (2) partially protected (some occurrences are within protected areas); and (3) protected (all occurrences are within protected areas).

The largest category is unprotected taxa (Table 8), accounting for 47% (45 taxa) of the rare endemics. Of these, 80% (36 taxa) are in Russia, 7% (3) in Greenland, 4% (2) in the United States, 4% (2) in Norway, 2% (1) in Canada, and 2% (1) in Canada and the United States.

Twenty-three percent of the taxa (22 taxa) are partially protected (Table 9). Of these taxa, protection ranges from about 4.5% to 83% of all occurrences. Of the partially protected taxa, 64% (14 taxa) occur in Russia, 14% (3) in Canada, 9% (2 occur in the United States and Russia but are entirely unprotected in Russia, and 4% (1) in Greenland.

Thirty percent of the taxa (29 taxa) are fully protected (Table 10). Of these, 76% (22 taxa) occur in Russia, and 24% (7) in the United States.

The majority of rare taxa, 61%, occur outside IUCN protected areas categories I-V (Table 11). In addition, 71% of rare endemic occurrences are outside these protected areas. Twenty-five percent of rare endemics occur within strict nature/scientific reserves (IUCN category I); 12.5% in managed nature reserves/wildlife sanctuaries (IUCN category IV); and 1.6% in national parks (IUCN category II). No rare endemics occur in natural monuments (IUCN category III) or protected landscapes and seascapes (IUCN category V).

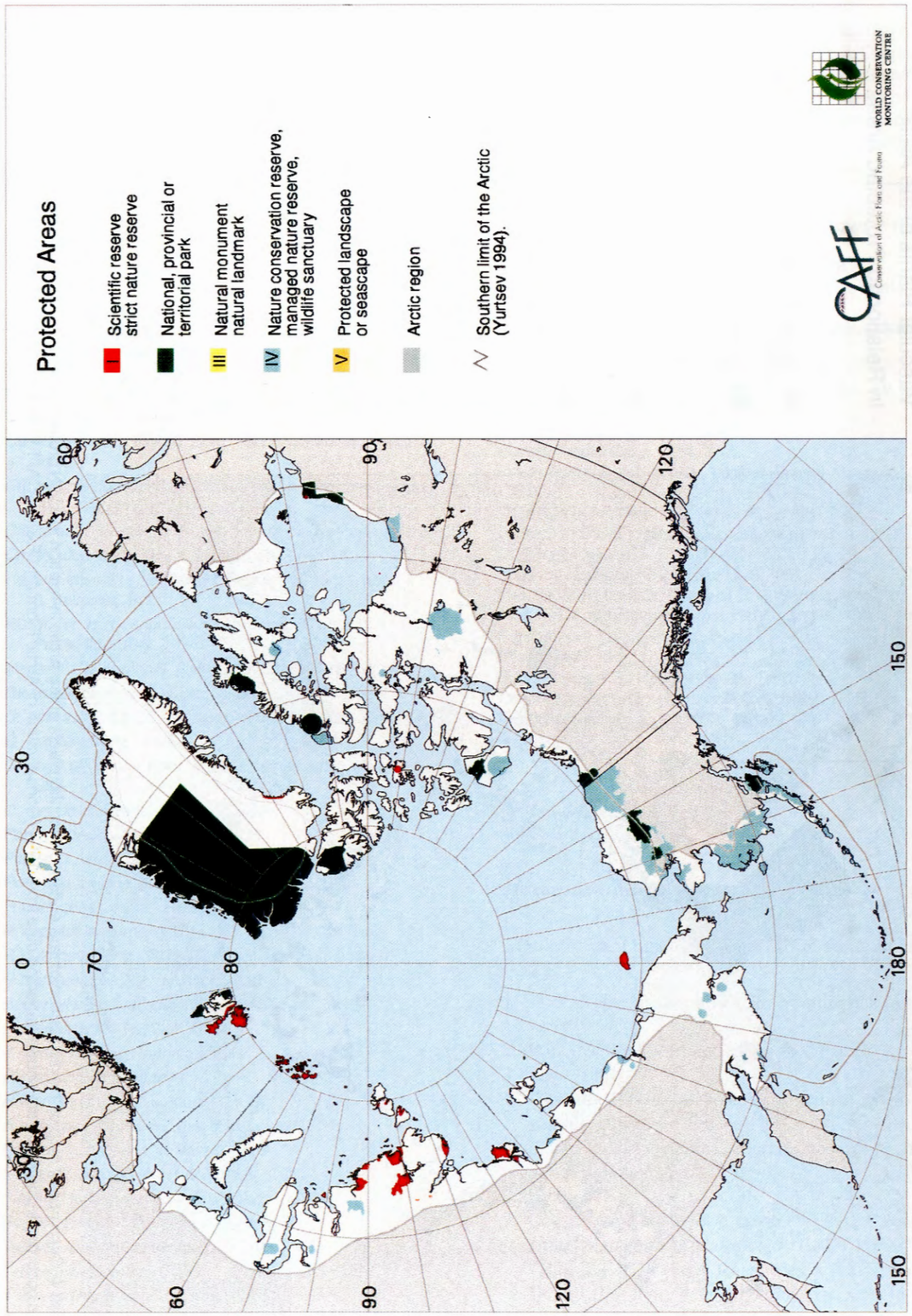


Figure 3. Circumpolar map of IUCN protected areas I-V (IUCN 1978). Only protected areas occurring in the Arctic are shown based on data from 1994 (Conservation of Arctic Flora and Fauna [CAFF] 1994).

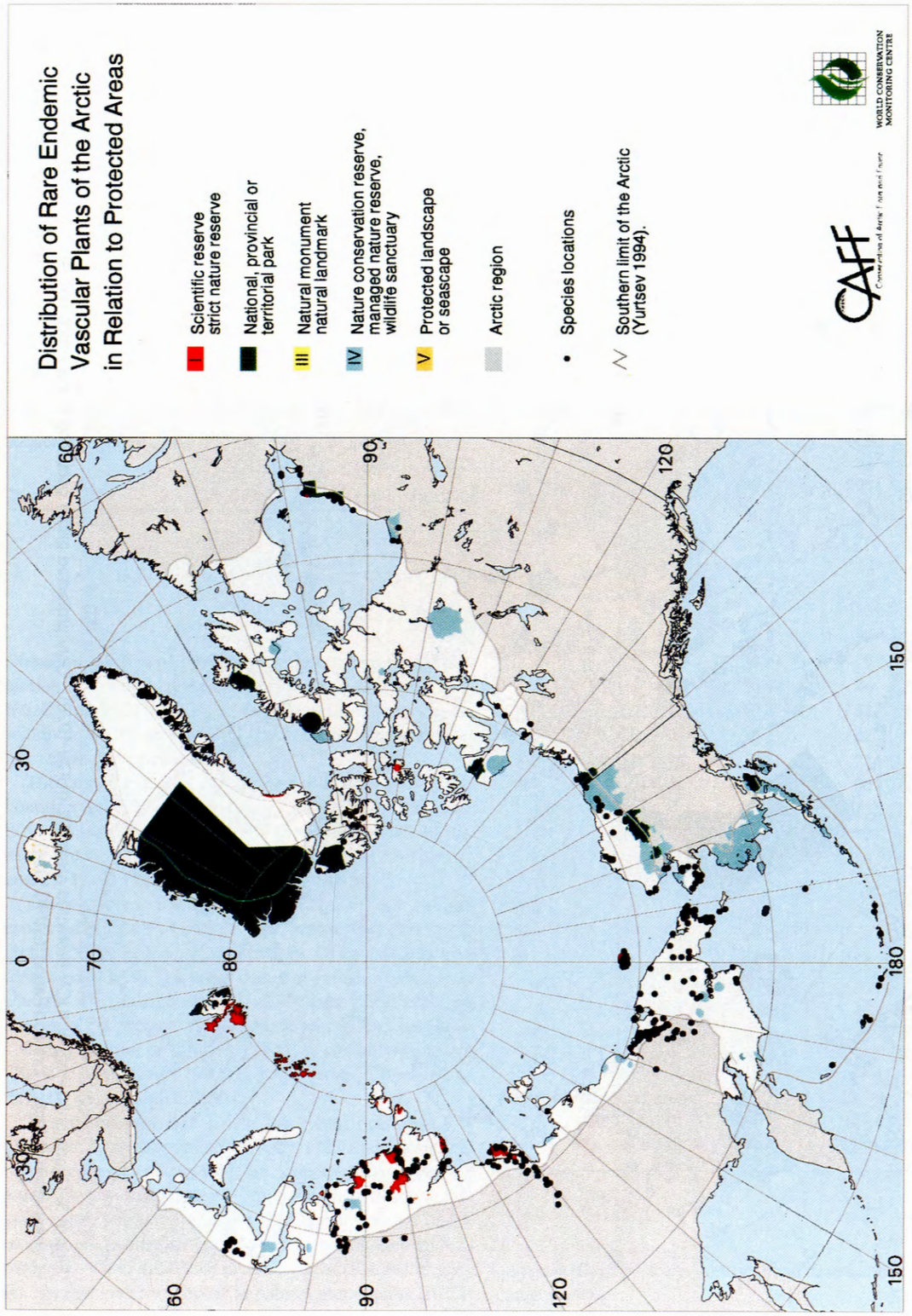


Figure 4. Circumpolar map of the distribution of rare endemic vascular plants of the Arctic in relation to IUCN protected areas I-V (IUCN 1978). Only protected areas occurring in the Arctic are shown based on data from 1994 (Conservation of Arctic Flora and Fauna [CAFF] 1994).

Table 8. Unprotected rare endemic vascular plants of the Arctic (= 45 taxa); these plants do not occur in IUCN protected area categories I-V. Key: CDN = Canada, GRN = Greenland, NOR = Norway, RUS = Russia, and USA = United States of America.

Arabidopsis bursifolia (DC.) Botsch. var. *beringensis* Jurtz., RUS
A. tschuktschorum (Jurtz.) Jurtz., RUS
Artemisia flava Jurtz., RUS
A. samojedorum Pamp., RUS
A. senjavinensis Bess. , RUS
Astragalus gorodkovii Jurtz., RUS
A. igoschinae R. Kam. & Jurtz., RUS
Beckwithia glacialis (L.) Á. Löve & D. Löve ssp. *alaskensis* Jurtz., D. Murray, & S. Kelso ined., USA
Cardamine sphenophylla Jurtz., RUS
Cassiope Xanadyrensis Jurtz., RUS
Castilleja arctica Kryl. & Serg. subsp. *vorkutensis* Rebr., RUS
Chrysosplenium rimosum Kom. subsp. *dezhnevii* Jurtz., RUS
Claytoniella vassilievii (Kuzen.) Jurtz. subsp. *vassilievii*, RUS
Crepis albescens Kuv. & Demid., RUS
Hedinia czukotica (Botsch. & Petrovsky) Jurtz., Korobk. & Balandin, RUS
XLedodendron vanhoeffeni (Abromeit) Dalgaard & Fredskild, GRN
Mertensia drummondii (Lehm.) D. Don, CDN and USA
Oxytropis beringensis Jurtz., RUS
O. deflexa (Pall.) DC. subsp. *dezhnevii* (Jurtz.) Jurtz., RUS
O. kateninii Jurtz., RUS
O. sordida (Willd.) Pers. subsp. *barnebyana* (Welsh) Jurtz., USA
O. sverdrupii Lynge, RUS
Papaver leucotrichum Tolm., RUS
Plantago canescens Adams subsp. *jurtzevii* Tzvel., RUS
Potentilla anjuica Petrovsky, RUS
P. beringensis Jurtz., RUS
P. czegitunica Jurtz., RUS
P. dezhnevii Jurtz., RUS
P. tschaunensis Juz. ex Jurtz., RUS
Puccinellia jenissejensis (Roshev.) Tzvel., RUS
P. rosenkrantzii Th. Sør., GRN
P. svalbardensis Rønning, NOR
Pucciphippsia czukczorum Tzvel., RUS
Ranunculus punctatus Jurtz., RUS
R. wilanderi (Nath.) Á. Love & D. Löve, NOR
Roegneria nepliana V. Vassil., RUS
Saliconia borealis Wolff & Jeffries, CDN
Sisyrinchium groenlandicum Boech., GRN
Suaeda arctica Jurtz. & Petrovsky, RUS
Taraxacum czaunense Jurtz. & Tzvel., RUS
T. czukoticum Jurtz., RUS*T. jurtzevii* Tzvel., RUS
T. leucocarpum Jurtz. & Tzvel., RUS
T. petrovskyi Tzvel. var. *safronovae* Tzvel., RUS
T. senjavinense Jurtz. & Tzvel., RUS

Table 9. Partially protected rare endemic vascular plants of the Arctic (= 22 taxa); these occur in some IUCN protected area categories I-V. Taxon name is followed by country code. Fraction: numerator (number of occurrences in protected areas); denominator (total number of occurrences). Key: CDN = Canada, GRN = Greenland, RUS = Russia, and USA = United States of America.

Androsace semiperennis Jurtz., RUS, 1/6
A. arctica Less. subsp. *arctica*, USA (unprotected in RUS), 1/10
A. globularia Bess. var. *lutea* Hultén, USA, 5/8
Artemisia lagopus Fisch. ex Bess. subsp. *abbreviata* Krasch. ex Korobk., RUS, 1/15
A. lagopus Fisch. ex Bess. subsp. *triniana* (Bess.) Korobk., RUS, 3/9
Calamagrostis poluninii Th. Sør., GRN, 1/22
Draba aleutica Ekman ex Hultén, RUS and USA, 5/6 (all localities within the USA are protected)
D. taimyrensis Tolm., RUS, 2/6
Erigeron muirii Gray, CDN, 2/14
Linum lewisii Pursh subsp. *lepagei* (Boivin) Mosquin, CDN, 2/8
Oxytropis putoranica M. Ivanova, RUS, 1/5
O. sordida (Willd.) Pers. subsp. *arctolenensis* Jurtz., RUS, 2/4
O. tichomirovii Jurtz., RUS, 2/22
Papaver atrovirens Petrovsky, RUS, 3/5
Poa hartzii R. Br. ssp. *alaskana* R. J. Soreng, USA, 1/5
Puccinellia byrrangensis Tzvel., RUS, 3/11
P. gorodkovii Tzvel., RUS, 2/7
P. poacea Th. Sør., CDN, 1/12
Rumex krausei Jurtz. & Petrovsky, RUS, 2/4
Taraxacum petrovskyi Tzvel. var. *petrovskyi*, RUS, 3/6
T. semitubulosum Jurtz., RUS, 3/7
T. taimyrense Tzvel., RUS, 1/13

Systematic List

Data for each taxon are presented in the following sequence:

1. The accepted name of a species, subspecies, or variety
2. Principal synonyms and misapplied names
3. Plant family
4. Latitudinal (zonal) geographical element, phytogeographic subzones (Yurtsev 1994)
5. Longitudinal (sectorial) geographic element, floristic subprovince (Yurtsev 1994)
6. Ecology
7. Conservation status of a taxon (IUCN Protected Areas Management Category = IUCN PAMC, see Table 2; IUCN Threat Categories = IUCN, see Table 1 [For more detailed definitions, refer to the original publication (IUCN 1994)]; geographic distribution).

Table 10. Protected rare endemic vascular plants of the Arctic (= 29 taxa); these occur completely within IUCN protected area categories I-V. Key: RUS = Russia and USA = United States of America.

Artemisia aleutica Hultén, USA
Claytoniella vassilievii (Kuzen.) Jurtz. subsp. *petrovskyi* Jurtz. & M. Griczuk, RUS
Douglasia beringensis S. Kelso, Jurtz., & D. F. Murray, USA
Gastrolychnis triflora (R. Br.) Tolm. & Kozhancz. subsp. *wrangelica* Jurtz., RUS
Hierochloë wrangelica Jurtz. & Probat., RUS
Oxytropis uniflora Jurtz., RUS
O. uschakovii Jurtz., RUS
O. wrangelii Jurtz., RUS
Papaver calcareum Petrovsky, RUS
P. chionophilum Petrovsky, RUS
P. multiradiatum Petrovsky, RUS
P. nudicaule L. subsp. *insulare* Petrovsky, RUS
P. uschakovii Tolm. & Petrovsky, RUS
Polystichum aleuticum C. Christensen, USA
Potentilla Xarctoalaskensis Jurtz., USA
P. brooksensis Jurtz., USA
P. murrayi Jurtz., USA
P. uschakovii Jurtz., RUS
P. wrangelii Petrovsky, RUS
Roegneria villosa V. Vassil. subsp. *coerulea* Jurtz., RUS
Salix stolonifera Cov. subsp. *carbonicola* Petrovsky, RUS
Saxifraga aleutica Hultén, USA
Senecio hyperborealis Greenm. subsp. *wrangelica* Jurtz., Korobk. & Petrovsky, RUS
Taraxacum nanaunii Jurtz., RUS
T. pseudoplatylepium Jurtz., RUS
T. tolmaczevii Jurtz., RUS
T. uschakovii Jurtz., RUS
T. wrangelicum Tzvel., RUS
Trisetum wrangelense (Petrovsky) Probat., RUS

Table 11. Distribution of rare endemic occurrences in relation to IUCN protected areas management categories I-V (IUCN 1978). Category definitions are shown in Table 2. Taxa may occur in more than one category. Percentages are in parentheses.

IUCN protection category	Number of taxa		Number of occurrences	
Taxa outside protected areas	78	(60.9)	372	(70.9)
I	32	(25.0)	114	(21.8)
II	2	(1.6)	2	(0.4)
III	0	(0.0)	0	(0.0)
IV	16	(12.5)	36	(6.9)
V	0	(0.0)	0	(0.0)
Total	128	(100.0)	524	(100.0)

8. Notes: diploid chromosome number (2n), biological considerations, taxonomic considerations and relationships.
9. The authors of the localities list (Ls) and of the annotation (T)
10. Related literature (citation)
11. Country (-ies) of occurrence

Geographical coordinates for the localities of individual taxa are shown in Appendix II, and maps showing the distribution of individual taxa in relation to these protected areas are in Appendix III.

1. ***Androsace semiperennis* Jurtz.**
2. No synonyms
3. Primulaceae
4. Northern and Southern Hypoarctic Tundra, Suboceanic Stlaniks (*Pinus pumila*)
5. Amguema Transitional Area, Continental Chukotka, South Chukotka, and adjacent areas of Suboceanic Stlaniks
6. Dry rubble and stony slopes of low mountains and hills, at the foot of tors; less frequently on alluvial gravels.
7. Known from six localities. Protected in one locality, Ust-Tanyrersky (IUCN PAMC = IV). IUCN = LR(nt)
8. 2n = 40. Facultative polycarpic. Closest relative is believed to be *A. gorodkovii* Ovcz. & Karav.
9. Ls: N.N. Taraskina, T: A.A. Korobkov
10. Korobkov (1980)
11. Russia

1. ***Arabidopsis bursifolia* (DC.) Botsch. var. *beringensis* Jurtz.**
2. No synonyms
3. Cruciferae (Brassicaceae)
4. Northern Hypoarctic Tundra
5. Beringian Chukotka
6. Zoogenic meadow on top of a high limestone tor.
7. Known from very few individuals in a single habitat at a single locality. IUCN = DD
8. 2n = 16. A short-lived perennial. See comments on *A. tschuktschorum*, below.
9. Ls: N.N. Taraskina, T: B.A. Yurtsev
10. Yurtsev (1975, 1981)
11. Russia

1. ***Arabidopsis tschuktschorum* (Jurtz.) Jurtz.**
2. *Arabis tschuktschorum* Jurtz.
3. Cruciferae (Brassicaceae)
4. Northern Hypoarctic Tundra
5. Beringian Chukotka
6. Zoogenic dry meadow on top of a limestone hill; *Dryas integrifolia* fellfield.
7. Known from a few individuals at a single locality; a presumed relict of Late Pleistocene tundra-steppe phase of Beringia. IUCN = DD
8. 2n = 16. A presumed derivative of the hypoarctic continental East Siberian species, *A. bursifolia* (DC.) Botsch., which is closely related to or conspecific with the North American *A. mollis* (Hook) Schulz (fide B.A. Yurtsev).
9. Ls: N.N. Taraskina, T: B.A. Yurtsev
10. Yurtsev (1975, 1981), Takhtajan (1988)
11. Russia

1. ***Artemisia aleutica* Hultén**
2. No synonyms
3. Compositae (Asteraceae)
4. Oceanic Boreal (mostly treeless mesic meadows and heaths)
5. Oceanic Insular, South Beringia (Aleutian Islands)
6. Windswept, open gravelly tundra; occurs as scattered, white, often sterile rosettes on seemingly barren areas between patches of heath vegetation. Associated taxa are *Achillea borealis*, *Chrysosplenium wrightii*, *Diapensia lapponica* subsp. *obovata*, *Acomastylis rossii*, *Lupinus nootkatensis*, *Senecio resedifolius*, and *Sibbaldia procumbens*.
7. Known from four localities and only from Kiska and Rat Islands. Protected in all localities, Aleutian Islands subunit of Alaska Maritime National Wildlife Refuge (IUCN PAMC = IV); the Aleutian Islands are a biosphere reserve (IUCN PAMC = IX). IUCN = VU
8. This species is one of a complex of taxa that includes *A. borealis* Pallas and *A. richardsoniana* Besser; it is most similar to the latter.
9. Ls and T: S.S. Talbot
10. Hultén (1939, 1968), Welsh (1974), Murray and Lipkin (1987), Lipkin and Murray (1997)
11. USA

1. ***Artemisia arctica* Less. subsp. *arctica***
2. No synonyms
3. Compositae (Asteraceae)
4. Northern and Southern Hypoarctic Tundra
5. Beringian Chukotka and Beringian Alaska
6. Willow-herb, mesic-tundra meadows on terraces, and forb-mesic meadows along brooks.
7. Known from ten localities; five in Russia and five in Alaska, but the distribution is believed to be poorly known. Protected in one locality, Bering Land Bridge National Preserve (IUCN PAMC = IV). IUCN = DD
8. 2n = 18. A diploid race; closely related to the tetraploid (2n = 36) *A. ehrendorferi* Korobk., which is common throughout the Chukotka, Alaska, and Yukon.
9. Ls: N.N. Taraskina, T: A.A. Korobkov
10. Hultén 1968 (pro minima), Korobkov (1981, 1987a)
11. Russia, USA

1. ***Artemisia flava* Jurtz.**
2. No synonyms
3. Compositae (Asteraceae)
4. Southern Hypoarctic Tundra and adjacent subarctic alpine areas
5. Continental Chukotka and adjacent subarctic alpine areas
6. Stony, rubble, or gravelly forb-dwarf shrub-lichen tundras and barrens on mountain slopes, nival terraces, and headwaters of brooks; prefers moist sites and acid to moderately acidic, siliceous rocks.
7. Known from ten localities, Anyui Mountains. IUCN = LR(lc)
8. 2n = 18. Closely related to the amphi-Beringian *A. globularia* var. *lutea* from the Bering Strait region, Alaska (see below).
9. Ls: T.M. Koroleva, T: A.A. Korobkov and B.A. Yurtsev
10. Korobkov (1981, 1987a), Zaslavskaya and Petrovsky (1985)
11. Russia

1. ***Artemisia globularia* Bess. var. *lutea* Hultén** (Fig. 5)
2. *Artemisia globularia* Bess. f. *lutea* (Hult.) B. Boiv.
3. Compositae (Asteraceae)
4. Northern and Southern Hypoarctic Tundra and Oceanic Boreal (mostly treeless mesic meadows and heaths)
5. Oceanic Insular, North and South Beringia, and Beringian Alaska
6. Windswept moist herb tundra on gravelly and sandy, acidic substrate.
7. Known from eight localities on St. Matthew Island, St. Paul Island, St. Lawrence Island, and western Seward Peninsula. Hultén's (1968) report of this taxon from Hall Island is incorrect, apparently a confusion of Hall with adjacent St. Matthew Island. Protected in five localities, the Alaska Maritime National Wildlife Refuge and Bering Land Bridge National Preserve (IUCN PAMC = IV). IUCN = LR(lc)
8. *Artemisia globularia* is a well-marked, widespread species distinguished from other Alaskan taxa in the genus by its much smaller heads of purplish-black flowers. Variety *lutea* is, however, a distinct, yellow-flowered race which shares with var. *globularia* glabrous corollas with numerous translucent glands. It is therefore distinct from the yellow-flowered *A. furcata* Bieberstein and *A. glomerata* Ledebour, which have corollas with long hairs and few if any translucent glands. *Artemisia flava* from Russia



Figure 5. *Artemisia globularia* var. *lutea*. This distinct yellow-flowered race occurs on islands of the Bering Sea, Alaska. Photograph courtesy of Sandra Looman Talbot, Alaska Biological Science Center, U.S. Geological Survey, Biological Resources Division.

differs from *A. globularia* var. *lutea* (see above) in its leaf dissection and dilated petioles (Murray and Lipkin 1987).
9. Ls and T: S.S. Talbot, R. Lipkin, D.F. Murray, and B.A. Yurtsev
10. Hultén (1968), Welsh (1974), Kharkevich and Kachura (1981), Korobkov (1987a), Murray and Lipkin (1987), Lipkin and Murray (1997)
11. USA

1. ***Artemisia lagopus* Fisch. ex Bess. subsp. *abbreviata* Krasch. ex Korobkov**
2. No synonyms
3. Compositae (Asteraceae)
4. Arctic tundra, Northern and Southern Variant; Northern Hypoarctic Tundra; and adjacent subarctic alpine areas
5. Easternmost Anabar-Olenek, Kharaulakh, and adjacent areas (northern Verkhoyansk Range)
6. Restricted to dry, mostly unvegetated rubble slopes and mountain summits.
7. Known from 15 localities; locally abundant. Protected in one locality, Lena Delta State Reserve (IUCN PAMC = I). IUCN = LR(lc)
8. 2n = 18. The northernmost race of the northeast Asian, petrophilous *A. lagopus* Fisch. ex Bess.
9. Ls: T.M. Koroleva, T: A.A. Korobkov
10. Korobkov (1981, 1987a)
11. Russia

1. ***Artemisia lagopus* Fisch. ex Bess. subsp. *triniana* (Bess.) Korobkov**
2. *Artemisia triniana* Bess.
3. Compositae (Asteraceae)
4. Arctic Tundra, Southern Variant; Northern Hypoarctic Tundra
5. Anabar-Olenek
6. Restricted to sands on riparian and marine terraces.
7. Known from nine localities. Protected in three localities, Lena Delta State Reserve (IUCN PAMC = I). IUCN = LR(nt)
8. 2n = 18. A High Arctic race with pulvinate growth form, related to and presumably originated from the northeast Siberian montane, petrophilous, continental subsp. *lagopus*.
9. Ls: T.M. Koroleva, T: A.A. Korobkov
10. Korobkov (1981, 1987a)
11. Russia

1. ***Artemisia samojedorum* Pamp.**
2. *Artemisia sieversiana* Willd. var. *jenisseensis* Reverdatto
3. Compositae (Asteraceae)
4. Northern and Southern Hypoarctic Tundra and adjacent subarctic woodlands (southward to the mouth of Kureika River)
5. Yamal-Gydan, Taimyr, and adjacent subarctic areas
6. Sandy, stony, and gravelly floodplain and steep banks of the Yenisei River valley; sometimes behaves as a ruderal species.
7. Known from ten localities. IUCN = LR(lc)
8. Biennial monocarpic herb belonging to the section *Absinthium* DC.
9. Ls and T: M.V. Sokolova
10. Korobkov (1987a)
11. Russia

1. ***Artemisia senjavinensis* Bess.**
2. *A. androsacea* Seem.
3. Compositae (Asteraceae)
4. Northern Hypoarctic Tundra
5. Beringian Chukotka (southeasternmost Chukotsk Peninsula)
6. Calcicolous; carbonate outcrops and dry slopes and wind-swept summits.

7. Known from seven localities; locally abundant. IUCN = LR(nt)
8. 2n = 54. Yurtsev (unpublished data, 1996) assigns all the Alaskan plants named *A. senjavinensis* to *A. androsacea* Seem. (or *A. senjavinesis* subsp. *androsacea* ined.). To him it differs from the Asian species by a more creeping habit, the branches of the aboveground shoot system having elongated basal internodes, not always abbreviated as in *A. senjavinensis* from Chukotka. The Alaskan plants have chromosome numbers of both 36 and 54.

According to Murray and Kelso (1997),

> In the view of Korobkov and B.A. Yurtsev (pers. comm.), many of the Alaskan plants tend to have a more open growth form than the more consistently pulvinate plants from Chukotka; thus they apply the name *Artemisia senjavinensis* in a narrow sense to the Russian plants only. They then treat the Alaska taxon as distinct from *A. senjavinensis* and give it the name *A. androsacea* Seem. [or *A. senjavinensis* subsp. *androsacea* (Seem.) Shed.]. Whereas, the Chukotkan plants are uniformly 2n = 54, both 2n = 36 and 54 are known for Alaskan specimens (Dawe and Murray 1981), which are without parallel morphological discontinuities; thus the cyclotypes cannot be distinguished except by counts. Furthermore, there are Alaskan plants equally pulvinate and indistinguishable from those on Chukotka; therefore, we view these differences as falling within the range of one species, *A. senjavinensis*.
>
> Nevertheless, we have for this document mapped the species in its restrictive sense.

The suggestion by Dawe and Murray (1981) that the two chromosome races on the Seward Peninsula may be ecologically separated warrants further study, specifically to answer this question. Does the variation in habit reflect a single polymorphic species, or would a closer look show that all compact forms (*A. senjavinensis*) are 2n = 54 and confined to lowland settings and the more open forms (*A. androsacea*) are 2n = 36 and confined to alpine sites?
9. Ls: A.R. Batten, N.N. Taraskina, T: D.F. Murray, B.A. Yurtsev
10. Dawe and Murray (1981), Korobkov (1981, 1987a), Takhtajan (1988), Murray (1992, 1994), Lipkin and Murray (1997), Murray and Kelso (1997)
11. Russia

1. ***Astragalus gorodkovii* Jurtz.**
2. No synonyms. Misapplied names: *Astragalus uralensis* auct., *A. australis* auct.
3. Leguminosae (Fabaceae)
4. Southern Hypoarctic Tundra
5. Ural-Novaya Zemlya
6. Dry gravelly floodplains.
7. Known from three localities. IUCN = VU
8. 2n = 16. A presumed relict of a cold, dry interval of Late Pleistocene. Considered by Stanley Welsh, Brigham Young University (pers. comm., 1996), who takes a more inclusive view, to be a minor variant of *Astragalus australis* s.l.
9. Ls: O.V. Rebristaya, T: O.V. Rebristaya and B.A. Yurtsev
10. Yurtsev (1986a)
11. Russia

1. ***Astragalus igoschinae* R. Kam. & Jurtz.**
2. No synonyms. Misapplied names: *Astragalus arbuscula* auct. non Pall.
3. Leguminosae (Fabaceae)
4. Southern Hypoarctic Tundra
5. Ural-Novaya Zemlya
6. Steep riparian bluff.
7. Known only from a single locality, the type collection. The exact location of this population (according to the specimen label) is uncertain because there are two rivers, called "Khoila R." on both the western and the eastern slopes of the Ural. IUCN = DD
8. Closest to the Altai-East Kazakhstan steppe or semi-desert semishrub species, *A. arbuscula* Pall. of section *Xiphidium*. A presumed relict of a cryo-arid interval of Late Pleistocene.
9. Ls: O.V. Rebristaya, T: O.V. Rebristaya and B.A. Yurtsev
10. Kamelin and Yurtsev (1982), Yurtsev (1986a)
11. Russia

1. ***Beckwithia glacialis* (L.) Á. Löve & D. Löve subsp. *alaskensis* Jurtz., D.F. Murray & S. Kelso ined.**
2. No synonyms
3. Ranunculaceae
4. Southern Hypoarctic Tundra
5. Beringian Alaska
6. Stony barrens, rubble slopes, and screes in the Kigluaik Mountains of western Seward Peninsula.
7. Known from seven localities. IUCN = VU
8. *Beckwithia* is treated by most authors within the genus *Ranunculus*, whereby *Beckwithia glacialis* becomes *Ranunculus glacialis*. The Alaska race, subsp. *alaskensis*, is disjunct from subsp. *glacialis* for which the closest localities are in East Greenland. Subspecies *alaskensis* differs from subsp. *glacialis* in having brown pubescence on the stems.
9. Ls and T: D.F. Murray, R. Lipkin, and B.A. Yurtsev

10. Lipkin and Murray (1997), ined.
11. USA

1. ***Calamagrostis poluninii* Th. Sør.**
2. No synonyms
3. Gramineae (Poaceae)
4. Southern and Northern Hypoarctic Tundra and Oceanic Boreal (mostly treeless mesic meadows and heaths)
5. West Greenland and adjacent areas
6. Dry coastal sands, stony river banks, and wind-exposed places.
7. Known from 22 localities in a rather large area in central West Greenland. Protected in one locality, Arnangarup Qoorua (IUCN PAMC = I). IUCN = LR(lc)
8. 2n = 56. C.W. Greene, College of the Atlantic (pers. comm., 1997) noted that *C. poluninii* appears to be close to *C. purpurascens* R. Br. var. *laricina* Louis-Marie [syn. *C. laricina* (Louis-Marie) Louis-Marie]. Variety *laricina* and *C. poluninii* could be considered short-awned forms of *C. purpurascens*; var. *laricina* is apparently pollen-sterile and probably apomictic. More study might show that *C. poluninii* belongs within var. *laricina*. Resolution of this question awaits further study, and, for now, *C. poluninii* is retained as a distinct species.
9. Ls: C. Bay and B. Fredskild, T: C. Bay
10. Sørensen (1954), Feilberg (1984), Fredskild (1996)
11. Greenland

1. ***Cardamine sphenophylla* Jurtz.**
2. No synonyms
3. Cruciferae (Brassicaceae)
4. Northern Hypoarctic Tundra
5. Amguema Transition Area and Beringian Chukotka
6. Mesic and moist tundra-meadows in lower parts and at the foot of slopes and associated with snow-rich areas.
7. Known from three localities with very small populations. IUCN = VU
8. 2n = 28. Belongs to the arctic-alpine section *Cardaminella*; related to the amphi-Beringian *C. digitata* Richards.
9. Ls: N.N. Taraskina, T: B.A. Yurtsev.
10. Yurtsev *in* Petrovsky (1975), Takhtajan (1988)
11. Russia.

1. ***Cassiope Xanadyrensis* Jurtz.**
2. No synonyms
3. Ericaceae
4. Northern Hypoarctic Tundra and adjacent mountainous woodland areas
5. South Chukotka and adjacent mountainous woodland areas
6. Dwarf shrub-moss-lichen, acidophilic, montane rubble tundras, medium-rich in snow.
7. Known from two localities in the Lower and Upper Anadyr watersheds; locally abundant. IUCN = DD
8. Intermediate both in its morphology and ecology between *Cassiope tetragona* D. Don and *C. ericoides* (Pall.) D. Don; it is therefore considered a taxon of hybrid origin involving these two species.
9. Ls: N.N. Taraskina, T: B.A. Yurtsev
10. Yurtsev *in* Vinogradova and Yurtsev (1980)
11. Russia

1. ***Castilleja arctica* Kryl. & Serg. subsp. *yorkutensis* Rebr.**
2. No synonyms
3. Scrophulariaceae
4. Southern Hypoarctic Tundra
5. Ural-Novaya Zemlya
6. Dry to mesic meadows on riverbanks and flood plains.
7. Known from six localities. IUCN = LR(nt)
8. Western mountainous race, replaced in the arctic plains of West Siberia by subsp. *arctica*.
9. Ls and T: O.V. Rebristaya
10. Rebristaya (1980)
11. Russia

1. ***Chrysosplenium rimosum* Kom. subsp. *dezhnevii* Jurtz.**
2. No synonyms
3. Saxifragaceae
4. Northern Hypoarctic Tundra
5. Beringian Chukotka (easternmost Chukotsk Peninsula)
6. Snowbed at the foot of a slope, on moist carbonate silty soil with sparse, dwarf-herb vegetation.
7. Known from a very small population in a single habitat at a single locality. IUCN = DD
8. 2n = 18. An arctic race of a hypoarctic Koryak subsp. *rimosum*.
9. Ls: N.N. Taraskina, T: B.A. Yurtsev
10. Taraskina (1984), Takhtajan (1988)
11. Russia

1. ***Claytoniella vassilievii* (Kuzen.) Jurtz. subsp. *petrovskyi* Jurtz. & M. Griczuk ined.**
2. *Claytonia vassilievii* Kuzen. p.p.; *Montiastrum vassilievii* (Kuzen.) O. Nilsson, p.p.
3. Portulacaceae
4. Arctic Tundra, Northern Variant
5. Wrangel Island
6. Moist, eutrophic frost-boil, dwarf shrub-herb-moss tundras on noncalcareous, clayish-gravelly alluvia or deluvia along watercourses.
7. Known from three localities; occasionally abundant. Protected in Wrangel Island State Reserve (IUCN PAMC = I). IUCN = VU
8. 2n = 60. *C. vassilievii* subsp. *petrovskyi* is very rarely collected with flowers.

9. Ls: N.N. Taraskina and V.V. Petrovsky, T: B.A. Yurtsev
10. Yurtsev (1974)
11. Russia

1. ***Claytoniella vassilievii* (Kuzen.) Jurtz. subsp. *vassilievii***
2. *Claytonia vassilievii* Kuzen., *Montiastrum vassilievii* (Kuzen.) O. Nilsson
3. Portulacaceae
4. Northern and Southern Hypoarctic Tundra; Suboceanic Stlaniks (*Pinus pumila*)
5. South and Beringian Chukotka and adjacent areas of Suboceanic Stlaniks (*Pinus pumila*)
6. Moist eutrophic, noncarbonate, forb-dwarf shrub-moss tundras, on bare rubble-silt or among mosses. Forms loose clones with creeping stems.
7. Known from eight localities with extremely sporadic distribution; sometimes locally abundant. It also occurs in the alpine belt of the large Stlanik subzone (type locality is Mount Irguney in Rarytkyn Range). IUCN = LR(lc)
8. 2n = 64. A creeping herb forming fragile stolons. Relatives are *Claytoniella kolymensis* Jurtz. of the Kolyma-Okhotsk Sea divide and *Claytoniella bostockii* (Pors.) Jurtz. of Alaska and Yukon.
9. Ls: N.N. Taraskina, T: B.A. Yurtsev
10. Yurtsev (1974)
11. Russia

1. ***Crepis albescens* Kuv. & Demid.**
2. No synonyms
3. Compositae (Asteraceae)
4. Southern Hypoarctic Tundra
5. Ural-Novaya Zemlya
6. East-facing rubble slope.
7. Known from a single locality. IUCN = DD
8. A local race that, alternatively, may be a disjunct population of the Asian, arctic-alpine *C. chrysantha* (Ledeb.) Turcz.
9. Ls and T: O.V. Rebristaya
10. Rebristaya (1987)
11. Russia

1. ***Douglasia beringensis* S. Kelso, B.A. Jurtsev & D.F. Murray** (Fig. 6)
2. No synonyms
3. Primulaceae
4. Southern Hypoarctic Tundra and adjacent subarctic alpine areas
5. Beringian Alaska and adjacent subarctic alpine areas
6. Associated taxa are *Oxytropis bryophila*, *Smelowskia porsildii (S. calycina* var. *porsildii)*, *Draba palanderiana*, *Poa glauca*, *Carex rupestris*, *Minuartia obtusiloba*, *Saxifraga oppositifolia* and the lichens *Thamnolia subuliformis*, *Flavocetraria (Cetraria) nivalis*, *Vulpicida (Cetraria) tilesii*, and *Ochrolechia frigida*.
7. Known only from two locations within a 15-km^2 area on the north-central Seward Peninsula. On the Seward Peninsula, *D. beringensis* is locally abundant on Paleozoic calcite marble outcrops, but it has not yet been found on other carbonate formations there (Kelso et al. 1994). Protected in one locality at Trail Creek near the northeast edge of the Bering Land Bridge National Preserve (IUCN PAMC = IV). The Kokrines Hills locality has not been mapped, as the specimen is a scrap and equivocal. IUCN = VU
8. 2n = 38. A close ally is *D. arctica* W. Hooker, which is known from the northeast corner of Alaska and northern Yukon Territory (Kelso et al. 1994).
9. Ls: D.F. Murray, R. Lipkin, and S.S. Talbot, T: S. Kelso
10. Kelso (1987, 1996), Kelso et al. (1994), Murray (1994), Lipkin and Murray (1997)
11. USA

1. ***Draba aleutica* Ekman ex Hultén**
2. *Draba behringii* Tolm. Misapplied name: *D. tschuktshorum* auct. non Trautv.
3. Cruciferae (Brassicaceae)
4. Oceanic Boreal (mostly treeless mesic meadows and heaths)
5. Oceanic Insular, South Beringia
6. Gravelly alpine sites, solifluction areas in the high mountains.
7. Known from six localities (Aleutian Islands, Pribilof Islands, and Commander Islands) but is probably more widespread. Protected in five localities of the Aleutian Islands subunit of Alaska Maritime National Wildlife Refuge (IUCN PAMC = IV); the Aleutian Islands are a biosphere reserve. IUCN = LR(lc)
8. According to Berkutenko (1978, 1983, 1985), Tolmatchev (1975a) misapplied the name *D. tschuktschorum* Trautv. to *D. aleutica*. She determined that *D. tschuktschorum* is actually close to *D. fladnizensis*.
9. Ls and T: R. Lipkin, S.S. Talbot
10. Hultén (1960, 1968), Welsh (1974), Tolmatchev (1975a), Berkutenko (1978, 1983, 1985), Rollins (1993), Lipkin and Murray (1997)
11. Russia, USA

1. ***Draba taimyrensis* Tolm.**
2. No synonyms
3. Cruciferae (Brassicaceae)
4. Arctic Tundra, Northern and Southern variants; Northern Hypoarctic Tundra
5. Taimyr



Figure 6. *Douglasia beringensis*. This species is known from two locations of the Seward Peninsula, Alaska, and is found on calcite marble outcrops. Photograph courtesy of David F. Murray, University of Alaska, Fairbanks.

6. Gravelly and rubble slopes and summits, terraces and floodplains, in sparse or closed vegetation of prostrate shrubs, lichens, and mosses.
7. Known from six localities. Protected in two localities, Great Arctic and Taimyrsky State Reserves (IUCN PACM = I). IUCN = DD
8. With features of taxa in both section *Lacteae* Tolm. and *Nivales* Tolm., which suggests hybrid origin.
9. Ls and T: M.V. Sokolova
10. Tolmatchev (1975a)
11. Russia

1. ***Erigeron muirii* Gray** (Fig. 7)
2. *Erigeron grandiflorus* Hook. subsp. *muirii* (A. Gray) Hultén
3. Compositae (Asteraceae)
4. Northern and Southern Hypoarctic Tundra
5. Northern and Beringian Alaska
6. Dry, south-facing fellfields, bluffs, terraces, alluvial fans, gravels, and sandstone outcrops, usually in open communities.
7. Known from 14 localities. Protected in two localities, Arctic National Wildlife Refuge (IUCN PAMC = IV). IUCN = LR(lc)
8. 2n = 18. A distinctive Beringian species endemic to northern Alaska, it closely resembles *E.grandiflorus* W.J. Hooker, *E. caespitosus* Nuttall, and *E. hyperboreus* E.L. Greene (Murray 1980). An early report of *E. muirii* from Wrangel Island, Russia, (Hultén 1941-1950) has not been confirmed and is probably based on a mislabeled specimen from Cape Thompson, Alaska. Reports from Herschel Island, Canada, are based on more pubescent forms of *E.grandiflorus* (Murray 1980), and reports from north eastern Asia (Petrovsky 1987) belong to *E. komarovii* Botsch.
9. Ls: C.M. McJannet, T: R. Lipkin and S.S. Talbot
10. Hultén (1941-1950, 1967, 1968), Wiggins and Thomas (1962), Welsh (1974), Murray (1980), Dawe and Murray (1981), Walker et al. (1987, 1989), McJannet et al. (1995), Lipkin and Murray (1997)
11. Canada, USA



Figure 7. *Erigeron muirii*. This distinctive Beringian species is found in the Northern and Southern Hypoarctic Tundra of Alaska and Canada. Photograph courtesy of David F. Murray, University of Alaska, Fairbanks.

1. ***Gastrolychnis triflora* (R.Br.) Tolm. & Kozhancz. subsp. *wrangelica* Jurtz.**
2. No synonyms
3. Caryophyllaceae
4. Arctic Tundra, Northern Variant
5. Wrangel Island
6. Sparse groupings on marine terraces; Arctic takkyrs.
7. Known from a single locality. Protected in Wrangel Island State Reserve (IUCN PAMC = I). IUCN = DD
8. 2n = 72. A local race of the Canadian-Greenland, facultatively halophytic *G. triflora*. Related to the amphi-Beringian arctic species, *G. ostenfeldii* (Pors.) Petrovsky. *Gastrolychnis* is often treated as *Silene* or *Melandrium*.
9. Ls and T: B.A. Yurtsev
10. Yurtsev and Petrovsky (1994)
11. Russia

1. ***Hedinia czukotica* (Botsch. & Petrovsky) Jurtz., Korobk. & Balandin**
2. *Hediniopsis czukotica* Botsch. & Petrovsky
3. Cruciferae (Brassicaceae)
4. Southern Hypoarctic Tundra
5. Continental Chukotka
6. Sparse groupings at the foot of volcanic tors or on the tops of tors and on cliff ledges, with other relict xerophytic species.
7. Known from three localities; locally abundant at the type locality. IUCN = VU
8. 2n = 24. One of four presumed relict species of a Central-Asian genus *Hedinia* (Yurtsev et al. 1987) or, alternatively, as the monotypic genus *Hediniopsis* (Botschantsev and Petrovsky 1986). The Central Asian biennial (or short-lived perennial) ancestor of this species is presumed to have appeared during a cryo-arid interval of Late

Pleistocene under tundra-steppe environments (Yurtsev et al. 1987).
9. Ls: T.M. Koroleva, N.N. Taraskina, T: B.A. Yurtsev
10. Botschantsev and Petrovsky (1986), Yurtsev et al. (1987)
11. Russia

1. ***Hierochloë wrangelica* Jurtz. & Probat.**
2. No synonyms
3. Gramineae (Poaceae)
4. Arctic Tundra, Northern Variant
5. Wrangel Island
6. Zoogenic, dry-grassy meadows at the foot of south-facing shale slopes of tors or on summits of low, flat hills.
7. Known from five very small populations at a single locality; mostly rhizomatous clones, but locally dominant. Protected in Wrangel Island State Reserve (IUCN PAMC = I). IUCN = DD
8. Closely related to the South-Siberian-Mongolian *H. glabra* Trin. of hemi-halophytic or steppe dry-meadows, presumably a relict of cryo-arid intervals of Late Pleistocene.
9. Ls and T: B.A. Yurtsev
10. Yurtsev (1989), Yurtsev et al. (1989a)
11. Russia

1. ***XLedodendron vanhoeffeni* (Abromeit) Dalgaard & Fredskild**
2. *Rhododendron vanhoeffeni* Abromeit
3. Ericaceae
4. Arctic Tundra, Northern Variant; Northern and Southern Hypoarctic Tundra
5. West Greenland
6. Mossy dwarf-shrub heath dominated by *Vaccinium uliginosum* subsp. *microphyllum*, *Salix glauca*, and *Betula nana*.
7. Known from nine localities in central West Greenland. IUCN = LR(nt)
8. *XLedodendron vanhoeffeni* is thought to be a generic hybrid between *Ledum palustre* subsp. *decumbens* and *Rhododendron lapponicum*. Chromosome counts are not yet available. In comparison to the two parent species, *XL. vanhoeffeni* is distinctly earlier flowering. Its flowers are pinkish white to pink with ten stamens; *Rhododendron* has five stamens and *Ledum* has ten.
9. Ls and T: C. Bay
10. Dalgaard and Fredskild (1993)
11. Greenland

1. ***Linum lewisii* Pursh subsp. *lepagei* (Boivin) Mosquin**
2. *Linum perenne* L. var. *lewisii* (Pursh) Eat. & Wrightn f. *lepagei* (Boivin) Lepage
3. Linaceae
4. Southern Hypoarctic Tundra and adjacent subarctic woodland areas
5. West Hudsonian and adjacent subarctic woodland areas
6. Dry grasslands to alpine ridges
7. Known from eight locations: Manitoba (Churchill) and Ontario (W James Bay-Hudson Bay N to approximately 56°30'N), and islands of James Bay-Hudson Bay (South Twin Island, Akimiski Island, and Long Island). Protected in two localities, Cape Churchill Wildlife Management Area (IUCN PAMC = IV) and Polar Bear Provincial Park (IUCN PAMC = I). IUCN = LR(nt)
8. Mosquin (1971) stated that the principal distinguishing features of subsp. *lepagei* occur in the structure of the flower (stigma tips that are either the same height as or slightly below the anther tips) and the size of the fruit (smaller than in most plants of the subsp. *lewisii*).
9. Ls and T: G.W. Argus, C.M. McJannet, and S.S. Talbot
10. Boivin (1966), Mosquin (1971), Scoggan (1978-1979), McJannet et al. (1995)
11. Canada

1. ***Mertensia drummondii* (Lehm.) D. Don.** (Fig. 8)
2. *Mertensia sibirica* var. *drummondii* (Lehm.) A. Gray; *Mertensia lanceolata* var. *drummondii* (Lehm.) Boivin; *Lithospermum drummondii* Lehman
3. Boraginaceae
4. Northern and Southern Hypoarctic Tundra
5. Northern Alaska, Central Canada, and adjacent areas
6. Sand dunes and blowouts near rivers, sand banks, and gravel beaches near the coast. Sparsely vegetated dry herbaceous and shrub communities. In Alaska found only on Pleistocene sand deposits. Associates are *Astragalus alpinus*, *Bromus pumpellianus*, *Polemonium boreale*, *Rumex graminifolius*, *Senecio hyperborealis*, and *Tanacetum bipinnatum*.
7. Known from nine localities; four widely separated areas in arctic Alaska and five in Canada. The two major areas in Alaska are along one stretch of less than 55 km along the Meade River near Atqasuk (south of Barrow) and approximately 250 km east on the Kogosukruk near Umiat. Five sites are in Canada's District of Mackenzie (Victoria Island and Union and Dolphin Strait). Several Alaskan sites are within the National Petroleum Reserve, Alaska (NPR-A), managed by the Bureau of Land Management. IUCN = LR(nt)
8. This plant is unlike other species of *Mertensia* in Alaska but similar to *M. lanceolata* (Pursh)

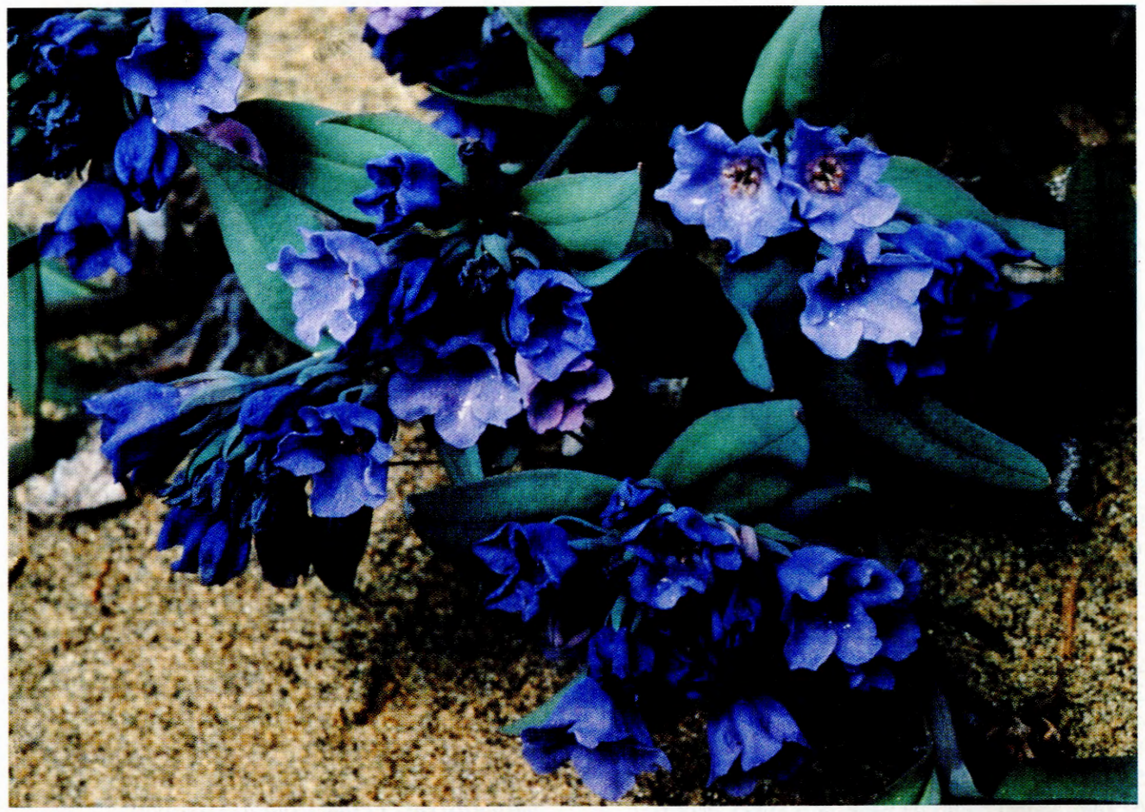


Figure 8. *Mertensia drummondii.* This species occurs on sandy sites in the Northern and Southern Hypoarctic Tundra of Alaska and Canada. Photograph courtesy of Jo Overholt, Image Alaska, Anchorage.

Candolle and *M. viridis* A. Nelson of the southern Rocky Mountains (Murray and Lipkin 1987).
9. Ls: G.W. Argus, R. Lipkin, and C.M. McJannet; T: S.S. Talbot
10. Williams (1940), Porsild (1964), Hultén (1968), Welsh (1974), Scoggan (1978-1979), Cody (1979), Komarkova and Webber (1980), Porsild and Cody (1980), Cody et al. (1992), Murray (1992), McJannet et al. (1995), Lipkin and Murray (1997)
11. Canada, USA

1. ***Oxytropis beringensis* Jurtz.**
2. No synonyms
3. Leguminosae (Fabaceae)
4. Northern Hypoarctic Tundra
5. Beringian Chukotka
6. Dry forb-sedge-dwarf shrub, rubble tundras on calcareous eluvium and deluvium.
7. Known from two localities where the species is locally abundant. IUCN = LR(nt)
8. 2n = 96. Calcicolous species with close affinities to *O. sordida* (Willd.) Pers.; it could be treated as a subspecies of the latter, filling the gap between the geographic ranges of *O. sordida* subsp. *schamurinii* Jurtz. and *O. sordida* subsp. *barnebyana* (Welsh) Jurtz.
9. Ls: N.N. Taraskina, T: B.A. Yurtsev
10. Yurtsev (1986b), Yurtsev et al. (1994)
11. Russia

1. ***Oxytropis deflexa* (Pall.) DC. subsp. *dezhnevii* (Jurtz.) Jurtz.**
2. *Oxytropis deflexa* (Pall.) DC. var. *dezhnevii* Jurtz.
3. Leguminosae (Fabaceae)
4. Northern Hypoarctic Tundra
5. Beringian Chukotka (easternmost Chukotsk Peninsula)
6. Frost scar, forb-sedge-dryas calciphyte tundras on south-facing rubble-silty slopes; disturbed sites on carbonate-rich sandy terraces.
7. Known from five localities. IUCN = LR(nt)
8. 2n = 16. Yurtsev (1986b) regarded this taxon as close to the North American hypoarctic *O. deflexa* subsp. *foliolosa* (Hook.) Barneby. Welsh, Brigham

Young University (pers. comm., 1996) considers this taxon as a minor variant and places it within subsp. *foliolosa*.
9. Ls: N.N. Taraskina, T: B.A. Yurtsev, and S.S. Talbot
10. Dawe and Murray (1981), Yurtsev (1986b)
11. Russia

1. ***Oxytropis kateninii* Jurtz.**
2. No synonyms
3. Leguminosae (Fabaceae)
4. Northern Hypoarctic Tundra
5. Beringian Chukotka
6. Meadow-tundra on a northeast-facing slope, rich in winter snow.
7. Known from a single locality. IUCN = DD
8. Allied to the Northeast Siberian *O. vasskovskyi* Jurtz. of westernmost Chukotka and to *O. viscida* Nutt. of North America.
9. Ls: N.N. Taraskina, T: B.A. Yurtsev
10. Yurtsev (1986b)
11. Russia

1. ***Oxytropis putoranica* M. Ivanova**
2. *Oxytropis norinii* Yu. Kozhevn
3. Leguminosae (Fabaceae)
4. Arctic Tundra, Southern Variant and subarctic alpine adjacent areas
5. Taimyr and subarctic alpine adjacent areas
6. Dry rubble tundras on windswept crests and exposed upper slopes of low mountains and hills; prefers carbonate and basaltic rocks.
7. Known from five localities; locally abundant, common to both the Arctic Byrranga Mountains and the Subarctic Putorana Plateau. Protected in one locality, Taimyrsky State Reserve (IUCN PAMC = I). IUCN = LR(nt)
8. 2n = 16. *O. putoranica* belongs to the subsection *Uniflorae* Jurtz. of the section *Baicalia* Bunge, providing the link between the most specialized pulvinate *O. uniflora* and *O. oligantha* Bunge of the Central Asian subsection *Chionobiae* (Schischk.) Jurtz.
9. Ls: M.V. Sokolova and N.N. Taraskina, T: B.A. Yurtsev
10. Yurtsev (1986b, 1988a)
11. Russia

1. ***Oxytropis sordida* (Willd.) Pers. subsp. *arctolenensis* Jurtz.**
2. No synonyms
3. Leguminosae (Fabaceae)
4. Northern Hypoarctic Tundra
5. Easternmost Anabar-Olenek and Kharaulakh
6. Mesic, forb-dwarf shrub-moss meadow tundras of slopes and terraces; on shale and sandstone colluvium.
7. Known from four localities; northernmost spur of Kharaulakh Mountains. Protected in two localities, Lena Delta State Reserve (IUCN PAMC = I). IUCN = LR(nt)
8. Yurtsev (unpublished data, 1996) has pointed out resemblances of subsp. *barnebyana* to subsp. *sordida* (Taimyr Peninsula), subsp. *arctolenensis* Jurtz. and subsp. *schamurinii* Jurtz. (Wrangel Island; see *Oxytropis beringensis*).
9. Ls: T.M. Koroleva, T: B.A. Yurtsev
10. Yurtsev (1986b)
11. Russia

1. ***Oxytropis sordida* (Willd.) Pers. subsp. *barnebyana* (Welsh) Jurtz.**
2. *Oxytropis arctica* R. Br. var. *barnebyana* Welsh
3. Leguminosae (Fabaceae)
4. Southern Hypoarctic Tundra
5. Beringian Alaska
6. Sandy or gravelly terraces, ridges and roadsides; *Salix* heath and meadows.
7. Known from seven localities in the vicinity of Kotzebue and neighboring areas of northwest Alaska. Associates are *Artemisia tilesii*, *Arctagrostis latifolia*, *Papaver lapponicum*, *Epilobium (Chamerion* or *Chamaenerion) latifolium*, *Salix alaxensis*, *S. glauca*, *Lathyrus maritimus*, *Astragalus alpinus*, *Braya purpurascens*, *Festuca rubra*, *Oxytropis maydelliana*, *O. koyukukensis*, *Cnidium cnidiifolium*, *Poa glauca*, and *Chrysanthemum (Tanacetum) bipinnatum*. IUCN = LR(nt)
8. Subsp. *barnebyana* is a tall, erect oxytrope with large white flowers forming a compact inflorescence. There remains some question as to the circumscription of this taxon. Narrowly defined subsp. *barnebyana* includes only those populations in and around Kotzebue, the type locality. At anthesis it is readily distinguishable from the blue- flowered *O. koyukukensis* A.E. Porsild (a segregate of *O. arctica*), but in fruit the two are indistinguishable. Although specimens from areas to the northeast at Prudhoe Bay (Kuparuk River) are included by some in subsp. *barnebyana*, others are reluctant to accept this taxonomy without further analysis, and this locality has not been mapped.

   Welsh, Brigham Young University (pers. comm., 1996) noted that flower size, pilose stipules, and calyx features indicate an alliance of subsp. *barnebyana* with the sympatric *O. arctica*, and the combination *O. arctica* var. *barnebyana* is the one he originally proposed. A taxonomic alignment of subsp. *barnebyana* and related taxa, therefore, requires a clearer statement of relationships among *O. arctica*, *O. campestris*, and *O. sordida*.
9. Ls: R. Lipkin, T: S.S. Talbot and B.A. Yurtsev
10. Welsh (1967, 1968, 1974), Yurtsev (1986b), Murray and Lipkin (1987), Murray (1994), Lipkin and Murray (1997), Moran (1997)
11. USA

1. ***Oxytropis sverdrupii* Lynge**
2. No synonyms
3. Leguminosae (Fabaceae)
4. Northern Hypoarctic Tundra
5. Continental Chukotka
6. Dry forb-dryas tundras, margins of cryophyte-steppes, and dry slopes of high sandy terraces
7. Known from two localities where it is locally abundant (Ayon Island). IUCN = LR(nt)
8. 2n = 48. A cryoxerophilous species of the subsection *Inaequiseptatae* of section *Baicalia*, providing a presumed link between the hypoarctic steppe taxon, *O. schmorgunoviae* Jurtz. (see Appendix I), and the arctic *O. wrangelii* Jurtz. (see below)
9. Ls: T.M. Koroleva, T: B.A. Yurtsev
10. Yurtsev (1986b)
11. Russia

1. ***Oxytropis tichomirovii* Jurtz.**
2. No synonym. Misapplied names: *Oxytropis arctica* auct. non R. B.
3. Leguminosae (Fabaceae)
4. Arctic Tundra, Northern and Southern variants; Northern Hypoarctic Tundra
5. Taimyr
6. Dry to mesic forb-dwarf shrub, forb-sedge-dwarf shrub-moss tundras and meadow tundras, gravelly floodplains, rubble and stony slopes and mountain summits, sandy hills; usually protected by snow in winter.
7. Known from 22 localities; southward barely reaching the northernmost Putorana Plateau. Protected in two localities, Great Arctic State Reserve (IUCN PAMC = I). IUCN = LR(lc)
8. 2n = 16. A presumed intersectional hybrid between *O. nigrescens* (Pall.) Fisch. from the section *Arctobia* Bunge and *O. arctica* R. Br. subsp. *taimyrensis* Jurtz. from the section *Orobia* Bunge.
9. Ls: M.V. Sokolova, T: M.V. Sokolova and B.A. Yurtsev
10. Yurtsev (1986b)
11. Russia

1. ***Oxytropis uniflora* Jurtz.**
2. No synonyms
3. Leguminosae (Fabaceae)
4. Arctic Tundra, Northern Variant
5. Wrangel Island
6. *Dryas*-forb stripe vegetation of fellfields on upper third of south-facing rubble slopes of carbonate shale and sandstone on two adjacent hills. Grows with other relic continental species of legumes such as *Hedysarum dasycarpum* Turcz., *Astragalus pseudodsurgens* Jurtz., and *A. tugarinovii* N. Basil.
7. Known only from a single locality in the central intermontane depression of Wrangel Island where it is locally abundant. Protected in Wrangel Island State Reserve (IUCN PAMC = I). IUCN = DD
8. 2n = 16. A true pulvinate plant, closely related to the Middle Siberian *O. putoranica* M. Ivanova (see above) and constituting with it a separate subsection *Uniflorae* Jurtz. of section *Baicalia* Bunge. The arrival of the presumed ancestral type (*O. putoranica*) from the Taimyr Peninsula to Wrangel Island could have occurred via the exposed polar shelf during a cryo-arid interval of the Late Pleistocene.
9. Ls: N.N. Taraskina, T: B.A. Yurtsev
10. Yurtsev (1988a)
11. Russia

1. ***Oxytropis uschakovii* Jurtz.**
2. No synonyms. Misapplied names: *Oxytropis adamsiana* auct.
3. Leguminosae (Fabaceae)
4. Arctic Tundra, Northern Variant
5. Wrangel Island
6. Dry forb-sedge-prostrate shrub-lichen tundras and forb-sedge cryophyte steppes on south-facing slopes and dry gravelly floodplains.
7. Known from 10 localities; locally abundant. Protected in Wrangel Island State Reserve (IUCN PAMC = I). IUCN = LR(lc)
8. 2n = 48. Related to the *Oxytropis adamsiana* Jurtz. group.
9. Ls: N.N. Taraskina, T: B.A. Yurtsev
10. Yurtsev (1986b)
11. Russia

1. ***Oxytropis wrangelii* Jurtz.** (Fig. 9)
2. No synonyms. Misapplied names: *Oxytropis bellii* auct, *O. sverdrupii* auct.
3. Leguminosae (Fabaceae)
4. Arctic Tundra, Northern Variant; Northern Hypoarctic Tundra
5. Wrangel Island, Amguema Transition Area, and Continental and Beringian Chukotka
6. Dry to mesic forb-prostrate shrub-lichen (-moss) tundras, tundra-steppe and forb-sedge cryophyte steppes on mountain slopes (up to 400 m), well-drained terraces, and floodplains.
7. Known from 14 localities; common in western and central parts of Wrangel Island and a local dominant on some sites; rare (four localities) on Chukotka Peninsula. Protected in 10 localities, Wrangel Island State Reserve (IUCN PAMC = I). IUCN = LR(lc)



Figure 9. *Oxytropis wrangelii.* This oxytrope occurs on Wrangel Island and Beringian Chukotka, Russia. Photograph courtesy of Boris A. Yurtsev, Komarov Botanical Institute, St. Petersburg.

8. 2n = 64. An octoploid species of subsection *Inaequiseptatae* Jurtz. of the steppe section *Baicalia* Bunge.
9. Ls: N.N. Taraskina, T: B.A. Yurtsev
10. Yurtsev (1986b)
11. Russia

1. ***Papaver atrovirens*** **Petrovsky**
2. No synonyms
3. Papaveraceae
4. Arctic Tundra, Northern Variant; Northern Hypoarctic Tundra
5. Wrangel Island and Continental Chukotka
6. Restricted to carbonate soils in frost-boil tundras.
7. Known from five localities. Protected in four localities, Wrangel Island State Reserve (IUCN PAMC = I). IUCN = LR(nt)
8. 2n = 56. Related to the arctic mountain species *P. paucistaminum* Tolm. and Petrovsky.
9. Ls: T.M. Koroleva and N.N. Taraskina, T: V.V. Petrovsky
10. Petrovsky (1983a)
11. Russia

1. ***Papaver calcareum*** **Petrovsky**
2. No synonyms
3. Papaveraceae
4. Arctic Tundra, Northern Variant; Northern Hypoarctic Tundra
5. Wrangel Island
6. Restricted to dry limestone screes and rubble summits.
7. Known from seven localities. Protected in all localities, Wrangel Island State Reserve (IUCN PAMC = I). IUCN = LR(lc)

8. 2n = 70. Belongs to the *P. radicatum* complex.
9. Ls: T.M. Koroleva and N.N. Taraskina, T: V.V. Petrovsky
10. Petrovsky (1983a)
11. Russia

1. ***Papaver chionophilum*** **Petrovsky**
2. No synonyms
3. Papaveraceae
4. Arctic Tundra, Northern Variant
5. Wrangel Island
6. Calciphyte; restricted to snowbeds.
7. Known from eight localities. Protected in all localities, Wrangel Island State Reserve (IUCN PAMC = I). IUCN = LR(lc)
8. 2n = 56
9. Ls: T.M. Koroleva, N.N. Taraskina, T: V.V. Petrovsky
10. Petrovsky (1983a)
11. Russia

1. ***Papaver leucotrichum*** **Tolm.**
2. No synonyms
3. Papaveraceae
4. Northern Hypoarctic Tundra
5. Kharaulakh
6. Petrophyte restricted to moist, carbonate, stony-clayish barrens at elevations 700-1000 m in the mountains of Arctic East Siberia.
7. Known from a single locality where it is abundant. IUCN = LR(nt)
8. Allied to *P. pulvinatum* Tolm. from Arctic Siberia.
9. Ls and T: V.V. Petrovsky
10. Tolmatchev (1975b)
11. Russia

1. ***Papaver multiradiatum*** **Petrovsky**
2. No synonyms
3. Papaveraceae
4. Arctic Tundra, Northern Variant
5. Wrangel Island
6. Petrophyte restricted to warm, noncalcareous scree slopes.
7. Known from eight localities; locally abundant. Protected in all localities, Wrangel Island State Reserve (IUCN PAMC = I). IUCN = LR(lc)
8. 2n = 42. Belongs to the *P. radicatum* complex
9. Ls: T.M. Koroleva and N.N. Taraskina, T: V.V. Petrovsky
10. Petrovsky (1983a)
11. Russia

1. ***Papaver nudicaule*** **L. subsp.** ***insulare*** **Petrovsky**
2. No synonyms
3. Papaveraceae
4. Arctic Tundra, Northern Variant
5. Wrangel Island
6. Restricted to dry meadows on rubble slopes.
7. Known from six localities. Protected in all localities, Wrangel Island State Reserve (IUCN PAMC = I). IUCN = LR(nt)
8. 2n = 42. Local insular race of *P. nudicaule* L.
9. Ls: T.M. Koroleva and N.N. Taraskina, T: V.V. Petrovsky.
10. Petrovsky (1983a)
11. Russia

1. ***Papaver ushakovii*** **Tolm. & Petrovsky**
2. No synonyms
3. Papaveraceae
4. Arctic Tundra, Northern Variant
5. Wrangel Island
6. Restricted to rubble or gravel-clayish sites in tundra.
7. Known from seven localities; locally abundant. Protected in all localities, Wrangel Island State Reserve (IUCN PAMC = I). IUCN = LR(lc)
8. 2n = 56. Belongs to the *P. radicatum* complex.
9. Ls: T.M. Koroleva and N.N. Taraskina, T: V.V. Petrovsky
10. Tolmatchev (1975b)
11. Russia

1. ***Plantago canescens*** **Adams subsp.** ***jurtzevii*** **Tzvel.**
2. No synonyms. Misapplied name: *Plantago septata* auct. non Morris.
3. Plantaginaceae
4. Northern Hypoarctic Tundra
5. Continental Chukotka
6. Dry meadow and steppe on south-facing slope of a high sandy terrace.
7. Known from a single locality where it occurs in a regional nature monument, Big Rautan Island in Chaun Bay; locally abundant (propagation by sprouts). IUCN = DD
8. One of six races of the northeast Siberian-northwest American xerocontinental species *P. canescens*; the closest localities of related taxa are the Yana River drainage for subsp. *canescens* and western Alaska for subsp. *septata* (Morris) Tzvel. A presumed relict of the cryo-arid intervals of Late Pleistocene, which spread via the exposed continental shelf.
9. Ls: N.N. Taraskina, T: B.A. Yurtsev
10. Yurtsev (1981), Tsvelev (1983)
11. Russia

1. ***Poa hartzii*** **R. Br. subsp.** ***alaskana*** **R.J. Soreng**
2. No synonyms
3. Gramineae (Poaceae)
4. Arctic Tundra, Southern Variant; Northern and Southern Hypoarctic Tundra
5. Northern Alaska
6. Sparsely vegetated riparian sands and gravels of active floodplain, especially point bar deposits.

7. Known from five localities on the Alaskan Arctic Slope: Meade River (coastal plain) and Lake Peters (eastern Brooks Range). Protected in one locality of the Arctic National Wildlife Refuge (IUCN PAMC = IV). Occurs in the National Petroleum Reserve-Alaska, which is managed by the Bureau of Land Management. IUCN = LR(nt)
8. A Low Arctic race of the High Arctic facultative halophytic *P. hartzii*; var. *hartzii* is found on Wrangel Island in the Canadian Arctic Archipelago, Greenland, and central Svalbard.
9. Ls and T: R. Lipkin
10. Soreng (1991), Lipkin and Murray (1997)
11. USA.

1. ***Polystichum aleuticum* C. Christensen**
2. *Polystichum lachenense* (Hook.) Bedd.
3. Aspidiaceae (Dryopteridaceae)
4. Oceanic Boreal (mostly treeless mesic meadows and heaths)
5. Oceanic Insular, South Beringia
6. Moist grottos and crevices in rock outcrops and adjacent meadows below mountain summits. Associates are *Carex macrochaeta*, *Cystopteris fragilis*, *Acomastylis rossii*, *Saxifraga unalaschensis*, *Tofieldia coccinea*, and *Veronica stelleri*.
7. Known only from three populations on Mount Reed on Adak Island of the central Aleutian Islands, Alaska; Endangered (U.S. Department of the Interior 1988). Protected in all localities, Aleutian Island Unit of the Alaska Maritime National Wildlife Refuge (IUCN PAMC = IV); the Aleutian Islands are a biosphere reserve. IUCN = EN
8. The species was first collected on Atka Island in 1932, but recent attempts to relocate it have been unsuccessful. This small tufted fern is only about 15 cm tall. Its fronds arise from a stout rhizome with numerous chestnut-brown remains of stipe bases. The dark green to olive-green fronds taper gradually above and below the middle. The small overlapping pinnae can have the small auricle at the base and spiny bristle-tipped teeth on the margins. Straw-colored scales up to 3 mm long are found on all parts of the plant, but they can be less evident late in the season. These features distinguish *P. aleuticum* from all other ferns in the Aleutian Islands.

   In a recent update to his fern manual, Lellinger (1987) contended that *P. aleuticum* was conspecific with *P. lachenense* of Asia, although no evidence was cited to support this conclusion. *P. lachenense* is from the Himalayas, Taiwan, and Japan. *P. sinense* Christensen from China may also be related to *P. aleuticum* (Hultén 1968).
9. Ls and T: S.S. Talbot
10. Christensen (1938), Hultén (1960, 1968), Welsh (1974), Wagner (1979), Smith (1985), Lellinger (1987), Murray and Lipkin (1987), Flora of North America Editorial Committee (1993), Talbot et al. (1995), Lipkin and Murray (1997)
11. USA

1. ***Potentilla anjuica* Petrovsky**
2. No synonym. Misapplied name: *Potentilla crantzii* auct.
3. Rosaceae
4. Northern and Southern Hypoarctic Tundra and adjacent subarctic woodland areas
5. Continental Chukotka and adjacent areas
6. Floodplain gravels and terraces, less frequently on south-facing slopes of low mountains; usually on unvegetated sites.
7. Known from seven neighboring localities of northern Anyui Upland in western Chukotka; locally abundant. IUCN = LR(nt)
8. 2n = 42. A presumed intersectional hybrid, possibly a combination of *Potentilla Xrubella* Th. Sørens. and *P. arenosa* (Turcz.) Juz.
9. Ls: T.M. Koroleva, T: T.M. Koroleva, V.V. Petrovsky, and B.A. Yurtsev
10. Petrovsky (1983b), Yurtsev (1984)
11. Russia

1. ***Potentilla Xarctoalaskensis* Jurtz.**
2. No synonyms
3. Rosaceae
4. Southern Hypoarctic Tundra
5. Beringian Alaska
6. Floodplain gravels and mine tailings (collected with *P. litoralis* Rydb.).
7. Based on two specimens from a single locality on the Seward Peninsula. Its taxonomic status is uncertain. Protected in Bering Land Bridge National Preserve (IUCN PAMC = IV). IUCN = DD
8. The plant appears to combine the characteristics of *P. arenosa* (Turcz.) Jur. of section *Niveae* Rydb. and *P. litoralis* Rydb. (*P. virgulata* Nels.) of section *Tanacetifoliae* (Th. Wolf) Jurz., hence it is presumed to be of hybrid origin.
9. Ls and T: B.A. Yurtsev
10. Yurtsev (1993)
11. USA

1. ***Potentilla beringensis* Jurtz.**
2. No synonyms
3. Rosaceae
4. Northern Hypoarctic Tundra
5. Beringian Chukotka
6. Dry wind-swept edges of 10-m marine terrace (two micropopulations) and a sandy beach ridge (one micropopulation) at margin of a *Leymus villosissimus* dry meadow.

7. Known from a single locality on the easternmost Chukotka Peninsula; all three micropopulations are close to the settlement of Lavrentiya. The site of the type collection seems to have been already destroyed; the second site is situated within the cemetery, and the third is a favorite picnic area of local people. IUCN = DD
8. 2n = 28. Closely related to *P. wrangelii* Petrovsky (see below). Possibly originated from intersectional crosses between *P. anachoretica* Soják (section *Multifidae*) and section *Aureae*.
9. Ls: N.N. Taraskina, T: B.A. Yurtsev
10. Yurtsev (1984), Takhtajan (1988)
11. Russia

1. ***Potentilla brooksensis* Jurtz.**
2. No synonyms
3. Rosaceae
4. Southern Hypoarctic Tundra
5. Northern Alaska
6. Habitat is unknown (was not recorded).
7. Known from a single specimen from the eastern Brooks Range. Protected in the Arctic National Wildlife Refuge (IUCN PAMC = IV). IUCN = DD
8. A minor race of *P. pensylvanica* L. of the section *Tanacetifoliae* (Th. Wolf) Juz.
9. Ls and T: B.A. Yurtsev
10. Yurtsev (1993)
11. USA

1. ***Potentilla czegitunica* Jurtz.**
2. No synonyms
3. Rosaceae
4. Northern Hypoarctic Tundra
5. Beringian Chukotka
6. Dry calcareous meadows on cliffs.
7. Known from a single locality in the Chegitun River canyon near its confluence with its tributaries, the Putukuneiveyem and Gunguveyem; essentially one locality extending several square kilometers and including canyons of the tributaries; locally abundant. IUCN = DD
8. Presumably of hybrid origin from a cross between section *Niveae* and *Multifidae*, the *Multifidae* component being *P. anachoretica*.
9. Ls: N.N. Taraskina, T: B.A. Yurtsev
10. Tolmatchev and Yurtsev (1960-1987)
11. Russia

1. ***Potentilla dezhnevii* Jurtz.**
2. No synonyms
3. Rosaceae
4. Northern Hypoarctic Tundra
5. Beringian Chukotka
6. Dry calcareous meadows on cliffs in two neighboring canyons.
7. Represented by few individuals at each of the two localities. IUCN = DD
8. A presumed hybrid of an intersectional cross between *P. anachoretica* Soják and *P. subvahliana* Jurtz.
9. Ls: N.N. Taraskina, T: B.A. Yurtsev.
10. Yurtsev (1984)
11. Russia

1. ***Potentilla murrayi* Jurtz.**
2. No synonyms
3. Rosaceae
4. Southern Hypoarctic Tundra
5. Beringian and Northern Alaska
6. Limestone screes and tors.
7. Known from two localities. Protected in two localities, Arctic National Wildlife Refuge and Bering Land Bridge National Preserve (IUCN PAMC = IV). IUCN = VU
8. Presumably of hybrid origin as it combines the characteristics of *P. subvahliana* Jurtz. of section *Niveae* and *P. anachoretica* Soják. of section *Multifidae* Rydb.
9. Ls and T: B.A. Yurtsev
10. Yurtsev (1993)
11. USA

1. ***Potentilla tschaunensis* Juz. ex Jurtz.**
2. No synonyms. Misapplied names: *P. petrovskyi* auct. non Soják, quoad typ.
3. Rosaceae
4. Northern and Southern Hypoarctic Tundra, Suboceanic Stlaniks (*Pinus pumila*), and adjacent subarctic alpine areas
5. Continental Chukotka and adjacent areas
6. Herbaceous dry meadows on cliffs.
7. Known from six localities where it is sometimes locally abundant. IUCN = LR(nt)
8. 2n = 28, 56. A presumed hybrid taxon from a cross between *P. anachoretica* and *P. nivea* L. sensu Juz.
9. Ls: N.N. Taraskina, T: B.A. Yurtsev
10. Yurtsev (1984)
11. Russia, USA (Yurtsev observed a similar plant at Eldorado Creek, north-central Seward Peninsula, needs further study).

1. ***Potentilla uschakovii* Jurtz.**
2. No synonyms
3. Rosaceae
4. Arctic Tundra, Northern Variant
5. Wrangel Island
6. Sparse grass-forb halophytic and calciphytic vegetation on the margin of a dry silty-gravel proluvial terrace.
7. Known from a single habitat at a single locality in the upper reaches of Somnitelnaya River, Wrangel

Island. Protected in Wrangel Island State Reserve (IUCN PAMC = I). IUCN = DD
8. Apparently of hybrid origin (*P. pulchella* R. Br. x *P. subvahliana* Jurtz.), with only ternate leaves.
9. Ls: N.N. Taraskina, T: B.A. Yurtsev
10. Yurtsev (1988b), Yurtsev et al. (1989a)
11. Russia

1. ***Potentilla wrangelii* Petrovsky**
2. No synonyms
3. Rosaceae
4. Arctic Tundra, Northern Variant
5. Wrangel Island
6. Herbaceous mesic to xeric tundra meadows on slopes or, more rarely, on elevated floodplains.
7. Known from seven microsites at a single locality on Wrangel Island. Protected in Wrangel Island State Reserve (IUCN PAMC = I). IUCN = DD
8. Closely related to *P. beringensis* Jurtz. Presumably of hybrid origin from an intersectional cross between *Multifidae* X *Aureae*, the *Multifidae* component most probably was *P. anachoretica* Soják.
9. Ls: N.N. Taraskina, T: B.A. Yurtsev
10. Petrovsky (1977), Yurtsev (1984), Yurtsev et al. (1989a)
11. Russia

1. ***Puccinellia byrrangensis* Tzvel.**
2. *Phippsia vahliana* (Liebm.) Á. Löve & D. Löve subsp. *byrrangensis* (Tzvel.) Á. Löve & D. Löve. Misapplied names: *Puccinellia vahliana* auct.
3. Gramineae (Poaceae)
4. Northern Hypoarctic Tundra; Arctic Tundra, Northern and Southern variants
5. Taimyr
6. Frost boil and hummock, dwarf-shrub tundras on peat-clayish and calcareous soils on gently sloping hillsides and mountains.
7. Known from 11 localities. Protected in three localities, Great Arctic and Taimyrsky State Reserves (IUCN PAMC = I). IUCN = LR(lc)
8. A possible link between a circumpolar group of species including the amphi-Atlantic *P. vahliana* (Liebm.) Scribn. & Merr., the Chukotkan *P. colpodioides* Tzvel., and the amphi-Beringian *P. wrightii* (Scribn. & Merr.) Tzvel.
9. Ls: M.V. Sokolova, T: M.V. Sokolova and B.A. Yurtsev
10. Bubnova (1990)
11. Russia

1. ***Puccinellia gorodkovii* Tzvel.**
2. No synonyms
3. Gramineae (Poaceae)
4. Arctic Tundra, Northern and Southern variants; Northern Hypoarctic Tundra
5. Taimyr
6. Dry, sandy to stony, slopes and terraces.
7. Known from seven localities. Protected in two localities, Great Arctic National Reserve (IUCN PAMC = I). IUCN = LR(lc)
8. Related to *P. tenuiflora* (Griseb.) Scribn. & Merr.
9. Ls and T: M.V. Sokolova
10. Tsvelev (1964), Bubnova (1990)
11. Russia

1. ***Puccinellia jenissejensis* (Roshev.) Tzvel.**
2. *Atropis jenisseiensis* Roshev.
3. Gramineae (Poaceae)
4. Arctic Tundra, Northern and Southern variants; Northern Hypoarctic Tundra
5. Taimyr
6. Unvegetated riparian slopes on loose sediments.
7. Known from three localities. IUCN = VU
8. Related to *P. wrightii* (Scribn. & Merr.) Tzvel. and *P. angustata* (R. Br.) Rand. & Redf.
9. Ls and T: M.V. Sokolova
10. Bubnova (1990)
11. Russia

1. ***Puccinellia poacea* Th. Sør.**
2. No synonyms
3. Gramineae (Poaceae)
4. Arctic Tundra, Northern Variant; Southern Hypoarctic Tundra
5. Ellesmere-North Greenland and Central Canada
6. In shallow depressions with salt accumulations on river banks, floodplains, terraces, and tidal flats.
7. Known from about 12 localities. Protected in one locality, Ellesmere Island National Park (IUCN PAMC = II). IUCN = LR(lc)
8. High Arctic continental halophyte.
9. Ls and T: G.W. Argus, C.M. McJannet, and B.A. Yurtsev
10. Sørensen (1953), Sørensen *in* Porsild (1964), Scoggan (1978-1979), McJannet et al. (1995)
11. Canada

1. ***Puccinellia rosenkrantzii* Th. Sør.**
2. No synonyms
3. Gramineae (Poaceae)
4. Arctic Tundra, Southern Variant; Northern Hypoarctic Tundra
5. West Greenland
6. On clay washed out of mud volcanos.
7. Known from four localities within a very limited area in central West Greenland. IUCN = VU
8. 2n = 56
9. Ls: C. Bay and B. Fredskild, T: C. Bay
10. Sørensen (1953), Fredskild (1996)
11. Greenland

1. ***Puccinellia svalbardensis* Rønning**
2. No synonyms
3. Gramineae (Poaceae)
4. Arctic Tundra, Southern Variant
5. Svalbard
6. Dry silty substrate near seashores.
7. Known from two localities. Not protected but the western locality is within Kongsfjorden Bird Sanctuary where it was reported as being numerous; the site has not been revisited lately. IUCN = VU
8. 2n = 42. This species has been included within *P. tenella* in *Flora Europaea* by Hughes and Halliday (1980).
9. Ls and T: A. Elvebakk
10. Rønning (1962, 1972), Hughes and Halliday (1980), Elven and Elvebakk (1996)
11. Norway

1. ***Pucciphippsia czukczorum* Tzvel.**
2. No synonyms. Misapplied names: *Phippsia concinna* auct.
3. Gramineae (Poaceae)
4. Northern Hypoarctic Tundra
5. Beringian Chukotka
6. Coastal halophyte, restricted to snowbed sites.
7. Known from four localities; locally abundant. IUCN = VU
8. 2n = 22. Presumed intergeneric hybrid between *Phippsia algida* Soland. and *Puccinellia tenella* (Lange) Holmb.
9. Ls: N.N. Taraskina, T: B.A. Yurtsev
10. Yurtsev et al. (1973a)
11. Russia

1. ***Ranunculus punctatus* Jurtz.**
2. No synonyms
3. Ranunculaceae
4. Northern and Southern Hypoarctic Tundra
5. Continental and Beringian Chukotka and disjunct in subarctic adjacent areas
6. Frost-boil herb-dwarf shrub-moss calcareous tundras along gullies and in fens, mostly on slopes of carbonate mountains.
7. Known from 10 localities. IUCN = LR(lc)
8. 2n = 48.
9. Ls and T: T.M. Koroleva
10. Yurtsev et al. (1973a), Zaslavskaya and Petrovsky (1985)
11. Russia

1. ***Ranunculus wilanderi* (Nath.) Á. Löve & D. Löve**
2. *Ranunculus affinis* Sm. f. *wilanderi* Nath.
3. Ranunculaceae
4. Arctic Tundra, Southern Variant
5. Svalbard
6. Damp moss tundra below a bird cliff.
7. Known from an extensive population at a single locality. Located in a plant protection area. IUCN = VU.
8. An apomict of the *R. auricomus* complex. New information indicates that this taxon is a likely candidate for inclusion in the annotated list pending further evaluation.
9. Ls and T: A. Elvebakk
10. Nathorst (1883), Elven and Elvebakk (1996)
11. Norway

1. ***Roegneria nepliana* V. Vassil.**
2. *Elymus neplianus* (V. Vassil.) Czer., *E. macrourus* (Turcz.) Tzvel. subsp. *neplianus* (V. Vassil.) Tzvel.
3. Gramineae (Poaceae)
4. Northern and Southern Hypoarctic Tundra and adjacent areas
5. Continental Chukotka and adjacent areas
6. Warm, dry, grassy, silty slopes of mountains, hills, high terraces, river banks and less frequently on gravel floodplains.
7. Known from seven localities. IUCN = LR(nt)
8. 2n = 28. Close to the widespread East Siberian-West North American *Roegneria macroura* (Turcz.) Nevski and sometimes considered a subspecies of it.
9. Ls and T: T.M. Koroleva
10. Zaslavskaya (Koroleva) (1981), Zaslavskaya and Petrovsky (1985)
11. Russia

1. ***Roegneria villosa* V. Vassil. subsp. *coerulea* Jurtz.**
2. *Elymus vassilievii* Czer. subsp. *coerulea* (Jurtz.) Czer.
3. Gramineae (Poaceae)
4. Arctic Tundra, Northern Variant
5. Wrangel Island
6. Sparse grass-forb halophyte-calciphyte vegetation ("arctic takkyrs") of shallow depressions, wet in spring, but covered with saline crust in summer, mostly in the continental inner parts of the island.
7. Known from five localities; locally abundant. Protected in Wrangel Island State Reserve (IUCN PAMC = I). IUCN = LR(nt)
8. Related to the amphi-Beringian *R. villosa* [*Elymus vassilievii* Czer.; *E. sajanensis* (Nevski) Tzvel. subsp. *villosus* (V. Vassil.) Tzvel.].
9. Ls and T: B.A. Yurtsev
10. Yurtsev (1989), Yurtsev et al. (1989a)
11. Russia

1. ***Rumex krausei* Jurtz. & Petrovsky**
2. *Acetosella krausei* (Jurtz. & Petrovsky) Á. Löve & D. Löve
3. Polygonaceae
4. Northern and Southern Hypoarctic Tundra

5. Beringian Chukotka and Beringian Alaska
6. Moist to wet gravels and solifluction soil in tundra areas, especially near slope break points. Generally on calcareous gravels and agrillaceous soils in frost disturbed or solifluction areas with dryas-step or terrace communities.
7. Known from four localities in Asia (Cape Krause, Providenia Bay, Lorino) and seven in Alaska (mainly near Cape Thompson on the shore of the Chukchi Sea and Lost River near the tip of the Seward Peninsula); locally abundant. Protected in two localities, Alaska Maritime National Wildlife Refuge (IUCN PAMC = IV). IUCN = LR(nt)
8. 2n = 21. *Rumex krausei* shares some features with *R. beringensis* Jurtz. & Petrovsky. Sergei Mosyakin, N.K. Kholodny Institute of Botany (pers. comm., 1997) noted that, per published chromosome counts for the species (Yurtsev et al. 1973b), *R. krausei* is a presumably infertile triploid, possibly, he surmised, derived from *R. beringensis*. Notwithstanding, *R. krausei* can be shown to have clear morphological, ecological, and geographic distinctions from *R. beringensis* and is treated here as a distinct species.
9. Ls: N.N. Taraskina, T: B.A. Yurtsev, R. Lipkin, D.F. Murray and S.S. Talbot
10. Yurtsev et al. (1973b), Á. Löve and D. Löve (1975), Yurtsev et al. (1975), Kharkevich and Kachura (1981), Murray and Lipkin (1987), Murray (1992, 1994)
11. Russia, USA

1. ***Salicornia borealis* Wolff & Jeffries**
2. No synonyms
3. Chenopodiaceae
4. Southern Hypoarctic Tundra
5. West Hudsonian
6. Open tidal mudflats in the lower salt-marsh communities on both sides of the Churchill River, low-lying areas in the upper marsh between frost-heave mounds inhabited by *Salix brachycarpa*; commonly found growing around the periphery of salt-marsh pools and on open flats in high marsh. Associated flora: *Puccinellia phryganodes*, *Carex subspathacea*, *Plantago maritima*, and *Potentilla egedii*.
7. Known from two localities, Churchill, Manitoba, and approximately 30 km east of Churchill at La Perouse Bay. IUCN = VU
8. 2n = 18. Like all other diploid annual *Salicornia* plants investigated, these are inbreeders so they are a homozygous inbreeding line (P.W. Ball, University of Toronto, pers. comm., 1997). *Salicornia borealis* is unique among annual *Salicornia* with flowers and branches at the cotyledonary node. However, except for this characteristic, which is not always clearly expressed on all individuals, it is impossible to distinguish this plant from small individuals of the prairie species *S. rubra*. The taxonomy of *Salicornia* is a problem because too much is lost when the plants are dried. *S. borealis* is not clearly distinguished from *S. rubra*.

   Ball (pers. comm., 1997) questioned whether *S. rubra* is really distinct from the inland Asian and east European saline steppe plants which in *Flora Europaea* he called *S. prostrata*. The various populations both in North America and Europe studied by using enzyme electrophoresis were almost all invariate, and in North America the morphology and electrophoretic data do not correlate very well. Nevertheless, the Churchill area populations are distinctive and should be given some taxonomic recognition.
9. Ls and T: P.W. Ball, G.W. Argus, and C.L. McJannet
10. Jefferies et al. (1983), Wolff (1985), Wolff and Jefferies (1987a, 1987b), McJannet et al. (1995)
11. Canada

1. ***Salix stolonifera* Covil. subsp. *carbonicola* Petrovsky**
2. No synonyms
3. Salicaceae
4. Arctic Tundra, Northern Variant
5. Wrangel Island
6. Restricted to limestone barrens.
7. Known from three localities. Protected in Wrangel Island State Reserve (IUCN PAMC = I). IUCN = VU
8. 2n = 114. A local race of the montane American species *S. stolonifera*.
9. Ls and T: V.V. Petrovsky
10. Petrovsky and Zhukova (1983)
11. Russia

1. ***Saxifraga aleutica* Hultén**
2. No synonyms
3. Saxifragaceae
4. Oceanic Boreal (mostly treeless mesic meadows and heaths)
5. Oceanic Insular, South Beringia
6. In prostrate, dwarf shrub-herbaceous tundra in fine screes on high ridges and summits.
7. Presently known from eight localities in the central Aleutian Islands, but it is probably more wide spread. Protected in all localities, Aleutian Islands Unit of Alaska Maritime National Wildlife Refuge (IUCN PAMC = IV), the Aleutian Islands are a biosphere reserve. IUCN = LR(lc)
8. Affinity to *Saxifraga eschscholtzii* Sternb.
9. Ls: R. Lipkin and S.S. Talbot, T: R. Lipkin, S.S. Talbot, and B.A. Yurtsev
10. Hultén (1936, 1960, 1968), Welsh (1974), Murray and Lipkin (1987), Lipkin and Murray (1997)
11. USA

1. ***Senecio hyperborealis* Greenm. subsp. *wrangelica* Jurtz., Korobkov & Petrovsky**
2. No synonyms. Misapplied names: *Packera fernaldii* auct.
3. Compositae (Asteraceae)
4. Arctic Tundra, Northern Variant
5. Wrangel Island
6. Calciphyte restricted to dry, rubble or gravels and rocky barrens in the interior parts of the island.
7. Known from four localities where it is locally abundant. Protected in Wrangel Island State Reserve (IUCN PAMC = I). IUCN = LR(nt)
8. 2n = 138. This insular race is replaced by the Low Arctic, amphi-Beringian subsp. *hyperborealis* (2n = 46) in northeasternmost Chukotka Peninsula and in Alaska.
9. Ls: N.N. Taraskina, T: V.V. Petrovsky and B.A. Yurtsev.
10. Korobkov (1987b), Yurtsev et al. (1989b)
11. Russia

1. ***Sisyrinchium groenlandicum* Boech.** (Fig. 10)
2. *S. montanum* Greene; *S. angustifolium* Bicknell
3. Iridaceae
4. Southern Hypoarctic Tundra and Oceanic Boreal (mostly treeless mesic meadows and heaths)
5. West Greenland and adjacent areas
6. Dry south-facing slopes at moderately oceanic inland localities.
7. Known from 11 localities in central West Greenland, all except one within the same general area. IUCN = LR(nt)
8. 2n = 32
9. Ls: C. Bay and B. Fredskild, T: C. Bay
10. Bøcher (1948, 1966), Fredskild (1966, 1996)
11. Greenland

1. ***Suaeda arctica* Jurtz. & Petrovsky**
2. No synonyms
3. Chenopodiaceae
4. Northern Hypoarctic Tundra
5. Continental Chukotka
6. Silty beach and silty shoreline of a saline pond in the estuary of the Apapelkhin River.
7. Known from a single locality on the eastern shore of Chaun Bay. The type locality for the species has already been destroyed. IUCN = DD
8. Annual. Flowers in the axil of cotyledons. Presumably a relict of a warm sea transgression period. Allied to amphi-Atlantic coastal halophyte *S. maritima* (L.) Dumort.



Figure 10. *Sisyrinchium groenlandicum*. This member of the iris family occurs on dry south-facing slopes at moderately oceanic inland localities of central west Greenland. Photograph courtesy of Christian Bay, University of Copenhagen, Denmark.

9. Ls: N.N. Taraskina, T: B.A. Yurtsev
10. Yurtsev and Petrovsky (1978), Ignatov (1988)
11. Russia

1. ***Taraxacum czaunense* Jurtz. & Tzvel.**
2. No synonyms
3. Compositae (Asteraceae)
4. Northern and Southern Hypoarctic Tundra and adjacent subarctic alpine areas
5. Continental Chukotka and adjacent subarctic alpine areas
6. Dry, dwarf shrub-herb rubble and stony slopes of low mountains, mostly those exposed to the south; also on the rubble summit of a mountain where it occurs among the northernmost larch woodlands.

7. Known from four localities on the eastern coast of Chaun Bay and the neighboring Anyui forest-tundra areas. IUCN = LR(nt)
8. Close to the Asian *T. korjakorum* Charkev. & Tzvel.
9. Ls: T.M. Koroleva, T: T.M. Koroleva and B.A. Yurtsev
10. Tsvelev and Yurtsev (1987)
11. Russia

1. ***Taraxacum czukoticum* Jurtz.**
2. No synonyms
3. Compositae (Asteraceae)
4. Northern Hypoarctic Tundra
5. Continental Chukotka
6. Solifluction lobes, on andesite colluvium near the top of a mountain.
7. Known from only a few individuals at a single locality in the central part of the Chukotka Mountains. IUCN = DD
8. A species with a combination of characters of *T. phymatocarpum* and *T. arcticum* (section *Arctica* Dahlst.), pollen is present.
9. Ls: N.N. Taraskina, T: B.A. Yurtsev
10. Tsvelev and Yurtsev (1987)
11. Russia

1. ***Taraxacum jurtzevii* Tzvel.**
2. No synonyms
3. Compositae (Asteraceae)
4. Northern and Southern Hypoarctic Tundra and adjacent subarctic alpine areas
5. Amguema Transitional Area and adjacent subarctic alpine areas (Anjui Mountians)
6. Stony snowbeds, mostly on acid rocks.
7. Known from 12 localities; mostly in the east-central parts of the Anyui Mountains (10 localities) and on the Chukotka Peninsula (two localities). IUCN = LR(lc)
8. 2n = 32. Closely related to the more common Chukotka-Okhotian *T. zhukovae* Tzvel.
9. Ls: T.M. Koroleva and N.N. Taraskina, T: B.A. Yurtsev
10. Tsvelev and Yurtsev (1987)
11. Russia

1. ***Taraxacum leucocarpum* Jurtz. & Tzvel.**
2. No synonyms
3. Compositae (Asteraceae)
4. Arctic Tundra, Southern Variant; Northern Hypoarctic Tundra
5. Continental Chukotka
6. Eolian sands with sparse herbaceous vegetation.
7. Known from three localities (two of which are in a regional nature monument), locally abundant. IUCN = VU
8. 2n = 16. Diploid species of section *Ceratophora* Dahlst., morphologically similar to *T. macilentum* Dahlst. A presumed relict of Late Pleistocene "sand seas" of Western Beringia.
9. Ls: N.N. Taraskina, T: B.A. Yurtsev.
10. Tsvelev and Yurtsev (1987)
11. Russia

1. ***Taraxacum nanaunii* Jurtz.**
2. No synonyms
3. Compositae (Asteraceae)
4. Arctic Tundra, Northern Variant
5. Wrangel Island
6. Non-carbonate, dry rubble on south-facing slopes.
7. Known from two localities. Protected in Wrangel Island State Reserve (IUCN PAMC = I). IUCN = VU
8. Probably of hybrid origin from a cross between *T. phymatocarpum* of section *Arctica* and *T. lateritium* Dahlst. of section *Ceratophora*.
9. Ls: N.N. Taraskina, T: B.A. Yurtsev
10. Tsvelev and Yurtsev (1987)
11. Russia

1. ***Taraxacum petrovskyi* Tzvel. var. *petrovskyi***
2. No synonyms
3. Compositae (Asteraceae)
4. Arctic Tundra, Northern Variant; Southern Hypoarctic Tundra; and adjacent subarctic areas
5. Wrangel Island and Continental Chukotka and adjacent subarctic areas
6. Dry, grassy, mostly south-facing rubble slopes, tors and their pediments; in relict cryophyte steppes; on cliffs in the Anyui-Anadyr forest-tundra divide.
7. Known from six localities. Protected in one locality, Wrangel Island State Reserve (IUCN PAMC = I). IUCN = LR(lc)
8. 2n = 40. A presumed intersectional hybrid with putative parents from section *Ceratophora* and section *Arctica* (probably, *T. soczavae* Tzvel.).
9. Ls: T.M. Koroleva and N.N. Taraskina, T: V.V. Petrovsky, B.A. Yurtsev, and T.M. Koroleva
10. Tsvelev and Yurtsev (1987)
11. Russia

1. ***Taraxacum petrovskyi* Tzvel. var. *safronovae* Tzvel.**
2. No synonyms
3. Compositae (Asteraceae)
4. Arctic Tundra, Southern Variant
5. Yana-Kolyma
6. An eroded west-facing slope near the seashore.
7. Known from a single locality. IUCN = DD
8. According to Yurtsev (unpublished data, 1996) it probably deserves the rank of a separate species.

9. Ls: T.M. Koroleva, T: T.M. Koroleva and B.A. Yurtsev
10. Tsvelev and Yurtsev (1987)
11. Russia

1. ***Taraxacum pseudoplatylepium* Jurtz.**
2. No synonyms. Misapplied names: *T. platylepium* auct. non Dahlst.
3. Compositae (Asteraceae)
4. Arctic Tundra, Northern Variant
5. Wrangel Island
6. Short-lived snowbeds on the slopes of high terraces in carbonate alluvium and proluvium.
7. Known from seven localities where it is common. Protected in Wrangel Island State Reserve (IUCN PAMC = I). IUCN = LR(lc)
8. 2n = 24, 32. A chionophilous species of *T. phymatocarpum* agg.
9. Ls: N.N. Taraskina, T: B.A. Yurtsev
10. Tsvelev and Yurtsev (1987)
11. Russia

1. ***Taraxacum semitubulosum* Jurtz.**
2. No synonyms. Misapplied names: *Taraxacum arcticum* auct.
3. Compositae (Asteraceae)
4. Arctic Tundra, Southern Variant; Northern Hypoarctic Tundra; and subarctic alpine adjacent areas
5. Anabar-Olenek and Kharaulach and adjacent subarctic alpine areas
6. A snowbed plant, sometimes occurring with *T. arcticum* (Trautv.) Dahlst.
7. Known from seven localities. Protected in three localities in the Lower Lena State Reserve where it is locally abundant. IUCN = LR(lc)
8. Affinities of the widespread *T. arcticum* (Trautv.) Dahlst., as well as the Beringian *T. alaskanum* Rydb. and *T. kamtschaticum* Dahlst.
9. Ls: T.M. Koroleva, N.N. Taraskina, T: T.M. Koroleva, B.A. Yurtsev
10. Tsvelev and Yurtsev (1987)
11. Russia

1. ***Taraxacum senjavinense* Jurtz. & Tzvel.**
2. No synonyms
3. Compositae (Asteraceae)
4. Northern Hypoarctic Tundra
5. Beringian Chukotka (Chukotsk Peninsula)
6. Snowbeds and on carbonate colluvium.
7. Known from three localities where it is locally abundant. IUCN = LR(nt)
8. A species of section *Arctica* which combines the characteristics of *T. phymatocarpum* Vahl and *T. sibiricum* Dahlst.
9. Ls: N.N. Taraskina, T: B.A. Yurtsev
10. Tsvelev and Yurtsev (1987)
11. Russia

1. ***Taraxacum taimyrense* Tzvel.**
2. No synonyms
3. Compositae (Asteraceae)
4. Arctic Tundra, Southern Variant; Northern and Southern Hypoarctic Tundra
5. Taimyr
6. Steep, stony riparian slopes and cliffs; sandy and gravelly alluvial flats and lake shores.
7. Known from 13 localities. Protected in one locality, Purinsky Sanctuary (IUCN PAMC = IV). IUCN = LR(lc)
8. Related to *Taraxacum bicorne* Dahlst. and *T. macilentum* Dahlst. (section *Ceratophora* Dahlst.) but with some features of *T. phymatocarpum* Vahl of section *Arctica* Dahlst. Possibly of hybrid origin.
9. Ls and T: M.V. Sokolova
10. Tsvelev and Yurtsev (1987)
11. Russia

1. ***Taraxacum tolmaczevii* Jurtz.**
2. No synonyms
3. Compositae (Asteraceae)
4. Arctic Tundra, Northern Variant
5. Wrangel Island
6. Carbonate gravel-silt in frost boils on proluvial terraces.
7. Known from four localities in the southwestern and central parts of Wrangel Island; never abundant. Protected in Wrangel Island State Reserve (IUCN PAMC = I). IUCN = VU
8. 2n = 24. A peculiar species of *T. phymatocarpum* agg.; similar in leaf blade form and dissection to the Canadian-Greenland diploid *T. holmenianum* Sahlin (*T. pumilum* Dahlst., non Gaudich).
9. Ls: N.N. Taraskina, T: B.A. Yurtsev
10. Tsvelev and Yurtsev (1987), Yurtsev et al. (1989b)
11. Russia

1. ***Taraxacum uschakovii* Jurtz.**
2. No synonyms
3. Compositae (Asteraceae)
4. Arctic Tundra, Northern Variant
5. Wrangel Island
6. Early melting snowbeds on carbonate substrates.
7. Known from eight localities in the southwest and central part of Wrangel Island where it is common. Protected in Wrangel Island State Reserve (IUCN PAMC = I). IUCN = LR(nt)
8. 2n = 32. By the combination of characters, this species could have originated from a cross between some nival species of *T. phymatocarpum* agg. (2n = 24) and *T. arcticum* (Trautv.) Dahlst. (2n = 40), with which it is commonly associated in snowbeds.

9. Ls: N.N. Taraskina, T: B.A. Yurtsev
10. Tsvelev and Yurtsev (1987), Yurtsev et al. (1989b)
11. Russia

1. ***Taraxacum wrangelicum* Tzvel.**
2. No synonyms
3. Compositae (Asteraceae)
4. Arctic Tundra, Northern Variant
5. Wrangel Island
6. Mountain snowbeds on carbonate substrates.
7. Known from six localities in the southwestern and central parts of the Wrangel Island where it is common. Protected in Wrangel Island State Reserve (IUCN PAMC = I). IUCN = LR(nt)
8. 2n = 40. A species of *T. phymatocarpum* agg.
9. Ls: N.N. Taraskina, T: B.A. Yurtsev
10. Tsvelev and Yurtsev (1987), Yurtsev et al. (1989b)
11. Russia

1. ***Trisetum wrangelense* (Petrovsky) Probat.**
2. *Trisetum spicatum* (L.) Richt. subsp. *wrangelense* Petrovsky
3. Gramineae (Poaceae)
4. Arctic Tundra, Northern Variant
5. Wrangel Island
6. Restricted to dry hillsides.
7. Known from four localities. Protected in Wrangel Island State Reserve (IUCN PAMC = I). IUCN = LR(nt)
8. 2n = 28. Sympatric with *T. spicatum* (L.) Richt.
9. Ls: N.N. Taraskina, T: V.V. Petrovsky.
10. Probatova (1985)
11. Russia

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The cover photograph of *Artemisia globularia* var. *lutea*, from St. Matthew Island, Alaska, is courtesy of Sandra Looman Talbot, Alaska Biological Science Center, U.S. Geological Survey Biological Resources Division, Anchorage.

Glossary[a]

Alluvium - Material that is transported and deposited by running water.
Alpine - Those portions of mountain landscapes above tree line, or referring to the organisms living there.
Amphi-Atlantic - On both sides of the Atlantic Ocean.
Amphi-Beringian - On both sides of the Bering Strait and Bering Sea.
Annual - Plant that completes its life cycle and dies in one year or less.
Arctic-alpine - Pertaining both to arctic and alpine regions.
Biennial - Plant that requires two years to complete its life cycle.
Calcareous - Referring to limestone-derived carbonate-rich soils.
Calciphyte - A plant that prefers calcareous soils; it is calciphilous.
Chionophilous plants - Plants preferring snow-rich sites.
Colluvium (-via) - A general term for all kinds of materials moving downslope because of gravitation effect.
Conspecific - Of the same species.
Cryo-arid - Cold and very dry (climate, area, period).
Cryophyte - A plant of cyro-arid areas.
Cryoxerophyte - A plant of dry habitats in cold latitudinal or altitudinal zones.
Eluvium - Rock debris produced by the weathering in situ.
Eolian - Wind borne.
Endemic - A taxon confined to a particular region, as endemic to Chukotka.
Eutrophic - Habitats, particularly soil and water, rich in nutrients.
Fellfield - From the Danish "fjeld-mark," or rock desert. A type of tundra ecosystem characterized by rather flat relief, very stony soil, and low, widely spaced vascular plants.
Floodplain - A nearly level plain bordering streams and rivers and subject to periodic flooding.
Frost boil - Discrete areas of bare soil disturbed by frost action.
Halophyte - Plant adapted to existence in a saline environment and more or less restricted to saline or alkaline soils or to sites influenced by salt water.
Heterostyly - Condition in which individuals within a species differ in the length of style in their flowers. Anthers in one type of flower are at the same level as stigmas in the other, thus ensuring cross-pollination and preventing self- pollination (Lawrence 1995).
Hygric - Refers to a wet or moist condition of a habitat.
Hypoarctic - Region that includes both the Low Arctic and the Subarctic (northern taiga plus forest-tundra).
Ined. - In the process of being published.
Mesic - Soils, sites, or habitats characterized by intermediate moisture conditions, i.e., neither decidedly wet (hygric) nor decidedly dry (xeric).

[a]Definition of terms are from Burgunker (1961), Gabriel and Talbot (1984), and Yurtsev (unpublished data, 1996).

Monocarpic - A plant that bears fruit only once and dies, cf. polycarpic.
Montane - Pertaining to mountain slopes, including those below the alpine zone.
Nival - Pertaining to the barren region of permanent ice and snow.
Octaploid - A plant with a chromosome complement of eight sets of the haploid (n) number.
Oligotrophic - Restricted to nutrient-poor, leached soils.
Perennial - Plant that lives for three or more years.
Petrophilous plants - Growing primarily or wholly on rubble, gravelly, or stony substrate.
Plakor - Areas of interfluvial plains covered by moderately drained fine-textured silt or clay material.
Polycarpic - Perennial plant that fruits many times over its life; cf. monocarpic.
Proluvial - Material, usually gravel or sand, having moved down the slope through gravitation and water flows and deposited at the base; "proluvial"—the attributive from proluvium (Lat.).
Pulvinate - Cushion-shaped.
Relict - Species belonging to an earlier vegetation and climatic regime than that in which it is now found, in azonal, intrazonal, or extrazonal habitats, usually with strongly disjunct distribution.
Rhizome (**-atous**) - A stem, generally modified (particularly for storing nutrients), that grows along or below the surface of the ground and produces adventitious roots, scale leaves, and suckers irregularly along its length.
Riparian - Pertaining to the streamside environment.
Ruderal - Plant species growing on disturbed sites or in waste places; weed plants that exploit conditions of high disturbance and low competitive stress.
Scree - Sheet of coarse rock debris mantling a mountain slope.
Snowbed - An area where snow accumulates each winter and melts late each growing season.
Solifluction - Process of downslope movement of soil caused by frost action; characteristic of areas with cold arctic or alpine climates.
Steppe - (1) A landscape term referring to the broad, undulating, treeless and grassy plains; (2) A community of xerophilous herbaceous perennials of temperate to cold-temperate zones or belts.
Stlanik - Plant formation and growth forms of creeping shrubs or small trees, for example, *Pinus pumila*.
Sympatric - Refers to taxa occupying the same or overlapping ranges.
Taiga - A Russian term meaning the boreal conifer forest or the landscape dominated by such vegetation.
Takkyr - Slightly concave land surfaces in arid areas, with ponded water in the spring, that dries out and cracks into polygons in summer; normally salt-rich, with a special set of halophytic plants. Arctic takkyrs differ from those of the true desert zones; playa deposits (Burgunker 1961).
Taxon - Species or lower or higher taxonomic levels, including forms that are not yet formally described.
Tor - Isolated mass of resistant rock composed of either a single or numerous joint blocks standing above the unaltered bedrock and the surrounding terrain. Tors usually contain numerous blocks piled one upon another, forming castellated piles or fingers of rocks.
Xeric - Refers to a dry habitat or site.
Xerophyte - A plant that can grow in dry places.
Zoogenic - Caused by or associated with animals or their activities.

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Appendix I. Excluded taxa

1. ***Erigeron yukonensis* Rydb.**
2. No synonyms
3. Compositae (Asteraceae)
4. Hypoarctic
5. In the Arctic, West Canadian
6. Calcareous rocky slopes.
7. Canadian Arctic and more common in the Canadian subarctic Yukon.
8. East Beringian continental species; in Alaska, the species has been collected south of the Arctic at Harding Lake near Fairbanks. This species was excluded because there are locations outside the Arctic as defined herein.
9. Ls: C.M. McJannet, T: G.W. Argus, R. Lipkin, and D.F. Murray
10. Cody (1979), Porsild and Cody (1980), McJannet et al. (1995)
11. Canada and USA.

1. ***Gagea samojedorum* Grossh.**
2. No synonyms. Misapplied names: *Gagea fistulosa* auct. non Ker-Gawler, *G. pusilla* auct. non Schult. & Schult. fil.
3. Liliaceae
4. Southern Hypoarctic Tundra and adjacent montane areas
5. Ural-Novaya Zemlya and adjacent montane areas
6. Streamside mountain tundra meadows.
7. Known from ten localities. IUCN = LR(lc)
8. Related to *G. fistulosa* Ker-Gawler, a species of the middle to southern European mountains. Not endemic to the Arctic.
9. Ls and T: O.V. Rebristaya
10. Kobeleva (1976), Kuliev and Morozov (1988), Morozov and Kuliev (1989)
11. Russia

1. ***Gymnigritella runei* Teppner & Klein**
2. No synonyms
3. Orchidaceae
4. Subarctic alpine
5. Swedish mountains (Åsele and Lycksele lappmark); four rather close sites.
6. Herb-rich meadows close to the timber line.
7. Four sites within all 200-300 individuals.
8. Stabilized apogamous allopolyploid, from *Nigritella nigra* Reichenb. fil. and *Gymnadenia conopsea* (L.) R. Br., 2n = 80. This taxon was excluded from the annotated list because all sites were not in the Arctic as defined herein.
9. Ls and T: M. Aronsson
10. Teppner and Klein (1989), Rune (1993)
11. Sweden

1. ***Oxytropis schmorgunoviae* Jurtz.**
2. No synonyms
3. Leguminosae (Fabaceae)
4. Northern Hypoarctic Tundra, Suboceanic Stlaniks (*Pinus pumila*), and subarctic woodland adjacent areas
5. Continental Chukotka and adjacent areas (taiga of the Kolyma drainage)
6. South-facing dry steppe bluffs.
7. Known from five localities; locally abundant. IUCN = LR(nt)
8. 2n = 48. A hypoarctic steppe species of the amphi-Beringian subsection *Inaequiseptatae* Jurtz. of section *Baicalia* Bunge and a presumed link between the subarctic steppe taxon, *O. scheludjakovae* Karav. & Jurtz., and the Ayon Island endemic, *O. sverdrupii* Lynge. Not endemic to the Arctic.
9. Ls: T.M. Koroleva, T: B.A. Yurtsev
10. Yurtsev (1986b)
11. Russia

1. ***Papaver gorodkovii* Tolm. & Petrovsky**
2. No synonyms
3. Papaveraceae
4. Low to High Arctic
5. Wrangel Island, Beringian Chukotka, and Beringian Alaska; co-endemic to West and East Beringia (subendemic of Wrangel Island).
6. Restricted to carbonate gravelly alluvium and moist screes.
7. Known from 25 localities (17 in Russia and eight in the United States). Under protection in Wrangel Island State Reserve.
8. 2n = 42. Allied to *P. walpolei* Pors. from Central Beringia. This taxon was excluded from the annotated list because new information showed that it occurred in more than 20 localities.
9. Ls: T.M. Koroleva and N.N. Taraskina, T: V.V. Petrovsky
10. Tolmatchev (1975b), Murray (1994)
11. Russia and USA

1. ***Papaver laestadianum* (Nordh.) Nordh.**
2. *Papaver radicatum* Rottb. subsp. *laestadianum* Nordh.
3. Papaveraceae
4. In alpine areas within the boreal zone
5. Scandinavia (none of Yurtsev's zones)

6. Screes, barren rock outcrops, open gravel in the middle alpine belt. Secondary localities along river banks in the lowland.
7. Vulnerable according to the 1992 Norwegian Red List. Only known from a very restricted area in northernmost Sweden and in adjacent areas of Norway. In Sweden one site with 20-500 individuals yearly; in Norway about ten localities of an estimated 1,000-2,000 individuals.
8. 2n = 56. Related to *P. lapponicum* (Tolm.) Nordh. (same chromosome number) and *P. radicatum* and is in need of taxonomic restudy. This species was excluded because all localities were outside the Arctic as defined herein.
9. Ls and T: M. Aronsson and A. Elvebakk
10. Nordhagen (1939), Nilsson and Gustafsson (1979), Heggelund (1993), Nevermo (1997, University of Tromsø, pers. comm.)
11. Norway and Sweden

1. ***Pedicularis hyperborea* Vved.**
2. No synonyms
3. Scrophulariaceae
4. Northern and Southern Hypoarctic Tundra
5. Ural-Novaya Zemlya and Yamal-Gydan European-West Siberian and adjacent areas
6. Sedge-cotton grass wet meadows and mires.
7. Known from 36 localities; common in some areas.
8. Belongs to *Pedicularis palustris* L. alliance and is closest to the Siberian-West American *P. pennelii* Hult. This taxon was excluded from the annotated list because new information showed that it occurred in more than 20 localities.
9. Ls and T: O.V. Rebristaya
10. Ivanina (1980)
11. Russia

1. ***Polygonum alaskanum* Wight ex Hult. subsp. *alaskanum***
2. *Aconopogon alaskanum* (Wight ex Hult.) Soják s. str.
3. Polygonaceae
4. Low Arctic
5. Central Beringian (easternmost Chukchi Peninsula and western Alaska)
6. In Chukchi Peninsula: petrophyte zoogenic meadows on cliffs (noncarbonate rocks, slightly acidic). Forms rhizomatous clones. It is uncommon on the Seward Peninsula where it occurs on gravel bars of lakes, rubble small ridges, and similar open sites.
7. Common in Alaska but rare in Asia.
8. 2n = 20. Replaced in the rest of Alaska-Yukon territory by subspecies *hulténianum* Jurtz., very common in taiga valleys, on roadsides. This taxon was excluded from the annotated list because new information showed that it occurred in more than 20 localities.
9. Ls: N.N. Taraskina, T: D.F. Murray, B.A. Yurtsev
10. Hultén (1968), Yurtsev et al. (1975), Hong (1991), Chambers (1992)
11. Russia and USA

1. ***Potentilla insularis* Sojàk**
2. Misapplied names: *P. rubicaulis* Lehm and *P. pedersenii* (Rydb.) Ostenf.
3. Rosaceae
4. Arctic Tundra, Southern Variant
5. Svalbard, Ellesmere-North Greenland
6. Dry screes and cliffs in association with sea bird colonies.
7. Known from scattered colonies in central Spitsbergen and one collection from northeast Greenland. Some of the localities have rather large populations; the size and structure of these populations are now being studied (R. Elven et al., University of Oslo, pers. comm., 1996). Several populations are in plant protection areas. The status of the species in Greenland is unknown. IUCN = LR.
8. Previously considered to be a possibly apomictically reproducing and locally arisen, polytopic hybridogeneous species swarm that may have originated from *P. chamissonis* and *P. pulchella*, and including *P. lyngei* (Elven and Elvebakk 1996). Ongoing studies indicate its position as a separate species (R. Elven, University of Oslo, pers. comm., 1997).
9. Ls. and T: A. Elvebakk
10. Yurtsev (1984), Elven and Elvebakk (1996)
11. Greenland and Norway

1. ***Potentilla rubella* Th. Sør.**
2. No synonyms
3. Rosaceae
4. Arctic Tundra, Northern Variant
5. Central East Greenland and the central Russian Arctic
6. Dry south- or west-facing slopes.
7. Known from 12 localities in Northeast Greenland and apparently many from central Russian Arctic.
8. Related to the Eurasian *P. chrysantha* group. In the Russian flora, it is hybridogenous between *Potentilla hyparctica* and *P. stipularis*, both taxa occurring within the range of *P. rubella* in Greenland (C. Bay, unpublished data, 1996). According to B. Eriksen (University of Göteborg, pers. comm., 1997), the distribution and taxonomic status of *Potentilla rubella* has to be investigated further. The systematics of *Potentilla* are so uncertain that listing species such as *P. rubella* as rare may lead to loss of confidence in a credible list. Valuable background notes on the species (B. Eriksen, University of Göteborg, pers. comm., 1997) follow and provide considerable insight into the problem. The species

was described by Sørensen (1934) as an endemic from Eastern Greenland. It is said to be closely related to *P. emarginata* (section *Aureae*; now *P. hyparctica*), judged by the floral similarities, but in contrast to *P. hyparctica*, which has trifoliate leaves, *P. rubella* has almost exclusively pentafoliate leaves. The plants of *P. rubella* are also more robust, with projecting inflorescences. The plants are found on calcareous soil, in depressions in rich meadow communities as well as on sandy ridges. In the area from where *P. rubella* is known, *P. crantzii* (5-foliate) and *P. stipularis* (7-9 foliate) also occur. The question of whether *P. rubella* is a valid species cannot be answered at this time, but a thorough investigation is needed before putting *P. rubella* on the list of rare arctic plants. An alternate and contrasting hypothesis would be that *P. rubella* is nothing but a robust ecotype of *P. hyparctica*, having increased the number of leaflets in the nutrient-rich community in which it is growing. A hybridogeneous origin cannot be ruled out either, but this would have to be tested. The very diverse habitats mentioned range from wet depressions to dry ridges. This range is puzzling and may suggest that *P. rubella* may even be a result of confusion by taxonomists of two or more species. Very little is known (or written) about the morphological variation normally found in the other three species growing in that area and *P. rubella* could represent a morphological aberrant of more than one species. No reference is made to *P. rubella* in Juzepchuk (1941), but Yurtsev is of the opinion that *P. rubella* is found in Russia. If *P. rubella* is an ecotype, rather than a relict species connecting section *Aureae* and some other European taxa, as suggested by Gelting (Sørensen 1934), it is possible that Yurtsev may have found "*P. rubella*" on the Siberian coast. *Potentilla hyparctica* is extremely common in many places and various ecotypes could be expected. *Potentilla crantzii* is absent, but *P. stipularis* often cooccurs with *P. hyparctica* and thus the hybridization hypothesis is still valid. On the other hand, if *P. rubella* is the connection between sect. *Aureae* and European taxa, it is not very likely that it would be common in Siberia. This taxon was excluded from the annotated list because new information showed that it occurred in more than 20 localities.
9. Ls: C. Bay and B. Fredskild, T: C. Bay and B. Eriksen
10. Bay (1992)
11. Greenland and Russia

1. ***Primula tschuktschorum* Kjellm.** (quoad typ., non auct. plur.)
2. *Primula beringensis* (Pors.) Jurtz.
3. Primulaceae
4. Low Arctic
5. Central Beringian (on either coast of Bering Strait) stenochoric coendemic of the eastern Chukotka Peninsula, St. Lawrence Island, Alaska Peninsula, and the western Seward Peninsula.
6. Eutrophic moist frost-scar, forb-sedge-dwarf, shrub-moss tundras, and most common on spots of bare gravel-silty noncarbonate soils; humid outcrops in the mountains; streamside meadows.
7. Known from 19 localities where it is sometimes locally abundant; many unreported localities are known.
8. 2n = 22. Differs markedly from the related *P. eximia* Greene (*P. tschuktschorum* auct. plur. non Kjellm.) by its morphology, ecology, and biology (heterostyly). Most common in Seward Peninsula (Bendeleben Mountains). This taxon was excluded from the annotated list because new information showed that it probably occurred in more than 20 localities.
9. Ls: N.N. Taraskina, R. Lipkin, S.S. Talbot, T: R. Lipkin, S.S. Talbot, B.A. Yurtsev.
10. Hultén (1968), Korobkov (1980), Kelso (1987, 1996), Murray and Lipkin (1987), Murray (1992)
11. Russia and USA

1. ***Puccinellia bruggemanni* Th. Sør.**
2. No synonyms
3. Gramineae (Poaceae)
4. Arctic Tundra subzone (Middle to High Arctic, mostly in the Arctic)
5. Canadian-North Greenland; West Hudsonian (IVB) and East Greenland (IVD)
6. Dry stony silt on (mostly south-facing) slopes (Greenland); damp sandy tundra, particularly below owl perches and around lemming mounds (Canada).
7. Known from 24 localities spread over a large area in North and East Greenland (an overlooked species); in Canada from Prince Patrick Island, south to Ellesmere, south to King William Island.
8. Closely related to *Puccinellia angustata*. This taxon was excluded from the annotated list because new information showed that it occurred in more than 20 localities.
9. Ls: C. Bay, B. Fredskild, and C.M. McJannet, T: C. Bay
10. Sørensen (1955), Scoggan (1978-1979), Bay (1992, 1993), McJannet et al. (1995)
11. Canada and Greenland

1. ***Saxifraga svalbardensis* D.O. Øvstedal**
2. No synonyms
3. Saxifragaceae
4. Middle and northern Arctic tundra zone (I-II)
5. Svalbard
6. Wet mires and in moss carpets along creeks.

7. Many localities, not rare, and many localities are probably within protected areas. When it was published in 1975 only four localities were known, but Elvebakk (unpublished data, 1997) has found it in suitable habitats in almost all areas that he has visited in Svalbard. These localities have not been published, but the conclusion is that it is common as stated by Elven and Elvebakk (1996).
8. 2n = 64, probably originated from a hybrid between *S. cernua* and *S. rivularis* s. lat. Pseudo-viviparous. This taxon was excluded from the annotated list because new information showed that it occurred in more than 20 localities.
9. Ls and T: A. Elvebakk
10. Øvstedal (1975), Elven and Elvebakk (1996)
11. Norway

1. ***Thlaspi arcticum* A.E. Porsild**
2. No synonyms
3. Brassicaceae (Cruciferae)
4. Northern and Southern Hypoarctic Tundra
5. Northern Alaska, Central Canada, and adjacent areas
6. Well-drained sites on alpine slopes, dry ridges, and especially in the sandy gravels of low river terraces and on the active floodplain.
7. Known from at least 40 localities.
8. 2n = 28. This diminutive white- to lavender-flowered mustard is distinguished from its close relatives in the family Cruciferae, particularly *Draba*, *Arabis*, and *Braya*, by its compact rosette of glabrous leaves, glabrous leafy stem, and short, broad, somewhat obovate or club-shaped fruits on spreading pedicels that are as long as the fruits (Murray and Lipkin 1987). Because it flowers very early (right after snowmelt), it is easily overlooked later in the season; some plants have only basal rosetttes, without flowering stems, further reducing their visibility. A detailed taxonomic reevaluation was prepared by Murray (1988). This taxon was excluded from the annotated list because new information showed that it occurred in more than 20 localities.
9. Ls: R. Lipkin, T: R. Lipkin, D.F. Murray
10. Porsild (1943), Hultén (1968), Welsh (1974), Holmgren (1979), Dawe and Murray (1981), Murray and Lipkin (1987), Murray (1988)
11. Canada, Russia and USA

Appendix II. Location of rare endemic vascular plants of the Arctic by country and latitude and longitude.

Key to country codes: CDN, Canada; GRN, Greenland; NOR, Norway; RUS, Russia; and USA, United States of America.

Androsace semiperennis Jurtz., RUS, 66 53N 179 00W, 67 30N 179 00W, 66 20N 178 00W, 65 58N 177 15E, 66 39N 176 40E, 65 20N 174 16E

Arabidopsis bursifolia (DC.) Botsch. var. *beringensis* Jurtz., RUS, 66 30N 171 05W

A. tschuktschorum (Jurtz.) Jurtz., RUS, 66 30N 171 30W

Artemisia aleutica Hultén, USA, 51 58N 177 32E, 51 48N 178 19E, 51 47N 178 21E, 51 58N 177 32E

A. arctica Less. subsp. *arctica*, RUS, 65 35N 171 00W, 65 45N 171 20W, 64 49N 175 20W, 64 25N 173 15W, 64 53N 172 30W; USA, 64 55N 165 00W, 64 52N 166 08W, 64 34N 165 23W, 65 55N 163 30W, 64 52N 163 45W

A. flava Jurtz., RUS, 68 25N 168 45E, 67 50N 169 25E, 66 48N 167 20E, 67 12N 165 50E, 67 30N 168 30E, 68 15N 166 03E, 66 50N 166 18E, 66 43N 167 23E, 66 43N 167 38E, 66 41N 167 47E

A. globularia Bess. var. *lutea* Hultén, USA, 60 24N 172 42W, 57 11N 170 24W, 63 20N 171 30W, 60 25N 172 37W, 63 47N 171 45W, 64 45N 166 10W, 60 18N 172 13W, 60 42N 172 42W

A. lagopus Fisch. ex Bess. subsp. *abbreviata* Krasch. ex Korobk., RUS, 71 34N 129 00E, 68 00N 130 00E, 69 25N 129 50E, 70 00N 129 00E, 70 17N 129 30E, 72 24N 126 50E, 70 41N 127 25E, 70 37N 129 38E, 73 15N 124 00E, 70 45N 128 00E, 71 50N 127 00E, 69 02N 130 00E, 71 32N 128 50E, 68 00N 129 42E, 67 25N 128 40E

A. lagopus Fisch. ex Bess. subsp. *triniana* (Bess.) Korobk., RUS, 73 15N 126 32E, 73 28N 123 20E, 73 04N 126 45E, 73 34N 125 20E, 73 17N 126 20E, 73 25N 125 12E, 74 00N 110 20E, 74 17N 111 10E, 74 20N 112 40E

A. samojedorum Pamp., RUS, 69 24N 86 10E, 70 03N 83 12E, 70 05N 83 10E, 70 08N 83 10E, 70 30N 83 30E, 69 10N 85 55E, 69 15N 84 45E, 69 47N 85 40E, 69 37N 84 26E, 68 53N 85 50E

A. senjavinensis Bess., RUS, 65 15N 172 45W, 64 53N 172 30W, 64 25N 172 30W, 64 50N 173 10W, 64 45N 173 05W, 64 50N 172 25W, 64 38N 172 30W

Astragalus gorodkovii Jurtz., RUS, 66 53N 65 45E, 66 50N 65 40E, 66 57N 65 49E

A. igoschinae R. Kam. & Jurtz., RUS, 66 35E 63 52E

Beckwithia glacialis (L.) Á. Löve & D. Löve ssp. *alaskensis* Jurtz., D. Murray, & S. Kelso ined., USA, 64 52N 165 45W, 64 53N 166 08W, 64 59N 164 50W, 64 59N 165 03W, 64 54N 166 04W, 64 55N 165 57W, 64 54N 166 00W

Calamagrostis poluninii Th. Sør., GRN, 61 23N 45 08W, 61 10N 45 25W, 61 38N 48 34W, 61 43N 48 08W, 61 54N 48 30W, 60 56N 45 16W, 60 54N 45 16W, 60 53N 45 17W, 60 51N 45 18W, 64 59N 51 17W, 64 09N 50 22W, 65 53N 52 15W, 64 21N 50 24W, 64 21N 50 27W, 64 47N 50 37W, 64 45N 50 36W, 64 15N 50 14W, 68 39N 50 42W, 66 30N 51 20W, 66 15N 50 20W, 67 07N 50 20W, 69 33N 50 12W

Cardamine sphenophylla Jurtz., RUS, 65 50N 171 00W, 64 50N 173 10W, 66 20N 179 10W

Cassiope Xanadyrensis Jurtz., RUS, 64 55N 178 38E, 65 23N 168 08E

Castilleja arctica Kryl. & Serg. subsp. *yorkutensis* Rebr., RUS, 67 28N 64 42E, 67 27N 64 00E, 67 32N 64 05E, 67 10N 63 38E, 67 02N 63 44E, 67 03N 64 04E

Chrysosplenium rimosum Kom. subsp. *dezhnevii* Jurtz., RUS, 66 05N 170 00W

Claytoniella vassilievii (Kuzen.) Jurtz. subsp. *petrovskyi* Jurtz. & M. Griczuk, RUS, 70 59N 178 28W, 71 08N 179 25W, 70 56N 179 37W

C. vassilievii (Kuzen.) Jurtz. subsp. *vassilievii*, RUS, 64 53N 172 30W, 66 00N 170 55W, 65 57N 174 37E, 64 44N 177 45E, 63 04N 179 21E, 64 40N 175 26E, 62 43N 176 58E, 62 48N 177 31E

Crepis albescens Kuv. & Demid., RUS, 66 53N 66 56E

Douglasia beringensis S. Kelso, Jurtsev, & D.F. Murray, USA, 65 48N 163 19W, 65 48N 163 23W

Draba aleutica Ekman ex Hultén, RUS, 54 59N 168 00E; USA, 57 11N 170 22W, 51 48N 178 18E, 51 58N 177 29E, 52 10N 174 13W, 52 56N 173 15E

D. taimyrensis Tolm., RUS, 75 10N 89 30E, 74 50N 90 10E, 74 15N 98 00E, 74 38N 104 04E, 74 50N 106 15E, 75 10N 113 00E

Erigeron muirii Gray, CDN, 69 35N 138 53W, 69 35N 139 00W, 69 34N 138 55W; USA, 68 09N 165 59W, 69 26N 148 37W, 69 28N 146 09W, 68 24N 151 25W, 68 19N 151 02W, 68 36N 149 07W, 69 28N 141 28W, 69 39N 146 50W, 69 19N 146 14W

Gastrolychnis triflora (R. Br.) Tolm. & Kozhancz. subsp. *wrangelica* Jurtz., RUS, 70 56N 179 37W

Hedinia czukotica (Botsch. and Petrovsky) Jurtz., Korobk. and Balandin, RUS, 68 45N 173 49E, 68 28N 166 32E, 68 34N 165 54E

Hierochloë wrangelica Jurtz. & Probat., RUS, 71 13N 179 19W

XLedodendron vanhoeffeni (Abromeit) Dalgaard & Fredskild, GRN, 70 19N 50 30W, 67 40N 51 22W, 67 02N 50 41W, 67 08N 51 08W, 67 05N 51 15W, 66 59N 50 25W, 66 30N 51 12W, 67 07N 51 15W

Linum lewisii Pursh subsp. *lepagei* (Boivin) Mosquin, CDN, 52 56N 82 10W, 53 00N 82 00W, 53 08N 80 00W, 53 18N 80 00W, 53 26N 82 10W, 54 52N 82 15W, 55 16N 85 12W, 55 40N 85 53W, 55 52N 86 46W, 56 29N 88 09W, 57 45N 94 05W

Mertensia drummondii (Lehm.) D. Don, CDN, 69 17N 119 07W, 68 56N 116 56W, 69 41N 124 39W, 68 49N 124 25W, 68 56N 116 56W; USA, 70 28N 157 17W, 70 29N 157 25W, 69 36N 152 12W, 70 40N 156 55W

Oxytropis beringensis Jurtz., RUS, 66 30N 171 30W, 66 30N 172 05W

O. deflexa (Pall.) DC. subsp. *dezhnevii* (Jurtz.) Jurtz., RUS, 64 53N 172 30W, 66 15N 171 05W, 64 50N 173 10W, 66 30N 172 05W, 66 30N 171 15W

O. kateninii Jurtz., RUS, 66 15N 171 41W

O. putoranica M. Ivanova, RUS, 74 15N 98 00E, 74 30N 98 20E, 75 12N 107 30E, 69 44N 94 00E, 69 44N 98 00E

O. sordida (Willd.) Pers. subsp. *arctolenensis* Jurtz., RUS, 72 24N 126 36E, 72 24N 126 48E, 71 55N 127 25E, 72 11N 126 58E

O. sordida (Willd.) Pers. subsp. *barnebyana* (Welsh) Jurtz., USA, 66 53N 162 37W, 66 52N 162 37W, 66 51N 162 36W, 66 51N 162 36W, 66 66N 162 35W, 66 51N 162 35W, 66 54N 162 34W

O. sverdrupii Lynge, RUS, 69 55N 167 58E

O. tichomirovii Jurtz., RUS, 72 48N 80 50E, 73 18N 89 40E, 75 20N 89 00E, 73 40N 93 35E, 73 20N 86 18E, 73 10N 95 50E, 72 45N 95 30E, 72 22N 100 35E, 75 22N 99 50E, 75 27N 99 48E, 75 34N 99 11E, 75 56N 99 48E, 76 04N 99 58E, 74 36N 101 32E, 74 47N 103 15E, 75 10N 104 15E

O. uniflora Jurtz., RUS, 71 08N 179 25W

O. uschakovii Jurtz., RUS, 70 59N 178 28W, 70 56N 179 37W, 71 19N 179 50W, 71 08N 179 42W, 71 15N 179 10E, 71 08N 179 25W, 71 03N 179 10W, 71 13N 179 19W, 71 08N 179 17E, 71 12N 178 58E

O. wrangelii Jurtz., RUS, 71 12N 178 58E, 71 08N 179 17E, 71 08N 179 42E, 70 52N 179 40E, 71 19N 179 50W, 71 01N 179 09E, 71 13N 179 19W, 70 54N 179 07W, 70 54N 179 07W, 70 56N 179 37W, 70 59N 178 28W, 66 15N 173 00W, 67 43N 176 50W, 69 55N 168 20E

Papaver atrovirens Petrovsky, RUS, 69 11N 178 49E, 70 56N 179 37W, 71 03N 179 10W, 71 08N 177 31W, 70 56N 179 56E

P. calcareum Petrovsky, RUS, 71 08N 179 17E, 71 12N 178 58E, 71 13N 179 19W, 71 19N 179 50W, 71 01N 179 09E, 71 08N 179 42E, 71 01N 179 31W

P. chionophilum Petrovsky, RUS, 70 59N 178 28W, 70 56N 179 37W, 71 08N 179 17E, 71 12N 178 58E, 71 13N 179 19W, 71 03N 179 10W, 70 54N 179 07W, 71 01N 179 09E

P. leucotrichum Tolm., RUS, 71 18N 127 41E

P. multiradiatum Petrovsky, RUS, 70 56N 179 37W, 70 59N 178 28W, 71 19N 179 50W, 71 13N 179 19W, 71 08N 179 17E, 71 12N 178 58E, 71 01N 179 09E, 71 08N 179 42E

P. nudicaule L. subsp. *insulare* Petrovsky, RUS, 70 56N 179 37W, 71 13N 179 19W, 71 08N 179 17E, 71 08N 179 42E, 71 03N 179 10W, 71 08N 177 31W

P. uschakovii Tolm. & Petrovsky, RUS, 70 56N 179 37W, 70 59N 178 28W, 71 08N 179 17E, 71 01N 179 09E, 71 08N 179 42E, 71 03N 179 10W, 71 08N 177 31W

Plantago canescens Adams subsp. *jurtzevii* Tzvel., RUS, 69 44N 170 10E

Poa hartzii R. Br. ssp. *alaskana* R.J. Soreng, USA, 70 39N 157 15W, 70 40N 156 55W, 70 52N 156 07W, 69 20N 145 02W

Polystichum aleuticum C. Christensen, USA, 51 49N 176 42W, 51 50N 176 42W, 51 49N 176 41W, 51 50N 176 44W

Potentilla anjuica Petrovsky, RUS, 68 46N 165 23E, 68 45N 166 11E, 69 28N 163 10E, 68 55N 165 40E, 68 28N 166 32E, 68 34N 165 54E, 67 21N 159 55E

P. Xarctoalaskensis Jurtz., USA, 65 53N 163 53W

P. beringensis Jurtz., RUS, 65 55N 171 00W

P. brooksensis Jurtz., USA, 69 20N 144 30W

P. czegitunica Jurtz., RUS, 66 30N 171 30W

P. dezhnevii Jurtz., RUS, 66 30N 171 30W, 66 15N 171 05W

P. murrayi Jurtz., USA, 68 27N 149 18W, 65 23N 163 23W

P. tschaunensis Juz. ex Jurtz., RUS, 68 45N 166 11E, 68 38N 166 05E, 69 20N 165 05E, 65 35N 173 54E, 65 44N 169 35E, 68 47N 170 00E

P. uschakovii Jurtz., RUS, 71 01N 179 31W

P. wrangelii Petrovsky, RUS, 71 13N 179 19W

Puccinellia byrrangensis Tzvel., RUS, 72 48N 80 50E, 73 18N 90 30E, 73 45N 92 05E, 73 29N 80 10E, 75 10N 100 03E, 75 19N 100 05E, 75 32N 99 11E, 76 12N 99 04E, 74 50N 106 15E, 75 12N 107 30E, 75 10N 113 00E

P. gorodkovii Tzvel., RUS, 72 48N 80 50E, 75 25N 88 54E, 75 19N 100 05E, 76 04N 99 58E, 76 12N 99 04E, 74 27N 102 50E, 74 50N 106 15E

P. jenissejensis (Roshev.) Tzvel., RUS, 71 43N 83 30E, 72 48N 80 50E, 73 40N 82 12E

P. poacea Th. Sørensen, CDN, 69 27N 133 02W, 78 59N 85 50W, 79 02N 81 50W, 79 16N 83 44W, 79 30N 88 30W, 79 58N 84 23W, 80 00N 86 15W, 80 03N 85 56W, 81 05N 79 05W, 81 49N 71 26W, 82 31N 62 15W

P. rosenkrantzii Th. Sør., GRN, 70 27N 53 34W, 70 27N 52 25W, 70 47N 53 40W, 70 30N 54 11W

P. svalbardensis Rønning, NOR, 78 57N 12 20E, 79 18N 16 00E

Pucciphippsia czukczorum Tzvel., RUS, 66 30N 171 05W, 64 53N 172 30W, 67 26N 174 40W, 65 35N 171 00W

Ranunculus punctatus Jurtz., RUS, 69 20N 164 25E, 69 16N 164 05E, 69 18N 165 40E, 68 46N 165 23E, 68 52N 166 09E, 68 30N 168 16E, 68 17N 167 08E, 65 35N 170 50W, 66 15N 170 20W, 65 35N 171 00W

R. wilanderi (Nath.) Á. & D. Löve, NOR, 78 35N 15 20E

Roegneria nepliana V. Vassil., RUS, 69 40N 162 12E, 68 45N 166 11E, 68 04N 166 25E, 69 10N 164 40E, 67 56N 167 18E, 67 41N 167 45E, 68 55N 165 40E

R. villosa V. Vassil. subsp. *coerulea* Jurtz., RUS, 71 13N 179 19W, 70 56N 179 37W, 71 08N 179 42W, 71 10N 179 02E, 71 12N 179 00W

Rumex krausei Jurtz. & Petrovsky, RUS, 64 53N 172 30W, 65 50N 171 00W, 65 45N 171 20W, 65 40N 171 50W; USA, 65 28N 167 10W, 68 09N 165 58W, 68 08N 165 39W, 68 38N 166 12W, 65 10N 166 29W, 65 27N 167 12W, 65 25N 167 11W

Salicornia borealis Wolff & Jeffries, CDN, 58 45N 93 25W, 58 47N 94 11W

Salix stolonifera Cov. subsp. *carbonicola* Petrovsky, RUS, 71 13N 179 19E, 71 08N 179 17E, 71 12N 178 58E

Saxifraga aleutica Hultén, USA, 51 50N 176 40W, 52 10N 174 11W, 52 04N 173 31W, 51 58N 177 29E, 52 46N 173 54E, 52 26N 173 36E, 51 48N 178 18E, 52 56N 173 15E

Senecio hyperborealis Greenm. subsp. *wrangelica* Jurtz., Korobk. & Petrovsky, RUS, 71 08N 179 42E, 71 19N 179 50W, 71 13N 179 19W, 70 56N 179 37W

Sisyrinchium groenlandicum Boech., GRN, 67 02N 50 44W, 64 21N 50 27W, 64 26N 50 12W, 64 22N 50 24W, 64 15N 50 12W, 64 26N 50 28W, 64 25N 50 16W, 64 14N 49 42W, 64 15N 50 10W, 64 25N 49 50W, 64 07N 50 08W

Suaeda arctica Jurtz. & Petrovsky, RUS, 69 45N 170 35E

Taraxacum czaunense Jurtz. & Tzvel., RUS, 67 23N 168 21E, 69 36N 170 12E, 69 40N 170 20E, 68 34N 165 54E

T. czukoticum Jurtz., RUS, 67 53N 177 15E

T. jurtzevii Tzvel., RUS, 69 16N 164 05E, 69 13N 165 40E, 68 32N 164 58E, 68 46N 165 23E, 68 37N 165 35E, 68 52N 166 09E, 68 38N 166 05E, 67 30N 168 30E, 68 30N 168 16E, 66 43N 167 23E, 66 20N 179 07W, 66 15N 171 50W

T. leucocarpum Jurtz. & Tzvel., RUS, 69 57N 168 03E, 69 55N 168 20E, 69 49N 173 32E

T. nanaunii Jurtz., RUS, 70 53N 179 40E, 70 56N 179 37W

T. petrovskyi Tzvel. var. *petrovskyi*, RUS, 69 16N 164 05E, 67 24N 168 23E, 66 11N 167 24E, 70 59N 178 28W, 71 10N 179 02E, 71 13N 179 19W

T. petrovskyi Tzvel. var. *safronovae* Tzvel., RUS, 72 52N 140 48E

T. pseudoplatylepium Jurtz., RUS, 70 56N 179 37W, 71 10N 179 02E, 71 08N 179 17E, 71 08N 179 42E, 71 03N 179 10W, 71 12N 179 43E, 71 08N 179 25W

T. semitubulosum Jurtz., RUS, 72 16N 123 00E, 72 32N 122 18E, 72 57N 121 40E, 69 05N 129 20E, 72 16N 125 40E, 72 00N 129 12E, 71 25N 129 00E

T. senjavinense Jurtz. & Tzvel., RUS, 64 53N 172 30W, 64 56N 172 33W, 66 16N 170 48W

T. taimyrense Tzvel., RUS, 72 48N 80 50E, 70 40N 88 30E, 70 53N 90 00E, 71 25N 89 15E, 71 40N 88 30E, 72 20N 85 30E, 73 18N 90 30E, 73 12N 89 40E, 73 40N 93 35E, 73 10N 95 50E, 75 10N 100 03E, 74 50N 106 15E, 70 52N 89 58E

T. tolmaczevii Jurtz., RUS, 70 56N 179 37W, 71 10N 179 02E, 71 08N 179 42W, 71 08N 179 25W

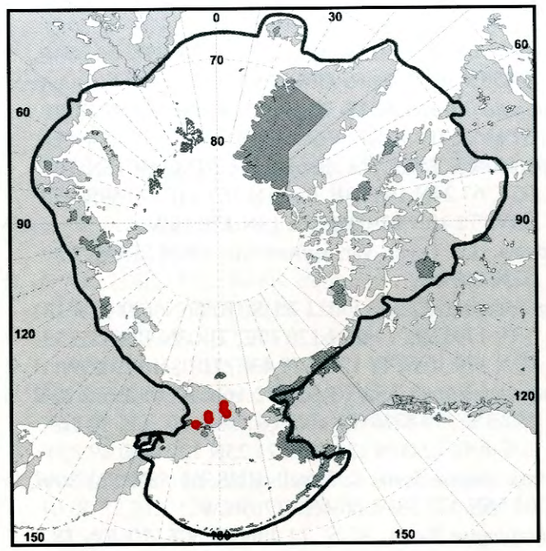
T. uschakovii Jurtz., RUS, 71 08N 179 17E, 71 10N 179 02E, 71 03N 179 10W, 71 12N 178 58E, 71 10N 179 40E, 70 56N 179 37W, 71 12N 179 43E, 71 08N 179 25W

T. wrangelicum Tzvel., RUS, 70 56N 179 37W, 71 08N 179 17E, 71 03N 179 10W, 70 57N 179 47W, 71 19N 179 50W, 71 01N 179 31W

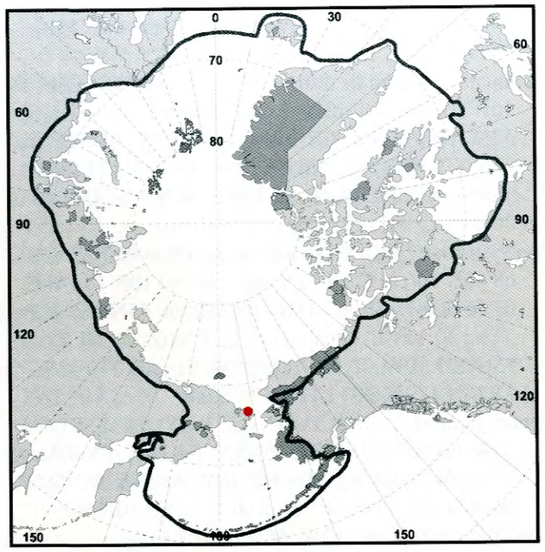
Trisetum wrangelense (Petrovsky) Probat., RUS, 71 08N 179 17E, 71 12N 178 58E, 70 56N 179 37W, 71 08N 179 42W

Appendix III. Distribution maps of individual rare endemics.

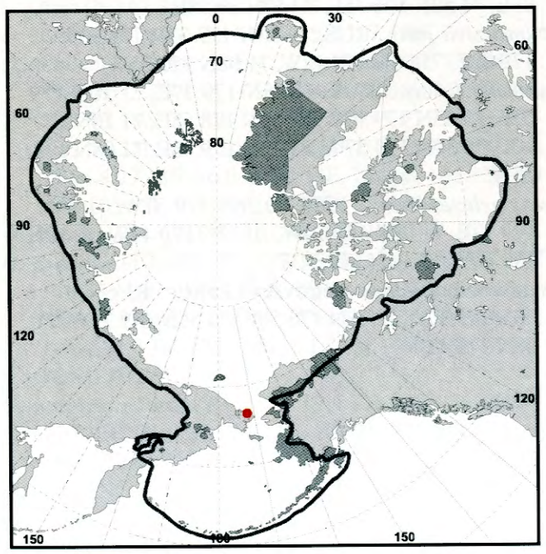
Taxa are arranged alphabetically. The Arctic is delimited by a solid dark gray line, land masses are represented by light gray, and habitat protected areas are intermediate gray. Taxon localities are shown as red dots. Locality coordinates are recorded in Appendix II.



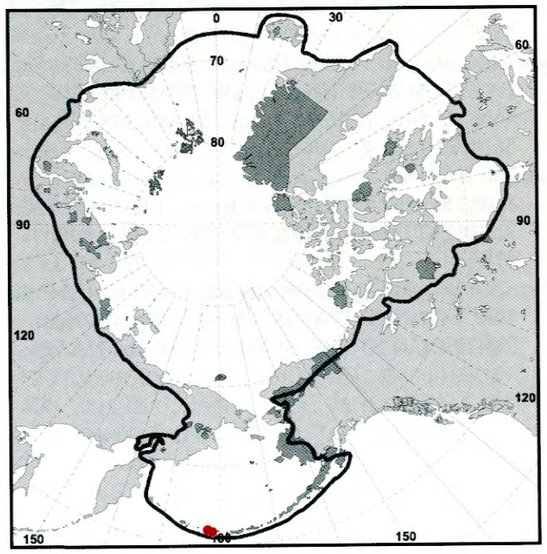
Androsace semiperennis Jurtz.



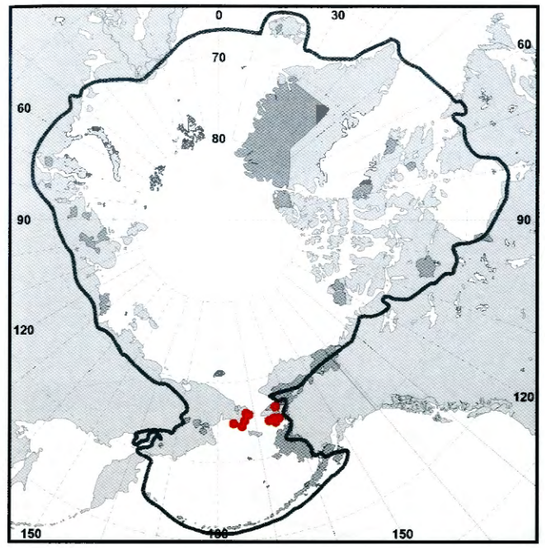
Arabidopsis bursifolia (DC.) Botsch.
var. *beringensis* Jurtz.



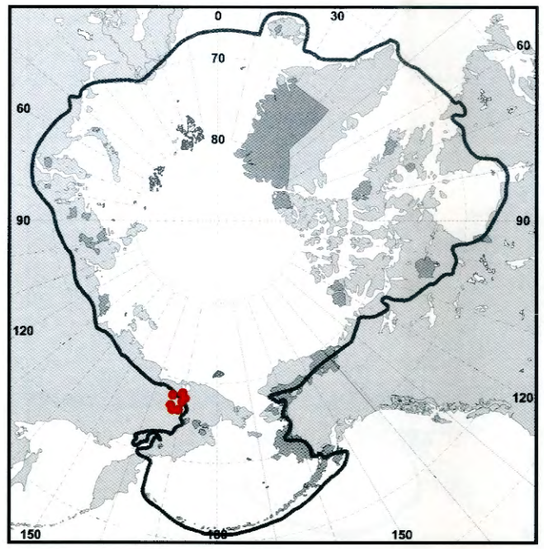
Arabidopsis tschuktschorum (Jurtz.) Jurtz.



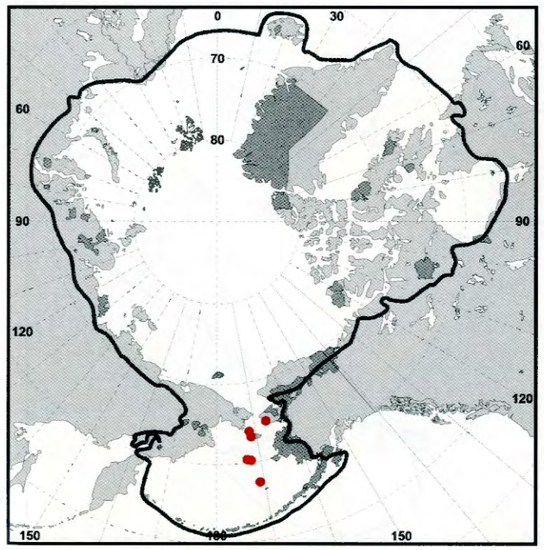
Artemisia aleutica Hultén



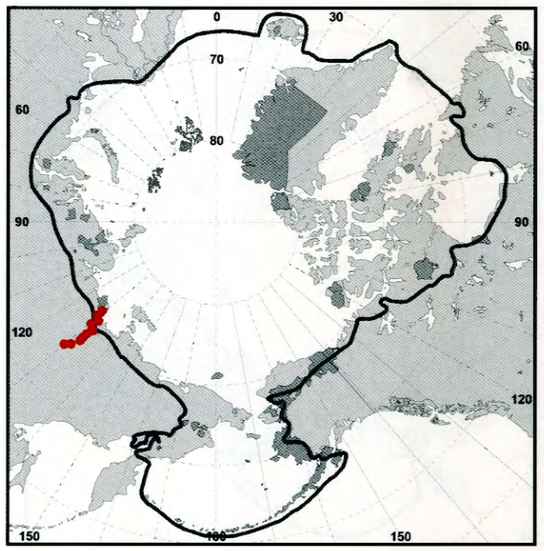
Artemisia arctica Less.
subsp. *arctica*



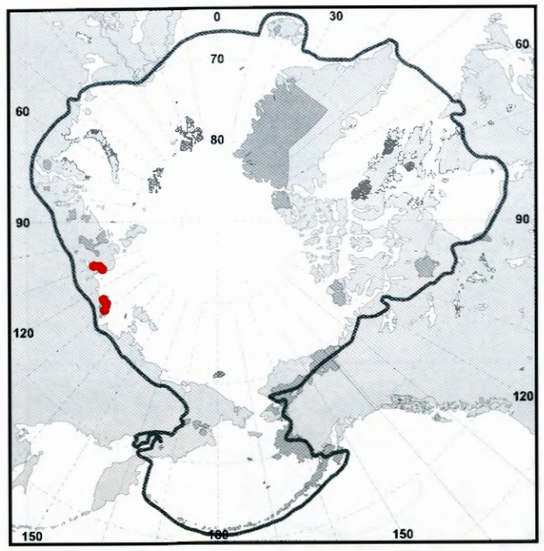
Artemisia flava Jurtz.



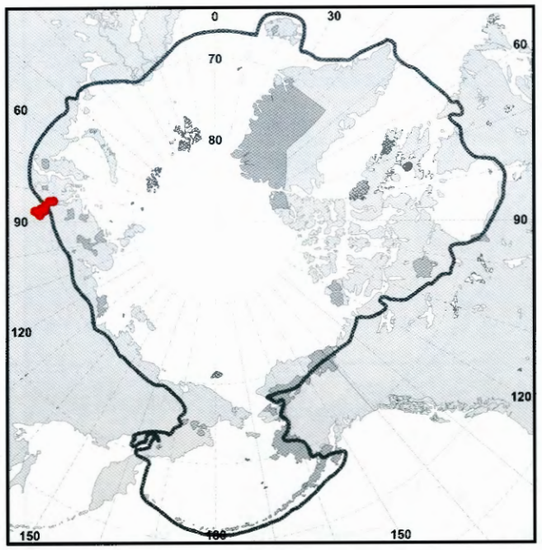
Artemisia globularia Bess.
var. *lutea* Hultén



Artemisia lagopus Fisch. ex Bess.
subsp. *abbreviata* Krasch. ex Korobk.



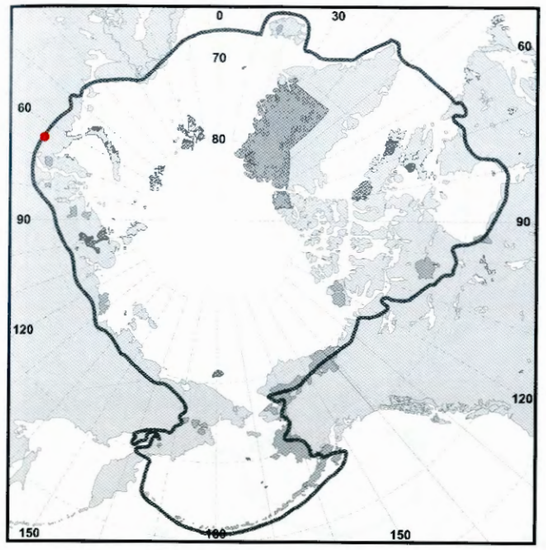
Artemisia lagopus Fisch. ex Bess.
subsp. *triniana* (Bess.) Korobk.



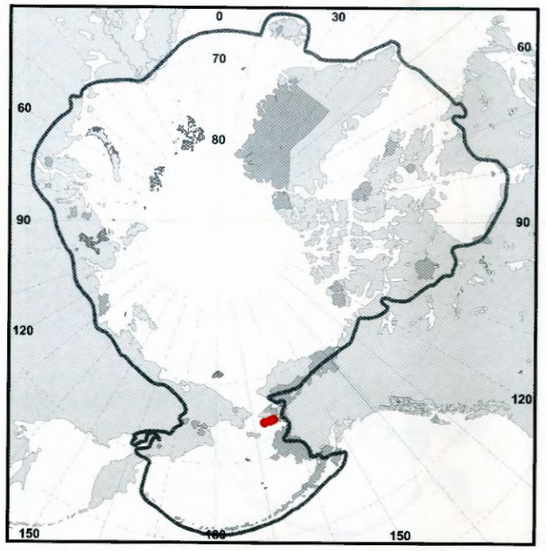
Artemisia samojedorum Pamp.

Artemisia senjavinensis Bess.

Astragalus gorodkovii Jurtz.



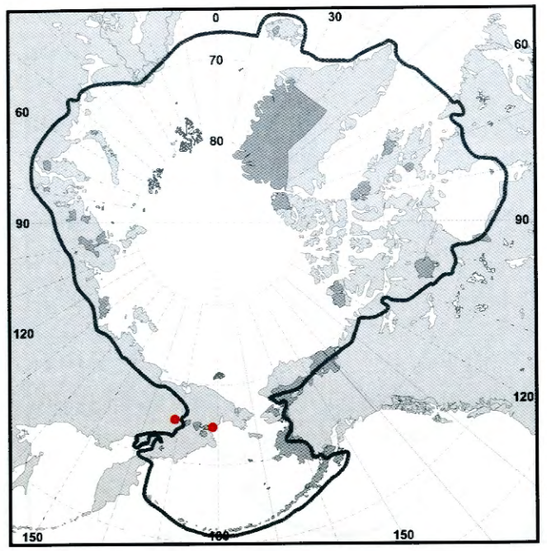
Astragalus igoshinae R. Kam. & Jurtz.



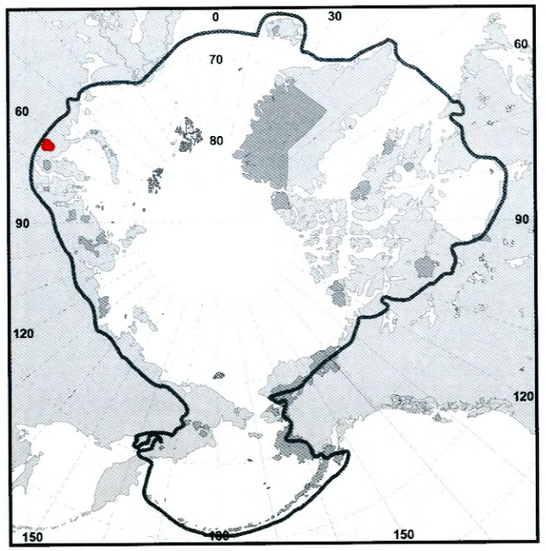
Beckwithia glacialis (L.) Á. Löve & D. Löve
subsp. *alaskensis* Jurtz., D.F. Murray, & S. Kelso ined.

Calamagrostis poluninii Th. Sor.

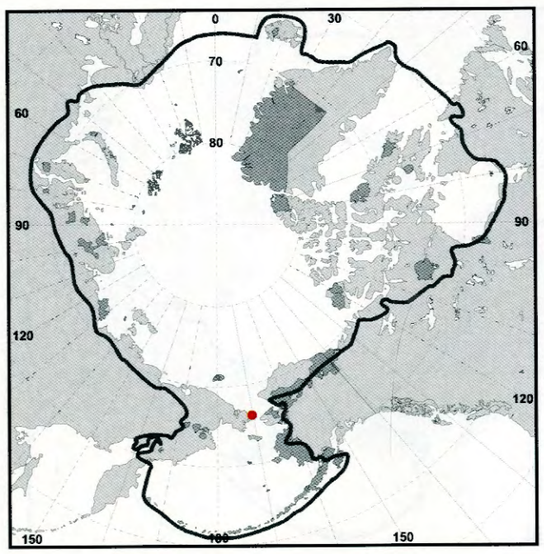
Cardamine sphenophylla Jurtz.



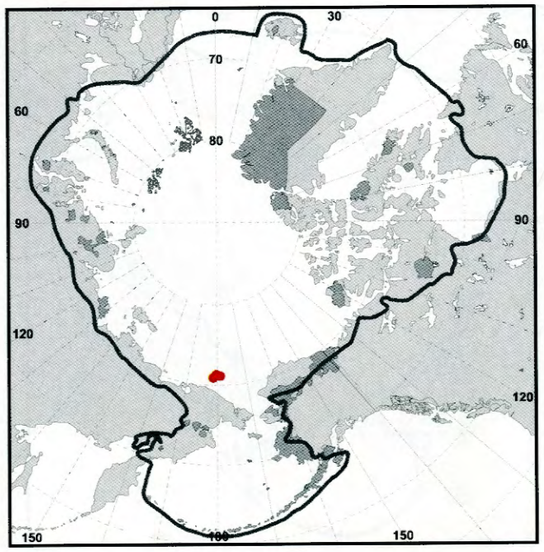
Cassiope Xanadyrensis Jurtz.



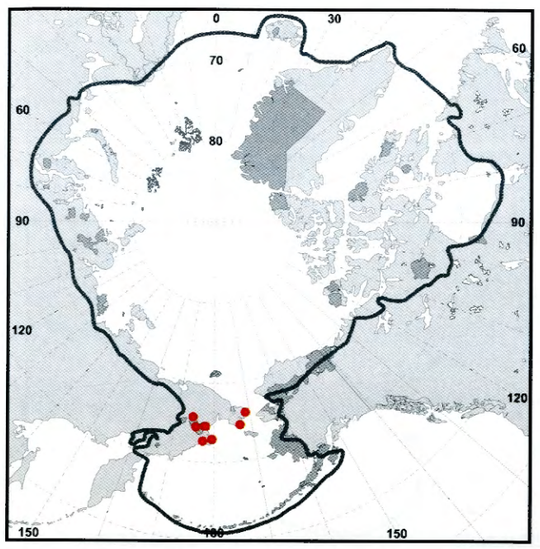
Castilleja arctica Kryl. & Serg.
subsp. *vorkutensis* Rebr.



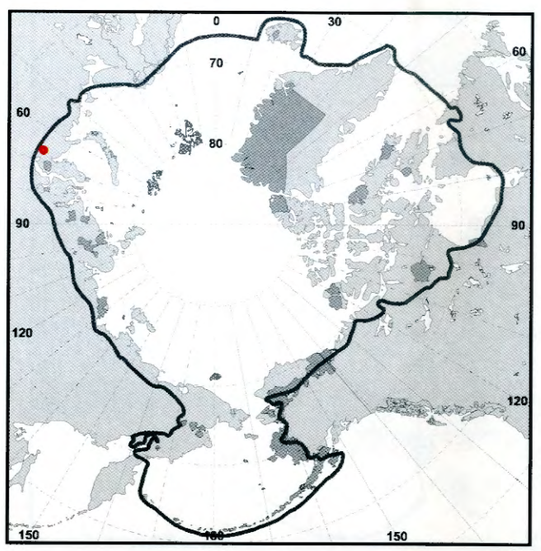
Chrysosplenium rimosum Kom.
subsp. *dezhnevii* Jurtz.



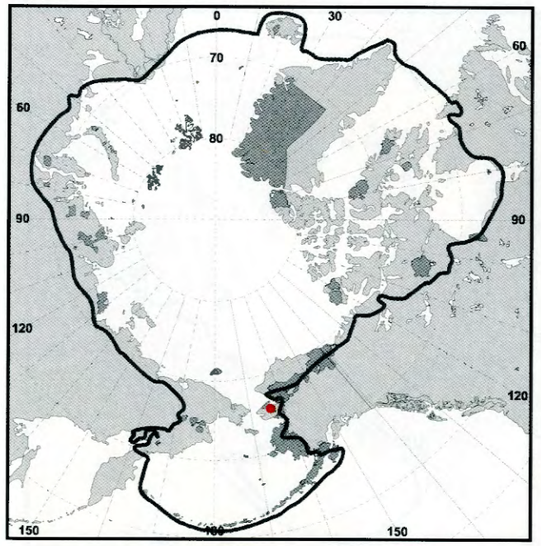
Claytoniella vassilievii (Kuzen.) Jurtz.
subsp. *petrovskyi* Jurtz. & M. Griczuk ined.



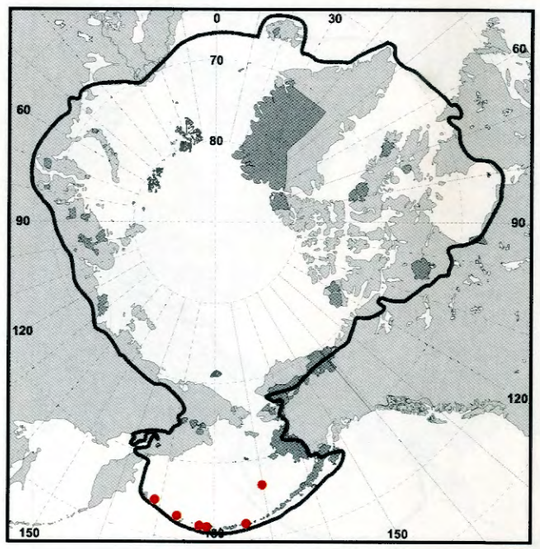
Claytoniella vassilievii (Kuzen.) Jurtz.
subsp. *vassilievii*



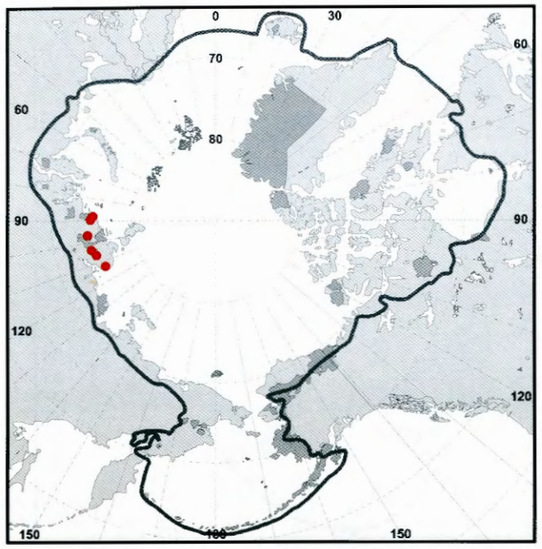
Crepis albescens Kuv. & Demid.



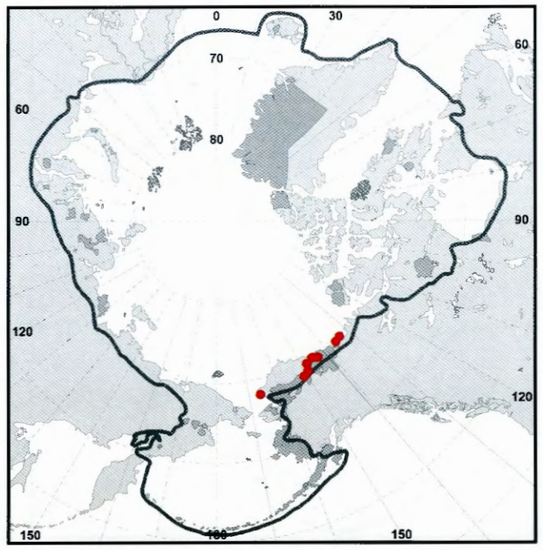
Douglasia beringensis S. Kelso, B.A. Jurtzev,
& D.F. Murray



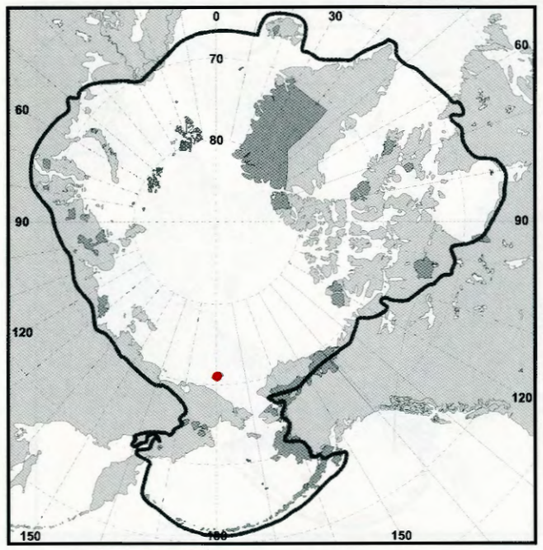
Draba aleutica Ekman ex Hultén



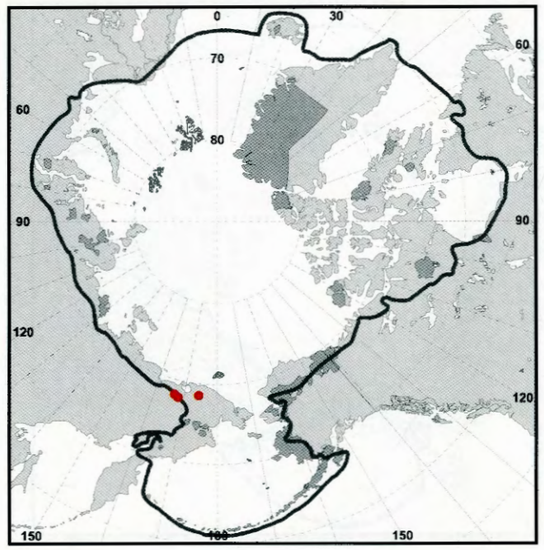
Draba taimyrensis Tolm.



Erigeron muirii Gray



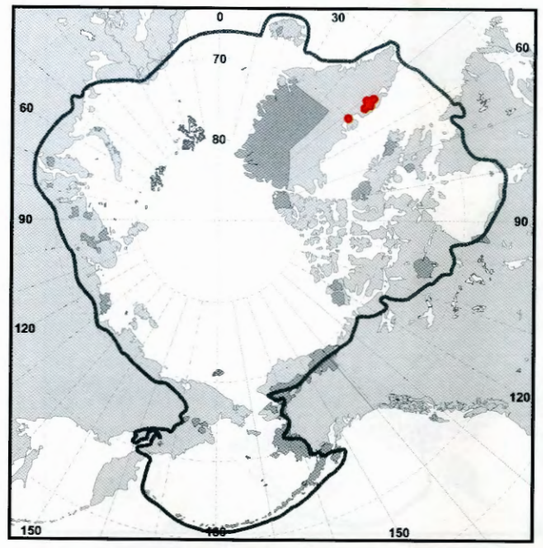
Gastrolychnis triflora (R. Br.) Tolm. & Kozhancz.
subsp. *wrangelica* Jurtz.



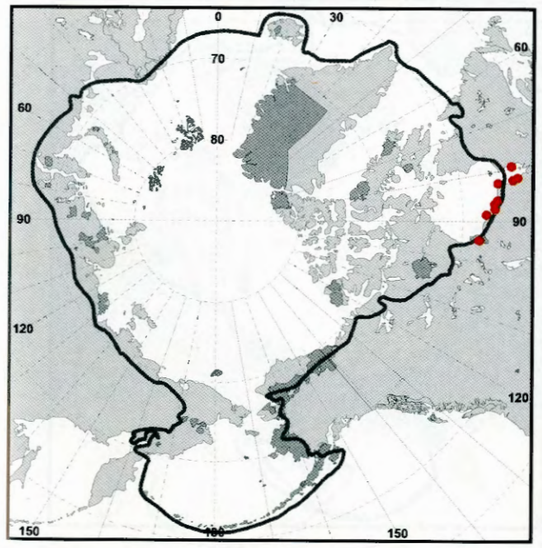
Hedinia czukotica (Botsch. & Petrovsky) Jurtz.,
Korobk., & Baland.



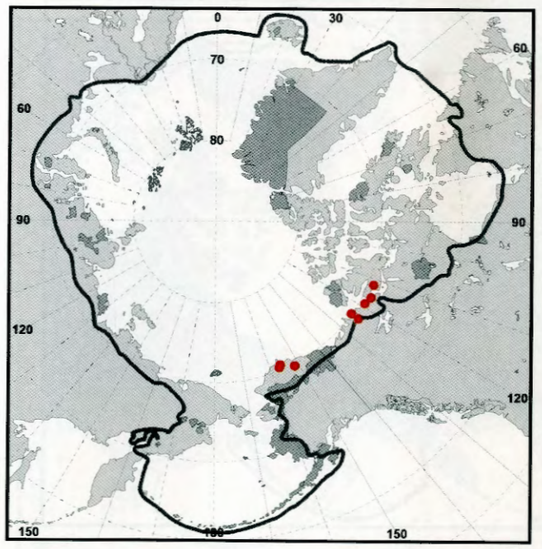
Hierochloë wrangelica Jurtz. & Probat.



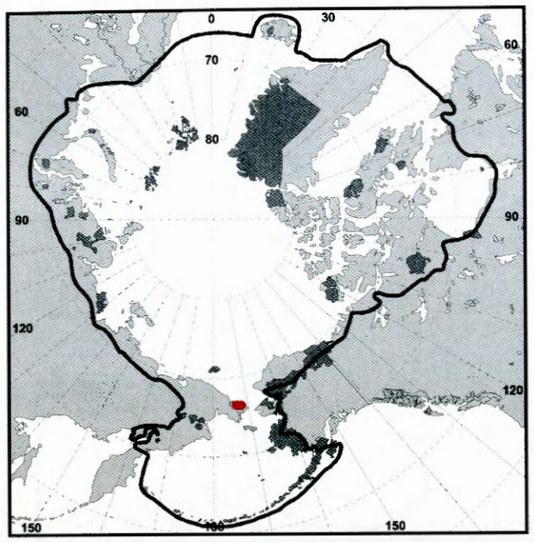
XLedodendron vanhoeffeni (Abromeit) Dalgaard
& Fredskild



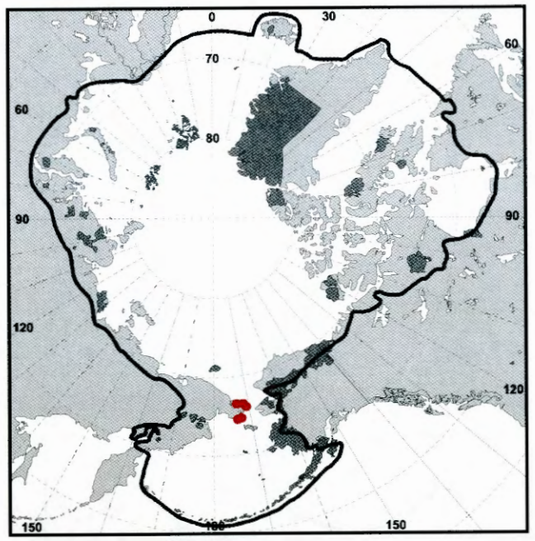
Linum lewisii Pursh
subsp. *lepagei* (Boivin) Mosquin



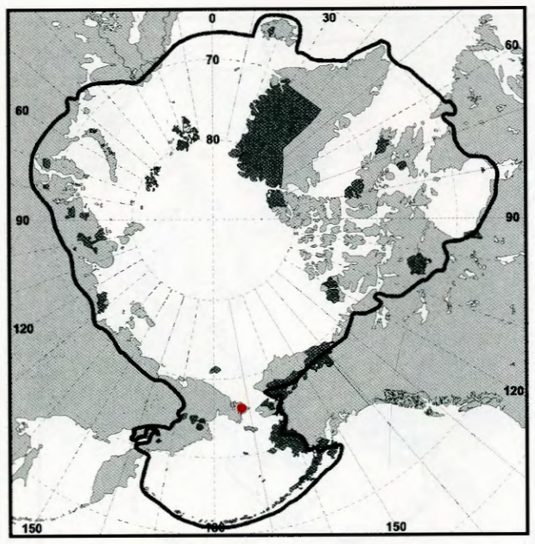
Mertensia drummondii (Lehm.) D. Don



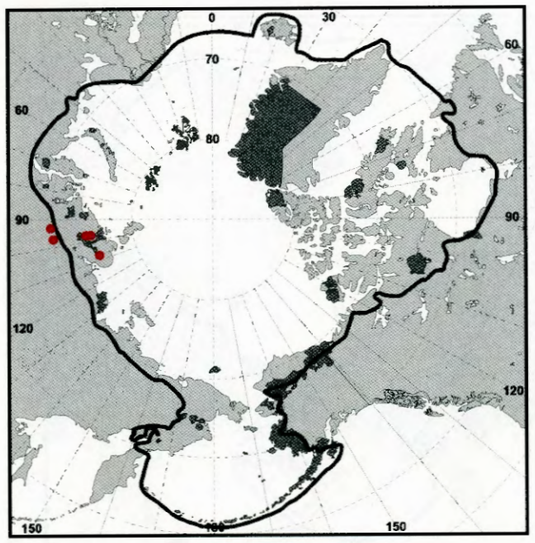
Oxytropis beringensis Jurtz.



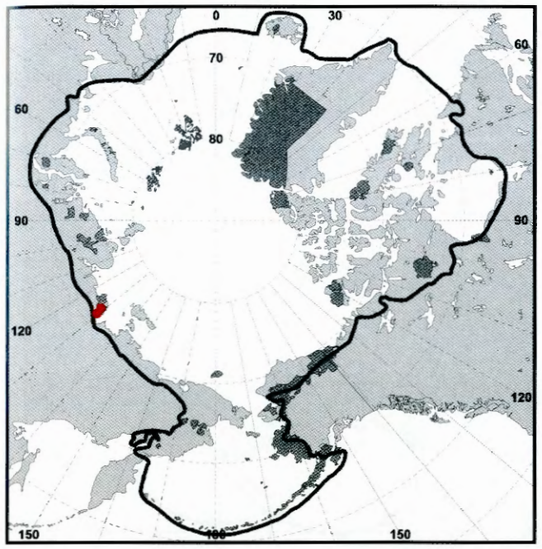
Oxytropis deflexa (Pall.) DC.
subsp. *dezhnevii* (Jurtz.) Jurtz.



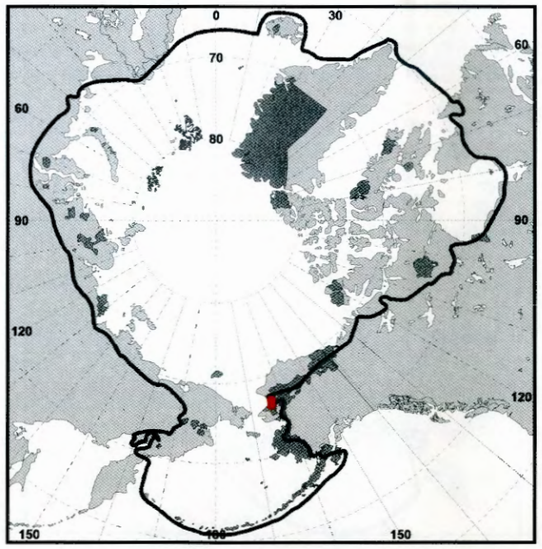
Oxytropis kateninii Jurtz.



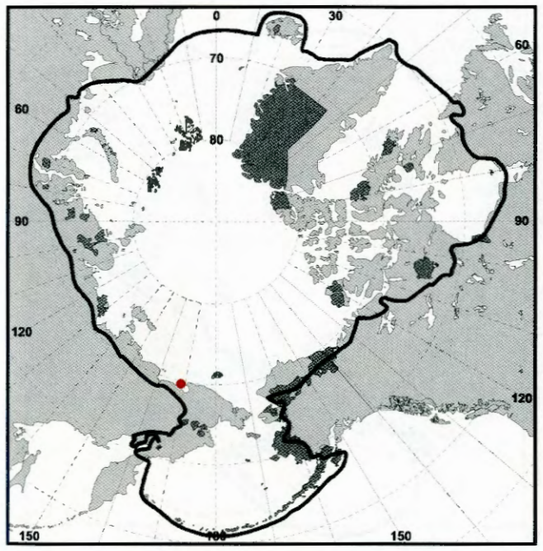
Oxytropis putoranica M. Ivanova



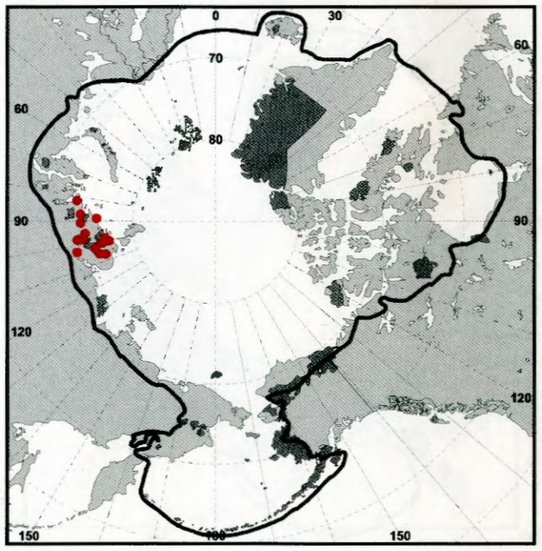
Oxytropis sordida (Willd.) Pers.
subsp. *arctolenensis* Jurtz.



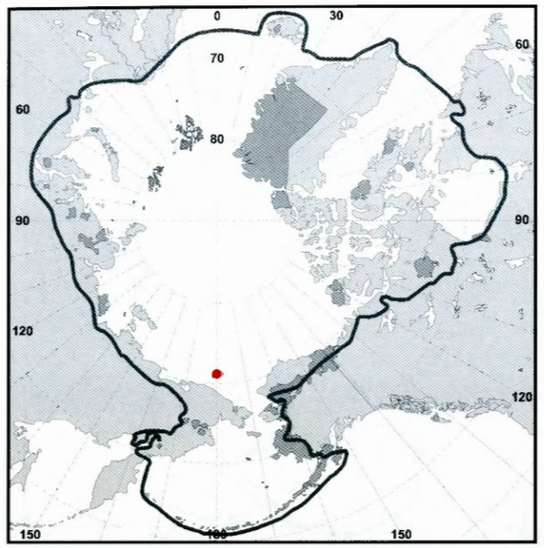
Oxytropis sordida (Willd.) Pers.
subsp. *barnebyana* (Welsh) Jurtz.



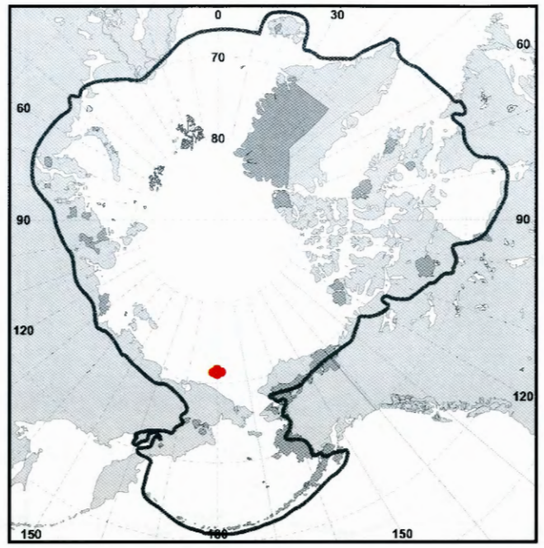
Oxytropis sverdrupii Lynge



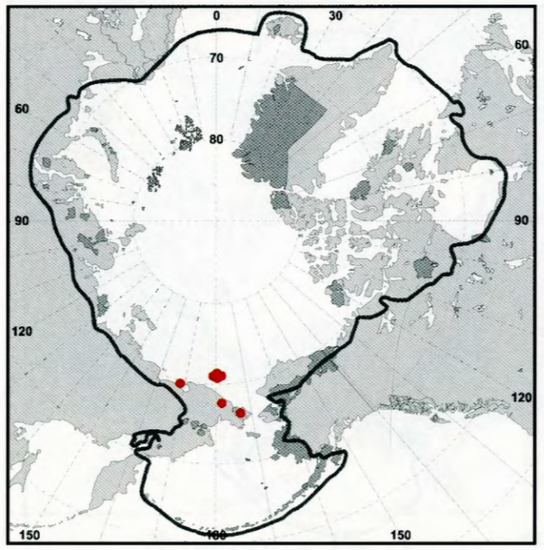
Oxytropis tichomirovii Jurtz.



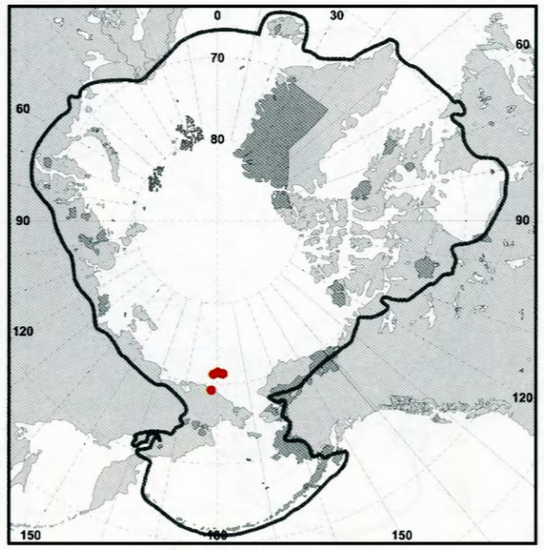
Oxytropis uniflora Jurtz.



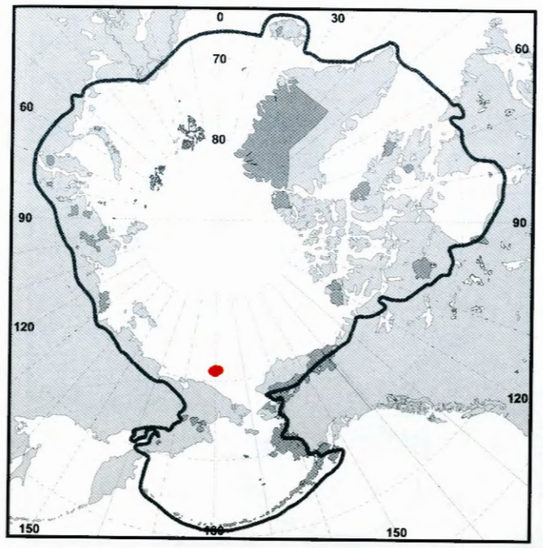
Oxytropis uschakovii Jurtz.



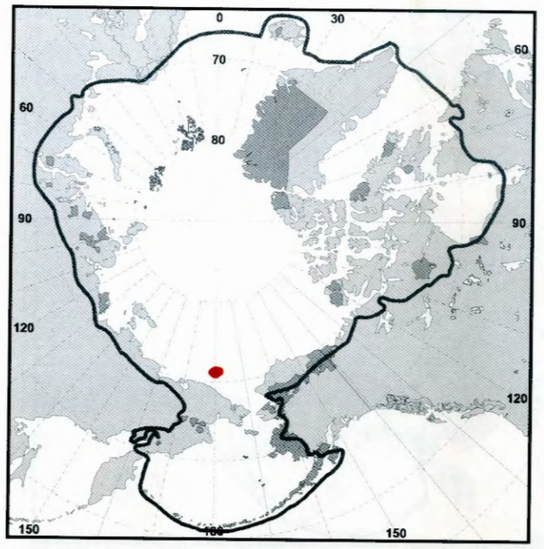
Oxytropis wrangelii Jurtz.



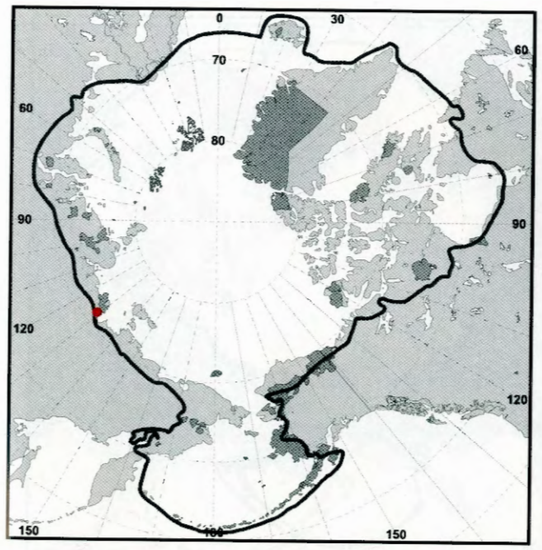
Papaver atrovirens Petrovsky



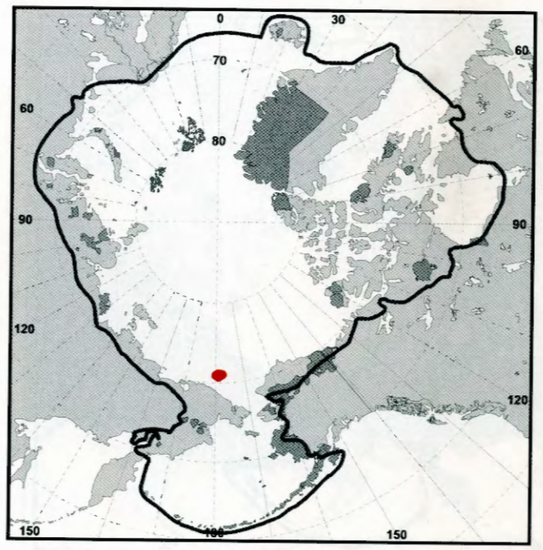
Papaver calcareum Petrovsky



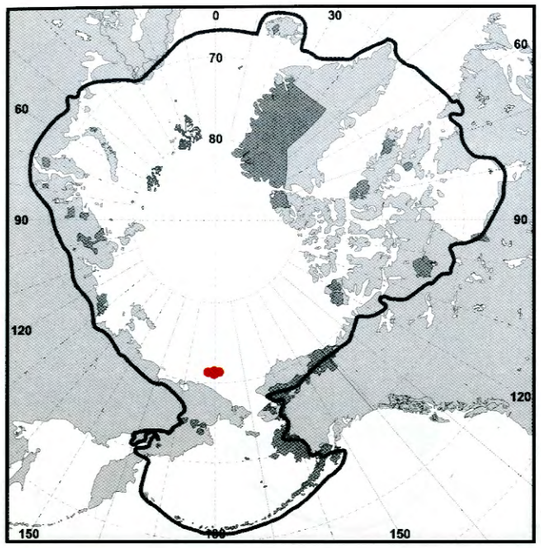
Papaver chionophilum Petrovsky



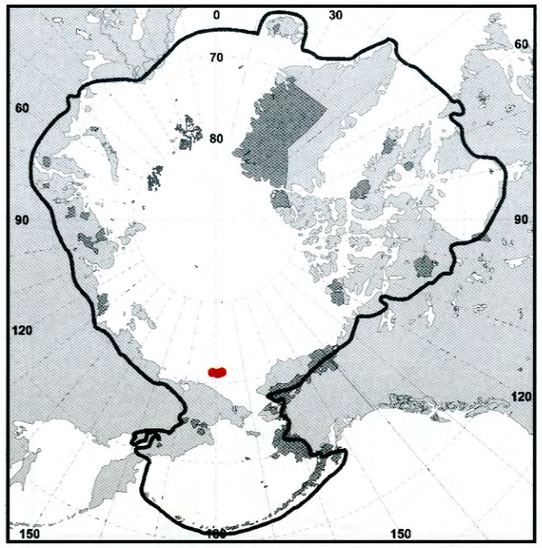
Papaver leucotrichum Tolm.



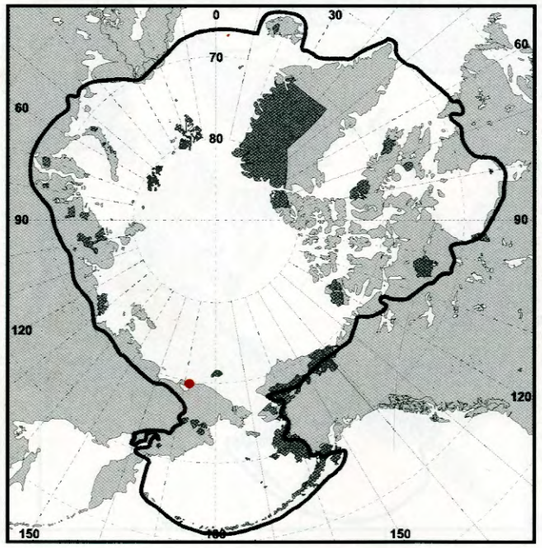
Papaver multiradiatum Petrovsky



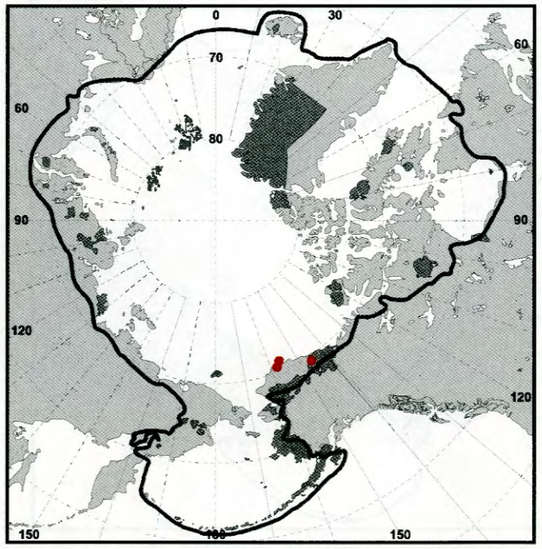
Papaver nudicaule L.
subsp. *insulare* Petrovsky



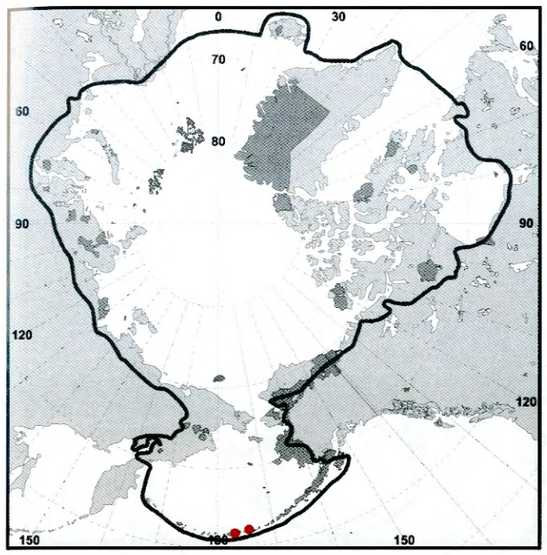
Papaver uschakovii Tolm. & Petrovsky



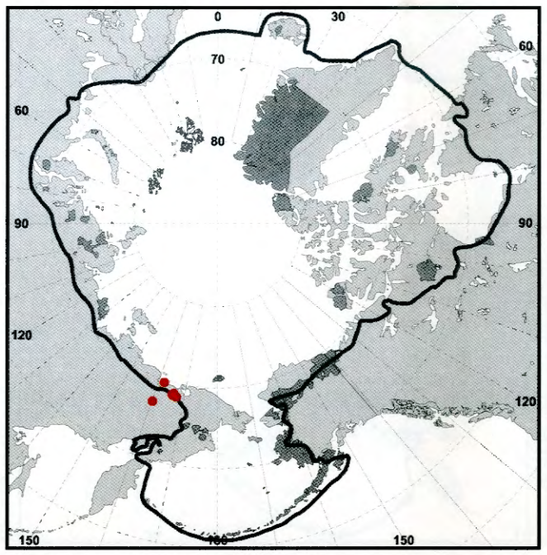
Plantago canescens Adams
subsp. *jurtzevii* Tzvel.



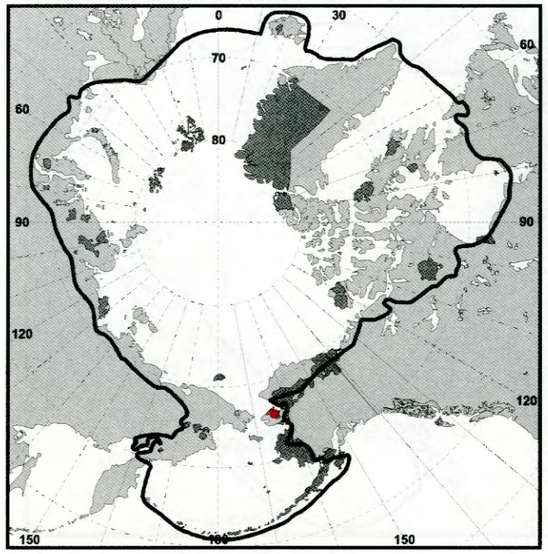
Poa hartzii R. Br.
subsp. *alaskana* R.J. Soreng



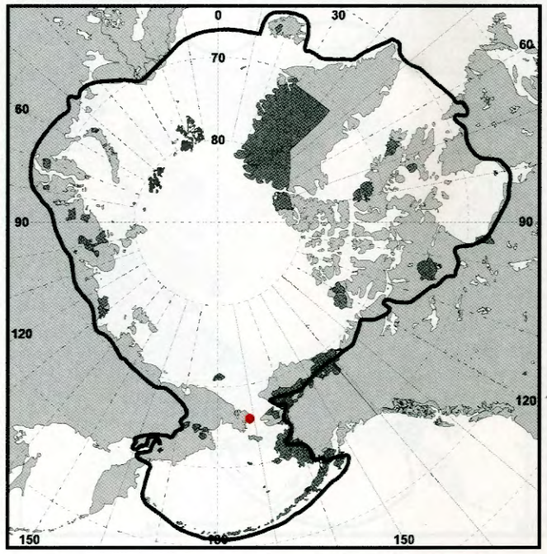
Polystichum aleuticum C. Christensen



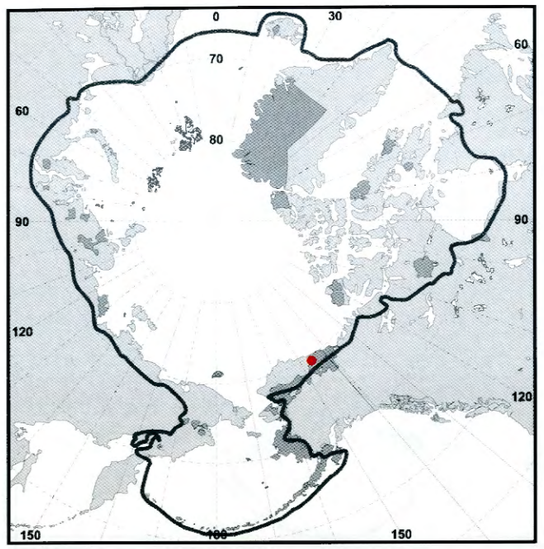
Potentilla anjuica Petrovsky



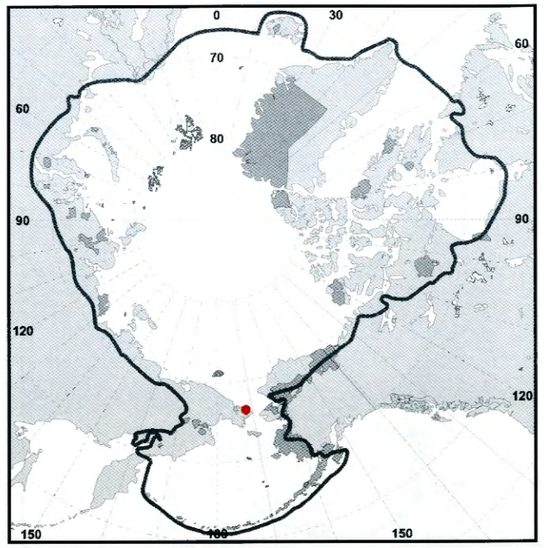
Potentilla Xarctoalaskensis Jurtz.



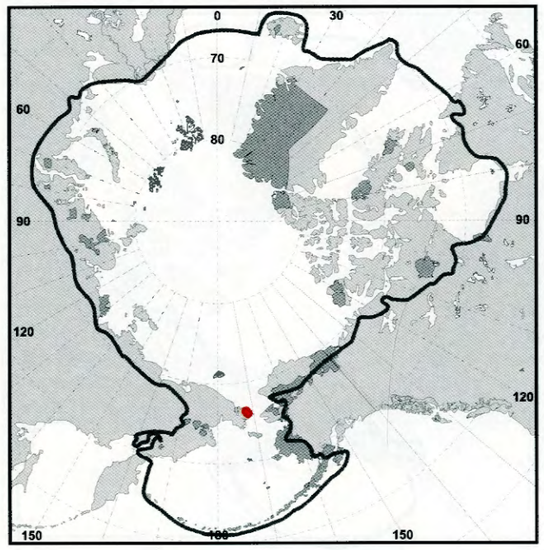
Potentilla beringensis Jurtz.



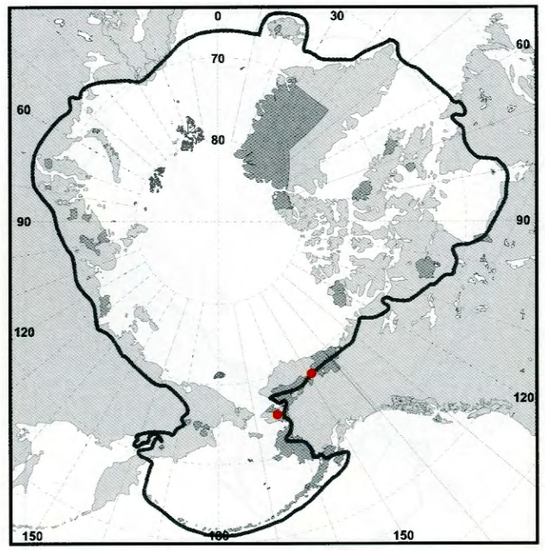
Potentilla brooksensis Jurtz.



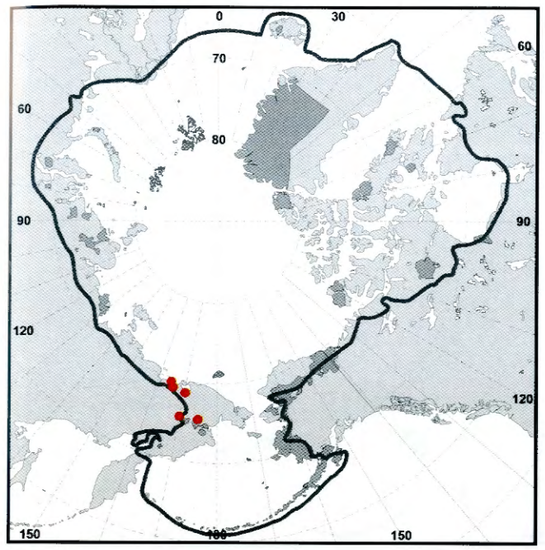
Potentilla czegitunica Jurtz.



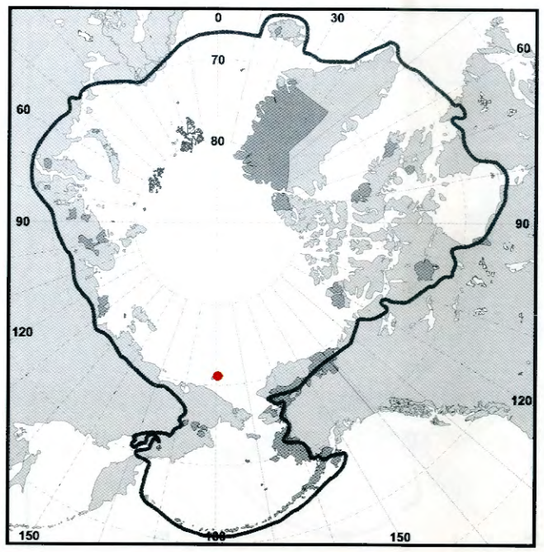
Potentilla dezhnevii Jurtz.



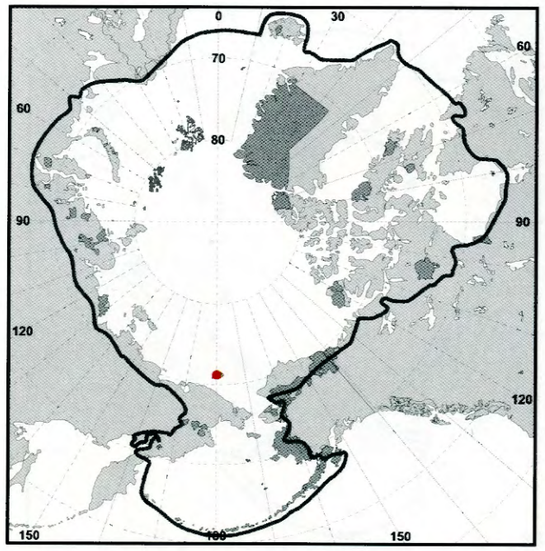
Potentilla murrayi Jurtz.



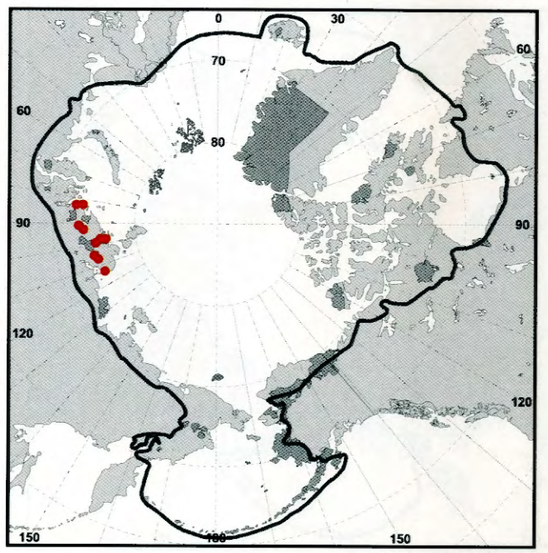
Potentilla tschaunensis Juz. ex Jurtz.



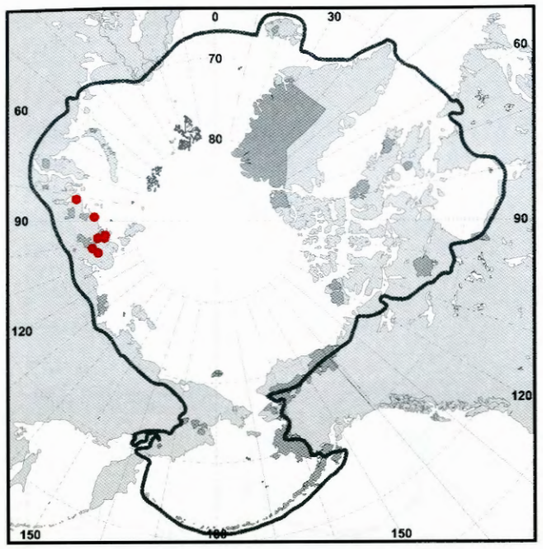
Potentilla uschakovii Jurtz.



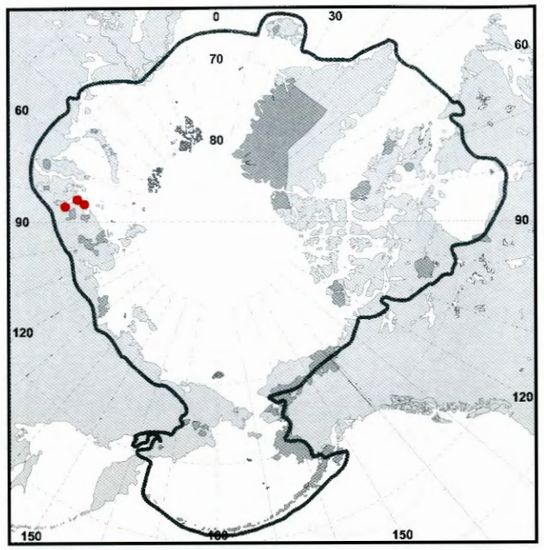
Potentilla wrangelii Petrovsky



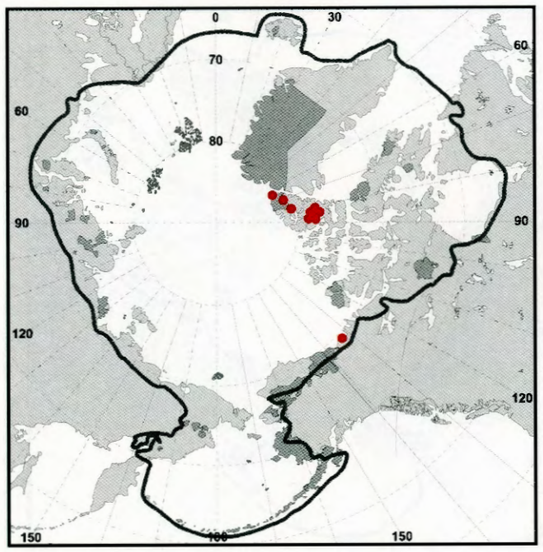
Puccinellia byrrangensis Tzvel.



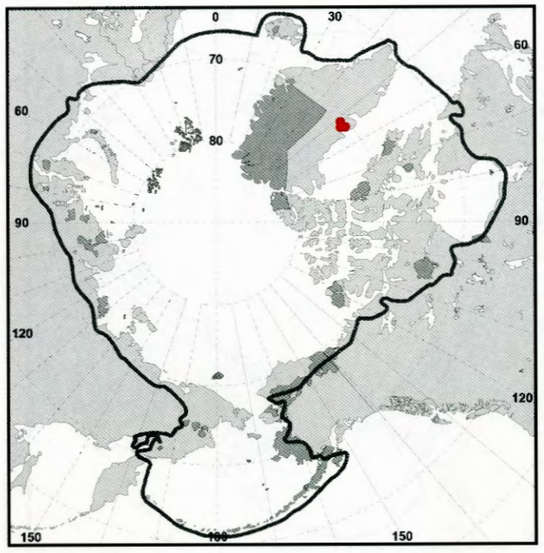
Puccinellia gorodkovii Tzvel.



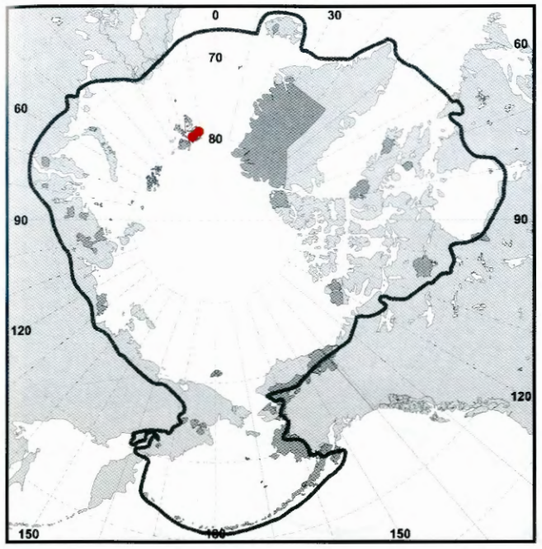
Puccinellia jenissejensis (Roshev.) Tzvel.



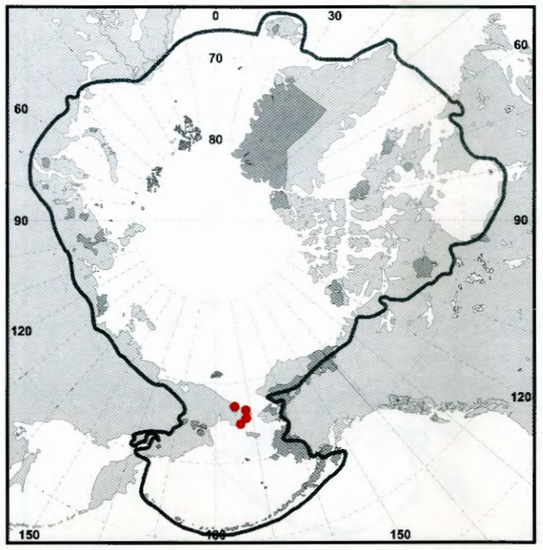
Puccinellia poacea Th. Sor.



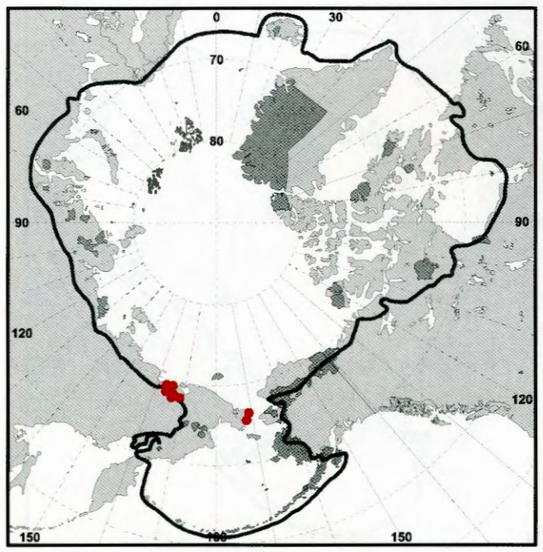
Puccinellia rosenkrantzii Th. Sor.



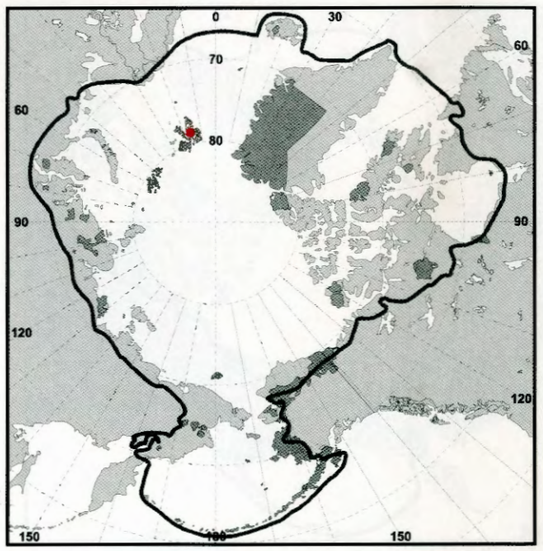
Puccinellia svalbardensis Ronning



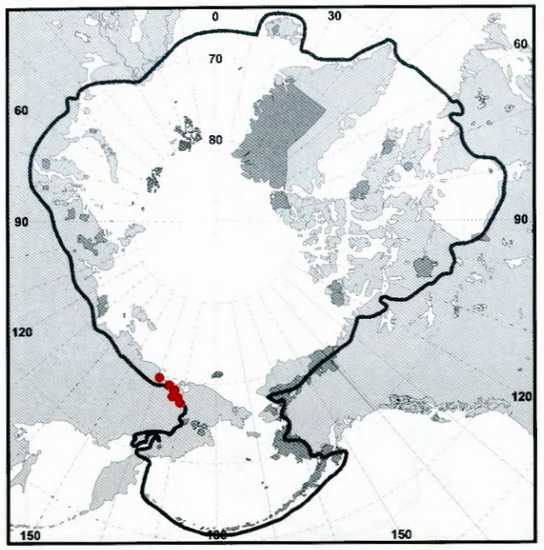
Pucciphippsia czukczorum Tzvel.



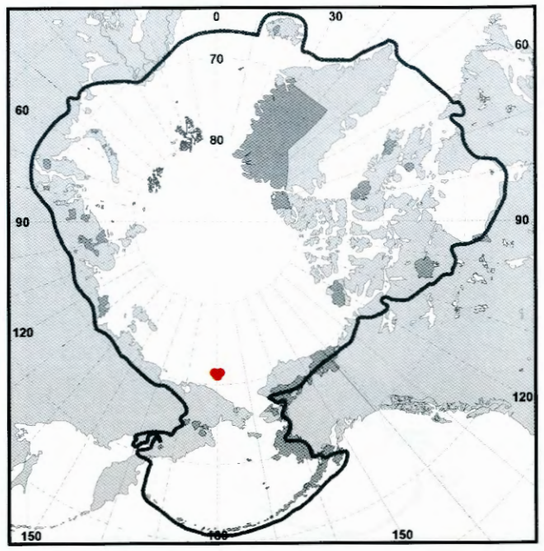
Ranunculus punctatus Jurtz.



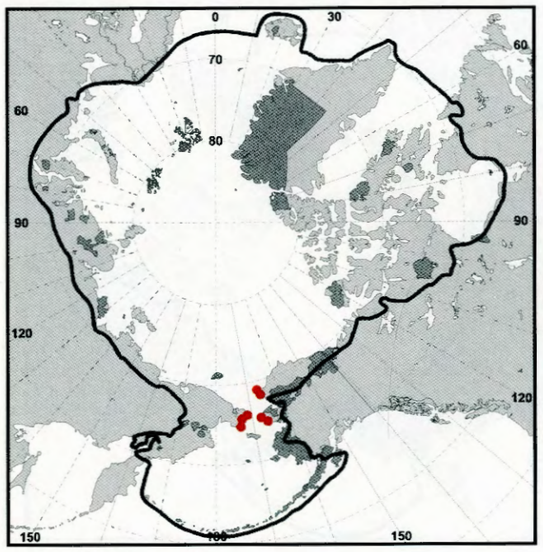
Ranunculus vilanderi (Nath.) Á. Löve & D. Löve



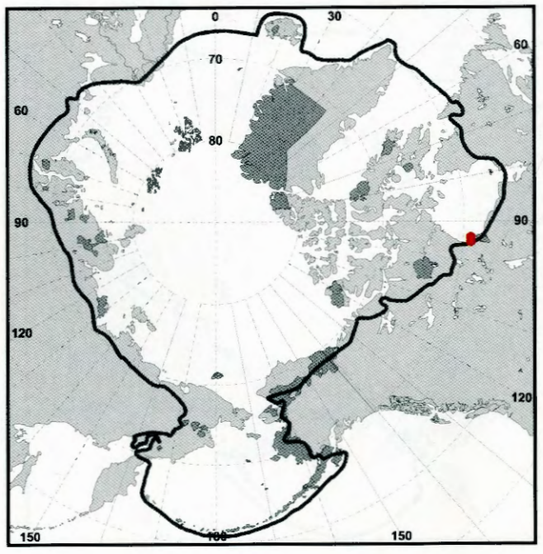
Roegneria nepliana V. Vassil.



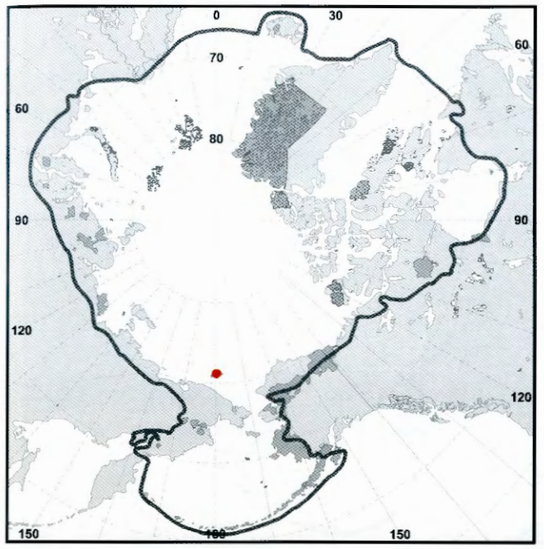
Roegneria villosa V. Vassil.
subsp. *coerulea* Jurtz.



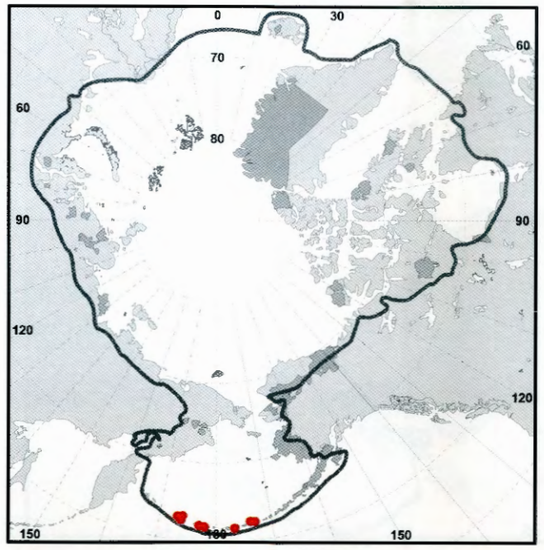
Rumex krausei Jurtz. & Petrovsky



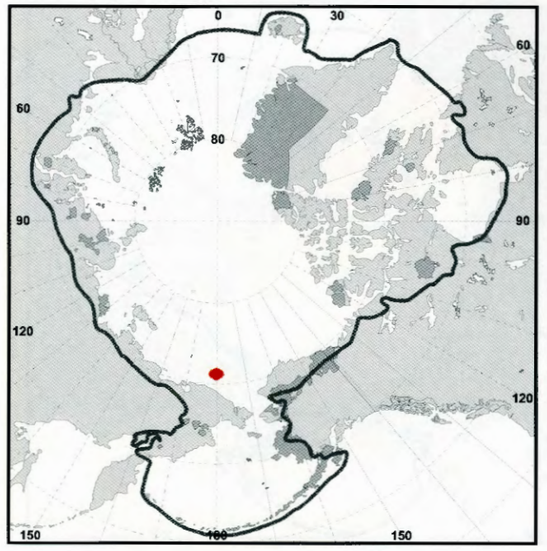
Salicornia borealis Wolff & Jeffries



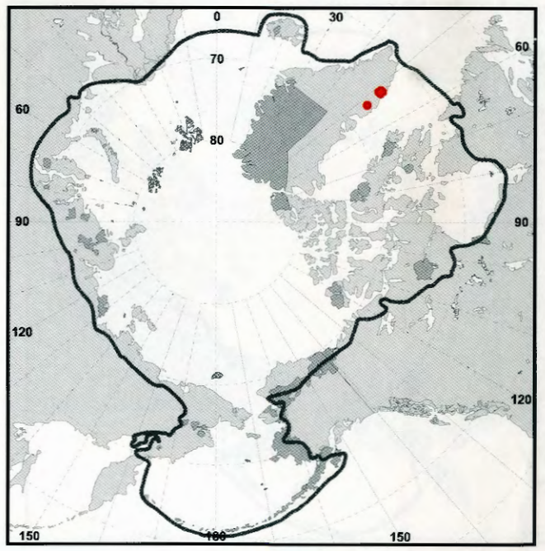
Salix stolonifera Cov.
subsp. *carbonicola* Petrovsky



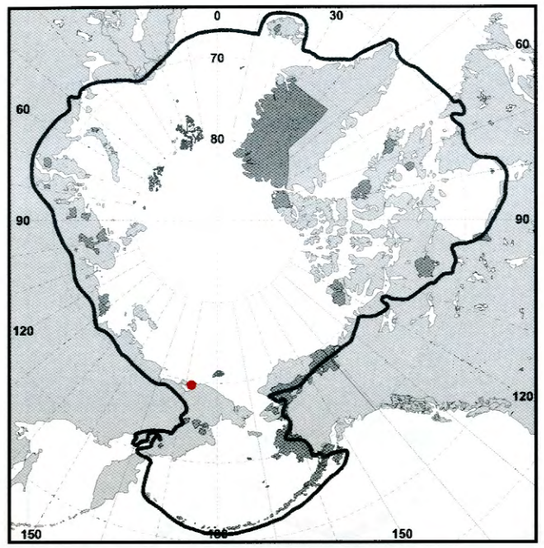
Saxifraga aleutica Hultén



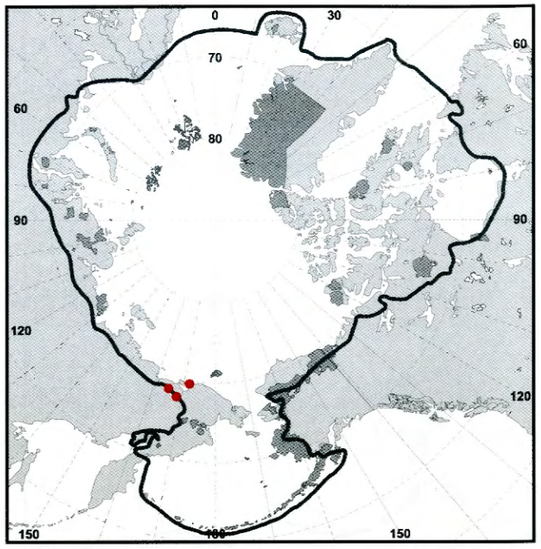
Senecio hyperborealis Greenm.
subsp. *wrangelica* Jurtz., Korobk., & Petrovsky



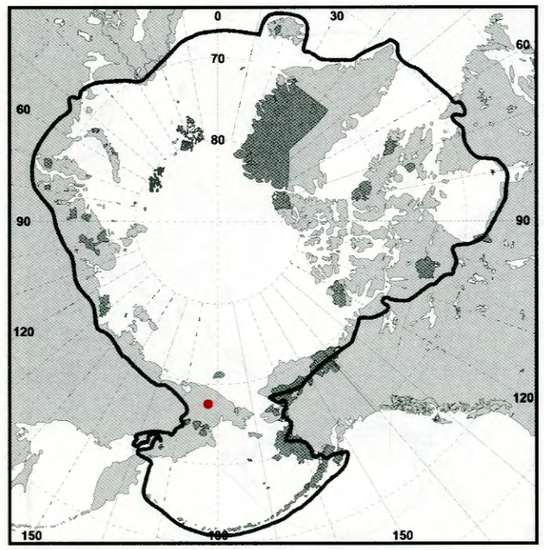
Sisyrinchium groenlandicum Boech.



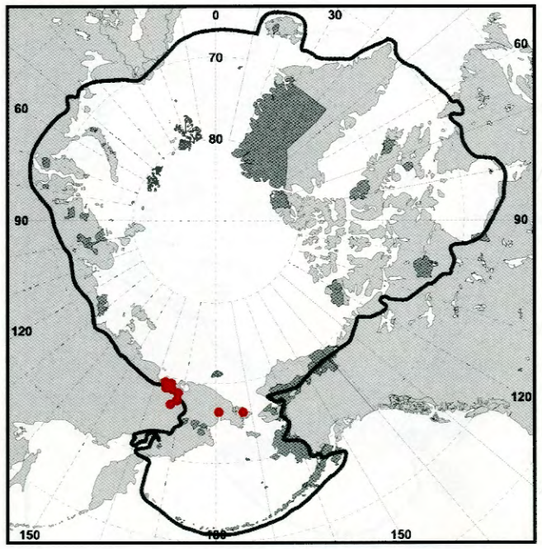
Suaeda arctica Jurtz. & Petrovsky



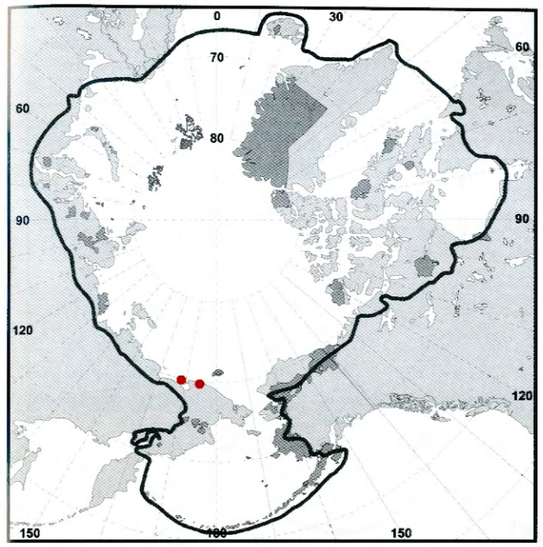
Taraxacum czaunense Jurtz. & Tzvel.



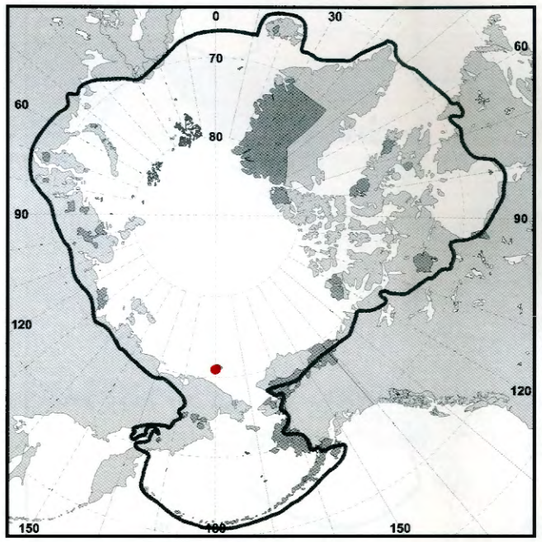
Taraxacum czukoticum Jurtz.



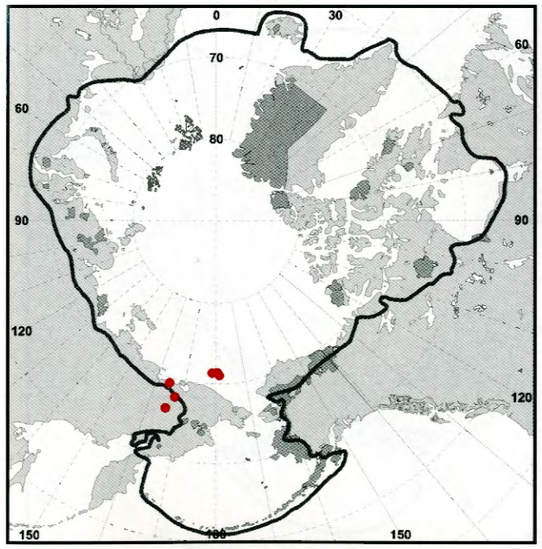
Taraxacum jurtzevii Tzvel.



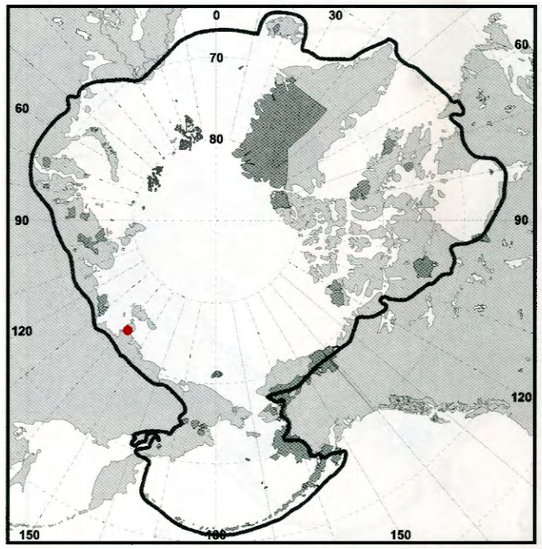
Taraxacum leucocarpum Jurtz. & Tzvel.



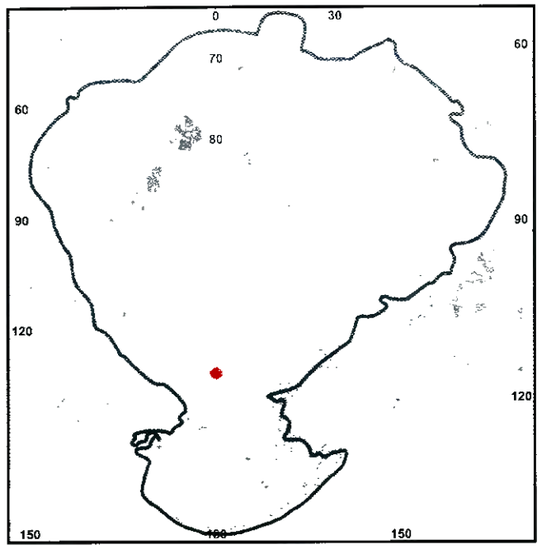
Taraxacum nanaunii Jurtz.



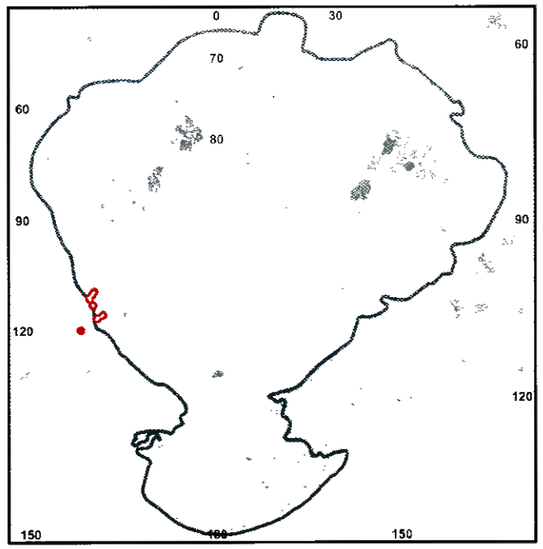
Taraxacum petrovskyi Tzvel.
var. *petrovskyi* Tzvel.



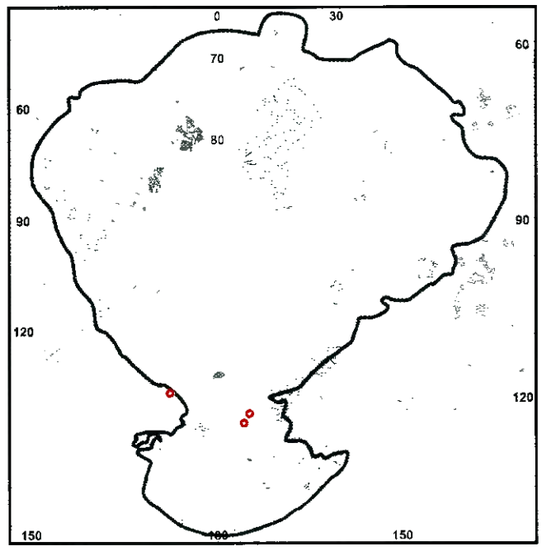
Taraxacum petrovskyi Tzvel.
var. *safronovae* Tzvel.



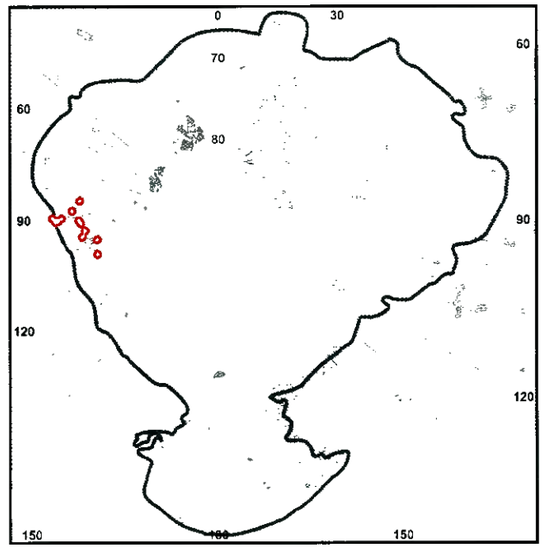
Taraxacum pseudoplatylepium Jurtz.



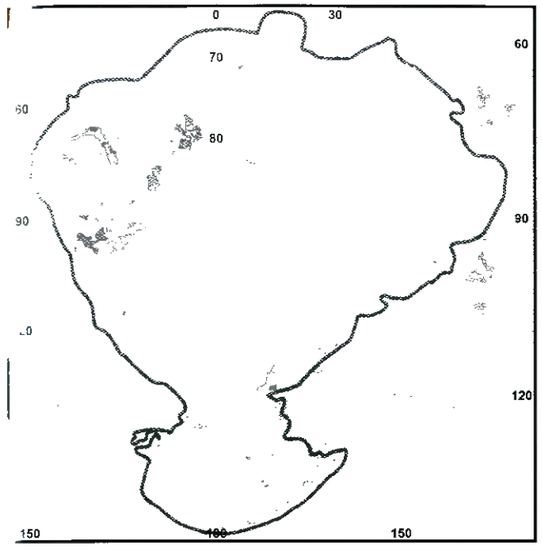
Taraxacum semitubulosum Jurtz.



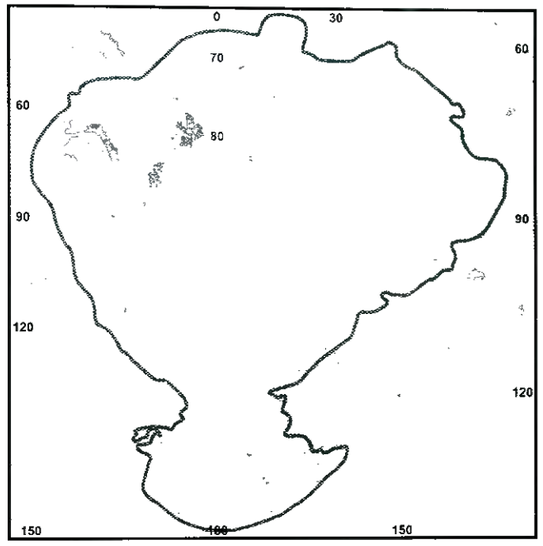
Taraxacum senjavinense Jurtz. & Tzvel.



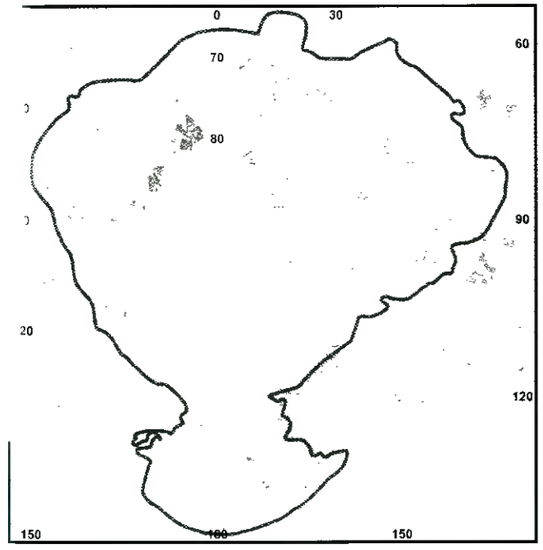
Taraxacum taimyrense Tzvel.



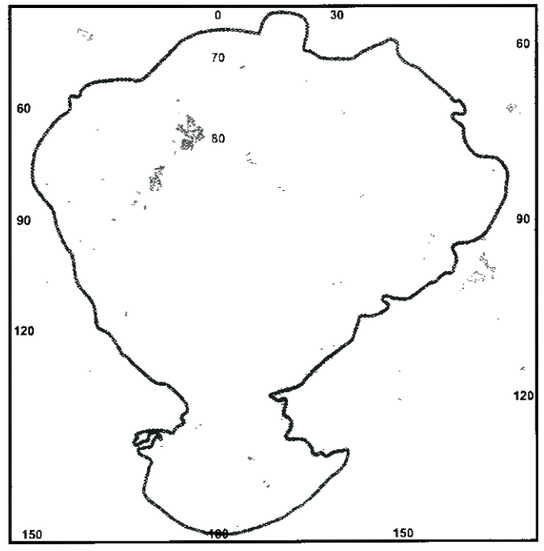
Taraxacum tolmaczevii Jurtz.



Taraxacum uschakovii Jurtz.



Taraxacum wrangelicum Tzvel.



Trisetum wrangelense (Petrovsky) Probat.

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13. ABSTRACT (Maximum 200 words)

The vascular flora of the Arctic was surveyed by specialists from eight Arctic countries to: (1) identify rare taxa endemic to the region; (2) establish an annotated list of these taxa; and (3) determine the level of protection currently afforded these plants. "Arctic" is defined as those lands beyond latitudinal tree line. Ninety-six rare endemic taxa were identified. Information compiled for each included taxonomy, geographic distribution, habitat preferences, biological characteristics, estimates of endangerment, and citations of supporting literature. Gap analysis determined the relation of rare taxa to areas of protected habitats. Taxa were grouped into three categories: (1) unprotected (no occurrences are within protected areas); (2) partially protected (some occurrences are within protected areas); and (3) protected (all occurrences are within protected areas). Results indicate that 47% of the rare endemics are unprotected, 23% partially protected, and 30% protected. According to IUCN Red List threat categories, 19% of the taxa are *vulnerable*, 29% *near threatened lower risk*, 26% *least concern lower risk*, 1% *endangered*, and 24% *data deficient*. The majority of rare endemic taxa, 61%, occur outside IUCN protected areas (categories I-V); 25% occur within strict nature/scientific reserves (IUCN category I); 12% in managed nature reserves/wildlife sanctuaries (IUCN category IV); and 1.6% in national parks (IUCN category II).

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