Structure of this book

This book is part of the international project "Mapping Asia Plants" (MAP), which will publish a series of books on the diversity of vascular plants on the Asian continent (Ma, 2017). This book is among the first set of publications. According to our incomplete statistics, there are at least 300 books devoted to the flora of different regions of North Asia. However, more than 95% of these texts are in Russian, due to language barriers, they are difficult to widely be used by the international scientific community. With the beginning of the Big Data Era and the China's 'Belt and Road' Initiative, cooperative scientific research between countries shows promising perspectives and highlights of the importance of breaking national boundaries to share research from previous generations. Integrating North Asian plant diversity data into the broader Asian or Eurasian body of knowledge is critical for exploring the origins and evolution of vascular plants, as well as for conserving plant diversity and ensuring the sustainable use of natural resources. In this book, we attempted to compile an integrated checklist of vascular plants of North Asia. We follow the administrative division of the Asian part of Russia presented by 27 first-level regions: 12 oblasts (provinces), 6 krais (territories), 5 republics, 3 autonomous okrugs (autonomous districts), and 1 autonomous oblast (Table 1).

Table 1 Area and number of vascular plant species in political (administrative) divisions of North Asia (i.e., Asian part of Russia)

No.	Region	Number of species/subspecies	References
1	Kamchatka Krai	>1,166	Yakubov & Chernyagina, 2004
2	Chukotka Autonomous Okrug	1,004	Yurtsev et al., 2010
3	Magadan Oblast	1,457	Berkutenko, 2010
4	Khabarovsk Krai	>2,516	Schlotgauer et al., 2001
5	Sakhalin Oblast	>1,525	Barkalov & Taran, 2004; Barkalov, 2009
6	Primorsky Krai	2,748	Kozhevnikov & Kozhevnikova, 2014
7	Jewish Autonomous Oblast	1,443	Rubtsova, 2002, 2017
8	Amur Oblast	2,024	Starchenko, 2008
9	Republic of Sakha (Yakutia)	1,984	Cherosov, 2012; Nikolin, 2013
10	Zabaykalsky Krai	~1,847	Flora of Baikal Siberia (http://www.flora.baikal.ru/) Anenkhonov, 2001
11	Republic of Buryatia	2,161	Flora of Baikal Siberia (http://www.flora.baikal.ru/)
12	Irkutsk Oblast	2,295	Malyshev, 2008
13	Krasnoyarsk Krai	>2,064	Malyshev et al., 1987–2003
14	Republic of Tuva	2,066	Shaulo, 2007
15	Republic of Khakassia	~1,537	Malyshev et al., 1987–2003
16	Altai Republic	2,136	Krasnoborov & Artemov, 2012

Continued

No.	Region	Number of species/subspecies	References
17	Altai Krai	2,264	Silantyeva, 2013
18	Kemerovo Oblast	1,585	Krasnoborov, 2001
19	Novosibirskaya Oblast	1,333	Krasnoborov, 2000
20	Tomsk Oblast	1,170	Revushkin, 2014
21	Omsk Oblast	>1,008	Bekisheva, 1999
22	Yamalo-Nenets Autonomous Okrug	>609	Malyshev et al., 1987–2003; Rebristaya, 2013
23	Khanty-Mansijsk Autonomous Okrug–Yugra	~1,200	Krasnoborov, 2006
24	Tyumen Oblast	1,430	Glazunov et al., 2017
25	Sverdlovsk Oblast	~1,612	Gorchakovskii, 1994; Knyazev et al., 2016, 2017, 2018
26	Kurgan Oblast	>979	Naumenko, 2008
27	Chelyabinsk Oblast	2,130	Kulikov, 2010

Most of 27 administrative regions have their own updated floras or checklists compiled according to the nomenclature of *Flora of Siberia* (Malyshev et al., 1987–2003) or *Vascular Plants of Soviet Far East* (Charkevicz, 1985–1996; Kozhevnikov & Probatova, 2006). For regions such as Krasnoyarsk Krai, Republic of Khakassia, and Kurgan Oblast, the updated floristic checklists still need to be compiled. For Omsk Oblast, we know only the list of species from the manuscript of the Ph.D. thesis by Bekisheva (1999). The annotated checklist for Sverdlovsk Oblast has been prepared and published in parts by M. S. Knyazev (Князев) and his colleagues. The first three parts of "An annotated check list of the flora of Sverdlovsk Region" (Knyazev et al., 2016, 2017, 2018) were printed in early 2019 and were taken into account here. Data on taxonomic groups missing in Knyazev et al. checklist were borrowed from the *Manual-key of Vascular Plants of the Middle Ural* (Gorchakovskii, 1994).

We have collected floristic data from sources listed in Table 1 (Xue et al., 2020). To harmonize taxonomy and nomenclature applied in different data sources, we followed the taxonomy of the 2019 Annual Checklist of the Catalogue of Life (http://www.catalogueoflife.org/annual-checklist/2019/). The name spellings and authors were accepted from the Catalogue of Life as well. Few names missing in this global index of species were nevertheless included in the checklist (not highlighted through the text). Few nomenclatural combinations suggested in the Catalogue of Life are validated through the text. The complete list of new combinations can be found at the end of this book. In this book, the classifications were based on PPG I (PPG I, 2016) for lycophytes and ferns, Christenhusz et al. (2011) for Gymnosperms, and APG IV (Chase et al., 2016) for Angiosperms. The family, genus, Latin name, important synonym and distributed regions in Asian Russia were recorded for each vascular species. There are a total of 2389 accepted species (including subspecies and variants) in this checklist by selected synonyms. These synonyms were taken mostly from names accepted in data sources covered by our compilation. Nomenclatural information on accepted taxa is followed by their distribution within Northern Asia, presented as a list of administrative regions of Asian Russia. In order to reduce the book volume, the names of regions are coded according to their numbers in Table 1. In addition to the native species, we have included in the book 545 species that

are alien to Northern Asia (marked with "*" after the species name) and 68 species that are known only from cultivation (marked with "#").

In total, 162 families, 1151 genera, 6459 species, 487 subspecies, 176 varieties, and 2 forms are listed in the checklist.

We statistically analyzed all of the data related to vascular plant species, subspecies, and varieties (a total of 7122 taxa) included in this book. The results indicated that the top three ranking families were Asteraceae with 1042 taxa (14.63%), Poaceae with 563 taxa (7.91%), and Fabaceae with 469 taxa (6.59%), while the top ten ranking families' taxa comprised 58.10% of the total (Figure 1). The results indicated that the top three ranking genera were *Carex* (Cyperaceae) with 307 taxa (4.31%), *Oxytropis* (Fabaceae) with 169 taxa (2.37%) and *Taraxacum* (Asteraceae) with 146 taxa (2.05%), while the top ten ranking genera's taxa comprised 18.28% of the total (Figure 2).

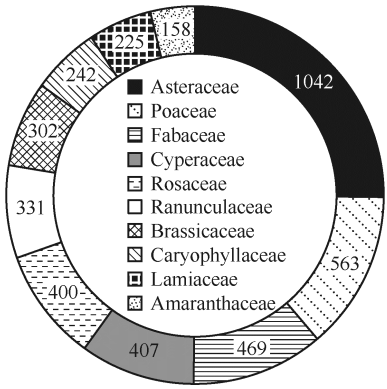

Figure 1 Quantitative statistics for the top ten families of species, subspecies, and varieties in North Asia's vascular plants checklist

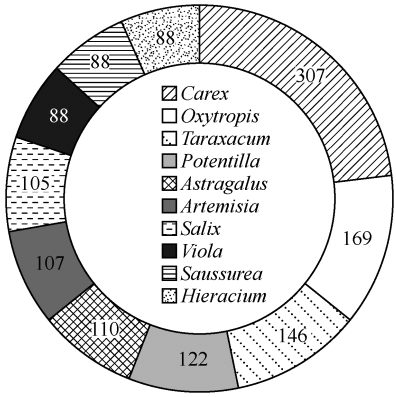

Figure 2 Quantitative statistics for the top ten genera of species, subspecies, and varieties in North Asia's vascular plants checklist

Among North Asia's 27 first-level regions, its vascular plants families, genera, and species (including subspecies and varieties) are unevenly distributed across different areas (Figure 3). This includes the Chukotka Autonomous Okrug in Russia's Far Eastern Federal District with its easternmost point, which has the lowest distribution of families (only 68). The Yamalo-Nenets Autonomous Okrug, located in the Arctic Regions of the Western Siberian Plain, has the lowest distribution of genera and species (including

subspecies and varieties), with 252 and 719 respectively. Primorsky Krai in Russia's Far Eastern Federal District has the highest distribution of families, genera, and species (a total of 144 families, 799 genera, 2364 species, and 180 subspecies and varieties), while the region with the second-highest distribution is Khabarovsk Krai (a total of 136 families, 710 genera, 2176 species, and 194 subspecies and varieties).

Furthermore, the distribution frequency of species (including subspecies and varieties) also has a certain imbalance. These species (including subspecies and varieties) are narrowly distributed in a single first-level distribution region with a total of 1938 taxa (including 1708 species and 230 subspecies and varieties), occupying 27.21% of the total 7122 taxa (Figure 4). Out of these, the five top-ranking areas were Primorsky Krai (403 taxa), Sakhalin Oblast (370 taxa), Chelyabinsk Oblast (212 taxa), Chukotka Autonomous Okrug (150 taxa) and Altai Krai (107 taxa). The comprehensive results for the preceding analysis indicated that North Asia's areas with diverse vascular plants growth are Primorsky Krai, Khabarovsk Krai, Sakhalin Oblast, Chelyabinsk Oblast, and Altai Krai. The common feature of these areas is that they are adjacent to the ocean or located in mountains with high habitat heterogeneity, and the environmental and climatic conditions are relatively favorable, which is conducive to the survival and evolution of organisms (Petrov & Terekhina, 2017). In contrast, the regions with low diversity are Arctic regions such as Yamalo-Nenets Autonomous Okrug and Chukotka Autonomous Okrug that have harsh environmental conditions. However, Chukotka Autonomous Okrug has a high proportion of eurychoric species (104 taxa) as well as subspecies and varieties (46 taxa) distributed only in this region, comprising 14.88% of its total amount of vascular plants, as it has several endemic polar species. These narrowly distributed plants are mainly vascular plants groups such as *Salix*, *Potentilla*, *Taraxacum* and *Oxytropis*, which have the characteristics of Arctic tundra vegetation (Ogureeva, 1999).

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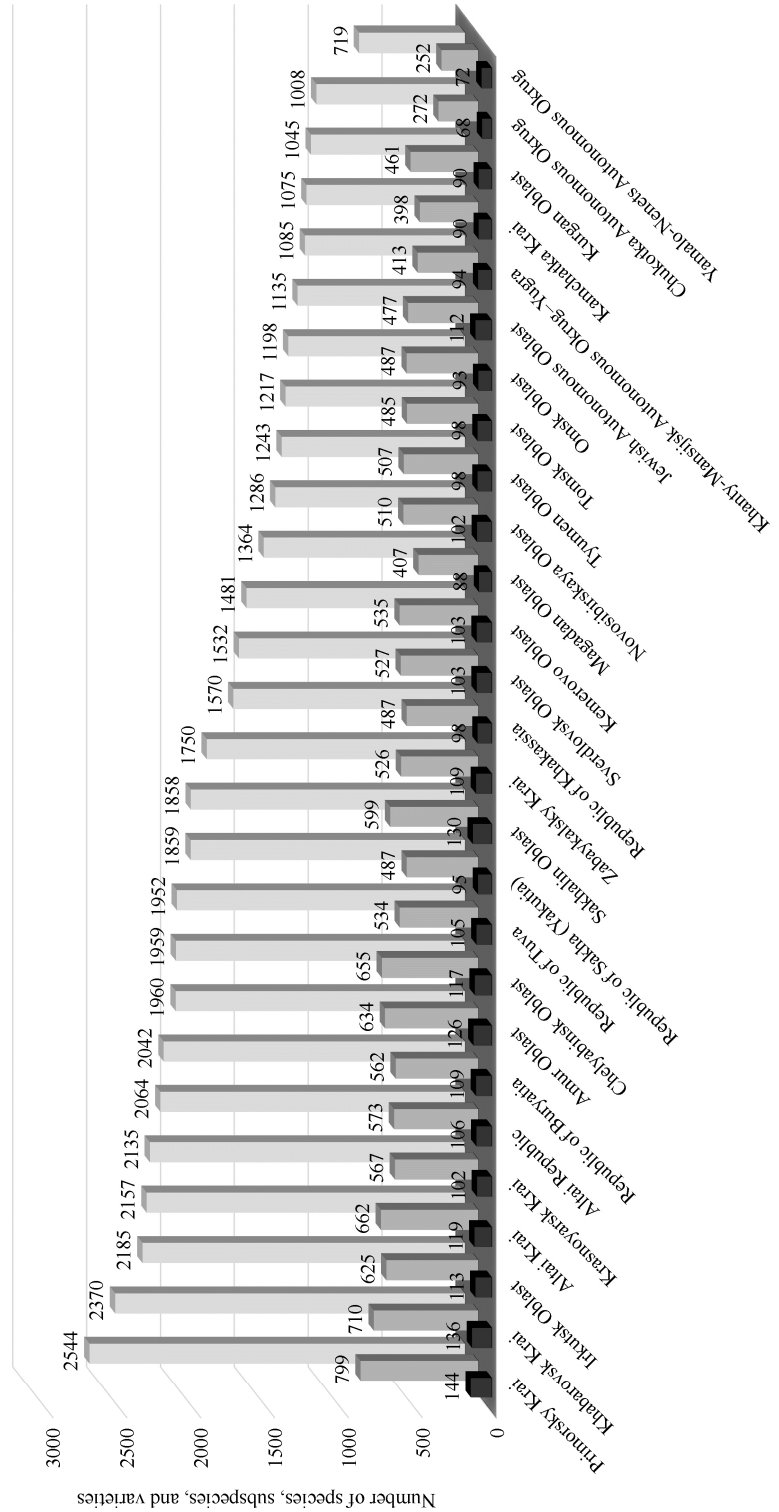

Figure 3 The amount of vascular plants families, genera, and species (including subspecies and varieties) in North Asia's 27 first-level provincial regions

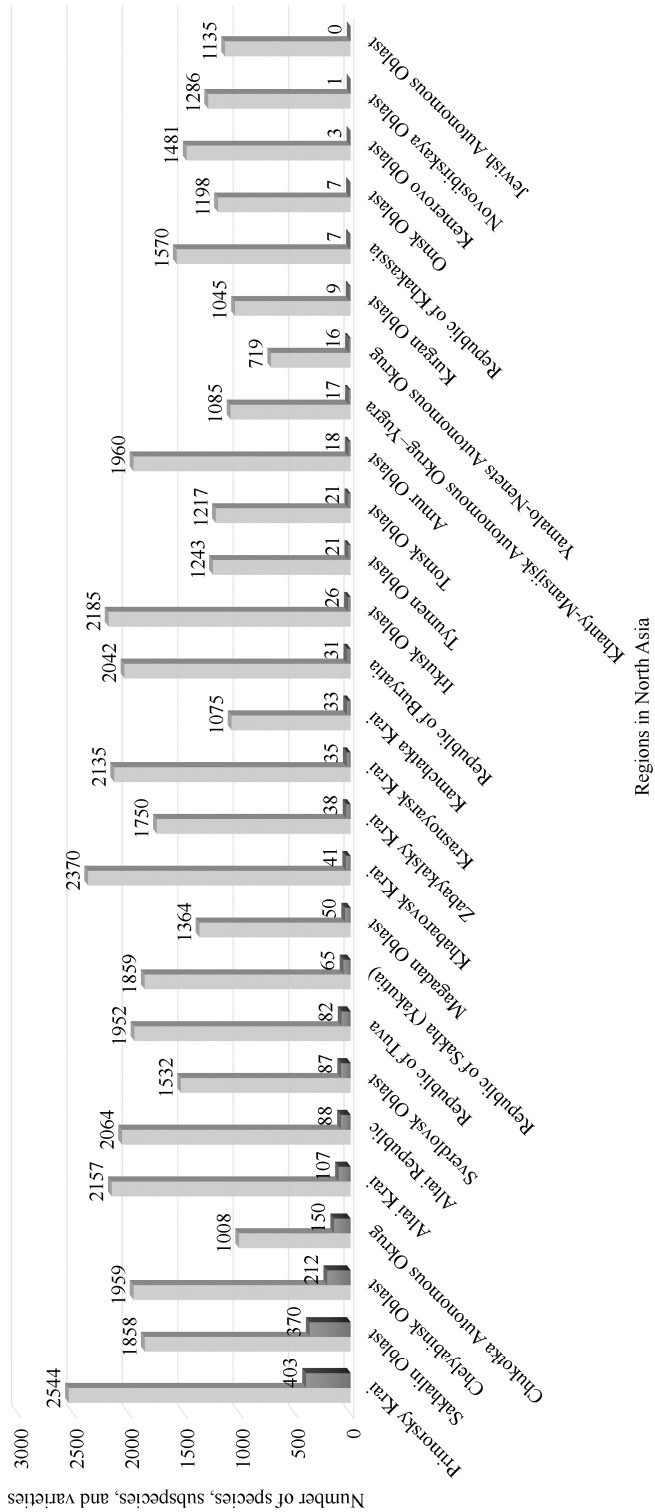

Figure 4 Amount of vascular plant species (including subspecies and varieties) distributed in all and some of North Asia's 27 first-level provincial administrative regions

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This is a reference book for plant science. It is available for researchers in plant taxonomy, conservation of plant diversity and species distribution pattern and so on.

Due to limited time for editing, we might have inadvertently made some omissions in the book. We would appreciate and welcome any comments, suggestions or improvements, and constructive criticism from the readers.

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