Preface

1. An overview of the physical geography of North Asia

North Asia, the Asian part of Russia, is a vast area of over 13 million square kilometers comprising the Ural Federal District, the Siberian Federal District, and the Far Eastern Federal District. Together, North Asia occupies a territory equal to 77% of Russia and nearly 30% of Asia as a whole. North Asia stretches for more than 7000 km from west to the east and nearly 4500 km from north to the south. Most of the territory is located in the Eastern Hemisphere, and only the Chukchi Peninsula is in the Western Hemisphere. The northern and the eastern borders of North Asia are bounded by the seas of the Arctic and Pacific Oceans. Along the southern limit, the region shares borders with Kazakhstan, Mongolia, China, and D. P. R. Korea. To the west, the boundary runs predominantly along the middle of the Ural Mountains separating the European and Asian parts of the Russian Federation.

The topography of North Asia is complex and predominantly mountainous. A transcontinental mountain chain extends from the south-west to the north-east across the entire region, connecting the mountains of Central Asia with Beringia. Within North Asia, this mountain chain includes the Altai and Sayan ranges, the Stanovoy Range, and the Verkhoyansk-Chukotka collision zone. A central part of North Asia is occupied by the elevated Central Siberian Plateau, and the Ural Mountains in the westernmost part of the region are separated from the Central Siberian Plateau by the large and poorly drained West Siberian Plain.

Long environmental gradients govern the diversity of climate and vegetation of North Asia. The climate varies from oceanic along the seashore to strongly continental in inner regions of Siberia. The latitudinal gradient includes four main natural zones: tundra, taiga (coniferous forest), mixed conifer and broad-leaved forest, and steppe (grassland) (Ogureeva, 1999); of which, the taiga zone occupies the largest area. Despite its enormous size, because North Asia occupies higher latitudes, it has low floristic diversity compared to many smaller regions in south Asia.

2. Brief historical review of floristic studies in North Asia

Floristic exploration of North Asia began in the first half of the 18th century when Emperor Peter I the Great founded the St. Petersburg Academy of Sciences (currently, the Russian Academy of Sciences) in 1724. The early explorers of North Asian flora were German and Russian naturalists and geographers, such as Johann G. Gmelin (1709–1755), Georg W. Steller (1709–1746) and Stepan P. Krasheninnikov (Степан П. Крашенинников; 1711–1755). One of the fruits of their efforts was “Flora Sibirica” (Gmelin, 1747–1769) — a pioneering work that cataloged 1178 vascular plant species in the region, including approximately 500 species described for the first time in this compendium (Malyshev, 1999).

Investigation of nature in North Asia motivated by the Academy of Sciences intensified in the second half of the 18th century. During this period, the southern part of Siberia was investigated by many, including Johann P. Falk (1727–1774), Johann G. Geogri (1729–1802), Erich Laxmann (1737–1796), Vasiliy Ph. Zuev (Василий Ф. Зуев; 1754–1794), Johann Sievers (1762–1795), and Peter S. Pallas (1741–1811). Their findings began to be published by P. S. Pallas in *Flora Rossica* (Pallas, 1784–1788). It was the first compendium covered the whole territory of the Russian Empire, but the

publication remains unfinished. Only two volumes were published, which included descriptions of 281 species and 100 hand-painted illustrations (Malyshev, 1999).

In the 19th century, florist works began to be published in greater numbers. Information was collected during special botanical expeditions organized under the patronage of the St. Petersburg Academy of Sciences. Perhaps the most productive expedition of this era was taken in 1826 by Carl F. von Ledebour (1785–1851), Carl A. von Meyer (1795–1855) and Alexander G. von Bunge (1803–1890) to Altai and Dzungaria, which contributed to *Flora Rossica* (Ledebour, 1842–1853). This four-volume compendium was the first completed flora of the Russian Empire. It contains a description of 6522 species from 1139 genera and 146 families.

The flora of Baikal Siberia was first described by Nikolai S. Turczaninow (Николай С. Турчанинов; 1796–1863), the first Siberian resident of botanical exploration. The main result of his investigations was the *Flora Baikalensi-Dahurica* (Turczaninow, 1842–1856), in which Turczaninow recorded 1454 species (Lipschitz, 1975). For the territory of the Far East, the first substantial work was the monograph *Primitiae Florae Amurensis: Versuch einer Flora des Amur-landes* (Maximowicz, 1859). This work by Carl I. Maximowicz (1827–1891) listed 973 plant species for the territory of the Amur River basin. At the end of the 19th century, Ernst R. von Trautvetter published additions to the *Flora Rossica* by Ledebour (Ledebour, 1842–1853), bring the total number of listed taxa to 6106 (Trautvetter, 1882–1884).

At the beginning of the 20th century, the large volume of accumulated data on the floristic diversity of North Asia began to be synthesized. Two major sources of information were the collections of Imperial Russian Geographical Society members, such as Ivan P. Borodin (Иван П. Бородин), Alexander A. von Bunge (Александр А. Бунге), Dmitry I. Litvinov (Дмитрий И. Литвинов), Aleksander L. Czekanowski (Александр Л. Чекановский), Jan S. F. Czerski, etc., and material collected by explorers, such as Vladimir N. Sukachev (Владимир Н. Сукачев), Vladimir L. Komarov (Владимир Л. Комаров), Sergey S. Ganeschin (Сергей С. Ганешин), Hippolytus M. Krascheninnikov (Ипполит М. Крашенинников), Afrikan N. Kryshtofovicz (Африкан Н. Криштофович), etc. during numerous expeditions in Asian Russia, organized by the Migration department of the General Directorate of Land Management and Agriculture of the Russian Empire. These efforts resulted in 15 volumes (called here issues) of unfinished “Flora of Asian Russia” (Fedtchenko, 1912–1920), which were published by the Main Botanical Garden. After the October Revolution in 1917, the same team started a new project, “Flora of Russia”, with few series within, though only three volumes of series *Flora of Asian Russia* were published (Fedtchenko, 1923–1924). In parallel, the Botanical Museum of Academy of Science started to publish “Flora of Siberia and the Far East” (Busch et al., 1913–1931), which totalled 6 volumes. However, both of these projects remained unfinished.

At the beginning of the 1930s, the Botanical Museum and the Main Botanical Garden were combined in one Botanical Institute of the Academy of Sciences (currently, the Komarov Botanical Institute of the Russian Academy of Sciences), the main botanical institution in the Russian Federation. Under the guidance of the Botanical Institute, a new project “Flora of the USSR” (Komarov et al., 1934–1964) was initiated and destined to become the most important and unprecedented work that integrated floristic of the whole country. At the beginning, the leader of the project was the famous Russian botanist Vladimir L. Komarov (Владимир Л. Комаров; 1869–1945), who’s role as chief editor was later passed to Boris K. Schischkin (Борис К. Шишкин; 1886–1963) and then to Eugene G. Bobrov (Евгений Г. Бобров; 1902–1983) (Linczevski, 1966). The “Flora of

the USSR" — a 30-volume floristic monograph — achieved a tremendous task: description and effective consolidation in modern terms of floristic knowledge for the whole country of the Soviet Union, including the target region, North Asia. There are 17,520 plant species (of which about 1800 were described as new species) from 1676 genera and 160 families listed (Czerepanov, 1973).

One of the most important projects initiated a few years before the completion of the "Flora of the USSR" was the "Arctic flora of the USSR" (Tolmachev & Yurtzev, 1960–1987). This multivolume book was launched by Alexander I. Tolmachev (Александр И. Толмачев; 1903–1979). After almost 27 years of hard work, the compendium covered not only the tundra zone but also the forest-tundra to some extent, and comprised 1762 species and subspecies from 351 genera and 72 families.

In the 1980s, botanists from the Far East under the leadership of Sigismund S. Charkevicz (Сигизмунд С. Харкевич; 1921–1998) prepared the eight-volume compendium *Vascular Plants of the Soviet Far East* (Charkevicz, 1985–1996) that was published over twelve years. It contained 4178 plant species (including 1154 species described from the Far East) from 962 genera and 158 families (Kozhevnikov & Rudyka, 2000).

Almost at the same time, the multivolume work *Flora of Siberia* (Vol. 1–14) (Malyshev et al., 1987–2003) was initiated by Leonid I. Malyshev (Леонид И. Малышев; 1931–2014). This flora covered three-quarters of the territory of North Asia. In total, there are 4510 species and subspecies from 842 genera and 137 families registered for the territory of Siberia. In 2005, the updated checklist of the Siberian vascular flora was published (Baikov, 2005), which added 77 taxa.

The newest checklist compiled for the whole of North Asia is the *Checklist of Flora of Asian Russia: Vascular Plants* (Baikov, 2012). Authors of this book undertook a monumental task in merging taxonomies from *Flora of Siberia* (Malyshev et al., 1987–2003) and *Vascular Plants of the Soviet Far East* (Charkevicz, 1985–1996; Kozhevnikov & Probatova, 2006) into one system. As a result, there are 6696 species and 265 subspecies from 1187 genera and 191 families. Until now, this checklist was the only general source on floristic diversity of North Asia. However, merging the 48 regions used to characterize plant distributions in both texts into 13 "floristic provinces" following Malyshev et al. (2000) led to a loss amount of information about species distribution.