Biological collections: An inventory of Russian Far East section in I.M. Krasnoborov Herbarium (NS)

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ABSTRACT

A complete inventory of the Russian Far East section of the vascular plants collection stored at the Krasnoborov Herbarium (NS) of the Central Siberian Botanical Garden SB RAS was made. As a result, 4423 unrecorded herbarium sheets and 457 previously unregistered species were added to the collection. Type specimens of 4 taxa which had been described from the Russian Far East were found and digitized: *Anemone tamarae* Kharkev., *Chrysosplenium schagae* Kharkev. & Vyschin, *Potentilla anjuica* V.V. Petrovsky и *Tephrosieris schistosa* (Kharkev.) Barkalov. The updated catalogue of the collection, consisting of 3248 taxa, was published on the Global Biodiversity Information Facility portal, GBIF.org. A taxonomic and historical analysis of the collections, as well as a list of the leading collectors, is presented.

Keywords: biological collections, herbarium, history, catalogue, Russia, vascular plants, taxonomy, GBIF

РЕЗЮМЕ

Гатилова Е.А., Хан И.В., Ковтонюк Н.К. Биологические коллекции: инвентаризация раздела Дальнего Востока России в Гербарии им. И.М. Красноборова (НС). Проведена полная инвентаризация отдела "Дальний Восток" коллекции сосудистых растений, хранящихся в гербарии им. И.М. Красноборова (НС) Центрального сибирского ботанического сада СО РАН. В результате инвентаризации добавлены новые поступления в количестве 4423 гербарных листов и 457 ранее не отмеченных видов. Обнаружены и оцифрованы типовые образцы 4 таксонов, описанных с территории Российской Федерации: *Anemone tamarae* Kharkev., *Chrysosplenium schagae* Kharkev. & Vyschin, *Potentilla anjuica* V.V. Petrovsky и *Tephrosieris schistosa* (Kharkev.) Barkalov. Обновленный каталог коллекции, состоящий из 3248 таксонов, опубликован на портале GBIF.org. Проведен таксономический и исторический анализ сборов, а также обзор ведущих коллекторов.

Ключевые слова: биологические коллекции, гербарий, история, каталог, Россия, сосудистые растения, таксономия, GBIF

The Central Siberian Botanical Garden, Siberian Branch of the Russian Academy of Sciences (CSBG SB RAS) was founded in 1946 and currently is the largest botanical institution in the Asian part of Russia.

The CSBG herbarium consists of two collections that have their own acronyms in Index Herbariorum (Thiers 2021): the NS collection named after I.M. Krasnoborov and the NSK collection named after M.G. Popov. There are in total about 680 000 herbarium specimens of vascular plants, collected not only in Siberia, but also in Europe, Asia and America (Kovtonyuk et al. 2020).

The inventory of herbarium collections and the publication of up-to-date catalogues through the Global Biodiversity Information Facility (GBIF) allows researchers worldwide to view and work with collections and biodiversity data remotely. In addition, such an inventory is an important preparatory step for further digitization of the herbarium.

Herbarium specimens collected from the territory of the Russian Far East are allocated in a separate section in the NS herbarium (Gatilova et al. 2020). There are specimens from the Primorye, Kamchatka and Khabarovsk Territories,

Amur, Sakhalin and Magadan Regions, Jewish Autonomous Region and Chukotka Autonomous Area. A specific feature of the Russian Far East section of the NS herbarium (RFE NS) is the inclusion of the herbarium specimens from Trans-Baikal Territory (former Chita Region), in contrast to the Far East section of the NSK herbarium. Possibly, some of the herbarium samples from Chita Region were earlier inserted in the Siberia section of NS as "Others".

The purpose of this publication is to share biodiversity data by using GBIF on example of the catalogue of the vascular plant collection from the Russian Far East section of the I.M. Krasnoborov herbarium (NS). We believe that this information will be useful in preparation of the Flora of Russia.

Since 2006, three attempts to supplement the collection of RFE NS with prepared herbarium specimens were made, but a complete insertion was not possible due to a lack of space to accommodate the unrecorded specimens. As a result, 28 boxes and packs with prepared herbarium were stored without insertion. At the end of November 2020, a new convenient room for the herbarium collection was organized, and it was decided to move here the col-

lection RFE NS, which was previously stored in a small workroom. Relocation and inventory of the whole collection took about 2.5 months, of which 10 days were spent on quarantine processing of the collection.

The 4423 herbarium sheets and 457 new for the collection species were added to RFE NS. The next step of the inventory was the detailed verification of the existing catalogue of the RFE section, the herbarium boxes were renewed and all the specimens were recalculated. The ex-catalogue listed 8474 sheets and 2074 species of vascular plants, but the collection actually contained 11 750 sheets and 2814 species. Thus, over 3000 specimens and 740 taxa were already inserted, but were not catalogued and so they could not be found and used by specialists.

By revising the herbarium boxes in the RFE NS sector, samples belonging to other regions (Yakutia, the European part of Russia, the Altaiskii Krai and the Altai Republic, the Caucasus and Central Asia) were removed. In particular, 20 herbarium specimens from the collections of D.I. Litvinov (1902–1903) were found with notes on the labels "East Manchuria" or "West Manchuria". In fact, these plants were collected along the Chinese Eastern Railway (Gatilova et al. 2020). These herbarium specimens from Litvinov's collection, as well as three specimens collected by F. Karo on the right bank of Amur River were relocated to the Foreign Asia section of the NS.

Before the inventory, the RFE NS section contained undetermined herbarium sheets prepared for insertion. Unidentified herbarium specimens were surveyed with the valuable help of taxonomists V.V. Yakubov (Federal Scientific Center of the East Asia Terrestrial Biodiversity), A.L. Ebel, I.N. Shehovtsova, N.K. Kovtonyuk, I.V. Han, N.V. Vlasova, E.A. Gatilova, Yu.V. Ovchinnikov, S.V. Ovchinnikova (Central Siberian Botanical Garden), I.V. Belyaeva (Royal Botanical Gardens, Kew, UK). Currently, the section contains 11 herbarium specimens defined only up to the genus level: *Artemisia* (NS0039943, NS0039944), *Calamagrostis* (NS0039946), *Eleocharis* (NS0039956), *Juncus* (NS0041227), *Lonicera* (NS0041229), *Oxytropis* (NS0039938), *Poa* (NS0039940, NS0039941), *Thymus* (NS0041214), and *Trollius* (NS0040012). We invite all interested specialists to view and, where possible, identify the specimens using the barcode numbers in the "Search" field in the Digital Herbarium of the CSBS (<http://herb.csbg.nsc.ru:8081>), or make a request to digitize some taxa from the checklist published in the dataset (Gatilova et al. 2021).

During the inventory of the sector, we did not check whether all the specimens were identified correctly, and did not relocate all specimens with names of synonyms on them to one place. However, the updated catalogue contains information about the presence of taxa, whose names are synonyms. The correct spelling of the Latin names of plants, as well as the currently accepted names, were verified using online databases Catalogue of life (Catalogue 2021) and The World Checklist of Vascular Plants (WCVP 2021).

At present, the RFE section of NS comprises 16 174 herbarium sheets and 3248 species of vascular plants from 135 families. The largest families are Asteraceae (359 specimens), Poaceae (300), Cyperaceae (238), Rosaceae (173), Ra-

nunculaceae (164), Fabaceae (141), Brassicaceae (117), Caryophyllaceae (117), Polygonaceae (99) and Salicaceae (84).

The digitization of the entire RFE section was not carried out, although we had earlier digitized the families Primulaceae, Geraniaceae, Salicaceae, the genera *Allium*, *Rhododendron*, *Medicago*, and the class Polypodiopsida, which also contain herbarium sheets from Russian Far East (GBIF 2021). All regions of the Russian Far East are represented among the digitized material.

Botanists from Russian Far East Institutes (S.S. Kharkevich, T.G. Buch, A.E. Kozhevnikov, I.B. Vyshin, V.Yu. Barkalov, V.V. Yakubov, T.I. Nechaeva, T.A. Bezdeleva, N.S. Probatova, and M.Yu. Gorshkov) contributed a significant part of herbarium material to RFE NS section as well as Siberian collectors such as I.M. Krasnoborov, V.M. Hanminchun, D.N. Shaulo, G.I. Gorohova, V.I. Telegin, N.N. Lashchinskii, and G.A. Fedoseev. Additionally, the section contains materials from the Amur integrated expedition of the Komarov Botanical Institute 1957–1958 (collections of G.N. Nepli).

Among the oldest specimens in RFE section of NS there are plants collected by N.A. Pal'chevskii in 1889–1909 from Primorye Territory. He was the Vice-president of the Society for the Study of the Amur Region. He worked as a forester, first in Suchan in 1893, and then as a military forester of the entire South Ussuri region in 1899–1907. Pal'chevskii was a friend of V.K. Arsen'ev, the famous Russian explorer of Far Eastern nature, who taught him scientific methods and accompanied him on the expedition in 1906 and also some of his previous expeditions (Anonymous 1912).

Some herbarium specimens were collected by S.I. Korzhinskii in 1891. The East Siberian Branch of the Russian Geographical Society sent him to the Amur Region to study the local flora and the suitability of the region for colonization. This expedition resulted in the publication of "Report on the study of the Amur region as an agricultural colony" (Korzhinskii 1892).

Some collectors of the early 20th century are listed below. Specimens gathered by them were sent to CSBG as exsiccata or duplicates mostly from the Komarov Botanical Institute RAS (LE).

F.K. Karo worked in 1903–1904 around Blagoveshchensk. Some plants collected by Karo were gathered on the right bank of Amur River (in China) and were mistakenly placed in Russian Far East section, but some are from Amur Region. I.M. Shchegolev was an entomologist who participated in the expedition in 1903 in Khabarovsk Territory (Shchegolev 1906). P.V. Syuzev was an artillery officer during the Russian-Japanese War and did a military service in 'Ussuriiskii Krai' (now Primorye Territory) in spring, 1905, and in China in summer, 1905 (Nikolaev 1958). In his free time, he collected herbarium specimens. Later in his publications 830 plant species from Chinese Manchuria were listed (Syuzev 1907). N.A. Desulavi was a botanist who lived in Khabarovsk, and participated in expeditions with V.K. Arsen'ev in 1907 and 1908 (Anonymous 1912). G.A. Fedoseev was a Siberian geodesist, who since 1938 supervised topographic works on the Angara River, on the Middle and Lower Tunguska, and explored the Yablo-

novyi and Stanovoy Ridges, the Okhotsk Coast, and the Dzhugdzhur Ridge. Fedoseev also took part in the development of maps of the regions for the Bratskaya, Ust-Ilmskaya, Boguchanskaya and Zeyskaya hydroelectric power stations, and the Baikal-Amur Railway. Fedoseev knew a lot about the flora and fauna of the Russian Far East, collected many plants and birds from Siberia and the Russian Far East and donated all his collections to the Russian Academy of Sciences (Ermolenko 1999).

During the inventory of the RFE NS, the type specimens of the following taxa were found: *Anemone tamarae* Kharkev. (NS0000476), described from the Khabarovsk Territory from the gatherings by S.S. Kharkevich and V.V. Yakubov (Kharkevich 1981); *Chrysosplenium schagae* Kharkev. & Vyschin (= *Chrysosplenium pilosum* Maxim. subsp. *schagae* (Kharkev. & Vyschin) V.N. Voroshilov, NS0000477), described from the Khabarovskii Territory collected by I.B. Vyshin and S.S. Kharkevich (1985); *Potentilla anjuica* V.V. Petrovsky (NS0000479), described from the Magadanskaya Oblast (Petrovskii 1983). We have clarified the publication dates of the *P. anjuica* protologue, as they were misspelled in the text of the exsiccata.

The isotype of *Tephrosieris schistosa* (Kharkev.) Barkalov (NS0000480), described from the collections of S.S. Kharkevich and T.G. Buch from Kamchatka in 1976, was also kept in RFE NS section, although in the protologue only the VLA herbarium is indicated as the place of isotype storage (Barkalov 1992). Recently, these herbarium specimens were specially prepared (Fig. 1), then digitized using ObjectScan 1600, entered into the CSBG SB RAS Digital herbarium and kept together with the protologue in the section of NS type specimens.

CONCLUSION

The inventory of the entire herbarium section showed that there were a lot of mismatches between the catalogue data and the real herbarium samples of the collection. Such an inventory is very useful for further digitizing of the collection. This process helps to verify the correct Latin names of plants, and clarify their placement in NS according to the geography of herbarium gatherings. The interesting facts about history and collectors were discovered during the inventory. The summary table with catalogue published by GBIF (Gatilova et al. 2021) is very convenient for study by specialists worldwide. Researchers interested in studying the taxa from Russian Far East are welcome to visit our collections and work with NS and NSK herbaria in comfortable conditions or make a special request for digitization of the herbarium specimens of interest.

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Figure 1 Isotype of the name *Tephroseris schistosa* (Kharkev.) Barkalov (NS0000480)

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