

## **“PETER THE GREAT” Botanical Garden celebrates 300 years**

K.G. Tkachenko

Komarov Botanical Institute of RAS, St. Petersburg, Russia

The Apothecary's Garden, the Saint Petersburg Botanical Garden, Imperial Botanical Garden or the Peter the Great Botanical Garden also known as the Botanic Gardens of the Komarov Botanical Institute of the Russian Academy of Sciences.

In June 2014 our Garden celebrated the glorious date - 300 years. There were many guests and friends from different countries and cities of the world.

First of all, I must say a few words about our history. Peter the Great Botanical Garden is one of the oldest botanic gardens in Russia (and also in the former USSR). Its foundation dates back to 1713 [December] (or 1714 [February]) when Peter the First issued a decree to lay out «Aptekarsky Ogorod» (Hortus Medicus) to grow «useful, curious and foreign plants» on Voronij (now Aptekarsky) Island in St. Petersburg. In 1823 the «Aptekarsky Ogorod» was transformed into the Imperial Botanic Garden of St. Petersburg. It was from this time that a construction of a large range of greenhouses and other buildings was begun, the park started to take shape and trees and shrubs were planted. The Botanic Garden supported and participated in an extensive exploration of the flora of Russia and adjacent countries. Botanic expeditions to various regions of Russia and many countries of the world resulted in a considerable enlargement of the collections and intensive plant introduction. By 1873 the Garden's collections of living plants had covered over 21 thousand species and cultivars. The record amount of 27 793 taxa was achieved in 1905.

At different time periods of the Garden, there had been working leading botanists, who left mark in world botany. For example, Iogann Siegesbeck (XVIII), Friedrich (Fedor) Fisher, K.A. Meyer. E.H. Ave-Lalleman, R.E. Trautvetter (beginning of XIX), E.L. Regel, K.I. Maksimovich (from the middle of XIX till the end), B.A. Fedchenko, V.I. Lipsky, V.L. Komarov (from the end of XIX and beginning of XX). Originally the Apothecary's Garden focused mainly on growing medicinal herbs, but soon people began bringing saplings and seeds of rare and exotic plants - for which a greenhouse was specially built. The first real greenhouse in the Garden was built in 1732.

At the beginning of 1823 the Garden became the Imperial Botanical Garden. This new and prestigious title stimulated donation of large sums of money for greenhouse construction and purchase of plants abroad. The Garden organized expeditions to all parts of Russia, and also sent its scientists and gardeners abroad. Expeditions to various parts of the earth regularly augmented the Botanical Garden's collection with new sorts of trees, shrubs, flowers, and other plants.

By 1913, the collection plant as in Garden and in greenhouse has reached 25,000 species. In honor of the 200 – anniversary the Imperial Botanical Garden was assigned name of its founder (Peter the Great) the "Peter the Great Imperial Botanical Garden". And almost after 100 years, in 2013, this name is returned to the Garden.

Further, hard times were waiting for both Russia and the Garden: First World War, Great October revolution, Second World War and ruin.

After the Great October Socialist Revolution the Botanical Garden was administered by the People's Commissariat on the Land Use was first called the Main Botanic Garden of the Russian Federation and then the Main Botanical Garden of the USSR. In 1930 the Garden became subordinate to the Academy of Sciences of the Soviet Union and in 1931 was merged with the Botanical Museum into the Botanical Institute. From 1931 the Garden is a scientific department of the Komarov Botanical Institute.

The size of the living plant collections during its long existence was constantly changing. The collections of the Botanic Garden of St.-Petersburg – Petrograd – Leningrad – St.-Petersburg suffered from frequent floods and unfavorable weather conditions but most severally

they were afflicted during wars. By 1941, the Garden has restored. Currently, greenhouse collections of the Garden contain about 10,000 taxa (species, varieties, cultivars). Enormous losses occurred during the Second World War. Many greenhouses were destroyed and most plants perished in winter of 1941/42. It is sufficed to say that only 300 species of indoor plants from the original number of 5 thousands survived the siege. Severe losses also occurred in the collection of woody and herbaceous plants. The war was still going on, but the Garden started the restoration works.

It is noteworthy that collections of tropical and subtropical plants, collections of succulents and cacti increased from 283 species in 1945 to more than 6000 species at the present time. Heroic efforts of the gardeners who during days and nights of the siege preserved valuable specimens are memorable.

At present the Garden's holdings in quality and quantity exceed the pre-war level: the collections contain about 17 500 taxa (among them are over 8 thousand species) belonging to more than 2 500 genera and 345 families (Smirnov, Tkachenko, 2001; The Plants ..., 2002; Arnautov etc., 2003).

The main branch of the greenhouses' activities are traditional for botanical gardens.

First, they are a base for scientific research. It requires a meaningful presentation of flora of the tropical and subtropical zones in all its systematic diversity, demonstrating the most of orders, families, genera, i.e. implementing the systematic principle.

Living plant collections are developed with judgments. The scientific basis for forming the Garden's collection follows the main principles: 1 - to present as far as possible the plant life of the globe, i. e. to include representatives of maximum number of families and various floristic areas, 2 - to show typically, endemic species and relicts, species of economic plants and of scientific value, 3 - to present plants of various life forms, 4 - to show rare and endangered species of the flora of the Russia (and Former USSR) and of Leningrad area. Lists of plants which are necessary to add to the collections are completed according to analysis of regional floras, monographs and special research works. The collections are largely increased by plants brought plants from regular expeditions to different regions of the Russia (the Caucasus, Middle Asia, Far East) and abroad (Cambodia, China, Cuba, Ecuador, Guinea, India, Madagascar, Seychelles, Vietnam, etc.) which makes it possible to collect plants in their natural habitat.

Living plant collections are a basis for botanical and horticultural research, training and education activity, they provide plants material for collections of other botanic gardens both in the former USSR and abroad and they are the source of increasing the range of promising ornamental plants to be planted in towns.

In recent decades the Garden is also engaged in the problem of introduction of herbaceous plants and an extension of the range of ornament plants. A complex approach to this problem necessitated monographic researches of individual taxonomic and biological groups of plants. The studies are dealing with the interspecific diversity, biological peculiar features of plants in the wild and in cultivation and the ontogenesis. This research gives not only an insight into potentialities of plants, but also provides material to reveal affinity and relationships within the taxonomic groups. Recently a research into biology of certain systematic groups (the plant families Amaryllidaceae, Gramineae, Cactaceae, Iridaceae, Campanulaceae, Liliaceae and Orchidaceae) is performed on a larger scale.

Members of the Garden's staff managed to breed many promising hybrids of *Irises*, *Tulips* and *Hemerocallis* for the northwestern region of the USSR. An appearance of new ornamental plants used in landscape architecture is the outcome of this work. The results of introduction of herbaceous plants were this basis of a fundamental survey «Ornamental herbaceous plants» (Leningrad: Nauka, 1977). These monographic researches facilitated further development of the collections and creation of subject displays of plants. For example, a display «*Irises* - from their wild ancestor to a cultivated plant» was laid in the garden more than 30 years ago and it shows a variability of species, intraspecies and cultivars of these amazing plants.

These is a large outdoor exhibition «Bulbous plants» in the Garden, among indoor plants are «Cacti and succulents», «Plant life of sea coasts» and etc. on show in greenhouses. A display «Ornamental polyploidy plants» also attracted garden visitors.

“Peter The Great” Botanic Garden was and is one of main center of introduction of ornamental plants in cultivation in the former USSR. And now in Russia during the Garden’s existence about 3000 species of ornamental and economic plants, for the most part of the native flora, have been introduced in cultivation.

The collection of greenhouse plants is distributed between 24 greenhouses: 13 of them contain the collection of tropical plants, 7 – the subtropical collection, 2 – the collection of arid areas, and two are cultivation greenhouses, where seedlings are grown as collections supplements. Two greenhouses (the Big Palm and Big Subtropical ones) are designed for large-sized plants, and there is a special greenhouse for aquatic plants, built in 1899.

Most of the greenhouses are assigned for display, they are connected to form a roughly square layout which is very convenient for excursion routes. In the greenhouses there are presented almost all orders of spore plants, gymnosperms and flowering plants. A genus, if possible, should be presented in the collection by the type species and species from different sections. In the greenhouses there are representatives of approximately 300 families and about 2 500 genera.

**A brief outline of the collections.** There is unique greenhouses complex which were built in meddle XIX century, which occupies an area of 1 hectare. It is the largest greenhouses complex in Russia. Collections housed in 22 greenhouses, 17 of which - exposition. Two special greenhouses are designed for large-sized plants (Big subtropical and Big palm greenhouses, the height of the last 24 m). There is a special "greenhouse for *Victoria*" constructed in 1899, in the pool which are over 115 years in bloom *Victoria amazonica* and some water-plants from Tropical regions of Planet.

The Garden’s collections of tropical and subtropical plants whose richness and variety before the Second World War were excelled by those of Royal Botanic Gardens at Kew (Great Britain), in the post war years were created anew. At present the collections exceed the pre - war level in numbers of represented genera and families. The majority of plants were raised from seeds sent by other botanic gardens but over one third of the collections were gathered by workers of the Botanical Institute during field expeditions.

Plant displays are chiefly arranged by ecological and geographical principle but partly by systematic principle. Collection of ferns and their allies was always of great importance for the Garden. In the beginning of the 20-th Century the collection of these plants was one of the largest one in the world (in 1912 it was presented by 700 species). At present it amounts to 470 taxa (these are 407 species among them) relating to 109 genera from 39 families. The collection is constantly enlarged by sowing of spores and the material collected on expeditions.

Nowadays (for 2014) general number of taxon in collection of live plants in the Garden achieves almost 18500, 12 500 of which it is collections of protected ground (in greenhouses). Many of Garden’s collections are gathered by the principle of generic complexes. Gathering of collections is based on generic principals of systematic (there are representatives of suppress number of Gymnospermous and Angiospermous families, certainly Unicotyledonous and Bilibated, might be by one or limited numbers of species and genus, in collections); of geographic (there are representatives of all continents, as rare and disappearing species of different regions in the collection); of morphology (representatives of different life-forms, modifications, adaptive secularity to specific places of growth are gathered). Major plants of tropics, sub-tropics and temperate zone are presented in collections of open ground and protected ground.

**Collection of tropical plants.** It is accommodated in 13 greenhouses of the total area of 5300 square metros.

Among tropical flowering plants a collection of plants is of considerable interest, it consists of 100 species belonging to 49 genera. In the Tropical Palm House specimens of *Archontophoenix cunninghami* and *Ptychosperma elegans* always produce flowers and fruits, and the monocarpic palm *Caryota urens* has started to bloom. These are 146 taxa (including 117 species) of aroids belonging to 34 genera and 112 species of Bromeliads presenting 25 genera.

**Collection of the orchids.** It is represented more than 1500 taxa related to more than 110 genera of the family Orchidaceae.

**Collection of the Arecaceae family** – 167 taxa.

**Collection of the Polypodiophyta** – more than 630 taxa.

**Collection of sub-tropical plants.** It is located in 7 greenhouses of the total area of 3355 square meters.

The plants displayed in three greenhouses are from subtropical areas of the world, the Mediterranean region and South Africa, Australia and New Zealand, North and South America, China, Japan and the Himalayas. Conifers and Ericaceae are shown on separate displays.

**Collection of the Ericaceae family** – more than 250 taxa.

**Collection of succulent plants.** It amounts 2600 taxa (7 years ago were 1768 taxa) belonging to 295 genera and 37 families, it includes more than 1230 species of cacti and is one of the richest collections in the Russia. 340 rare and protected species (approximately 13 %;  $\frac{3}{4}$  - it is cacti and  $\frac{1}{4}$  - other succulents).

The special pride of the Garden is the collection of plant species that were named and described basing on specimens grown in our greenhouses: *Lepidozamia peroffskiana*, *Strelitzia nikolai*, *Clivia miniata*, *Spathiphyllum wallisii*, *Begonia echinosepala*, *Begonia verschaffeltii*, *Yucca elephantipes*, *Rhipsalidopsis gaertneri*, *Aspidistra locii*, *Strelitzia nicolai* Regel, *Yucca elephantipes* Regel ex Trel., *Spathiphyllum wallisii* Regel, *Begonia carolineifolia* Regel, *Aspidistra locii* Arnautov et Bogner, *Aspidistra nikolai* Aver etc.

No less important aspect of completing the collection is phylogenetic. The representatives of primitive families, which play an important role in solving the problems of evolution and phylogeny, are without a doubt the most valuable in the collections. The Garden's greenhouses contain an interesting collection of gymnosperms: Pinophyta (276 taxa), including many rare, endemic genera, Cycadales (47 species from 9 genera), Gnetum (2 types), Ephedra (12), and some representatives of primitive flowering plant families: Magnoliaceae, Eupomatiaceae, Austrobaileaceae, Annonaceae, Canellaceae, Winteraceae, Illiciaceae etc.

The third aspect of the completing is the geographical, i.e. selection of representatives from different floristic regions of the globe. In the greenhouses there are representatives of all six floral kingdoms, the most vastly represented is the East-Asian floristic region of the Holarctic kingdom. The flora of the East Asian region is of particular interest to botanists, because there are many ancient and rare species preserved; more than 70 representatives of endemic genera of this region are grown in the greenhouses: *Daiswa tonkinensis*, *Dysosma tonkinensis*, *Goniothalamus tonkinensis*, *Caryota gigas*, *Gnetum montanum*, *Aspidistra* (23 species), *Tupistra*, etc.

In the collection of tropical plants the Palaeotropical kingdom is brightly and diversely represented, the Neotropical somewhat weaker.

Representatives of the flora of Australia and New Zealand are accommodated in a greenhouse in the subtropical semi-ring, there are about 600 plant species collected, providing a vivid image of this unique floral kingdom.

The small kingdom of Cape is represented in the collection mainly by bulbous plants from the community of sclerophyllous shrubs. In the greenhouses many rare and endemic taxa are collected.

The morphological principle of acquisition reflects in the tendency of collecting the plants with scientifically interesting forms of life, environmental and, therefore, morphological features, such as: lianas and epiphytes, cacti of arid areas and forest cacti, succulent and caudex forming

plants, swamp plants and floating forms. A specific group comprises carnivorous plants: *Nepenthes*, *Sarracenia*, *Dionea*, *Pinguicula*, *Drosera* (Carnivorous plants). For each group of plants special conditions are set up.

In recent years the role of botanical gardens in the conservation of genetic resources is steadily escalating. Large greenhouse collections may also contribute to the protection and reintroduction of species threatened with extinction.

After monitoring the collections of the ICNC Botanical Garden we found out that in the Garden's greenhouses more than 1 500 species of rare and endangered plants of tropical and subtropical regions of the globe are grown, enrolled on the IUCN (the International Union for Conservation of Nature) Red List or regional red lists (*Napoleonaea fogelii*, *Wollemia nobilis*, *Aristolochia steupii*, *Deppea splendens*).

An important objective of the Global Strategy for Plant Conservation, presented before the Botanical Gardens, is preserving in their collections medicinal plants, wild relatives of cultivated plants, and other species which have major economic importance. While reinforcing collections, attention has always been paid to useful plants. An entire greenhouse is allocated to the tropical fruit and spice plants, and the geographically based exhibitions also include useful plants. Tourists, especially children, always find these plants interesting. Flowering and fruiting coffee, cocoa, papaya, mango, citruses and ginger provide a peculiar colour to the tropical greenhouses.

In the North-West Russia, where people do not see any green plants for more than half a year, it is difficult to overestimate the aesthetic importance of hothouse collections. That is the reason for constantly updating the collection of fine-flowering orchids, ericas and camellias, paying more attention to cultivar variety, gathering large collections of pelargoniums, fuchsias and hederas and paying special attention to the winter-blooming plants.

The collections undergo constant development. In order to improve the quality of collections, certain plant families are revised, and the lists of promising species for future introductions are made. And the constant job of curators includes verification, identification of new plants brought from expeditions and nomenclature correction according to the recent changes. Without this orderly work of curators the collection would lose its uniqueness and value, and only due to precise definitions a whole wide range of scientific research is possible to be carried out.

**Collections of outdoor plants.** They contain many species of trees and shrubs, lianas and perennial herbaceous plants. The arboretum of the northernmost botanic gardens took its share over a period of 285 years, and is a monument of landscape architecture protected by the State.

**The collection of roses.** During XX century were tested about 600 cultivars of roses in the Garden. Now we display on special small roses garden approximately 250 taxa from each roses gardens group (Old Garden Roses, Hybrids Bourbon, Hybrid Gallica, Damask, Moos, Hybrid Perpetual, Centifolia, Morden Roses, Floribunda, Grandiflora, Miniature, Rambler, Shrubsm Polyantha, Kordesii etc.) and also more than 25 species wild species of *Rosa* genus.

**The collection of perennial herbaceous plants.** The collection in general contains ornamental plants (genus complex: *Paeonia*, *Phlox*, *Hemerocallis*, *Hosta*, *Pulsatilla*, *Sedum*, *Sempervivum*, *Trollius*, *Cypripedium*, *Orchis*, *Astilbe*, etc.). In total its include approximately 700 taxa. Other hand – this collection using as a base for Alpinarium collection. Plants, which we bring to Garden from expedition first time investigate on this collection, than transferred to Alpinarium.

**The Alpinarium collection** The Alpine garden was made in 1900. The collection contains plants of alpine meadows, sub - alpine belt, cliffs and rocky slopes and other habitats. The main part of the collection is composed of wild herbaceous plants growing on rocky sites. These collection is demonstrate high mountain plants, but soon it became the Rock garden where plants from various regions, primarily mountains, of the Northern hemisphere were arranged geographically: 1) Western Europe, 2) the Caucasus, Crimea and the Mediterranean, 3) Siberia,

4) Middle Asia, 5) Central Asia and Far East, 6) North America, 7) New Zealand. There are approximately 1 000 taxa on 2014 year.

**Collections of the family Iridaceae.** It was being established since 1947 by prof. G.I. Rodionenko. As a maximum (from 1975 till 2000) on this collection there are 120 species and 710 cultivars belonging to 37 genera of the family Iridaceae. Now it includes 80 species and 250 cultivars of *Iris* genus.

**The collection of bulbous, tuberous (corm) and monocots plants.** It includes more than 600 species belonging to 130 genera of 18 families of order Liliales and also many varieties and cultivars which shown in the arboretum and greenhouses. These collection including some species from Red Book of Russia and Leningrad's region (*Cypripedium*, *Erytronium*, *Orchis*). The main idea for these collection – shown as more as possible different bulb plants (*Lilium*, *Tulipa*, *Scilla*, *Erytronium*, *Muscari*, *Chionodoxa*, *Galtonia*).

**The collection of medical plants.** It is the oldest one in the Garden. It's history is closely connected with the development of «Aptekarsky ogorod» [Pharmaceutical or Chemist's Garden]. From the very start the Garden has been engaged into studies of medicinal, culinary and agricultural crop plants.

At present the main objects (species and genus complexions) for elaboration by workers of the group, investigating peculiarities of age state origin, anthecology, raw plant material and seed productivity, belongs to following families: Apiaceae, Asteraceae, Caryophyllaceae, Crassulaceae, Berberidaceae, Fabaceae, Laminaceae, Paeoniaceae and Saxifragaceae. The total number taxa change every often, because include annual, biannual plants. Approximately this collection has from 600 till 700 species and 1000-1200 samples.

Study of peculiarities of ontogenesis and anthecology play an important role in conservation of biodiversity of useful plant world (Tkachenko etc., 1997; Tkachenko, Pautova, 2002).

A significant contribution to enrichment of the Garden's collections is made by **Seed Storage Laboratory**. Since 1835 onwards the Garden annually produces «A list of seeds for exchange (Delectus seminum)» and 450 botanic institutions are on the current mailing list. At 2010<sup>th</sup> it was 175<sup>th</sup> anniversary from the first publication of Delectus (Exchangeable catalogue). Every year (for end of XX century) the Garden receives from 2000 to 6000 samples of seeds and sends from 8000 to 12000 samples on exchange basis to other institutions. At present time we receiving from 150-200 till 1500 – 2700 seed's samples each year.

In 2013 we took part on IPEN and has acronym for our Garden – **LE**. In 2014 we published N 151 our *Index seminum* which included 2166 samples of seeds. During this period our Botanical Garden has close contacts with almost 500 botanical gardens and botanical institutes (universities, arboretums, parks, private collections) of the world. Nowadays active contact and material's exchange is passed with 340 gardens and private collections (291 of which are foreign and 47 are inside Russia). Every year we send seeds to all countries of the world. Approximately with 350 of Europeans, 30 Americans, 25 Asiatic, 5 Africans, 5 Zealandia and 5 Australian countries there is an exchange. With seed's exchange in the collection of garden a lot of valuable species appeared. For example – *Monodora tenuifolia*, *Rollinia sieberi*, *Zammia latifolia*, *Welwitsia mirabilis*, *Sternbergia lutea*, *Brexia madagascariensis* and others.

We appreciate to all our colleagues in all botanical gardens and institutes of botanical specialization, for possibility to refill our collections of open and protected ground, experience, study and save biodiversity in our Botanical Garden. Special word of gratitude to private collectors, who generously share with us their rare species, valuable findings, new exemplars, and also seeds, fruits, spores and layers. Kind relations with all botanists and people who are captivated in botanic promotes recovery, refilling, support and developing of our collections. And of course, our Garden is not so big by its surface, but has riches and valuable scientific collections, which allow to carry through different excursions for pupils, students, specialists, lovers, citizens and guests of our city.

And certainly we appreciate to all that collectors, our good friends, who harvesting seeds and fruits in their native places in different regions of our country develop suggested assortment of species, presented by us for exchange.

The greenhouses, arboretum and displays of out-door plants attract many foreign visitors. The Garden is visited on tour by 200-250 thousands people annually.

Last 7 years we took part on city museum performance “Night of museum”. Several times a year we organize thematic exhibitions on territory of our Garden. For example, each year in May we make exhibitions of flowering herbs *Paeonia*, in end of July beginning of August – we shown different cultivars of *Phlox*, in end of August – we shown hybrids of *Lilium*, *Dahlia*, *Gladiolus*. In September we make biennale for Cacti and Succulents. Best performants we make when shown our closing collection (in November) for different species and varieties of Orchidaceae. In 2014 we made 7-th exhibitions for Orchids.

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DSc. Kirill G. Tkachenko,  
Head of lab “Helpful Plants Introduction and Seedage”  
Peter the Great Botanical Garden  
of the Komarov Botanical Institute of RAS.  
2, Prof. Popova str., 197376 St. Petersburg, Russia