
**SUPERORDER LILIANAE IN THE HERBARIUM OF AL-FARABI
KAZAKH NATIONAL UNIVERSITY, THE STATE AND PROSPECTS**

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For the first time, the authors analyzed representation of the superorder Lilianae in the scientific herbarium of the largest university of the Republic of Kazakhstan, Al-Farabi Kazakh National University. Of the five orders, 13 families, 46 genera and 304 species of Lilianae known in Kazakhstan, the herbarium keeps specimens from 11 families, 30 genera and 146 species. Thus, 84.5 % of the families, 65.2 % of the genera and 47.7 % of the species of Lilianae are represented in the herbarium. Most of the specimens were collected in the first half of the XX century. Among the collectors there are famous florists, geobotanists, and natural resource scientists including Members of the Russian Academy of Sciences N.V. Pavlov and B.A. Bykov, and well known botanists V.P. Goloskokov, L.F. Demidovskaya, L.A. Demchenko V.S. Kornilov, V.P. Mikhailova, N.T. Ageeva and many others. The absence in the herbarium of specimens representing more than ten genera and half of the species of Lilianae draws attention to the need to continue scientific work and to increase collecting effort through targeted field work.

Keywords: scientific herbarium, superorder Lilianae, taxon, specimen, collector

According to A.L. Takhtajyan [15], there are five orders, 13 families, 46 genera and 304 species of Lilianae in Kazakhstan. Since the publication of “Flora of Kazakhstan” [5], Lilianae as a whole and its largest genera such as *Allium* L., *Gagea* Salisb. and *Tulipa* L. in particular acquired new members as a result of the discovery of new species, taxonomic revisions and geographic findings. We analyzed the newly published (i.e. post “Flora of Kazakhstan”) species lists and additions [1–4, 6, 8, 10–14, 17, 18]. As a result, we found out that the three genera mentioned above were expanded by 14, 11 and 8 species correspondingly. In addition, the distributions in Kazakhstan of the representatives of several other genera, including *Juno capnoides* Vved. [7], *Dactylorhiza longifolia* (Künge) Orlova and *Hemerocallis lilio-asphodelus* L. were established [11].

Based on our species list we revised the herbarium specimens of the superorder Lilianae kept in the scientific herbarium of Al-Farabi Kazakh National University (Almaty, Kazakhstan). The herbarium was founded in 1934 at the same time as the first Kazakh university. A small amount of specimens came from the herbarium of the Kazakh branch of the Academy of Sciences of the USSR founded in Almaty in 1932. Since then, lecturers and botany students have been contributing their specimens to the herbarium. The first university graduates who later became renowned scientists, among them B.A. Bykov, V.P. Goloskokov, L.F. Demidovskaya, L.A. Demchenko, as well as lecturers of the Faculty of Biology, in particular Professor and Member of the Academy of Science N.B. Pavlov who chaired the Department of Taxonomy of Higher Plants for 10 years, from 1938 to 1947, made substantial contribution to the herbarium. Many other members of the departmental staff, among them V.S. Kornilova, N.T. Ageeva, N.Kh. Eremina, as well as M.S. Lapshina who curated the herbarium for 38 years till February 2003, made substantial contribution to the development of the herbarium. Since the retirement of M.S. Lapshina, the herbarium has been curated by K.T. Abidkulova who has been carrying out a critical analysis of specimens from different taxonomic groups, in particular ferns [9]. In this article we present the results of the analysis of yet another group, Lilianae.

In the course of the revision of this taxonomic group, we studied ca 1700 specimens and 480 herbarium sheets, critically analysed, determined and revised 28 species as well as started updating and expansion of the scientific herbarium. In particular, A.A. Ivashchenko contributed several personal herbarium collections from 1980-1990, and K.T. Abidkulova together with Master and PhD students from the Department of Biodiversity and Biological Resources initiated targeted collecting effort aimed at the development of the scientific herbarium, because many specimens ended up as teaching resources used for educational purposes.

Here we present a list of specimens of the superorder Liliales known from Kazakhstan kept in the scientific herbarium of Al-Farabi Kazakh National University. Species listed in the Red Book of Kazakhstan [16] are marked by asterisk (*). The numbers in brackets refer to the number of herbarium sheets available for each species. **Order Liliales: Family Melanthiaceae Batsch.**, **Colchicum kesselringii* Regel (2), **C. luteum* Baker (2), *Veratrum lobelianum* Bernh. (2), *V. nigrum* L. (3); **Family Iridaceae Juss.**, **Crocus alatavicus* Regel et Semen. (1), **Gladiolus imbricatus* L. (1), **Iridodictyum kolpakowskianum* (Regel) Rodionenko (1), **Iris alberti* Regel (1), *I. bloudowii* Ledeb. (1), *I. halophila* Pall. (3), *I. lactea* Pall. (*I. ensata* sensu B. Fedtsch p.p.) (7-4), **I. ludwigii* Maxim. (1), *I. ruthenica* Ker.-Gawl. (12) *I. scariosa* Willd. ex Link (2), *I. sibirica* L. (2), *I. sogdiana* Bunge (7), *I. songarica* Schrenk (7), *I. tenuifolia* Pall. (9), **Juno kuschakewiczii* (B. Fedtsch.) Poljak. (2), **J. orchioides* (Carr.) Vved. (1); **Family Liliaceae Juss.**, *Fritillaria meleagroides* Patrin. ex Schult. et Schult. fil. (2), **F. pallidiflora* Schrenk (3), *Gagea bulbifera* (Pall.) Roem. et Schult. (3), *G. capusii* Terr. (4), *G. chomutovae* (Pascher) Pascher (2), *G. divaricata* Regel (1), *G. emarginata* Kar. et Kir. (2), *G. fedtschenkoana* Pascher (2), *G. filiformis* (Ledeb.) Kunth (1), *G. gageoides* (Zucc.) Vved. (1), *G. minutiflora* Regel (1), *G. ova* Stapf (6), *G. pseudoerubescens* Pascher (4), *G. reticulata* (Pall.) Schult. et Schult. fil. (1), *G. stipitata* Mercklin ex Bunge (2), *G. tenera* Pascher (4), *G. turkestanica* Pascher (1), *G. neo-popovii* Golosk. (*G. vaginata* M. Pop. ex Golosk. (1), *G. vegeta* Vved. (1), *Korolkowia sewerzowii* (Regel) Regel (2), **Lilium martagon* L. (2), *Lloydia serotina* (L.) Reichenb. (3), *Rhinopetalum karelinii* Fisch. ex Alexand. (4), *R. stenanthum* Regel (1), **Tulipa alberti* Regel (2), *T. behmiana* Regel (13), **T. brachystemon* Regel (3), *T. buhseana* Boiss. (6), *T. dasystemon* (Regel) Regel (2), *T. dasystemonoides* Vved. (1), **T. greigii* Regel (4), *T. heterophylla* (Regel) Baker (5), **T. kaufmanniana* Regel (5), **T. kolpakowskiana* Regel (2), **T. ostrowskiana* Regel (9), **T. regelii* Krasn. (1), **T. schrenkii* Regel (3), **T. tarda* Stapf, *T. turkestanica* (Regel) Regel (2); **Order Amaryllidales, Family Asphodelaceae Juss.**, *Eremurus altaicus* (Pall.) Stev. (5), *E. anisopterus* (Kar. et Kir.) Regel (4), *E. cristatus* Vved. (3), *E. inderiensis* (Stev.) Regel (5), *E. lactiflorus* O. Fedtsch. (6), *E. regelii* Vved. (2), *E. robustus* (Regel) Regel (1), *E. tianschanicus* Pazij et Vved. (4); **Family Hyacinthaceae Batsch.**, **Ornithogalum fischerianum* Krasch. (2), *Scilla puschkinoides* Regel (2); **Family Alliaceae J. Agardh**, *Allium albidum* Fisch. ex Bieb. (1), *A. altaicum* Pall. (1), *A. altissinum* Regel (1), *A. amblyophyllum* Kar. et Kir. (6), *A. atosanguineum* Schrenk (6), *A. barzsczewskii* Lipsky (6), *A. borszczowii* Regel (6), *A. caesium* Schrenk (11), *A. caricoides* Regel (4), *A. carolinianum* DC. (*A. polyphyllum* Kar. et Kir.) (2), *A. caspium* (Pall.) M. Bieb. (3), *A. decipiens* Fisch. ex Schult. et Schult. fil. (7), *A. delicatulum* Sievers ex Schult. et Schult. fil. (1), *A. drobovii* Vved. (3), *A. eriocoleum* Vved. ex Kaschtsch. et E. Nikit. (3), *A. fetisowii* Regel (5), *A. filidens* Regel (1), *A. flavescens* Bess. (4), *A. galanthum* Kar. et Kir. (1), *A. hymenorrhizum* Ledeb. (6), *A. iliense* Regel (6), *A. inconspicuum* Vved. (4), *A. inderiense* Fisch. ex Bunge (1), *A. inops* Vved. (2), *A. karataviense* Regel (1), *A. karelinii* Poljak. (1), *A. kaschianum* Regel (1), *A. kokanicum* Regel (1), *A. korolkowii* Regel (2), *A. kujukense* Vved. (3), *A. kursanovii* M. Pop. (*A. pseudoglobosum* M. Pop. ex Gamajun.) (1), *A. lasiophyllum* Vved. (1), *A. lehmannianum* Merckl. (2), *A. lineare* L. (6), *A. longicuspis* Regel (2), *A. longiradiatum*

(Regel) Vved. (2), *A. margaritae* B. Fedtsch. (3), *A. obliquum* L. (1), *A. oreophilum* C. A. Mey. (3), *A. oreoprasoides* Vved. (2), *A. oreoprasum* Schrenk (2), *A. pallasii* Murr. (4), *A. petraeum* Kar. et Kir. (1), *A. platyspathum* Schrenk (2), *A. praescissum* Reichenb. (3), *A. protensum* Wendelbo (*A. schubertii* Zucc.) (4), *A. robustum* Kar. et Kir. (1), *A. rubens* Schrad. ex Willd. (2), *A. schoenoprasum* L. (6), *A. scrobiculatum* Vved. (1), *A. semenowii* Regel (1), *A. setifolium* Schrenk (1), *A. sewerzowii* Regel (1), *A. strictum* Schrad. (2), *A. trachyscordum* Vved. (1), *A. turkestanicum* Regel (2), *A. victorialis* L. (3), *A. vvedenskyanum* Pavl. (1); **Family Amaryllidaceae J. St.-Hil.**, **Ungernia sewerzowii* (Regel) B. Fedtsch (1); **Family Ixioliriaceae Nakai**, *Ixiolirion tataricum* (Pall.) Herb. (2); **Order Asparagales, Family Convallariaceae Horan.**, **Majanthemum bifolium* (L.) F. Schmidt (5), *Polygonatum odoratum* (Mill.) Druce (*P. officinale* All.) (3), *P. sewerzowii* Regel (4); **Family Asparagaceae Juss.**, *Asparagus brachyphyllus* Turcz. (4), *A. bresleranus* Schult. ex Schult. fil. (4), *A. inderiensis* Blum ex Pacz. (*A. kasakstanicus* Iljin) (6), *A. neglectus* Kar. et Kir. (7), *A. officinalis* L. (*A. polyphyllus* Stev.) (9), *A. persicus* Baker. (6), *A. verticillatus* L. (1), **Order Orchidales, Family Orchidaceae Juss.**, *Coeloglossum viride* (L.) Hartm. (3), *Corallorhiza trifida* Chatel. (1), **Cypripedium calceolus* L. (3), **C. guttatum* Sw. (1), **C. macranthum* Sw. (1), *Dactylorhiza incarnata* (L.) Soó (3), *D. umbrosa* (Kar. et Kir.) Nevski (2), *Epipactis helleborine* (L.) Crantz (*E. latifolia* (L.) All.) (3), *Goodyera repens* (L.) R. Br. (4), **Platanthera bifolia* (L.) L. C. Rich. (2).

The Red Book plants of Kazakhstan [16] are represented by 25 species. The majority of the threatened species (i.e. 36 out of 61) are not represented in our herbarium collections: *Merendera robusta* Bunge, *Iris tigridia* Bunge, *Iridodictyon winkleri* (Regel) Rodionenko, *Juno almaatansis* Pavl., *J. coerulea* Poljak., *Crocus korolkowii* Regel et Maw, *Tulipa biebesteiniana* Schult. et Schult. fil., *T. borszczowii* Regel, *T. biflora* Pall., *T. zenaidae* Vved., *T. korolkowii* Regel, *T. lehmanniana* Merckl., *T. uniflora* (L.) Bess. ex Baker, *T. patens* Agardh ex Schult. et Schult. fil., *T. heteropetala* Ledeb., *Erythronium sibiricum* (Fisch. et C. A. Mey.) Kryl., *Eremurus hilariae* M. Pop. et Vved., *Allium caespitosum* Stev. ex Bong. et C. A. Mey., *A. lutescens* Vved., *A. kasteki* M. Pop., *A. microdictyon* Prokh., *A. polyrhizum* Turcz. ex Regel., *A. mongolicum* Regel, *A. pskemense* B. Fedtsch., *A. sergii* Vved., *A. suworowii* Regel, *A. turtschicum* Regel, *A. eduardii* Stearn, *Hemerocallis lilio-asphodelus* L., *Convallaria majalis* L., *Asparagus vvedenskyi* Botsch., *Paris quadrifolia* L., *Epipactis palustris* (L.) Crantz, *Epipogium aphyllum* Sw., *Dactylorhiza fushsii* (Druce) Soó, *Orchis militaris* L.

When personal contributions of various collectors are considered, it is worth mentioning that not only florists including M.G. Popov, B.K. Shishkin, N.V. Pavlov, V.P. Goloskokov, A.A. Dmitrieva, N.I. Kuznetsov, I.A. Linchevsky, Yu.A. Kotukhov, and B.I., Tarabayev, but also geobotanists including B.A. Bykov, N.I. Rubtsov, Z.V. Kubanskaya, I.V. Larin, N.T. Ageeva, O.M. Demina, L.A. Demchenko, and V.I. Terekhov, resource experts including V.P. Mikhailova and L.F. Demidovskaya, but also a paleobotanist V.S. Kornilova, mycologist S.R. Shvartsman, and a zoologists F. Samusev took part in the development of the herbarium collections. Some of the specimens kept in the University herbarium came from outside Kazakhstan in the course of the exchange of specimens between herbaria. Of those the collections made by G.I. Karev and A.F. Florensky in Kamchatka, by G.P. Poplavskaya in the Crimea, and O.Ya. Kutina in the Kola Peninsula are of particular interest.

Of special interest are the oldest herbarium specimens, e.g. those collected by A. Schrenk 176 years ago (*Allium caesium* Schrenk, June 1842) as well as the newest, e.g. collected by K.T. Abidkulova in May 2018 (*Fritillaria pallidiflora* Schrenk, *Tulipa brachystemon* Regel, *T. heterophylla* (Regel) Baker, *T. ostrowskiana* Regel, *T. dasystemon* (Regel) Regel and many others).

As a result of the revision of the collections of the target taxonomic group we found out that it was not adequately represented in the University herbarium. Only 65.2 % of genera and 47.7 % of species were represented in the collections. There is an urgent need for a thorough revision of the herbarium, processing of the backlog and collections development through the exchange of specimens between herbaria and organization of field trips aimed at filling collection gaps.

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НАДПОРЯДОК LILIANAЕ В ГЕРБАРІЇ КАЗАХСЬКОГО НАЦІОНАЛЬНОГО УНІВЕРСИТЕТУ ІМЕНІ АЛЬ-ФАРАБІ, СТАН І ПЕРСПЕКТИВИ

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Вперше автори проаналізували представленість надпорядку Liliaceae в науковому гербарії найбільшого університету Республіки Казахстан – Казахського національного університету імені Аль-Фарабі.

Із п'яти порядків, 13 родин, 46 родів і 304 видів Liliaceae, відомих з Казахстану (відповідно до системи А.Л.Тахтаджяна 1987 р.), в гербарії зберігаються представники 11 родин, 30 родів і 146 видів. Таким чином, у гербарії представлено 84,5 % родин, 65,2 % родів і 47,7 % видів Liliaceae флори Казахстану.

З часу публікації «Флора Казахстану» Liliaceae в цілому та її найбільші роди, такі як *Allium* L., *Gagea* Salisb. і, зокрема, *Tulipa* L., в результаті відкриття нових видів, таксономічних ревізій і географічних знахідок поповнилися новими представниками. У результаті аналізу списків і доповнень, опублікованих після завершення праці «Флора Казахстану», ми з'ясували, що чисельність представлених у гербарії згаданих вище трьох родів зросла відповідно на 14, 11 і 8 видів. Крім того, були виявлені у флорі Казахстану представники кількох інших родів, серед них *Juno capnoides* Vved., *Dactylorhiza longifolia* (Künze) Orlova та *Hemerocallis lilio-asphodelus* L.

Більшість зразків, представлених у гербарії, були зібрані в першій половині ХХ ст. Серед колекціонерів є відомі флористи, геоботаніки, спеціалісти з природних ресурсів, серед яких академіки Російської академії наук Н.В. Павлов і Б.А. Биков, а також відомі вчені В.П. Голоскоков, Л.Ф. Демидовська, Л.А. Демченко, В.С. Корнілов, В.П. Михайлова, Н.Т. Агеева та багато інших.

Особливий інтерес становлять найстаріші зразки гербарію, які були зібрані А. Шренком ще 176 років тому (*Allium caesium* Schrenk, червень 1842 р.), а також новітні знахідки, такі як, наприклад, зібрані К.Т. Абідкуловою у травні 2018 р. *Fritillaria pallidiflora* Schrenk, *Tulipa brachystemon* Regel, *T. heterophylla* (Regel) Baker, *T. ostrowskiana* Regel, *T. dasystemon* (Regel) Regel і багато інших.

Відсутність у гербарії зразків, які представляють більше десяти родів і половину видів Liliaceae, спонукає до продовження наукових досліджень і до активації зусиль із колекціонування за допомогою цілеспрямованої польової роботи.

Ключові слова: науковий гербарій, надпорядок Liliaceae, таксон, зразок, колектори