ДЕПОЗИТАРИЙ
ЖИВЫХ СИСТЕМ
«НОЕВ КОВЧЕГ»

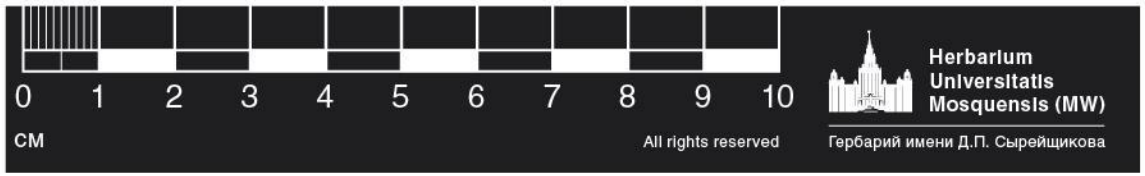
Moscow Digital Herbarium and the *National Depository Bank of Live Systems* Initiative (Russia)

Dr Sci Alexey P. Seregin
Lomonosov Moscow State University

XIX International Botanical Congress (Shenzhen, China, 2017)
“Biodiversity informatics and Mapping Asia Plants (MAP)” Symposium

Moscow University Herbarium (MW)

- Founded ca. 1780
- The second largest herbarium in Russia
- Six staff members (science & technical)
- Part of the *National Depository Bank of Live Systems* initiative (launched by the Moscow University)
- No international loans due to custom regulations

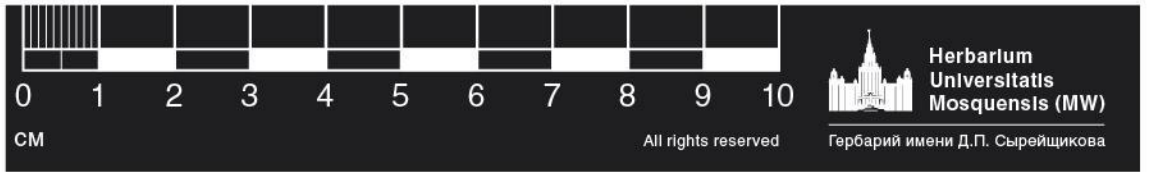


Specimen Total

- **1,011,253** specimens (as of Nov 2016) including:

- 924,167 vascular plants
- 77,086 bryophytes
- ca. 10,000 lichens

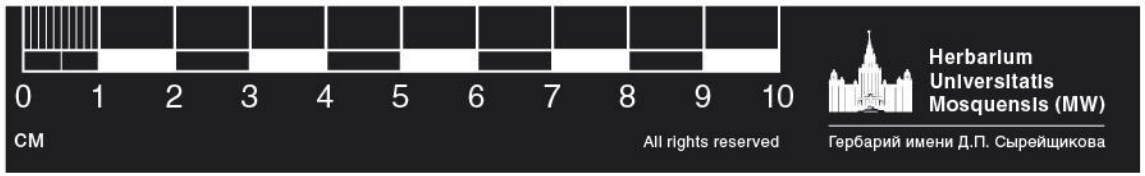
Statistics update is available once a year.



Specimen Ranking

- 61th in the world
- 24th among university herbaria

- 2nd in Russia (after Komarov Institute)



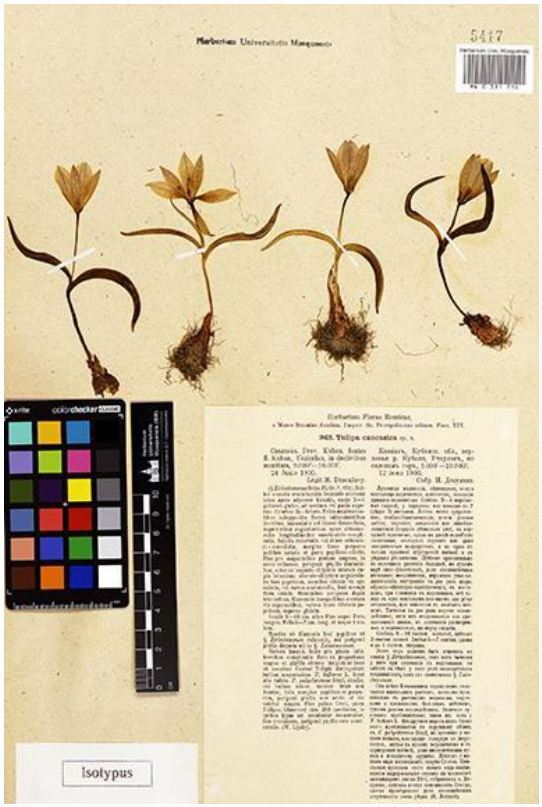
Collection Growth

- Mean annual increase in 2005-2016 was 15,100 specimens

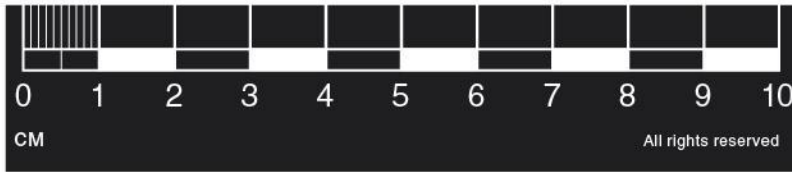
- In 2016, we added 22,013 specimens (expeditions, old collections, gifts, exchange, etc.)

Taxonomic Outline

- 39,323 species (excl. historic collections) including:
- 37,100 vascular plants
- 2,223 bryophytes



Types of ca. 3,000 taxa are curated separately (4,620 specimens).

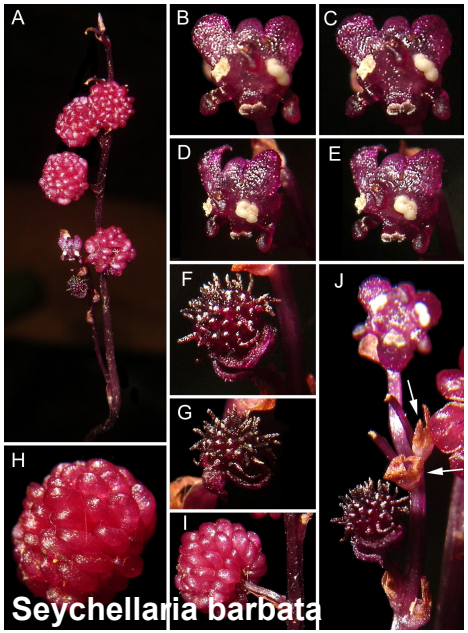


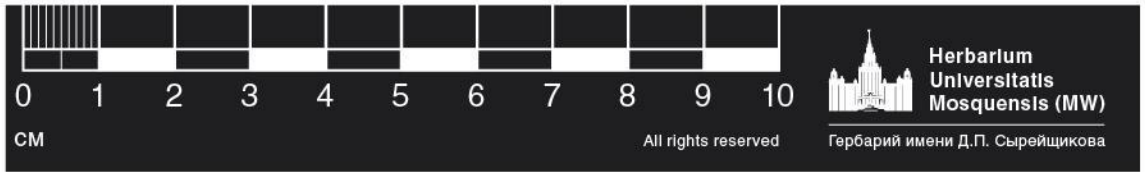
Herbarium Universitatis Mosquensis (MW)
Гербарий имени Д.П. Сырейщикова

Plant Taxonomy in the Moscow University

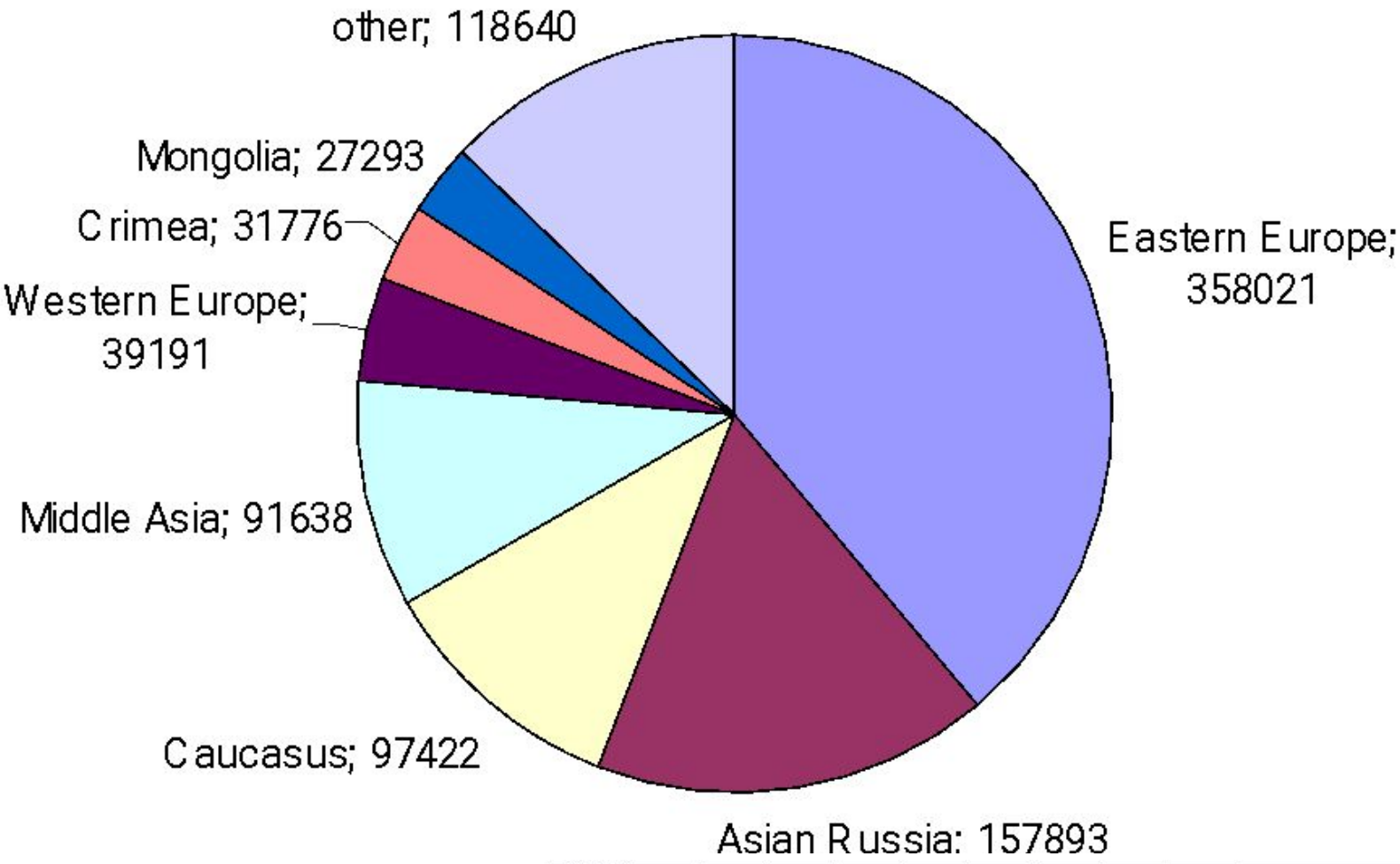
60 new species of vascular plants were described by the Moscow University staff members in 2012-2016:

- **Apiaceae**: 15 species (M. Pimenov, E. Kljuykov, D. Lyskov et al.)
- **Amaranthaceae s. l.**: 11 species (A. Sukhorukov)
- **Asparagaceae**: 10 species (N. Vislobokov et al.)
- **Amaryllidaceae s. l.**: 9 species (A. Seregin)
- **Apocynaceae**: 2 species (Y. Alexeev)
- **Cucurbitaceae**: 2 species (M. Nuraliev)
- **Polygonaceae**: 2 species (O. Yurtseva)
- **Thismiaceae**: 2 species (M. Nuraliev)
- **Molluginaceae**: 2 species (A. Sukhorukov)
- **Asteraceae, Centrolepidaceae, Lophiocarpaceae, Orchidaceae, Triuridaceae**: 1 species





Geographical Scope: Vascular Plants

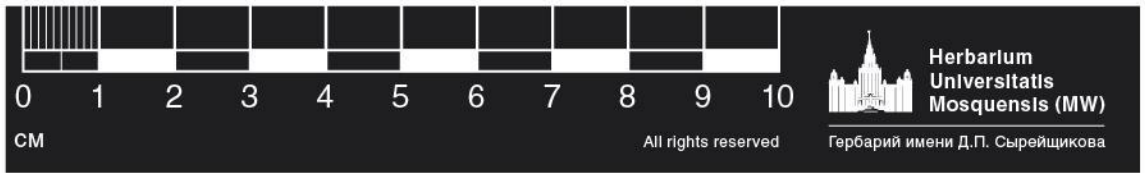


Moscow University Project

- Moscow University have received 750,000,000 RUR (ca. 10,910,000 Euro) for foundation of the ***National Depository Bank of Live Systems*** from Russian Science Foundation.

- 4-year project (2015-2018).

- Five branches: 1) Plants; 2) Animals; 3) Fungi & Microbes; 4) Human Material; 5) Bioinformatics.

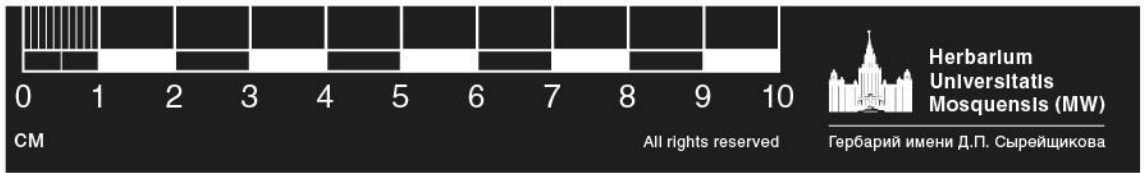


Moscow University Project: Plants

- 125,000,000 RUR (ca. 1,820,000 Euro) for plant studies (collections, new labs, expeditions, extra salary, etc.) in 2015-2018.

- The largest grant in the history of Russian botany.

- 24% for the Moscow University Herbarium (MW) for digitisation, databasing and management.

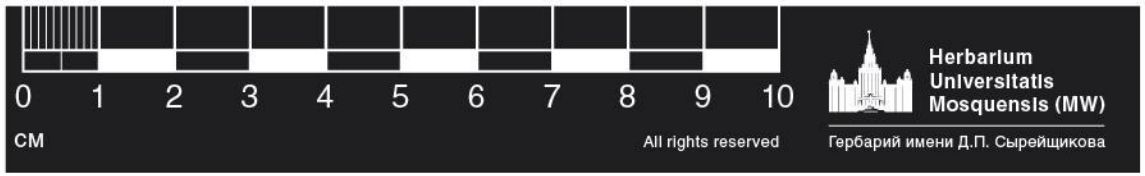


Digitisation as a World Trend

Leiden (Netherlands)

Paris (France)

New York (USA)



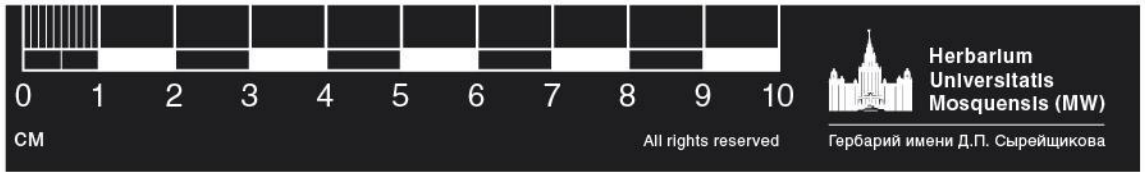
Equipment or Services?

or

Herbarium Budget in 2015-2016

Contract with a commercial partner:

- **11,850,000 RUR** (ca. 172,360 Euro) for digitisation of 786K specimens (or 15.08 RUR per specimen)



Extra Funding in 2015-2016

Development of the web portal:

- **2,500,000 RUR** (ca. 36,400 Euro)

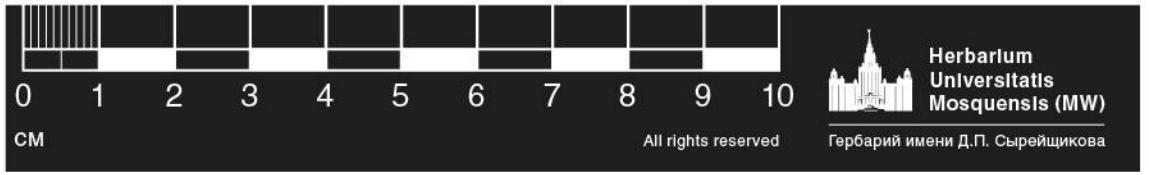
Additional herbarium facilities (cupboards):

- **4,800,000 RUR** (ca. 69,800 Euro) for the additional space to preserve ca. 192K new specimens

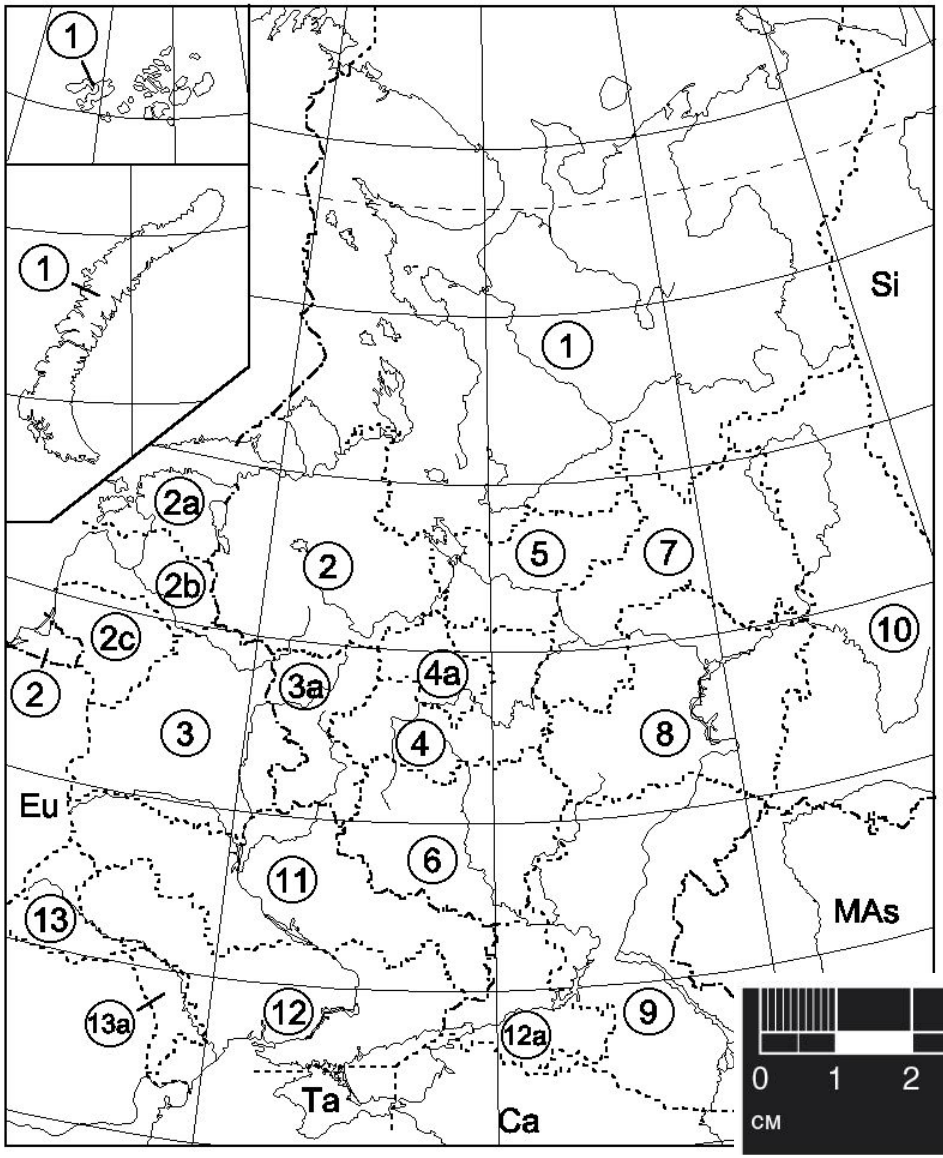
Herbarium Universitatis Mosquensis (MW)
Гербарий имени Д.П. Сырейщикова

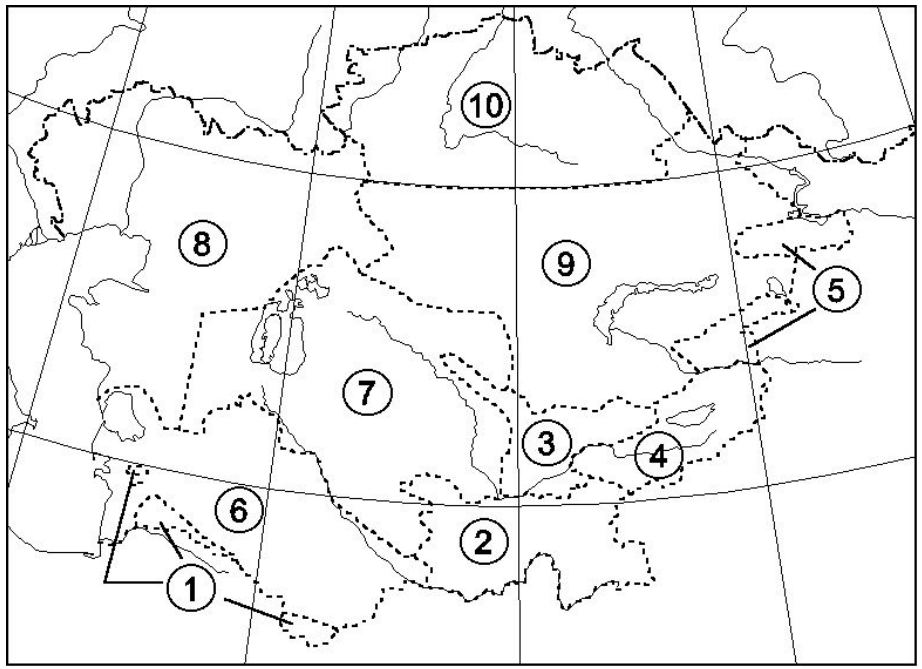
Digitisation: Imaging as the First Step

- Only imaging at 300 dpi TIFF (JPG copy)
- Basic metadata from folders (ID, species name, area code)
- No label data
- Free full online access



Area Codes from Folders





↑ Area codes of Middle Asia

←Area codes of Eastern Europe

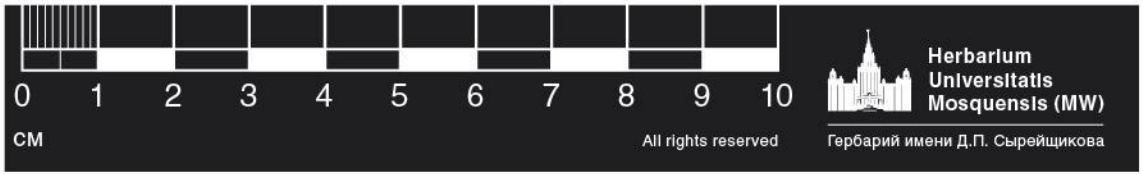
Herbarium Universitatis Mosquensis (MW)

Гербарий имени Д.П. Сырейщикова

Metadata Production

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
1		Fam	Index	×	Genus	×	Species	Authors	ssp/va	Infraspecific epit	Synonym	Msp	M1	M2	M3	M4	M5	M6	M7	M8
26856	26903	238a	6351		Limonium		bicolor	(Bunge) Kuntze												
26857	26904	238a	6351		Limonium		bungei	(Claus) Gamajun.												
26858	26905	238a	6351		Limonium		californicum	(Boiss.) Heller												
26859	26906	238a	6351		Limonium		cancellatum	(Bernh. ex Bertol.) Kuntze												
26860	26907	238a	6351		Limonium		carnosum	(Boiss.) Kuntze			Statice carnosa Boiss.									
26861	26908	238a	6351		Limonium		caspium	(Willd.) Gams											4	15
26862	26909	238a	6351		Limonium		chinensis	Girard.												
26863	26910	238a	6351		Limonium		chrysocomum	(Kar. et Kir.) Kuntze												
26864	26911	238a	6351		Limonium		congestum	(Ledeb.) Kuntze												
26865	26912	238a	6351		Limonium		coralloides	(Tausch) Lincz.												
26866	26913	238a	6351		Limonium		cordatum	(L.) Mill.												
26867	26914	238a	6351		Limonium		cretaceum	Tscherkasova												3
26868	26915	238a	6351		Limonium		densiflorum	(Guss.) Kuntze												
26869	26916	238a	6351		Limonium		dichroanthum	(Rupr.) Ikonn.-Gal.							11	1			1	
26870	26917	238a	6351		Limonium		diffusum	(Pourr.) Kuntze												
26871	26918	238a	6351		Limonium		donetzicum	Klokov												
26872	26919	238a	6351		Limonium		echioides	(L.) Mill.	subsp	exaristatum (Mu	L. exaristatum (Murb.) P. Fournier									
26873	26920	238a	6351		Limonium		echioides	(L.) Mill.												
26874	26921	238a	6351		Limonium		erythrorhizum	Ikonn.-Gal. ex Lincz.												
26875	26922	238a	6351		Limonium		feralaceum	(L.) Kuntze												
26876	26923	238a	6351		Limonium		ferganense	Ikonn.-Gal.						3	4					
26877	26924	238a	6351		Limonium		fischeri	(Trautv.) Lincz.			L. nudum ...									
26878	26925	238a	6351		Limonium		flexuosum	(L.) Kuntze												
26879	26926	238a	6351		Limonium		gmelinii	(Willd.) Kuntze							2		8		5	16
26880	26927	238a	6351		Limonium		gruberii	Lincz.												

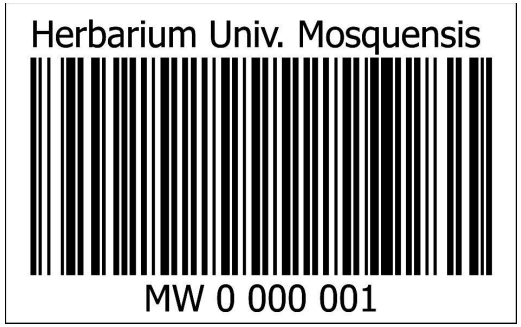
Table showing presence of 11 specimens of *Limonium dichroanthum* (Rupr.) Ikonn.-Gal. from M3 geographical area (Western Tian Shan).

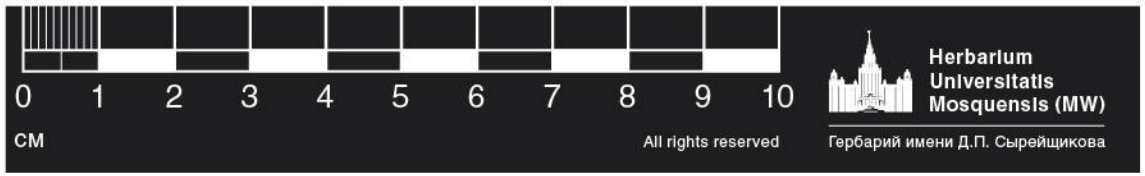


Barcodes as an Accurate Counter

Eastern European collections:

- 338,940 specimens before barcoding
- 352,720 specimens after barcoding
- 13,780 increase (+4.07%)





Metadata Example

Stipa sibirica

Area S2
(Altai & Sayany)

0 1 2 3 4 5 6 7 8 9 10
CM

Herbarium Universitatis Mosquensis (MW)
Гербарий имени Д.П. Сырейщикова

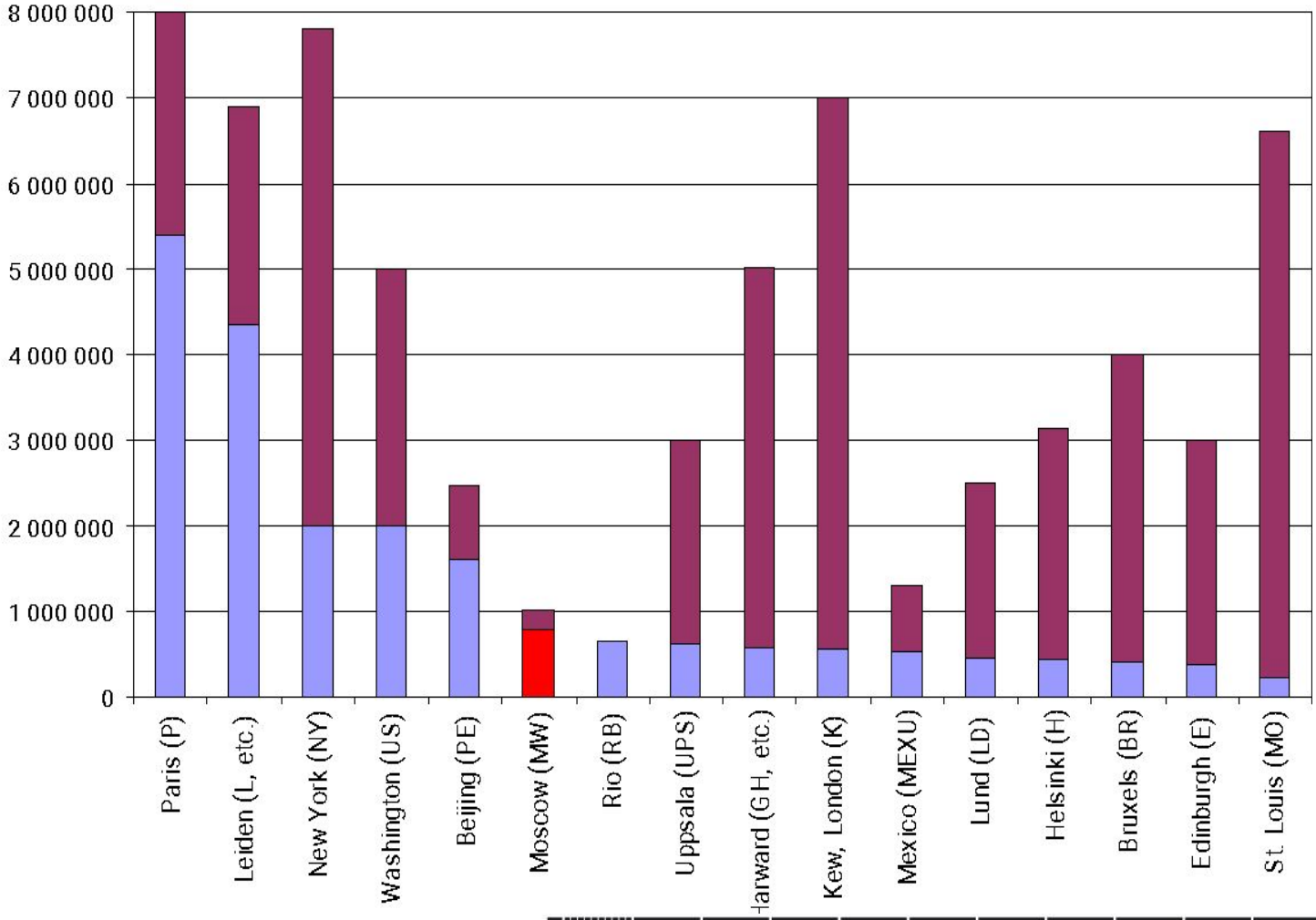
Current Digitisation Rate

- **785,844** specimens (77.7%) are scanned and available online including:

- 708,209 specimens of vascular plants (300 dpi)
- 4,632 type specimens of vascular plants (600 dpi)
- 72,997 labels of bryophytes

Herbarium Universitatis Mosquensis (MW)
Гербарий имени Д.П. Сырейщикова

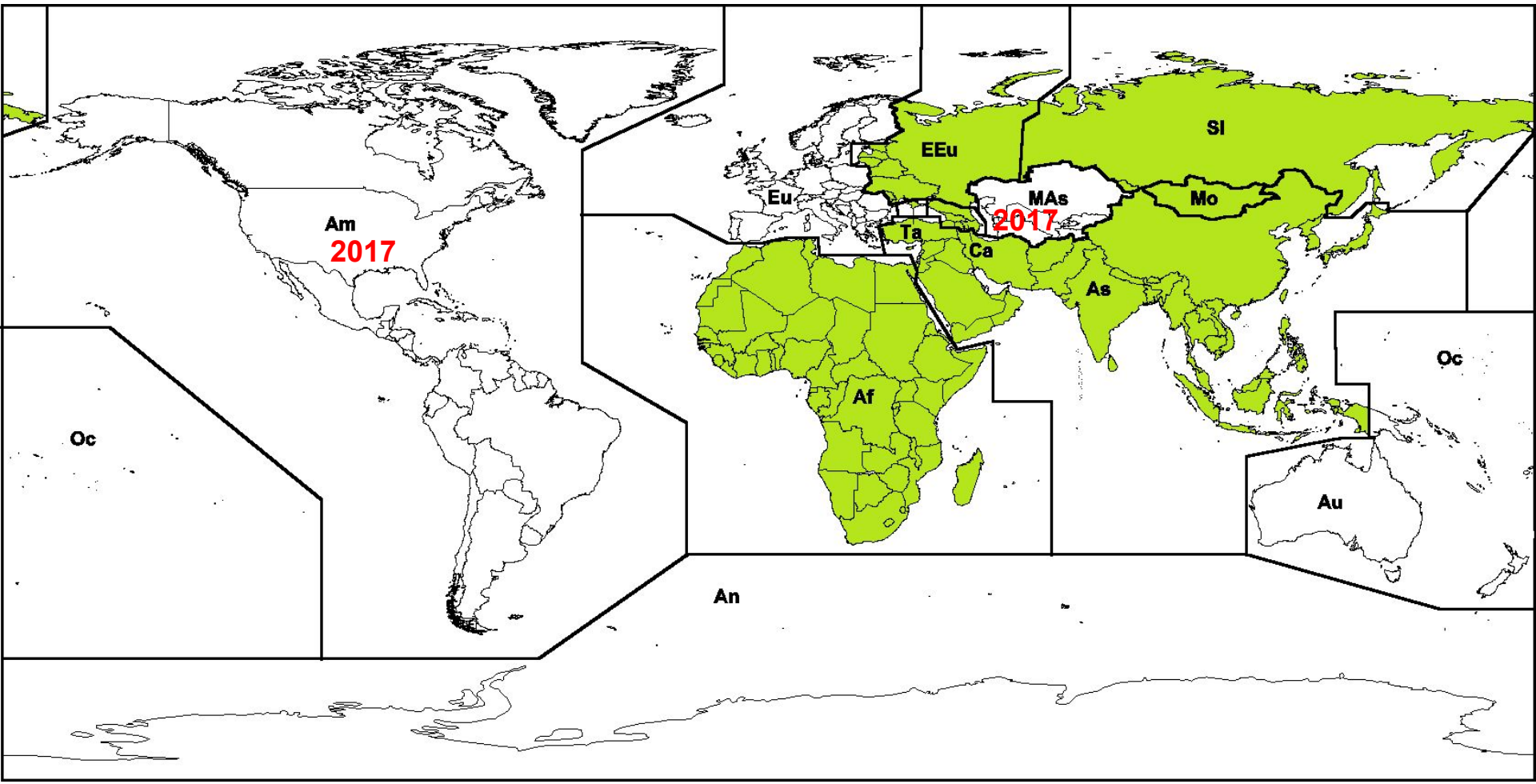
Digital Collections Ranking



Herbarium Universitatis Mosquensis (MW)

Гербарий имени Д.П. Сырейщикова

Current Digitisation Coverage

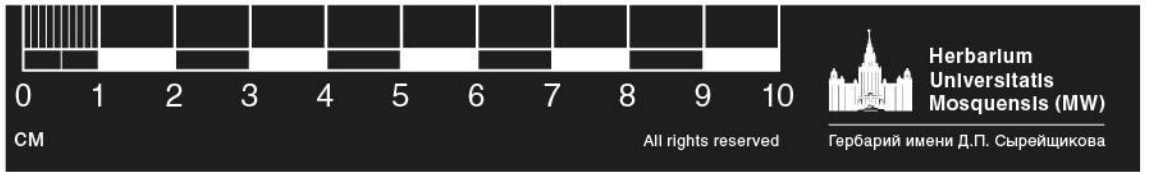


0 1 2 3 4 5 6 7 8 9 10
CM

Herbarium Universitatis Mosquensis (MW)
Гербарий имени Д.П. Сырейщикова

Digitisation: Quick Geotagging

- Country names were used as geotags
- 756K specimens were geotagged using existing country names from folders
- 30K specimens were geotagged manually in 2017



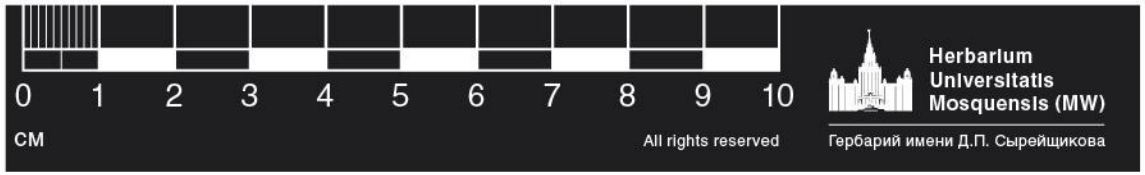
Asian Resources: 301K Specimens

- Russia 157,200 specimens
- Middle Asian countries 94,100
- Mongolia 27,300
- PR of China 3,940
- Vietnam 3,880
- Turkey 2,440
- India 1,680
- Japan 1,620

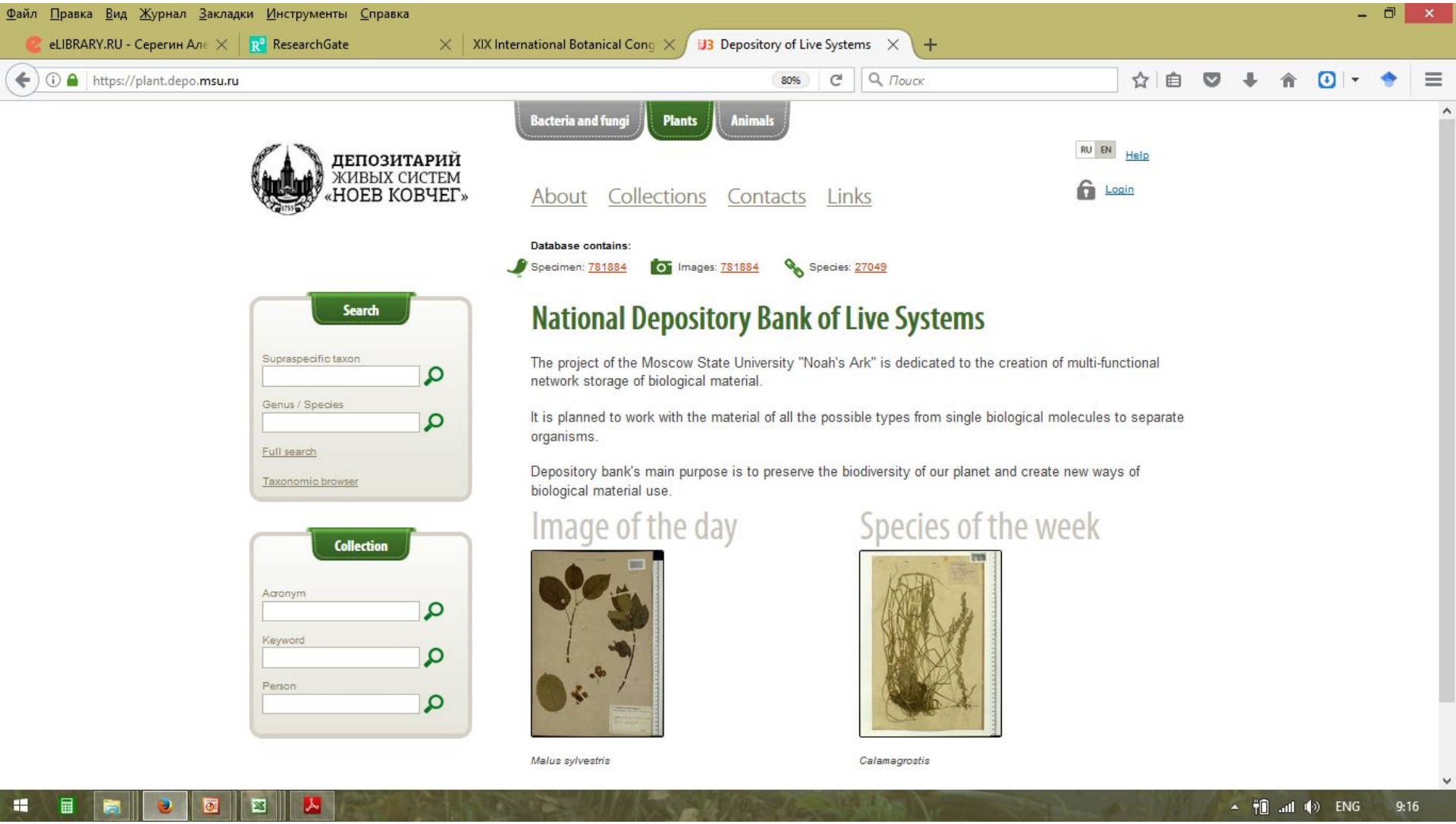
Herbarium Universitatis Mosquensis (MW)
Гербарий имени Д.П. Сырейщикова

Online Access

- http://plant.depo.msu.ru/ (public access)
- Russian / English versions
- 786K specimens at 300 dpi (JPG)
- Automatic linking of the collection names with *Catalogue of Life* taxonomy
- No label data at the moment
- No geographical coordinates

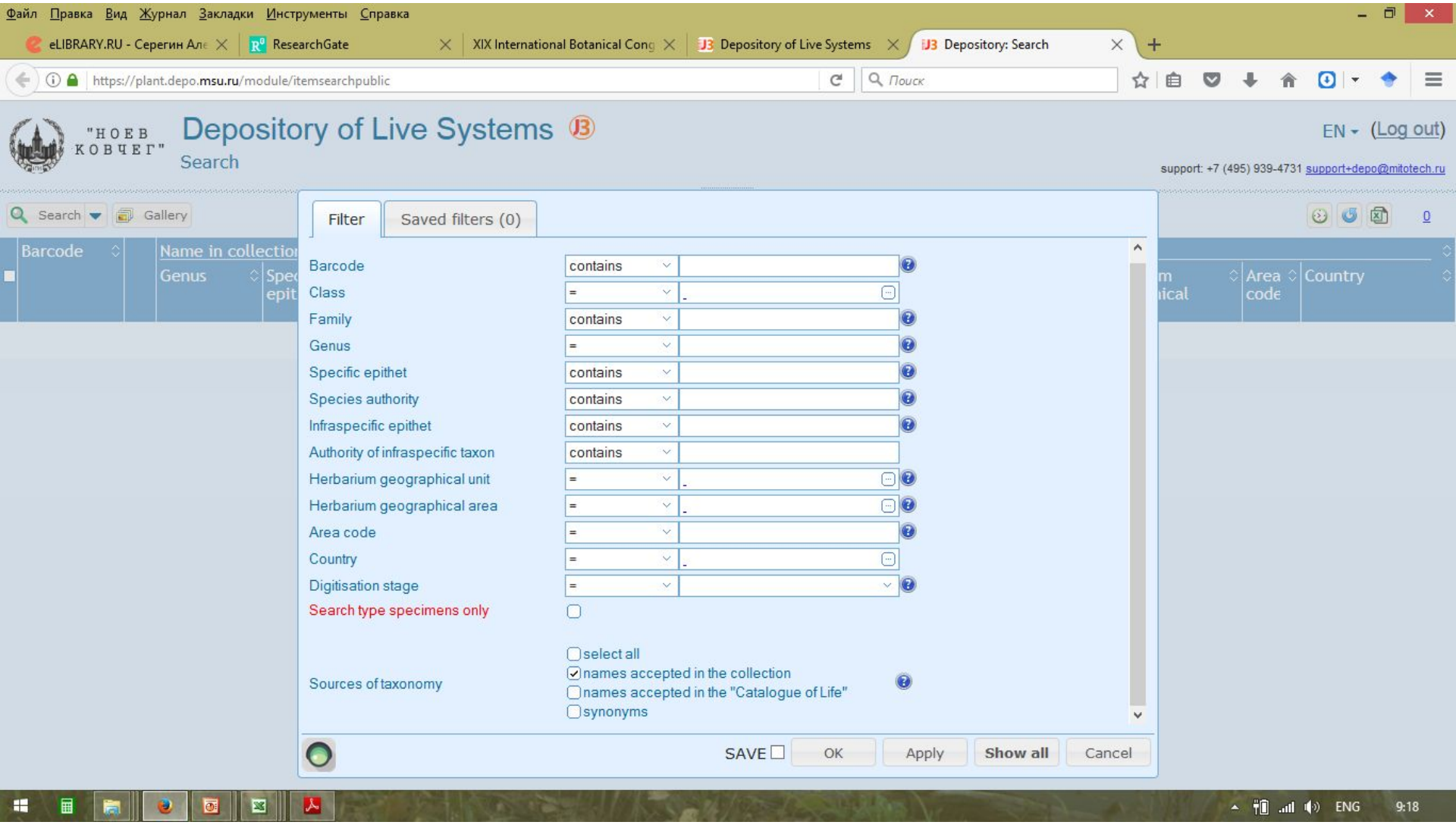


https://plant.depo.msu.ru/



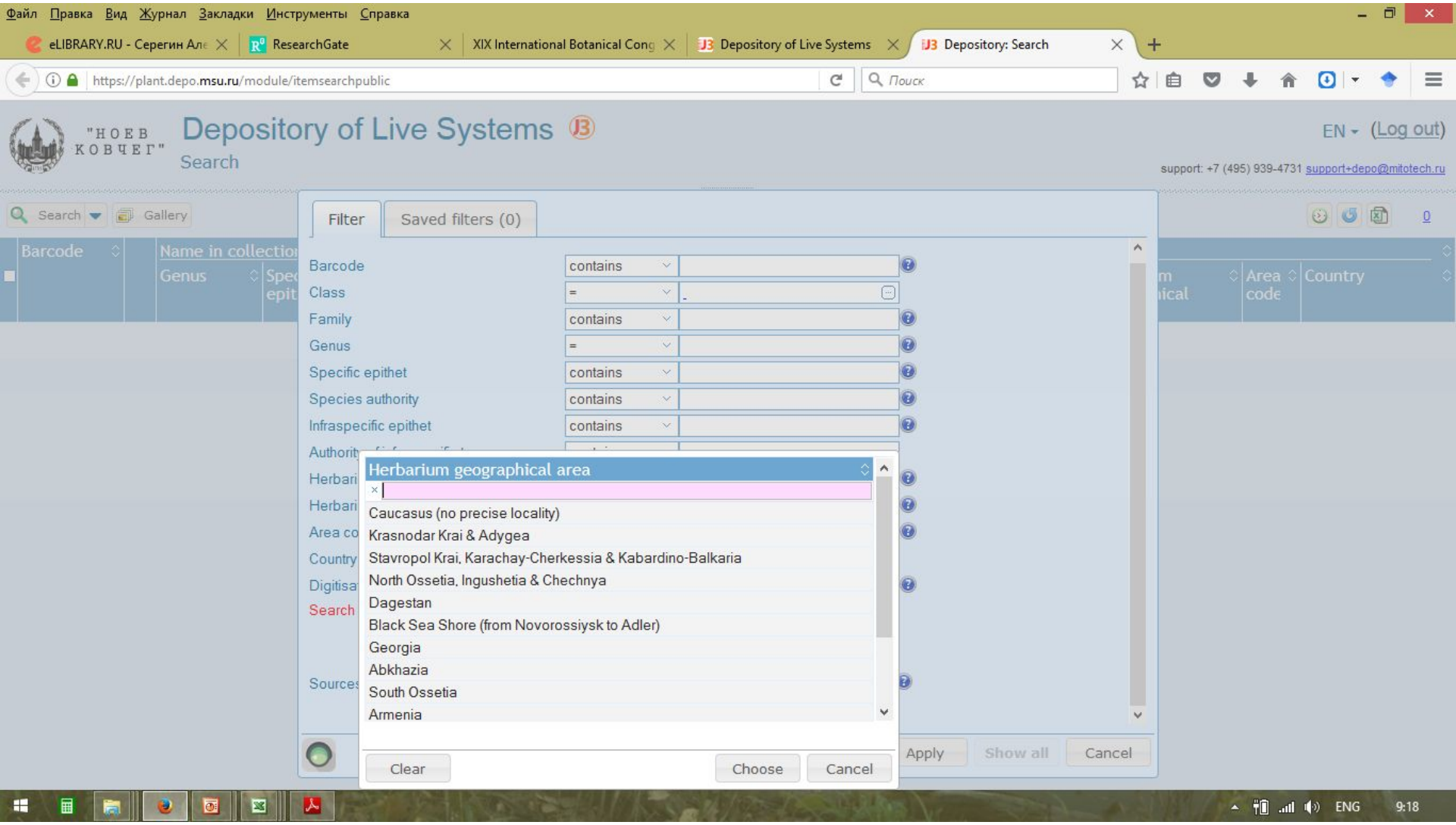
Home page

https://plant.depo.msu.ru/



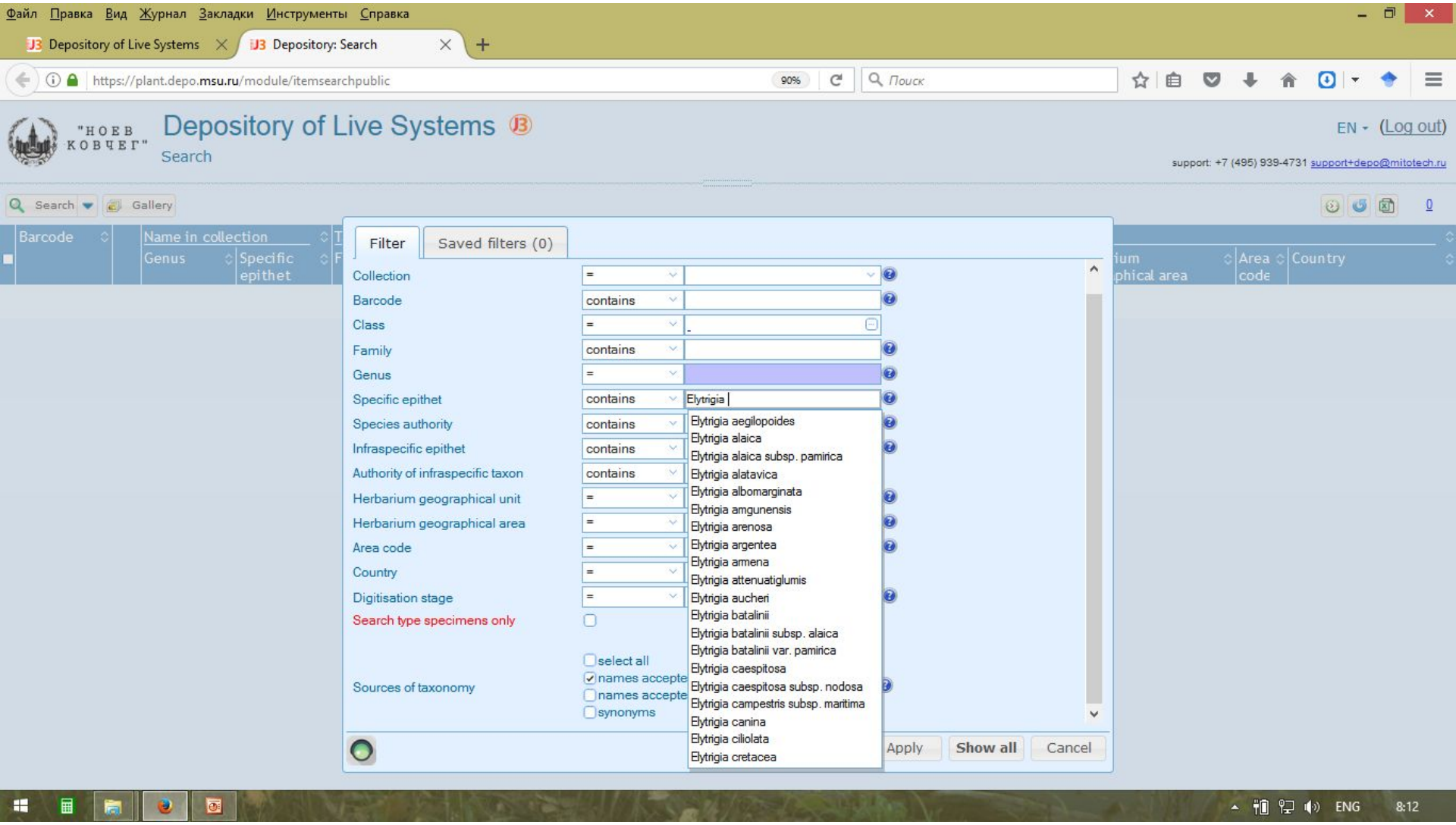
Full search form

https://plant.depo.msu.ru/



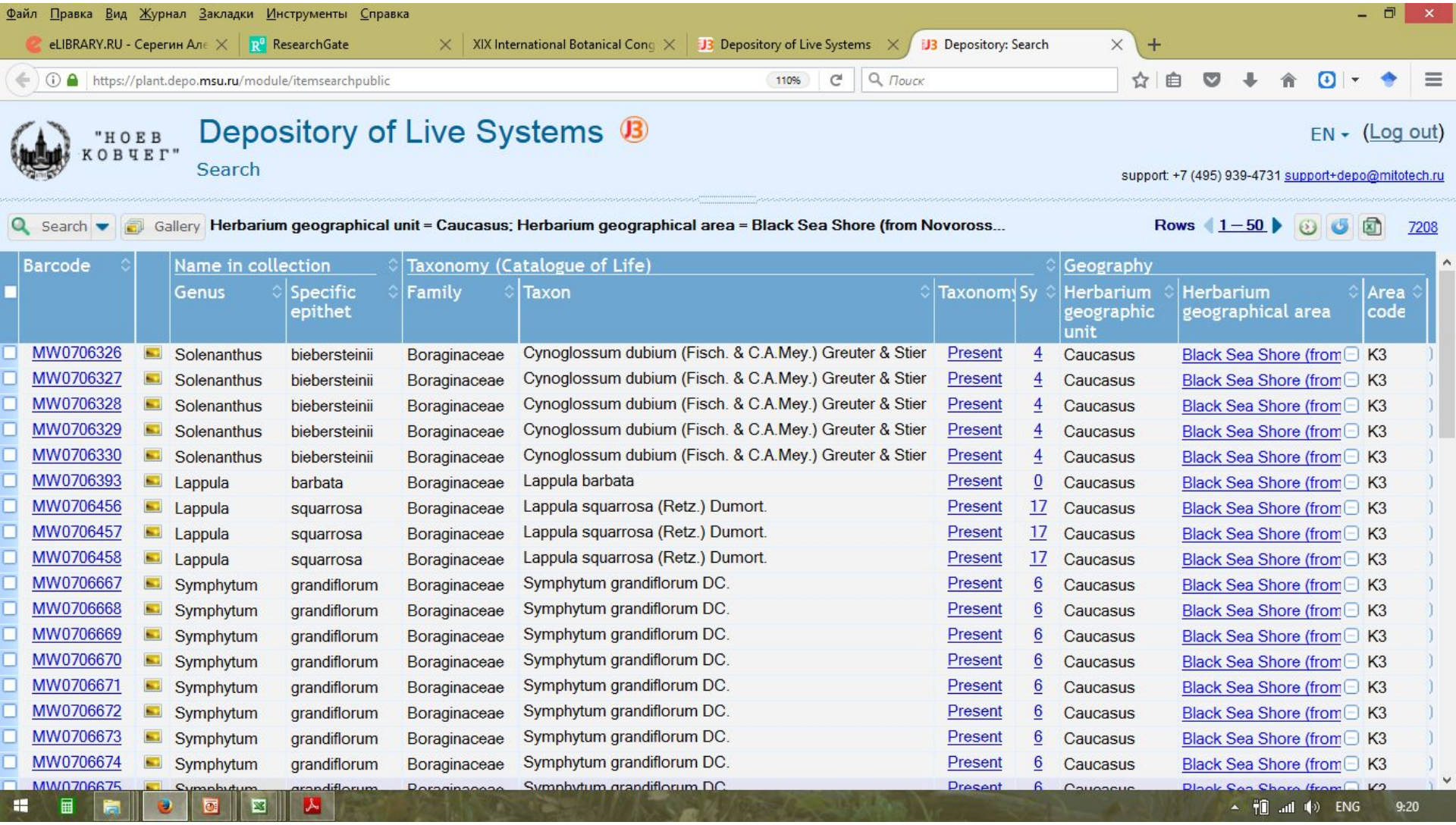
Geographical areas as the most precise geotags

https://plant.depo.msu.ru/



“Live search” feature in taxonomic fields

https://plant.depo.msu.ru/



Barcode	Name in collection		Taxonomy (Catalogue of Life)				Geography		
	Genus	Specific epithet	Family	Taxon	Taxonomy	Sy	Herbarium geographic unit	Herbarium geographical area	Area code
MW0706326	Solenanthus	biebersteinii	Boraginaceae	Cynoglossum dubium (Fisch. & C.A.Mey.) Greuter & Stier	Present	4	Caucasus	Black Sea Shore (from	K3
MW0706327	Solenanthus	biebersteinii	Boraginaceae	Cynoglossum dubium (Fisch. & C.A.Mey.) Greuter & Stier	Present	4	Caucasus	Black Sea Shore (from	K3
MW0706328	Solenanthus	biebersteinii	Boraginaceae	Cynoglossum dubium (Fisch. & C.A.Mey.) Greuter & Stier	Present	4	Caucasus	Black Sea Shore (from	K3
MW0706329	Solenanthus	biebersteinii	Boraginaceae	Cynoglossum dubium (Fisch. & C.A.Mey.) Greuter & Stier	Present	4	Caucasus	Black Sea Shore (from	K3
MW0706330	Solenanthus	biebersteinii	Boraginaceae	Cynoglossum dubium (Fisch. & C.A.Mey.) Greuter & Stier	Present	4	Caucasus	Black Sea Shore (from	K3
MW0706393	Lappula	barbata	Boraginaceae	Lappula barbata	Present	0	Caucasus	Black Sea Shore (from	K3
MW0706456	Lappula	squarrosa	Boraginaceae	Lappula squarrosa (Retz.) Dumort.	Present	17	Caucasus	Black Sea Shore (from	K3
MW0706457	Lappula	squarrosa	Boraginaceae	Lappula squarrosa (Retz.) Dumort.	Present	17	Caucasus	Black Sea Shore (from	K3
MW0706458	Lappula	squarrosa	Boraginaceae	Lappula squarrosa (Retz.) Dumort.	Present	17	Caucasus	Black Sea Shore (from	K3
MW0706667	Symphytum	grandiflorum	Boraginaceae	Symphytum grandiflorum DC.	Present	6	Caucasus	Black Sea Shore (from	K3
MW0706668	Symphytum	grandiflorum	Boraginaceae	Symphytum grandiflorum DC.	Present	6	Caucasus	Black Sea Shore (from	K3
MW0706669	Symphytum	grandiflorum	Boraginaceae	Symphytum grandiflorum DC.	Present	6	Caucasus	Black Sea Shore (from	K3
MW0706670	Symphytum	grandiflorum	Boraginaceae	Symphytum grandiflorum DC.	Present	6	Caucasus	Black Sea Shore (from	K3
MW0706671	Symphytum	grandiflorum	Boraginaceae	Symphytum grandiflorum DC.	Present	6	Caucasus	Black Sea Shore (from	K3
MW0706672	Symphytum	grandiflorum	Boraginaceae	Symphytum grandiflorum DC.	Present	6	Caucasus	Black Sea Shore (from	K3
MW0706673	Symphytum	grandiflorum	Boraginaceae	Symphytum grandiflorum DC.	Present	6	Caucasus	Black Sea Shore (from	K3
MW0706674	Symphytum	grandiflorum	Boraginaceae	Symphytum grandiflorum DC.	Present	6	Caucasus	Black Sea Shore (from	K3
MW0706675	Symphytum	grandiflorum	Boraginaceae	Symphytum grandiflorum DC.	Present	6	Caucasus	Black Sea Shore (from	K3

Results as a table

https://plant.depo.msu.ru/

Файл Правка Вид Журнал Закладки Инструменты Справка

eLIBRARY.RU - Серегин Але | ResearchGate | Новости | Depository: Specimen | Depository: Search

https://plant.depo.msu.ru/module/itempublic?openparams=[open-id%3D79526891]

"НОЕВ КОВЧЕГ"

Depository of Live Systems

Specimen

EN (Log out)

support: +7 (495) 939-4731 support+depo@mitotech.ru

Solenanthus biebersteinii [MW0706326]

How to cite

General | Depo... | Biblio...

300dpi

Barcode	MW0706326
Name accepted in collection	
Genus	Solenanthus
Specific epithet	biebersteinii
Authority of species	
Infraspecific rank	
Infraspecific epithet	
Authority of infraspecific name	
Supraspecific taxa	Eukaryota Plantae Tracheophyta Magnoliopsida Boraginales Boraginaceae
Taxonomy (Catalogue of Life)	
Accepted name (Catalogue of Life)	**Cynoglossum dubium (Fisch. & C.A.Mey.) Greuter & Stier**
Synonyms	Cynoglossum biebersteinii (DC.) W. Greuter & Burdet Cynoglossum stamineum Bieb. Solenanthus biebersteinii DC. Solenanthus dubius Fisch. & Mey. ex Hohen.
Herbarium geographical unit	Caucasus
Herbarium geographical area	Black Sea Shore (from Novorossiysk to Adler) K3

Creation date 03.03.2017 | Get specimen permalink Get link | Visit counts 5

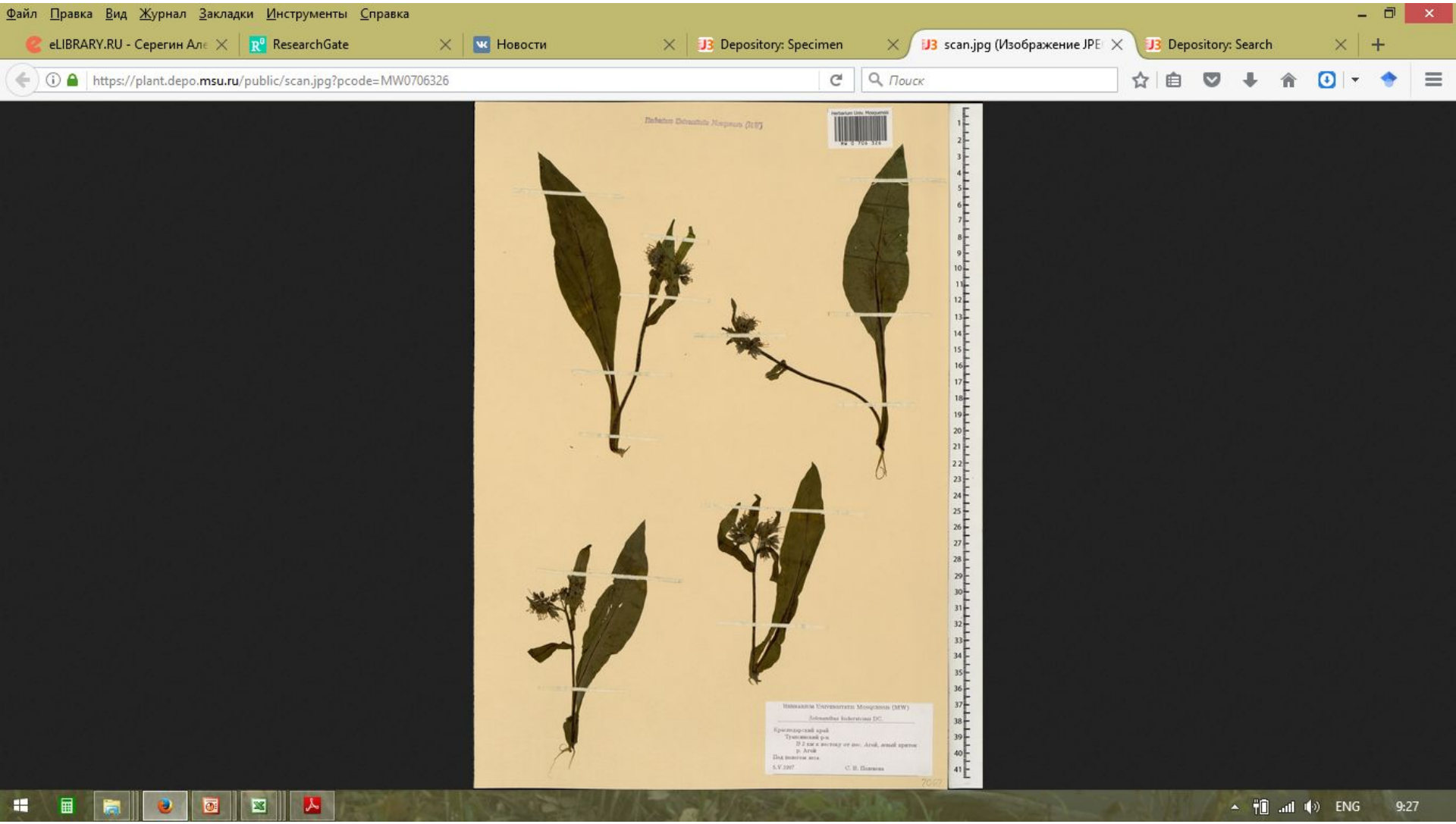
Digitisation stage 2016 (stage 2) | Get scan permalink Get link | Created/Verified by Seregin A. P.

ENG 9:26

Specimen record

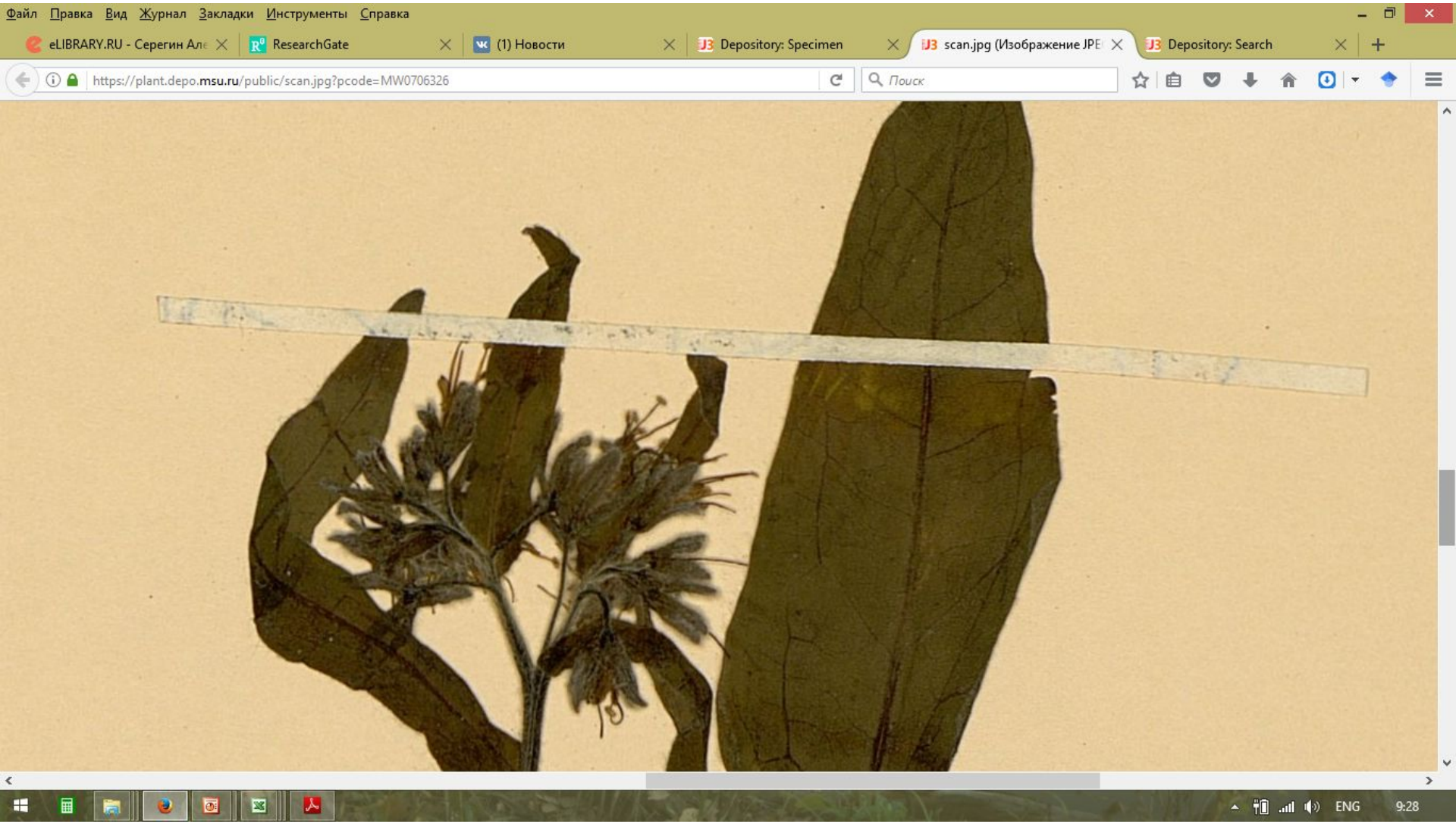
Herbarium Universitatis Mosquensis (MW)

https://plant.depo.msu.ru/



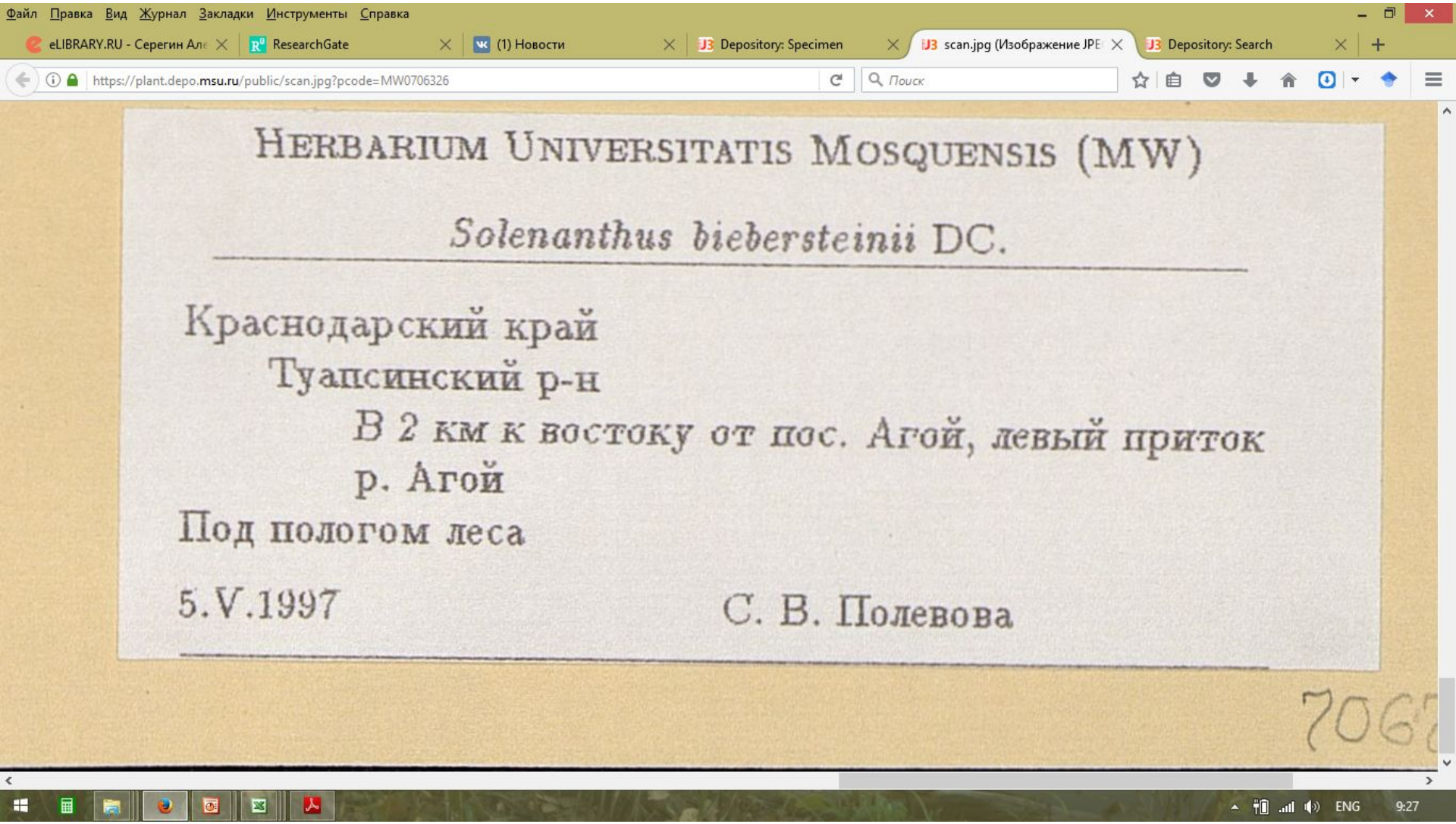
JPG files are directly available at 300 dpi

https://plant.depo.msu.ru/



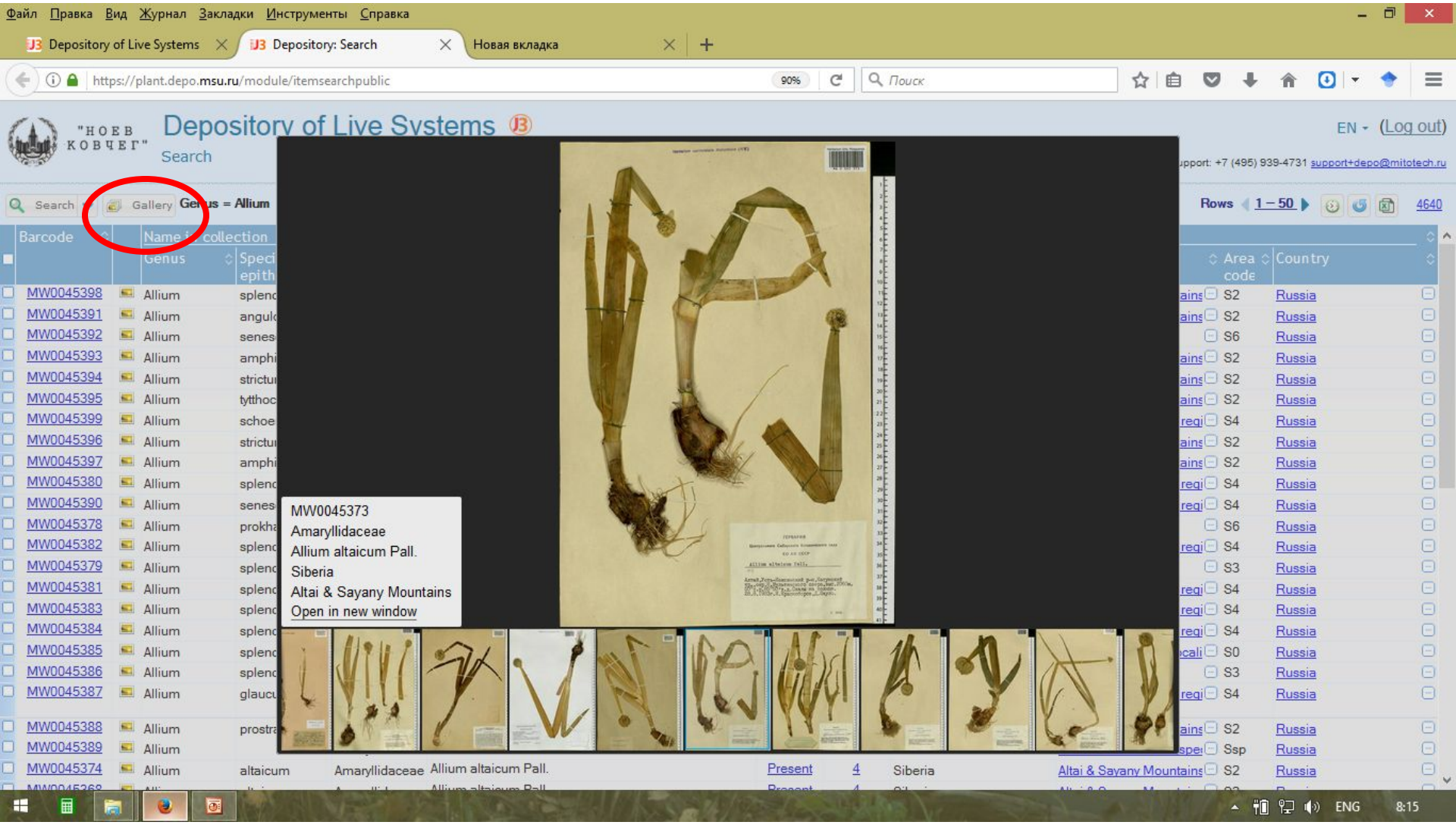
JPG files are directly available at 300 dpi

https://plant.depo.msu.ru/



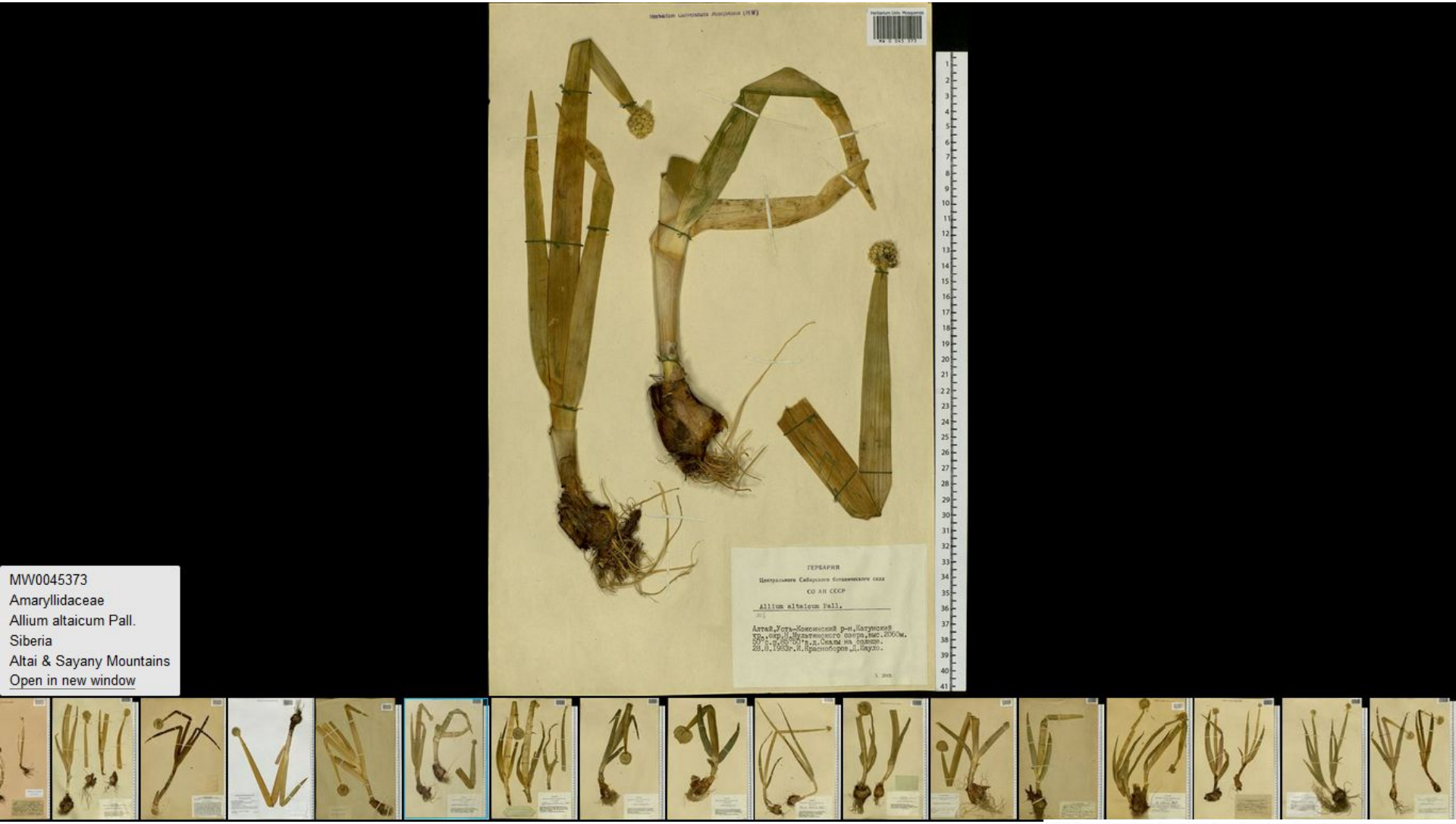
JPG files are directly available at 300 dpi: label at 100%

https://plant.depo.msu.ru/



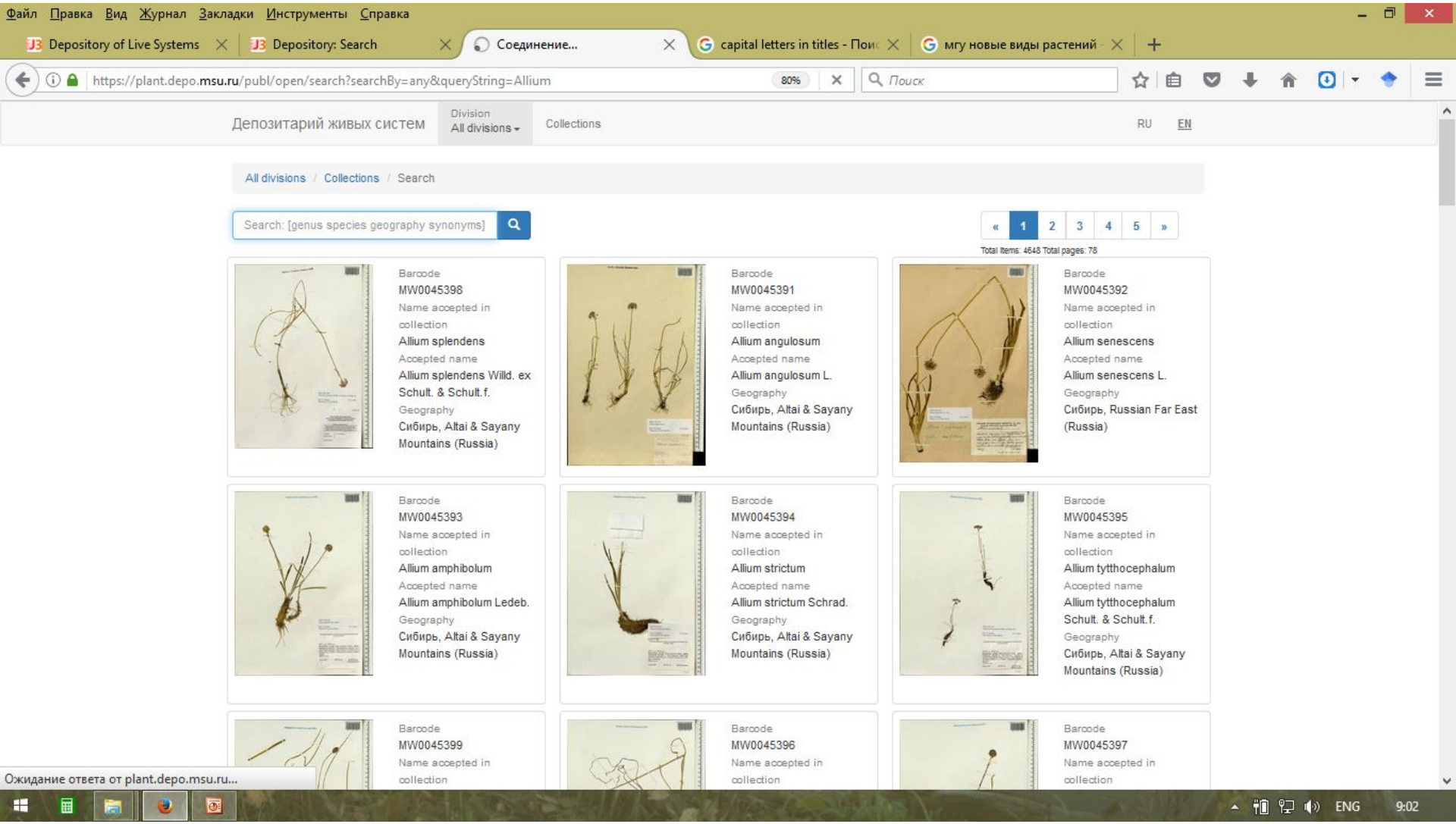
Gallery feature for quick scrolling of JPG files as slideshow

https://plant.depo.msu.ru/



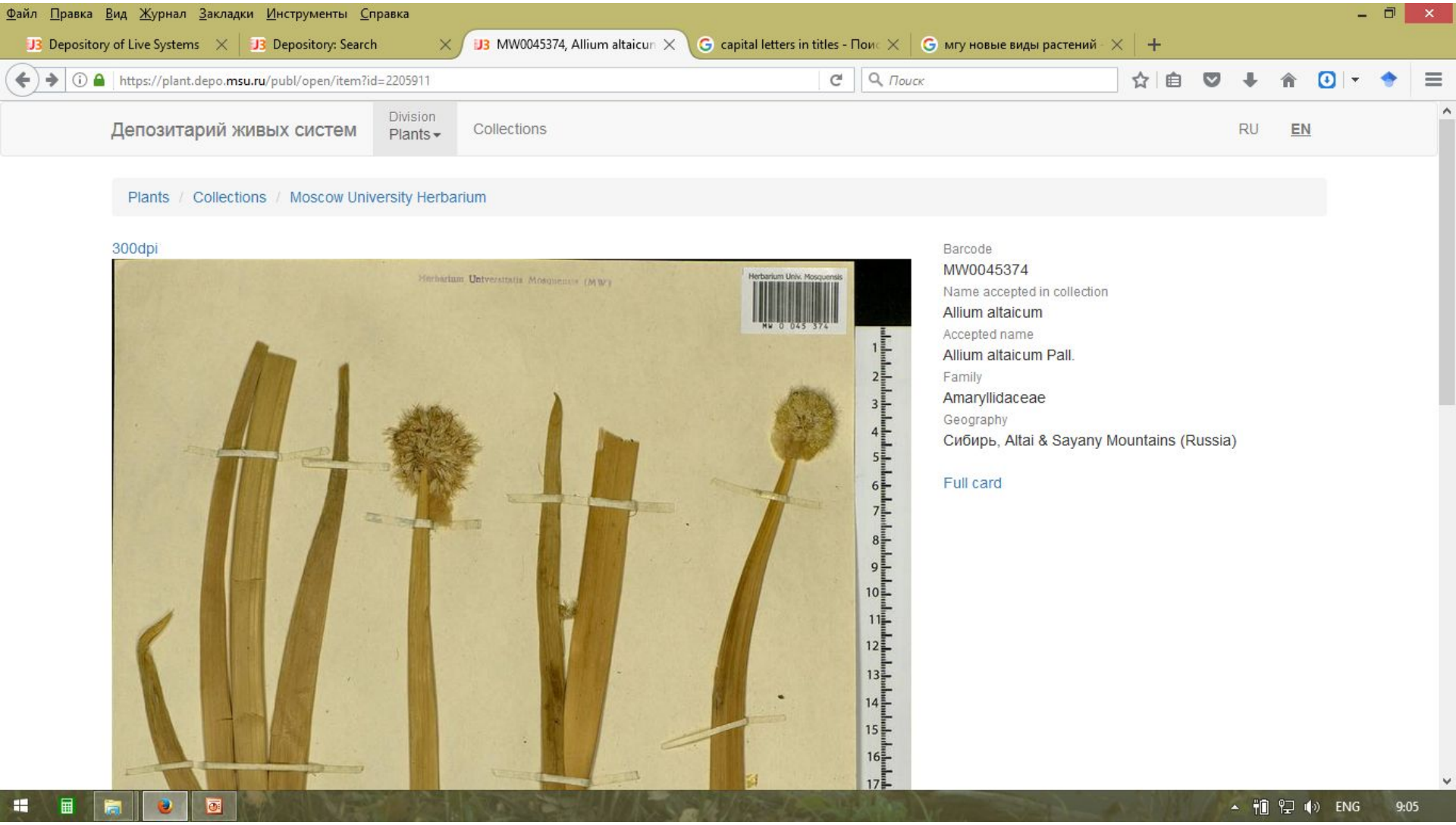
Gallery feature for quick scrolling of JPG files as slideshow

https://plant.depo.msu.ru/



Alternative results page used for *Google* indexing

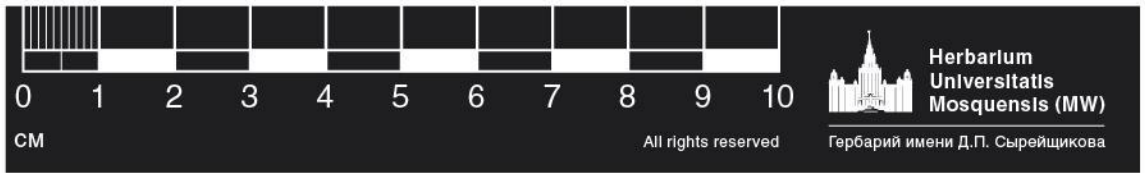
https://plant.depo.msu.ru/



Alternative specimen record used for *Google* indexing

Digitisation:
Label Capturing as the Second Step

- 45,000 labels will be databased in 2017: Caucasus and the Crimea
- Contract with highly trained commercial partner
- Single-label specimens only
- Original label language (no translation)
- 24 RUR (0.4 USD) per label



Digitisation: Georeferencing as the Third Step

- 3,000 specimens were georeferenced in 2017
- A single highly-trained freelancer
- N, E coordinates
- 10 RUR (0.18 USD) per specimen
- Gazetteer with standard localities as a result

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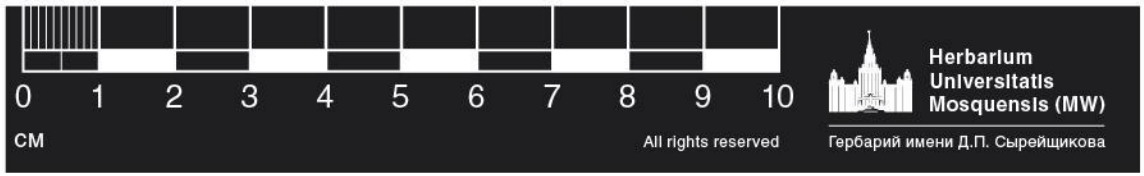
PR and Promotion

- Four appearances on federal TV

- Dozens of communications in news on web portals
- Digital Herbarium blog on vk.com
- Russian vernacular names (14K) used for indexing



MW Herbarium by the End of 2018

- 1,050,000 physical specimens (60^{th} in the world)
- integration of few lesser collections (negotiations are in progress)
- 930,000 specimens will be imaged (89%)
- 250,000 specimens will be databased (24%)
- 10,000 specimens will be georeferenced (1%)

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Thank you for being with me today!

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