

**PLANT EXPEDITION TO THE
REPUBLIC OF GEORGIA — CAUCASUS MOUNTAINS**

AUGUST 15 - SEPTEMBER 11, 2010



**SPONSORED BY THE
DANIEL F. AND ADA L. RICE FOUNDATION**

PLANT COLLECTING COLLABORATIVE (PCC)

Chicago Botanic Garden

Missouri Botanical Garden

The Morton Arboretum

New York Botanical Garden

University of Minnesota Landscape Arboretum

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Summary

With generous support from the Daniel F. and Ada L. Rice Foundation, Galen Gates and the Plant Collecting Collaborative (PCC) team made outstanding progress through an expedition in the Republic of Georgia. On this recent trip into the Caucasus Mountains, a record was set for the most collections made on any Chicago Botanic Garden and PCC expedition to date. The trip, door to door, was 26 days with field collecting most days; nearly every night's activity included seed cleaning. We made three hundred collections at 60 sites. Most were seeds from 246 types of trees, shrubs, and perennials, 14 were bulb taxa and four were in the form of perennial roots. Remarkably, 53 taxa are new to U.S. cultivation. Six of the bulb species fall under the Convention on International Trade in Endangered Species (CITES). Before these could leave Georgia, a review process was required and a permit secured with the personal signature of the Minister of the Environment. The Chicago Botanic Garden is one of 25 CITES Rescue Centers in the United States. Seeds, spores and herbaria were brought back to the Garden and disseminated to other PCC members.

These trips into the wild have increased the breadth and depth of the Garden's Living Collections, the basis of all botanic gardens. Combined efforts like this one increase diversity significantly with seed-grown plants that are curated at five institutions. These expedition plants will be grown in the Garden's Plant Production area and moved at the appropriate time and size into the collections. They will be planted in the display gardens and/or join over 3,300 other plants from previous expeditions. Expedition plants are evaluated each year for health, provenance-based adaptability, and any unique characters (e.g. better growth habit, unusual flowers).

While most plants collected are well-suited to the Garden's site, there are seven that have only lived at the Rice Foundation's Plant Evaluation Garden. If not for this site, some plant species would be lost to cultivation in the United States. With the international Convention on Botanical Diversity (CBD) treaty, and the federal government's ever-tightening control of its borders, securing documented, wild-origin germplasm is of critical importance if these plants are to survive *ex-situ* (in off-site conservation). These two topics were hotly debated at the Chicago Botanic Garden's International Symposium: *Plant Exploration: Protocols for the Present; Concerns for the Future*, also generously funded by the Rice Foundation. The proceedings from this event are still referenced at professional meetings today.

We thank the Daniel F. and Ada L. Rice Foundation for their support which made this trip possible. The Rice Foundation's contribution to conserving plant collections helps maintain botanic diversity, a critical challenge in the face of climate change.

Georgia's Caucasus

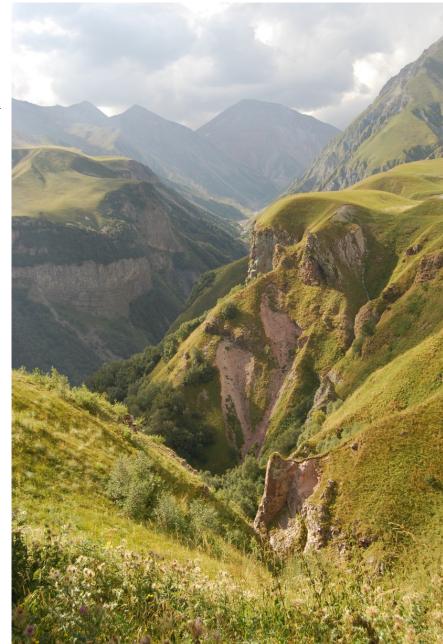


The Republic of Georgia is roughly the size of South Carolina. It is very similar in latitude to PCC member institutions. Tbilisi, our principle home base, is 41N Latitude and Chicago is 42 N (see maps, page 17). Habitats throughout the extent of the Caucasus include: deserts, steppe (prairie), savannas and forests. The country is bordered on the North by Russia with Turkey and Azerbaijan to the South.

The Georgian vegetation is a confluence of several floras: plant species from the northern range of Turkey, Iran, and the Himalayas; representation of the southern flora of the Russian and Ukrainian steppes; and specifically, geophytes (bulbs) from central Asia. The confluence of these floras and ecotones is valuable for tolerance to different growing conditions and species. Ecotones are transition areas of vegetation between two different plant communities, such as forests and grasslands.

Ecotones have some of the characteristics of each bordering community and often contain species not found in the overlapping communities. An ecotonal area often has a greater number of species and a higher density of organisms than are found in either flanking community.

The Lesser and Greater Caucasus Mountains are two ancient ranges that remain under great geologic pressure; through eons of tectonic plates pushing skyward, plants continue to be further isolated - which in some cases has precipitated new species (speciation). This biologically rich area contains an incredible 6,400 taxa (the entire US has 18,743 taxa). The melding of plant communities and existing mountain ranges account for the very high rate of endemism — 1,600 endemics (plants found nowhere else), a remarkable 25% of total taxa.



There are 17 endemic genera (not species) of plants in Georgia, nine of which are associated with high mountain ecosystems. Endemism is particularly high in rocky-scree environments; 80% of the plants growing on the Colchic limestone scree are found nowhere else in the world. The flora of the Caucasus region includes many ancient species. Notable relict species include the endemic rhododendrons (*Rhododendron caucasicum*, *R. ungemii*, *R. smirnowii*) and Persian ironwood (*Parrotia persica*).

Recent economic and political crises in the region account for intensified forest clearing for fuel-wood; illegal hunting and plant collecting threaten the region's truly unique biodiversity. Much of our collecting took place at higher elevations. The lower plains are experiencing the greatest destruction.

Like areas of the United States, the Georgian climate is challenging with hot summers and cold winters. One of the limiting factors in growing any plant is "hardiness" - a plant's tolerance to cold temperatures. We now better appreciate the negative impact hot temperatures can have on plants. Record summer temperatures were set in Tbilisi at over 113° F in 2010. Tbilisi's record low is –12° F. The record low for one of our home bases, Mt. Kazbegi, is –43° F. The Chicago Botanic Garden's record high and low temperatures are 104° F and –27° F.



We initially thought these *Carpinus* were showing early fall color,
unfortunately it was fatal drought-stress



Georgia and PCC members have similarities in climates and habitats



This waterfall was nearest the right-hand side of the image above. Notice how the three ridges decrease in vegetation as the distance increases from this water source

Note how the ground forces have tilted the sediment layers exposing colored strata. The dark mounds are *Spiraea trilobata*



Expedition

The objectives for this expedition were to:

- ◆ Collect, grow, evaluate, and preserve plant material to help develop the plant collections and herbaria of public gardens,
- ◆ Secure increased diversity through seed-grown plants at multiple institutions, and
- ◆ Support the federal government's National Germplasm System.

In order to develop diverse, high-quality plant collections, expeditions into native ecosystems are of paramount importance. As a whole, wild-collected, documented material is not commercially available and not readily available from the U.S. government's germplasm centers. At this point, most targeted germplasm can only be obtained by collecting from the wild. The placement of wild-collected germplasm in professionally curated *ex situ* collections is a priority of public gardens, members of PCC and the federal government.

Collections management maxim;

- First: Get *the* plant (a target species)
- Second: Get *a* wild-collected plant
- Third: Get the *right*, wild-collected plant (a climatic analog)

Although greater resources are required, PCC members are focused on high-quality acquisitions, working to eliminate the “second step” whenever possible.

Invariably, as with all expeditions, some targeted plants are not in seed but are in flower or only have green, partially-ripened seed. When collecting in the wild, seeds must be collected at that moment when the plant is found—and these may, or may not, ripen. In this situation, it helps to leave seeds attached to their stem and place them upside down in a paper bag; this increases the chance of further ripening.

Under varying and challenging expedition conditions, all seeds are regularly aired out and continuously cleaned. Whether seeds remain green or not, there is always the chance that one of those seeds will make it back to the U.S. and germinate. As with explorers thousands of years ago, there are no fool-proof methods for capturing great quantities of seed or creating perfect herbarium specimens.

Collecting sites included environments of sun and shade, moist and dry soils, low elevations, and mountains surpassing tree lines. This expedition covered altitudes from 1,000' to 8,000' (1.5 miles). As a rule, the higher the elevation, the greater a plant's hardiness. Hardiness should not be a problem for the plants collected, good drainage further increasing performance.

The Rice Foundation's continued support uniquely provided for the collection of largely perennial and spring bulbs - two groups of plants that have been over-looked by public garden expeditions. Over three hundred collections were made at 60 sites. Most were seeds from 246 types of trees, shrubs, and perennials, of which 14 were bulb taxa and four were in the form of perennial roots.

We acquired 53 taxa that are new to U.S. cultivation. The Garden coordinated the division and distribution of seeds, roots, bulbs, spores and herbarium specimens to other PCC members. In one case, a larger number of seeds will be sown and grown out. Growing 50-100 plants of a taxon usually allows for any genetic variation to reveal itself. Often, when the collection is divided five ways, the number of some seeds is small (e.g. three seeds of *Salvia garedji*). Seed quantities are greatly influenced by expedition conditions, the growing season that particular year, institutional representatives, and the degree of seed ripeness. Excess seeds were offered to the USDA for their germplasm facilities.

The expedition also secured six internationally endangered taxa which fall under the Convention on International Trade in Endangered Species (CITES). Before these could leave Georgia, a review process was required and a permit secured with the personal signature of the Minister of the Environment. These rarities are planted in a secure structure in a non-public area where they will be increased in quantity and eventually incorporated into the permanent collections.

As usual a Phyto-sanitary Certificate was required for exiting the Republic of Georgia and re-entering the United States. An international Convention on Biological Diversity (CBD) agreement between the Republic of Georgia and PCC members was not necessary, only personally-signed CITES permits from the Minister of the Environment. The Chicago Botanic Garden is one of 25 CITES Rescue Centers in the United States. When plants are confiscated at the border, the Garden, as a U.S. Rescue Center, has the opportunity to salvage illicit contraband.

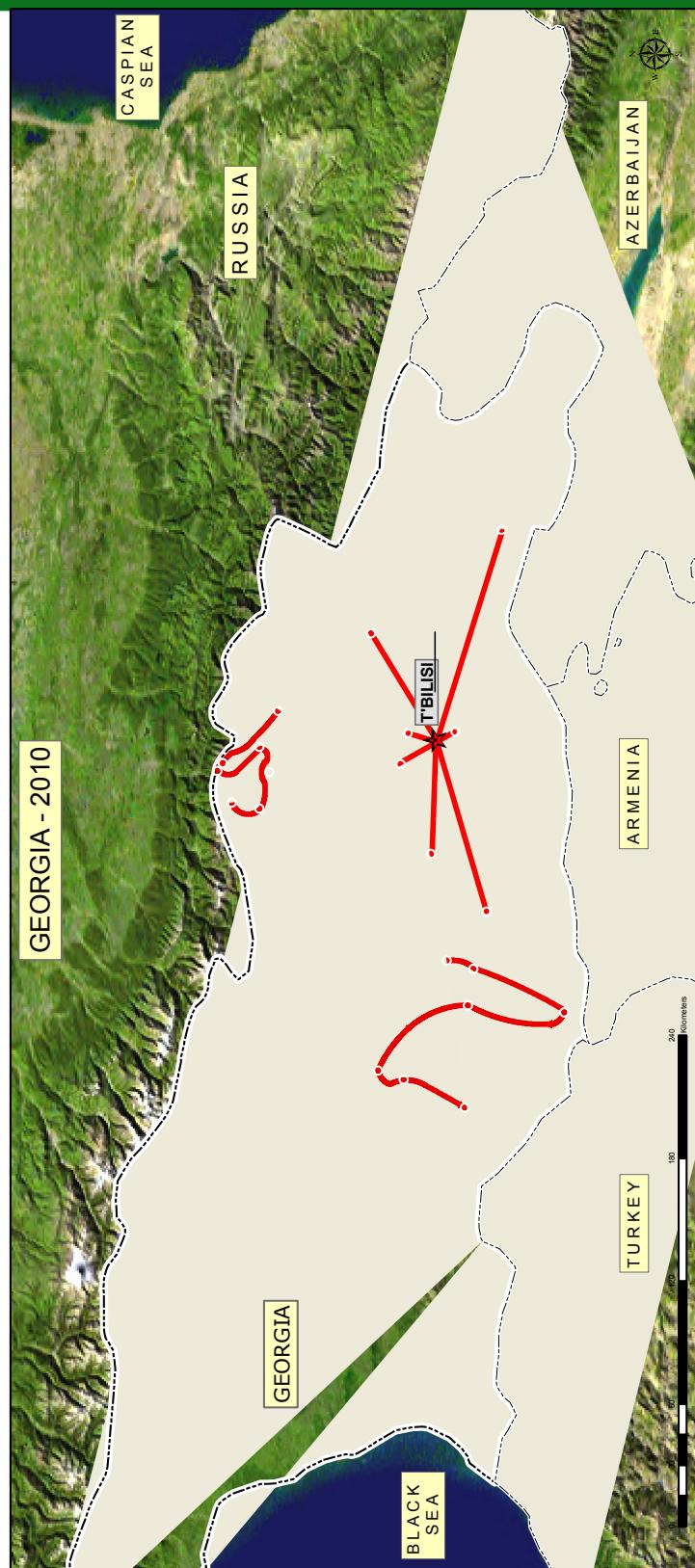
All collecting efforts were in full compliance with, and spirit of, the stipulations of CITES, the CBD, Republic of Georgia rules and regulations, and U.S. laws governing access to germplasm.



Expedition Route

Three sites acted as home base:

- ◆ Tbilisi (Capitol)
- ◆ Bakuriani (West)
- ◆ Kazbegi (North)



Itinerary

16 Aug.	Arrive in Tbilisi
17 Aug.	Tour Tbilisi Botanical Garden
18 Aug.	Shio-Mgvime
19 Aug.	Gombori Range
20 Aug.	Gareji
21 Aug.	Manglisi- Nichbisi
22 Aug.	Barisakho
23 Aug.	Tsalka - Bedeni Plateau
24 Aug.	Bakuriani Research Station
25 Aug.	Tskhratskharo Range
26 Aug.	Tetrobi - limestone region
27 Aug.	Surroundings of Tabatskuri Lake
28 Aug.	Akhaltsike - Vardzia
29 Aug.	Likani (Borjomi Kharagauli National Park)
30 Aug.	Bakuriani - Kazbegi
31 Aug.	Dariali Gorge - Gveleti
1 Sept.	Gergeti - Pansheti
2 Sept.	Juta
3 Sept.	Truso Gorge - Kobi
4 Sept.	Kazbegi - Tbilisi
5, 6 Sept.	Zedazeni, Algeti Gorge - Khrami gorge
7 Sept.	Department of Plant Conservation (cleaning bulbs of <i>Galanthus</i> ssp, etc)
8, 9, 10 Sept.	Cleaning seeds, inspections, CITES permits and shipping

Collaboration

The Plant Collecting Collaborative (PCC) is a consortium of five public gardens. They are:

Chicago Botanic Garden, Glencoe, Illinois

Missouri Botanical Garden, St. Louis, Missouri

The Morton Arboretum, Lisle, Illinois

The New York Botanical Garden, New York, New York

University of Minnesota Landscape Arboretum, Chanhassen, Minnesota

The mission of the PCC is to seek out new landscape plants that are well suited to the eastern upper-half of the United States. Plants of horticultural merit are of primary interest, but the PCC also recognizes the value in collecting medicinal, rare and endangered plants. The Collaborative was formed in 1992 to fulfill the needs of plant collections in Midwest institutions (originally called the Midwest Plant Collecting Collaborative). The New York Botanical Garden was invited to join in 2005 to strengthen perennial collections, at which time the name was changed to the Plant Collecting Collaborative.

This expedition was a joint international effort with colleagues from the Tbilisi Botanical Garden and Georgian Institute of Botany in the Republic of Georgia. Interest specifically in collecting in the Caucasus Mountains was precipitated by:

- ◆ An area virtually unexplored for perennials,
- ◆ Current access to one of the most diverse regions in the world, and
- ◆ Analogous ecosystems.

The American delegation was comprised of Galen Gates, Chicago Botanic Garden (delegation leader); Jason Delaney, Missouri Botanical Garden; and Jon Peters, The New York Botanical Garden. The Georgian delegation was supported by Dr. Nukri Sikharulidze, Director of the National Botanical Garden of Georgia, Ilia State University and Dr. Manana Khutshishvili, (Georgian leader), Director of the Herbarium, National Botanical Garden, Ilia State University.

Observations

In mountainous areas, we saw spruce-beech forests that were predominant on northern slopes while pines populated south aspects.

In late summer high elevation areas looked as if they were covered in just closely-mown lawn, belying the fact they were thick with diversity. It was a treat to see plants in flower that we had only seen in seed at lower elevations. (See page 23) Intermediate elevations showed the fallout from the record-breaking heat wave. (See page 5)

While the Caucasus Mountains are largely an endangered ecosystem with some species on the brink of extinction, it seemed the insect populations were alive and well, as noted during our marathon seed-cleaning sessions.

Specific species observations include the following:

Acer heldrichii ssp. *trautvetterii* was a great surprise with its perfectly clean foliage and red samaras. This particular tree was growing a mile above sea level and had a more narrow habit. (See page 20)

Aconitum anthora was also at a high elevation, about 12" tall, and uncharacteristic for a monkshood, sporting yellow flowers. (See page 23)

Colchicum speciosum was growing above 7,000' in a dry, heavily-grazed meadow. Being in the Colchicaceae (Amaryllidaceae) family, it is poisonous to livestock, so the sheep would pass over it, feeding on other plants to the ground. (See page 20)

Cotinus coggygria, the analog to the U.S. *C. obovatus*, grew in similarly rocky, dry soils. The specimens we collected seed from had two damaged leaves that showed an abundance of anthocyanin, so we are optimistic for strong fall color.

Dryopteris oreades is a beautiful fern we found in mountainous regions at elevations up to a mile. Its delicate appearance belies the fact that it grows from Iceland and Norway south to Spain and Pakistan.

Echinops sphaerocephala had the typical spiny-looking flowers but were actually soft to the touch. It has been very difficult to positively identify what is true and what masquerades as this taxon in the U.S.; this may prove to be a valuable identification characteristic. (See page 21)

Gentiana schistocalyx was an incredible gentian that appears more as a shrub at 24". It has the intense blue flowers one thinks of for this group of perennials (See page 21)

Rhododendron caucasicum we found above tree line at nearly 8,000'. They grow in only a thin layer of soil over a rocky substrate, providing little in nutrients and less in water. The cool temperatures at this altitude help keep their evergreen leaves from desiccating, and their diminutive height (18-20") helps keep them from being ripped out of the ground in the intensely wind-swept Tskhratsharo Pass. These populations were dramatic from a distance where their huge stands appeared as throw-rugs blanketing the mountain. (See page 24).

Observing plants in the wild is educational, providing insights so their cultural needs can be better understood and met. The biggest surprise was the "inhospitable" conditions the *Colchicum* require. On this trip we did not see Eurasian plant analogs that require different habitats than our American species. Two plants found in flower in the spring of 2000 had formed seeds this trip, which we collected, making the past ten years seem a shorter period of time.



As with previous Rice Foundation support, the PCC was able to secure high quality field equipment. In fact, our colleagues were very proud to show us the "clip and hold" pole-pruner provided by Rice Foundation funds in 2000. Our foreign colleagues had taken excellent care of this tool the past ten years.

Documentation

Field collections were documented with “passport” data (e.g., plant description, aspect, plant associates and collection-site specifics with latitude and longitude through GPS equipment). The Rice Foundation provided for a new GPS model that had just entered the market. Four antennae made it possible to punch through dense forest canopies providing much quicker access to satellites.

Herbarium specimens are dried plants that physically document each collection made and support the herbaria of cooperating institutions. On average for PCC expeditions, four herbarium specimens are collected per taxon; this trip the total number of specimens collected was 148. The focus was on seed collecting, which resulted in a total of 300 seed collections, a record for Garden expeditions.



Institutional Review

Of the 300 collections made from 60 sites, 246 taxa were offered to fellow PCC members. This reduction reflects: duplicate collections, questionable viability at the time of collecting, the desire for a broader genetic representation, limited seed availability at any particular site, unique characters, etc. There are always some duplicate collections made. The number of collections does not reflect diversity one-for-one.

A pre-trip analysis for potential invasiveness was conducted for target taxa and for the additional taxa upon return. Each taxon was run through two weed-risk assessment models.

Total taxa further drops to 231 viable seed lots after clearing the Animal and Plant Health Inspection Service (APHIS) Station in New York and following an internal review. The review was done by an inter-disciplinary Risk Assessment committee comprised of Garden staff: Boyce Tankersley, Director of Living Plant Documenta-

tion; Kay Havens, Co-Director of Plant Science and Conservation; Richard Hawke, Plant Evaluation Manager; Galen Gates, Curator of Herbaceous Plants and Michael Davenport, Collections Specialist who ran plants through the decision tree. (See Appendix III)

The results of this assessment were shared with other members of the PCC, and each institution will receive a copy of this report. Appendix III details how the various taxa ranked following the review.

Some collections are not received from host countries for a variety of reasons, endemic rarities initially accepted that ended up being weeds here; an insect may have just hatched from a minuscule egg, etc. Shipping in and out of the Republic of Georgia is extremely difficult with no standardized policies and procedures one day to the next (e.g. seeds, airfare, and luggage). Dr. Khutshishvili spent well over a week trying to get our supplies cleared prior to our arrival.

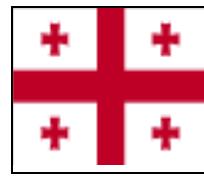
We greatly appreciate the Rice Foundation's continued support and particularly thankful that this trip was realized. This trip was a great success with 300 collections, 53 taxa new to U.S. cultivation, increased breadth and depth to be added to the collections and the potential for another plant introduction through Chicagoland Grows®.

Acknowledgements

The Plant Collecting Collaborative (PCC) would like to acknowledge the Daniel F. and Ada L. Rice Foundation whose generous support and assistance made the Republic of Georgia - Caucasus Mountains expedition possible.

We want to thank Sophia Siskel, President and CEO of the Chicago Botanic Garden, and Kris Jarantoski, Executive Vice President and Director for their support.

Special thanks to: Nukri Sikharulidze, PhD, Director of National Botanical Garden of Georgia, Ilia State University and Manana Khutsishvili, PhD, Director of the Herbarium, National Botanical Garden of Georgia, Ilia State University.



The Collaborative also wants to extend our appreciation to Jim Cocos of Missouri Botanical Garden and Todd Forrest of the New York Botanical Garden for supporting participation by Jason Delaney and Jon Peter, respectively.

In addition, we thank Tamriko Kurdadze, Director of Bakuriani Alpine Botanical Garden of National Botanical Garden of Georgia, Ilia State University; Nino Eradze, Associate Researcher, National Botanical Garden of Georgia, and Ilia State University; and Marina Siradze, Assistant Researcher National Botanical Garden of Georgia, Ilia State University.

Dr. Khutsishvili coordinated all field arrangements and virtually all translations throughout our time in the Republic of Georgia.

Temuri Siukaev, driver and botanist, was invaluable.

The following individuals were involved in the report:

weed risk assessment: - Michael Davenport; field notes - Kenn Ashley, Peggy Rash, and Karen Helmuth; report layout and production – Irene Lau; proofreading – Celeste Vandermey, Anya Maziak, Peggy Rash and Kenn Ashley; narrative, photography and editor - Galen Gates.

Map of the Republic of Georgia



Plant Collecting Collaborative (PCC) member locations



Map of the
Republic of Georgia
and PCC member
locations

Plant Collecting Collaborative
Latitude and Longitudes:

- ◆ Chicago Botanic Garden
Glencoe, IL
(Suburb of Chicago)
41.84°N, 87.69°W
- ◆ Morton Arboretum
Lisle, IL
(Suburb of Chicago)
41.84°N, 87.69°W
- ◆ University of Minnesota
Landscape Arboretum
Chanhassen, Minnesota
(Suburb of Minneapolis)
44.96°N, 93.27°W
- ◆ Missouri Botanical Garden
St. Louis, MO
38.64°N, 90.24°W
- ◆ New York Botanical Garden
New York, NY
40.51°N, 73.52°W

Collecting



We were fortunate to have Dr. Khutsishvili's staff helping with collecting



Freshly dug *Colchicum* bulbs



We tried to keep up with Manana K., who is affectionately named "mountain goat" by her colleagues

This is an example of seed bags and our collecting notebook documenting "passport data" with GPS readings, elevation and plant associates, etc.





We were fortunate to use Kew Garden's vehicle during the expedition. A true almond tree is shown beyond the SUV – a taxon more drought tolerant than expected



Fibigia clypeata



Scorzonera ketzkhowellii

Photos by Ken Krebs



Here peony seed is being collected. If collected and sown while still red, you avoid a two-year delay from a self induced double dormancy



In this area we witnessed the drought-tolerance of *Cotinus coggygria*



Jon Peter, New York Botanical Garden working on pressing a herbarium specimen

Collections



Prunus spinosa - a shrub with large plum fruits that were quite tasty. The plant had lost its foliage by September, but the fruit quality would have value in a breeding program. Unfortunately these are restricted by U.S. law, so we were unable to secure any *Prunus*



Sorbus caucasigena—this small scale tree usually bears orange fruit. We collected fruit from this red one that is clearly a different color than the typical orange fruit of the species



Colchicum speciosum – this beauty was found growing in an area that was quite dry, indicating these are over-watered in our Midwest gardens of clay soil. Note the honey bee.

Photo: Jason Delaney



Acer trautvetteri - this oval shaped maple was growing at a mile elevation with perfectly clean foliage and attractive red samaras



Gentiana septemfida is a delicate flower that is remarkable for its color intensity. We have been told a more adaptable landscape form is *G. s. var. lagodechianus* from Lagodeck, Georgia. We were not able to collect the latter form on this trip



Gentiana schistocalyx is an incredible shrub-like gentian standing at 18 – 24" with beautiful, vivid-blue flowers



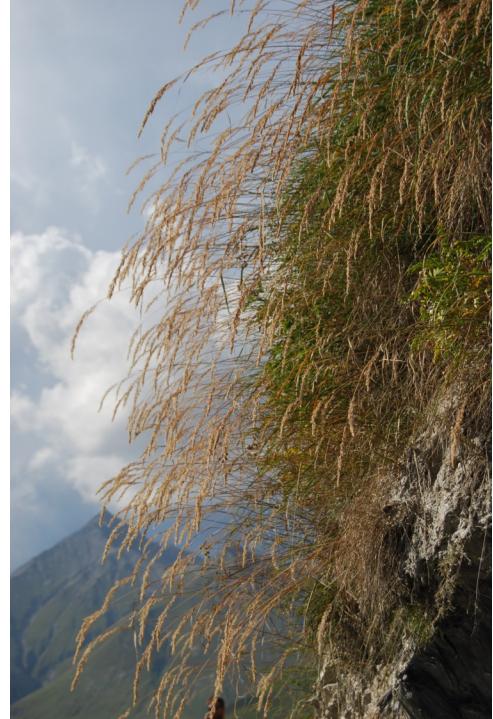
Echinops sphaerocephala, often known in this country for its prickly flowers, even late in the year, flowers were soft to the touch



Campanula and *Aconitum* here are a serendipitous combination
Photo by Jason Delaney



Alchemilla (lady's mantle) has an exceptional ecological amplitude; growing in wet steppe in Siberia and seen here in Georgia over a mile high growing in rock and facing south-west.



Just beyond safe-reach, this cliff-hugging grass was left with all its seed intact.



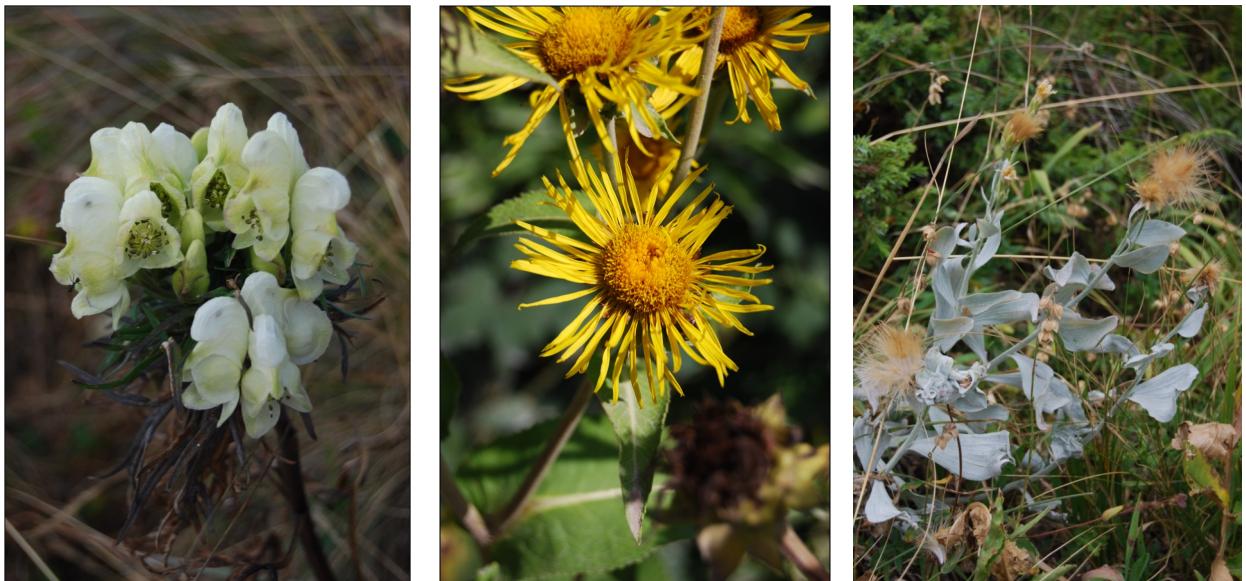
Taxus baccata – the yew on the right had much smaller, more refined foliage, but it was not bearing fruit. A frustration of expeditions is finding plants you desire - are in flower, have immature fruit, or have no seed at all that year.



Staphylea colchica – an Eurasian analog to our Bladdernut, the flowers of this species are collected in spring and pickled for their “vitamin” value in winter.



By looking at the picture above it is hard to believe that the bouquet (right) is evidence of what we saw as we climbed this peak. It was great to see the flowers of plants that were in seed at lower elevations



Aconitum anthora - not only a late-flowering monkshood but one with yellow flowers, photographed at a mile elevation - hardiness should not be an issue

Inula helenifolium contains an extract that has been shown to kill *Staphylococcus* as well as a broad range of other undesirable bacteria

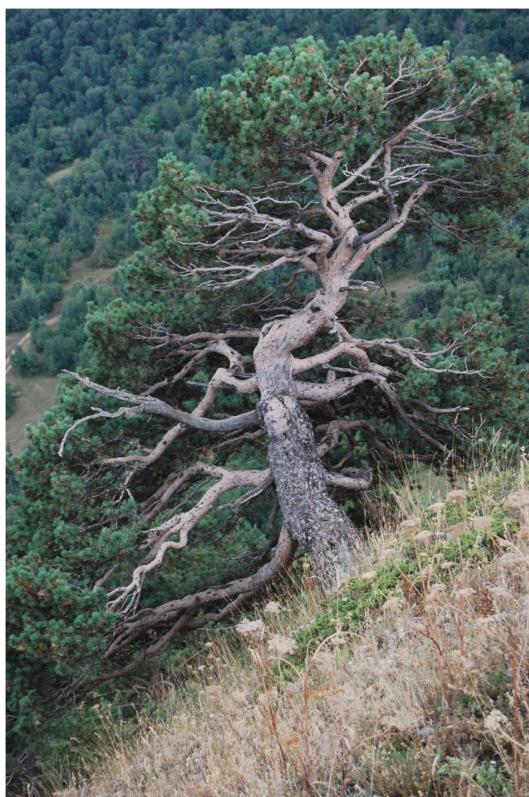
Scorzonera ketzhewelii an “aster” with attractive foliage that will probably require well-drained soil



Rhododendron caucasicum growing on rock at 8,000'



Quercus iberica - this oak has a broad ecological amplitude showing adaptability to a wide range of growing conditions



While some lump *Pinus sozposkyi* and *Pinus sylvestris* together, we have learned not to be too quick to apply a known Western name to a Caucasian plant



Platanus orientalis - Purportedly now over 1,000 years old, the diameter at one time was 11.8'



The area surrounding Mount Kazbegi became a Nature Reserve in 1979

Seed Processing



Larvae above - the insect populations were alive and well – too well. It took on average 4 hours to clean one taxon

We made 300 collections of seed. We spent more time drying and cleaning seed than we did collecting



Above you see linden seed as collected in the field, and the end product



Our herbarium specimens arrive following USDA inspection

Landscape



Georgia experiences great geologic activity

These three images show erosion of vast amounts of volcanic ash. In some areas the effuse was hundreds of feet thick



“Cave City” or Vardzia Reserve dating to 800 A.D.—still a functioning monastery; benefiting today from a small revenue stream— tourism



Calderas act as reminders of the region’s instability



A modern bridge that is lit up at night with lights that dance back and forth over the river



A grape vine put to good use for shade; 400 varieties were once grown in the Georgia wine-belt. At one time Georgia was known as Stalin's vegetable garden.



Sheep are moved into the high country through summer and were being taken back down to lower elevations in September. As practical shepherds, most flocks were herded by a goat—goats produce milk and meat as opposed to a herding dog which cannot live off the land and must be fed

Western influence is more prominent than during the Rice funded scouting trip of 2000





Original Georgian architecture



The home of a beloved philanthropist who has improved the quality of life in Tbilisi



While far afield this home is “connected”



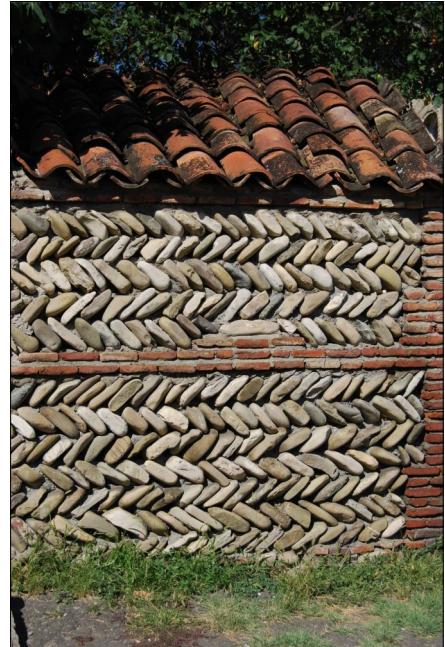
A Russian-built monument stating the Former Soviet Union will not re-invade Georgia



A more typical home (apartment building) in Tbilisi



Churches abound throughout the country



Due to the volcanic activity in the region, walls are constructed in a pattern that better withstands tremors.

Note the volcanic pipes below



Transportation



An Armenian sheep herder getting a closer look at what we were doing



A gentleman taking goods home from market; note the metal-rimmed wheels



It was harvest time near the end of the expedition - anything that could be cut and retained for winter



Buggy rides in Bakuriani—commerce!

Dining



Dr. Manana Khutishvili with her staff, Temuri our driver and the Director of the Bakuriani Research Station and her staff

We had access to excellent facilities (beds and hot showers) built by the World Wildlife Fund (WWF). We ate very well with home-made cheese, salmon, mashed potatoes, tomatoes, cucumbers, and what became a staple - khachapuri, a Georgian feast bread



A typical lunch in the field—with fresh dates!



Georgian fruit varieties are delicious. Fruit is locally grown so “cardboard” tomatoes and ‘Red Delicious’ apples don't exist.

People



Tbilisi Botanical Garden staff



A group of Russians enjoying themselves on vacation in Georgia



Roadside vendors
Photo: Jason Delaney

A broom
made from sea-
lavender, *Limonium*



The “gashes” on the mountainside are from Russian incendiary bombs dropped in late 2008. For several reasons, there are four international organizations monitoring Georgia



Georgia Past and Present

Georgia's earliest known civilization dates back 1.8 million years, as evidenced from excavations at Dmanisi in the south-eastern part of the country. The earliest Neolithic agricultural society is dated to between 6,000 and 5,000 BCE. These people used local obsidian for tools and raised animals such as cattle and pigs and grew crops, particularly grapes.

Much of Georgia's territory has been fought over by Persian, Roman, Byzantine, Arab, Mongol, and Turkish armies from at least the 1st century B.C. through the 18th century. The zenith of Georgia's power as an independent kingdom came in the 11th and 12th centuries, during the reigns of King David the Builder and his granddaughter, Queen Tamara. In 1783 the king of Kartli (in eastern Georgia) signed the Treaty of Georgia's with the Russians, by which Russia agreed to take the kingdom as its protectorate.

A more recent disturbance was in 1918 when the Bolsheviks went underground to overthrow their country. After much struggle, in 1936 Georgia became one of 15 Soviet Union Republics. With full independence in 1991, ethnic and civil strife erupted. Some Georgians preferred the earlier Russian-supported lifestyle while the majority liked the freedom they still have, even with a lower standard of living. In 1995 Georgia began to stabilize; however the separatist conflicts in Georgia's regions of Abkhazia and South Ossetia remain unresolved. Cease-fires are purportedly in effect, but these are so suspect that four international bodies keep watch: Commonwealth of Independent States (CIS), United Nations Observer Mission in Georgia (UNOMIG), Organization for Security and Co-operation in Europe (OSCE), and Human Rights Watch.

The Georgian government stakes much of its future on the revival of the ancient Silk Road as a Eurasian transportation corridor, a bridge for the transit of goods, including oil and gas between Europe and Asia. Where in 2000 we had ready access to all parts of the country, we were stopped each time we tried to cross the mountain pass through the Lesser Caucasus. The Georgian military manned this checkpoint armed with machine guns, stopping each vehicle for appropriate papers. British Petroleum has recently run oil and gas pipelines through this area. The terrorists' threats are taken very seriously. As we neared the pass we were told, "Do not take photographs for the next 2 miles."

Georgia's strategic position played a role in Russia's recent occupation and bombings. In October 2008 the Russian military made several air attacks (See page 33) with their invading ground forces coming to within 30 minutes by road of the capitol, Tbilisi. This is a country of five million residents, 20% of which reside in this city. In other respects, the future looks bright with Georgia now a member of the International Monetary Fund (IMF) the United Nations (UN), International Bank for Reconstruction and Development (IBRD), and the European Bank for Reconstruction and Development (EBRD).

Georgia continues toward a market economy and integration with Western countries.

Following is a news story we heard on the radio at 2:00 AM, September 11 as we headed to the airport for our return flight. Upon hearing the story our driver became animated, pointing out we had just been in the area mentioned.

News Item - Saturday, September 11, 2010

2 Police Killed, 5 Wounded In Attacks in South Russia - Associated Press

Several attacks in Russia's volatile North Caucasus region have left two police officers dead and another five wounded, officials said Saturday.

The ministry's branch in the Caspian Sea province of Dagestan says one officer was gunned down late Friday on the outskirts of the regional capital, Makhachkala.

Another policeman was killed Friday in the province of Ingushetia west of Chechnya. The gunmen shot and killed him outside an auto repair shop in the region's main city of Nazran.

In another attack Saturday in the province of Kabardino-Balkariya, a truck carrying police officers hit a radio-controlled land mine, leaving five policemen wounded.

The attacks follow Thursday's suicide bombing near the central market of Vladikavkaz, the regional capital of the republic of North Ossetia that killed 17 people and wounded more than 140. It was the most serious attack in Russia since the March subway bombings in Moscow that killed 40 people.

A car exploded in a courtyard of an apartment building in Vladikavkaz on Saturday, hurting no one but raising fears of a new terror attack. Authorities said the blast wasn't a terror attack, and apparently just linked to criminal disputes.

Sikoev also said the explosion was not a terrorist act, the news agency reported. No casualties have been reported, according to RIA- Novosti.

The car in which the grenade exploded belongs to a military service member, the news agency reported.

A police source told RIA-Novosti that the explosion was caused by a gas cylinder placed in a car. The scene has been cordoned off while police and emergency officials work, RIA-Novosti reported.

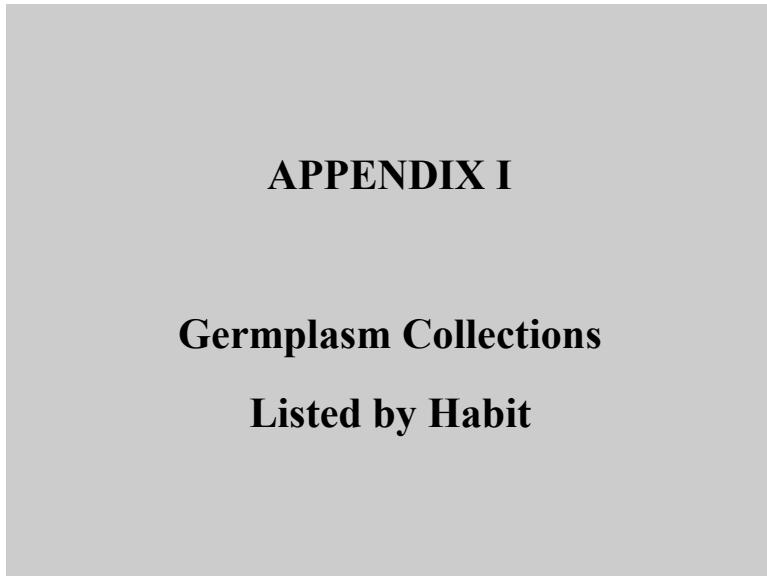
Meanwhile, the death toll from Thursday's attack at the central market in Vladikavkaz has risen to 18, according to the Itar-Tass news agency. At least 123 people were wounded in that attack. Police believe a suicide bomber detonated an explosive device containing the equivalent of 40 kilograms of TNT inside a car.

The Investigative Committee of the Russian Prosecutor's Office called the attack a "terrorist act." The committee also said the bomb was stuffed with various pieces of metal to increase human casualties. A natural gas canister, stored in the car's trunk, also detonated, the committee said.

The regional health ministry says 110 injured people remain in Vladikavkaz hospitals. Four are in grave condition. Eleven critically injured people were flown to Moscow overnight on a special Emergencies Ministry plane, according to Itar-Tass.

North Ossetia and the rest of the Caucasus region has been plagued with violence and political instability. The market where the attacks occurred has seen other terrorist incidents in the past.

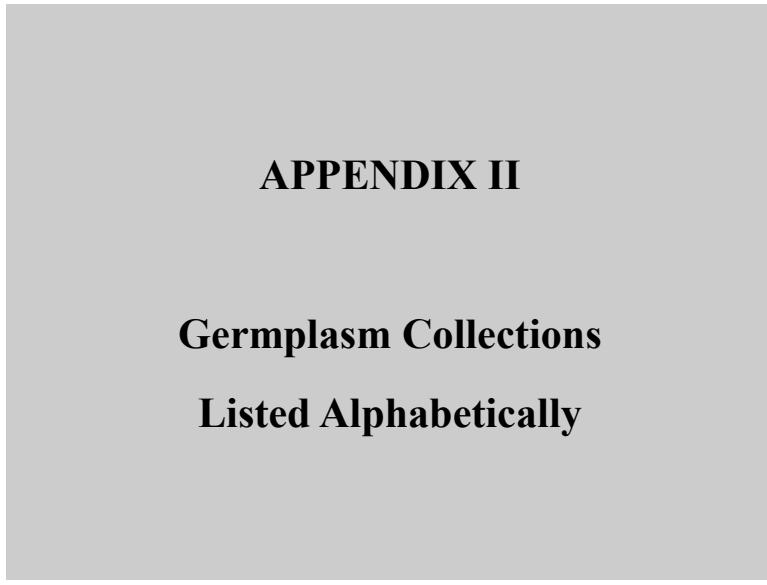
In November 2008, a suicide bomber blew up a bus at a nearby station, killing 12 people and wounding more than 40. And in March 1999, an explosion killed more than 50 people and wounded 300.



APPENDIX I

Germplasm Collections Listed by Habit

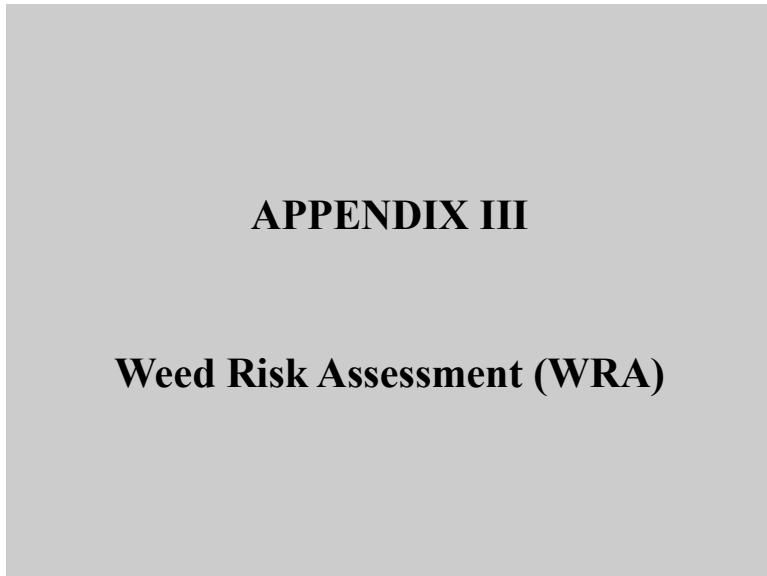




APPENDIX II

**Germplasm Collections
Listed Alphabetically**

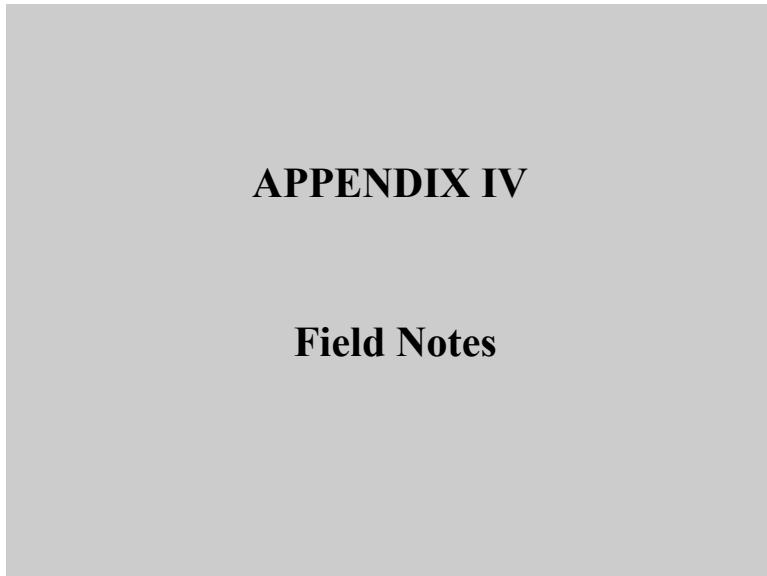




APPENDIX III

Weed Risk Assessment (WRA)





APPENDIX IV

Field Notes

