

Endemic Flora and Fauna of Georgia, Biodiversity, Peculiarities and Ecology

Vazha Todua

Botanic-Zoology Department, Sokhumi State University, 9 Politkovskaya Str., 0186, Tbilisi, Georgia.

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Abstract: Present document summarizes the research of Georgian endemic flora and fauna through morphological, biological and ecological methods. The purpose of the research was to discover more about the diversity of endemic plants (mostly vine and wheat), animals and birds in Georgia and the ecological conditions thereof. The document briefly discusses the location of Georgia, its nature, culture, as well as indigenous people living in Georgia about 15000 years ago and the existence of their ancestors presumably inhabiting this area about 1.8 million years ago. The research mainly focuses on wheat (*Triticum*) species, including the description of endemic relicts: *Triticumaestivum*, *T. paleo-colchicum* Menabde, *T. Timopheevi* Zhuk, *T. carthlicum* Nevsky, *T. Zhykovski*, *T. Zanduri*. All six species are widely spread in one of the regions of Georgia – Racha-Lechkhumi. In Herewith, Georgia has registered presence of 14 species of wheat of the 25 that can be found worldwide. In addition, Georgia is also known as the country with rich variety of vine species. There are 4000 species of vine in the world and 530 of them originate from Georgia. From mentioned species more than 437 have been preserved and “Usakhelauri” is considered to be the oldest one of them. Other vine species cultivated in Georgia include, but are not limited to *Rkatsiteli*, *Mtsvane*, *Kakhuri*, *Sapheravi*, *Tsolikauri*, *Dzveli SHavi*, *Ojaleshi*, *Chkhaveri*, etc. The present document also describes the most prominent endemic species of coniferous and flowering plants in Georgia, which are divided into 17 genera (*Pinus pithyusa*, *Reldarica*, *Betulamegrelica*, Georgian elm *Ulnus georgica* Schachiak, *Pyrus Demetrii* Kutath, *Corylus colchica* Albov, *Heracleum Sommieri* Manden, *Dioscorea Caucasica* Lipsky, and others; from *Campanulas* – *C. Draaki*, *C. Dzyschrica*, *C. Engurensis*, *C. Mirabilis*). Georgia has 67 species of *Campanulas* out of the total 110 known to the world. In birds – *Tetraogallus Caspius* Gmelin, *Lyarurus Mlocosieviczi* Taexanowski; in reptiles – *Mertensiella Caneasica* (waga) and etc. are described with the indication of relevant areas, information about their conditions and the terms for preserving them.

Key words: Flora, Fauna, Endemic, Vine, Wheat, Bird, Animal, Reptile

1. Introduction

Georgia is one of the oldest, safest and dynamic states in Eurasia located in South Caucasus, on the coast of the Black Sea. Here, in Colchis of relict origins, 15000 years back lived hunting tribal unions – people later called Georgians. Georgians have an ancient writing and alphabet. Georgian alphabet existed even in 3rd-4th centuries, although there is no specific source indicating to the exact period of creating Georgian writing. In 12th century a well-known and genius poem - *The Knight in the Panther's Skin* - was written by Shota Rustaveli. And, most importantly, Georgian writing is listed as 3rd among the 5 most beautiful writings in the world. The first European human remains have been discovered in Georgia – specifically, in 1991, the archeologists found the oldest human skull remains in Dmanisi, Georgia, which are dated as back as 1,8 million years. The population of Georgia count 5 million individuals and the capital city is Tbilisi.



Religion – Orthodox Christianity (337 A. C.), although in the center of the Old Tbilisi, there are still functioning very old Orthodox and Catholic churches, mosque and a synagogue, indicating to largely tolerant nature of Georgians as a nation.

Georgians are historical farmers, hardworking, intelligent, creative, calm and hospitable people. They have the privilege of living in a very rich environment in terms of plants, animals, reptiles and birds. None of the European countries have the diverse flora and fauna that can be compared to Georgia.

2. Research Object

The objects of the research are endemic plants and animals living in Georgia – main species of Georgian wheat (*Triticum*) and vine (*Vitis Vinifera*) from plants, and rare and relict species and genera of animals and birds.

3. Research Methods

Methods used during the research include morphological, biological and ecological methods. Propagation and cultivation of plants, issues related to conservation, etc. were taught at the university.

4. Results of the Research

Georgia is characterized with diversity and variety of plant and animal species. The number of species in Georgian flora (4500 species) is equal to the number of species in European part of Russia (up to Ural) and exceeds by ½ the number of species in Carpathian Mountains' flora. There are up to 900 genera of plants registered in Georgia, out of which about 16-17 are endemic. All of them are divided into 140 plant families. Those include about 380 endemic species of plants, part of which are relict plants. In the context of Georgian endemic plants, we have observed Bichvinta and Eldat Pine, Mengrelian Birch, Georgian Almond, Pontus Oak, Pontic Rhododendron, etc. As for animals and birds, there are about 1,5 million species in Georgia, with a Bee holding a very important place in Georgian farming. Georgians have always perceived bee as 'an insect from God'. Georgian Bee has the longest proboscis in the world (7.20 mm) and belong to the group of endemic insects of Georgia. It originates from Mukhuri Village, Chkhorotsku District.

Georgia is considered the homeland of vine and wheat species. There are 530 species of vine in Georgia and 14 species of wheat out of the total 25 known to the world. As for the cheese, its origins count 4 thousand years, whereas in case of Georgia it counts 8 thousand years. This is the peculiarity of Georgian people, nature, flora and plants.

Come to Georgia and you will be assured. More so, when it is much cheaper to travel to Georgia than to any other European country. You will be offered national dishes such as Elarji, Satsivi – considered to be the crown dish of any festivity, Gebzhalia, Khachapuri, Cheese, Dambalkhacho, Khinkali, Kuchmachi, Kupati, Kubdari, smoked pork (Shashkhi), Khashi with Georgian bread and many sweets including Churchkhela, and, most importantly, Georgian wine.

Main export products from Georgia are wine, honey, fruits, nuts – *Corylus*, blueberry – *Vaccinium*, citrus, mineral water (Borjomi) and others. Here, one can manage to go to the seaside and ski in high mountains of

Georgia in Svaneti Region in one day. None of the European countries has the diverse and rich flora and fauna to match that of Georgia, stretched over 69,700 kilometers. In Georgia, you can see mountains with 5,000 meters in height, glaciers, alpine meadows, subtropical seaside, deserts, half-deserts, fertile lowlands and gorgeous untouched woods with peculiar plants. Apart from Georgia, there are very rare cases of such fast cycle of plant species and type on such a small terrestrial area. 7% of the total territory consists of national parks and protected areas, whereas 75% of Georgia is covered in woods. There are 14 national forest reserves, 9 national parks, 17 protected areas, 14 national monuments and 2 protected landscapes in Georgia. Ad not am: collected materials confirmed that Georgia has approximately 13,300 plant species, among them 4,225 belong to the category of spermatophyte, 75 – pteridophyta, 600 – moss, 650 – lichen, 5,000 – fungus, and 2,000 – water-plants. Seventeen genera of endemic plants are grouped in 140 families. Bichvinta and Eldat Pine, Mengrelian Birch, Georgian Almond, Pontus Oak, Pontic Rhododendron, Prunus Laurocerasus and others have been observed among the endemic plants of Georgia. As for animals and birds, there are about 1,5 million species in Georgia, with a Bee holding a very important place in Georgian farming. Georgians have always perceived bee as ‘an insect from God’. Georgian Bee has the longest proboscis in the world (7.20 mm) and belong to the group of endemic insects of Georgia. It originates from Mukhuri Village, Chkhorotsku District. Each of the endemic species consist of predetermined genes and characteristics and contains various information. Wheat (Triticum) is a very interesting object in this regard. Some of what species are drought-resistant, whereas others are resistant to all types of fungal diseases, some are the carriers of precious gene pool, and so on.

For the ease of access and reference, we divided the research object into three groups. The first group includes local vine species. The second group is the species of wheat – the biggest treasure of Georgians. And, the third group includes animals and birds. The first group to discuss is vine.

Georgia is considered the cradle of vine species. The ancestor of vine – *Vitis Silvestris* – has been observed in Georgia. There are 4000 species of vine in the world and 530 of them originate from Georgia. From mentioned species, more than 437 have been preserved and “Usakhelauri” is considered to be the oldest one of them. It also is the most expensive among Georgian wines with a price of 222-235 Georgian Lari (30-35 USD) per liter. This vine, as well as Triticum, grows in Racha-Lechkhumi region. This region has cultivated up to 60 species of vine, among them Khvanchkara, which – coming second after Usakhelauri – is considered to be the living natural monument of Racha-Lechkhumi and is grown only in a single village within the region also called Khvanchkara.

There are vinery regions in Georgia, but Kakheti is considered the land of the oldest wine. Scientific Journal of the US National Scientific Academy, which is one of the most respectable scientific journals worldwide,

published an article with the title - Early Neolithic Wine of Georgia in South Caucasus. Among the authors of the article are the scientists from Georgia, US, France, Italy, Canada, Denmark and Israel.

The article discusses the results of recent multidisciplinary research of newly excavated materials from the site on the territory of Georgia. The results confirm that the tribes living in this area had the grape wine and viniculture back in 6,000-5,000 B.C., i.e. 8,000 years ago. Scientific society recognized that the oldest traces of viniculture have been discovered in Georgia, from where it spear across the globe having the huge impact on formation of agriculture, national cultures, biology, medicine and civilization in general.

Wines known worldwide, such as Rkatsiteli, Mtsvane Kakhuri, Khikhvi, Kisi, Sapheravi and others, grow on the lowlands near Alazani River, Kakheti Region. Imereti Region has the vine species such as Tsolikauri, Tsitska, Dzvel-Shavi (Obchuri). Samegrelo is known for Ojaleshi, Kachichi, Guriashi – for Chkhaveri, Adjara and Abkhazia – for Tskhenis Dzudzu, and so on.

As you can see, Georgians have the wine made from the prime vine species. But, when drinking a wine one would want something to go with it; so, what can we have together with wine?! There is a variety of choices, but the first and the foremost in Georgia is bread and cheese, as those two together with the wine have been in the food ration of Georgia for centuries.

Georgia is also considered the center of origins for bread and wheat culture. Wheat flour is used to prepare a dough for the premium quality bread – Lavash, making Khachapuri and Khinkali. Fourteen out of the 25 species of wheat worldwide are presented in Georgia. Five species out of 14 are endemic and cannot be found elsewhere in nature. Those are: *Triticum Aestivum*, *T. Paleo* – *Colchicum Menabde*, *T. Timopheevi Zhuk*, *T. Carthlicum Nevsky*, *T. Zhukovski*. Among Georgian endemic species also is the oldest Zanduri. Zanduri has three polyploid lines – Gvatsa, Chelta and Hexaploid Zanduri. Those are the selection materials of global significance and belong to the category of spring wheats. All of them grow in Racha-Lechkhumi, one of the regions in Georgia. Those monuments of aboriginal nature have a substantial national and scientific value. In addition, this beautiful region of Georgia – Racha-Lechkhumi, is also known for native-born and introduced fruit trees.

As for the cheese, its origins count 4 thousand years, whereas in case of Georgia it counts 8 thousand years, evidenced by the ancient vessels intended for keeping cheese excavated in Georgia. Hence it follows, that harvesting grapes, wheat and making cheese is indigenous for Georgia people and Georgian farmers have been improving and advancing the process throughout the evolution process.

Although, it should be noted, that such variety of endemic flora and fauna in Georgia is facing substantial threats due to the worsening of ecological conditions. Rare species of animals, birds and plants face extinction threat.

Among birds, Caspian Snowcock (*Tetragallus Caspius* Gmelin) is almost extinct. It is a very rare bird and belong to Small Caucasus endemic fauna. The number of Caspian Snowcocks continue to decrease and there are only some 50 of them in Georgia (mainly in Adjara and Imereti Regions, Small Caucasus mountain range). It has been included in the Red Book of Georgia. Another important bird is Caucasian Grouse (*Lyarurus Mlocosieviczi Taczanowskii*), which is a rare endemic variety of Georgia. Those are mainly observed in the area from Guria Mountains to Karabaghi Mountain Range (Small Caucasus). In Pshav-Khevsureti meadows, the share of Caucasian Grouse used to be 4 females and 1 males per kilometer. It has also been included in the Red Book. In general, there are about 360 varieties of endemic birds in Georgia.

A well-known resort Batumi is located in Adjara, on Black Sea coast. This coastal city is included in the annual migration route of numerous birds. In autumn – from North to South, in spring – from warm countries to their nesting place. For some of the species, Batumi and Kolkheti is the place to over-wintering (some of the birds have no need to going to further south). Batumi is open for rest and recreation all year around. You can attend international cultural events here such as the concerts of Placido Domingo, Jose Carrerras, Chris Botti, Sting, Enrique Iglesias and others. Batumi has a wide variety of comfortable hotels, which makes it attractive location for businessmen and business meetings. In Sataphlia (Imereti Region), dinosaur traces was found along with a cave, which is dated as back as 300 million years.

Among endemic reptiles, the most renowned one is Caucasian Viper (*Vipera Kaznakovi* Nikolski). It is the endemic specie of local area and very rare, but there is no specific quantitative information. It generally resides in Abkhazia, Samegrelo, Racha, Imereti, Adjara regions, Borjomi Gorge, etc. Another important endemic reptile is Caucasian Salamander (*Mertensiella Caucasia* (Waga)), commonly met in Adjara-Imereti mountain range, west part of Trialeti mountain range. In numbers - 10 Caucasian Salamander per kilometer.

Among coniferous plants, Bichvinta Pine (*Pinus Pithyusa* Stev) is worth mentioning. It represents one of the oldest relict endemic plant and is widely spread on Black Sea coast, Bichvinta cape, Gagra District in Abkhazia, which is currently occupied by Russia. Internally displaced persons from that region, including the author of this article, still await the moment to go back home. Bichvinta Pine are generally represented in small groups and does not belong to the category of protected species. Therefore, those trees are being cut and used as construction materials for buildings and roads. Another coniferous plant that needs to be mentioned is Eldar Pine (*Pinus Eldarica* Medw.) – rare relict of East Caucasus. It grows on the western part of Eldari Meadow, right bank of the River Ivri, creating sparse copses. It grows slowly and is almost never renewed. The reason for its decrease in numbers is wood-cutting, forest fires, violating local conditions, etc. Eldar lowlands occupy a small part of Georgian territory and is one of the drought-afflicted and uninhabited areas.

Among flowering plants, the most renowned is Georgian Barberries (*Berberis Iberica* Stev.). It belongs to the East Caucasus endemic group and has medical and treatment features. Alkaloid berberine extracted from barberries has the cancer-fighting effect. Georgian Barberries grow on a very small area, separately or in small groups. It is not protected as a plant. *Gymnospermium Smirnovii* Takht is a local endemic plant grown only in Kakheti Region (Lagodekhi). It is being destroyed due together with the forests and does not belong to the category of protected species. Another well-known tree is Mengrelian Birch (*Betula Megrelica*), which is the local endemic plant in West Georgia. Birch tree buds have medical and treatment features. Mengrelian Birches are grown in small copses, although the number thereof continues to reduce year by year (unprotected).

As of today, several varieties of endemic *Campanulas* are left unprotected: *Campanula Dzaaki* (Samegrelo); *Campanula Dzyschrica* (Abkhazia); *Campanula Engurensis* (Upper Svaneti); *Campanula Mirabilis* (Abkhazia). There are 67 varieties of *Campanula* in Georgia out of 110 *Campanula* species spread in Caucasus. 24 varieties of Georgian *Campanulas* are considered endemic species. Many varieties of *Campanula* are of decorative purpose. Other varieties are used in folk medicine.

Colchian Nuts (*Corylus Colchica* Albov) has nutritional and medical value. This is an endemic Georgian variety of nuts and grows in Samegrelo and Abkhazia. Colchian Nuts need humidity and when growing creates a sparse undergrowth (seen as separate plant on rare occasions). It is not among the protected plants and is being cut unsystematically.

Georgian Nuts (*Corylus*; *Berica* Wittm.) is a plant of equal importance, being the endemic species of Caucasus and represents a rare relict of Tertiary. Generally, it grows in Abkhazia, Racha-Lechkhumi, Kartli, Mtiuleti, Tush-Pshav-Khevsureti. It is commonly met in deciduous forests, singularly and in groups, is being cut down and left unprotected.

One of the most important species in Georgian forests is Imereti Oak (*Quercus Imeretiana*), which is a rare endemic relict spread in Abkhazia, Racha-Lechkhumi, Samegrelo, Imereti, Guria. Its number decreases year by year due to the forest-cutting. Imereti Oak is protected only within Ajameti Dzelkva Reserve. Erdeli *Corydalis* (*Corydalis Edrelii* Zucc.) is facing extinction. It is a perennial plant, extremely rare local Caucasian endemic species only grown in Javakheti. It is rare to find and the reason for its decrease in numbers is the violation of local conditions (uncertain whether protected or not). Another almost extinct plant is Kartli Peony (*Paeonia Lagodechiana* Kem-Nath.). It is a rarely found perennial grass-like plant with roots. It also is one of the rarest relicts in East Caucasus, grown in Kakheti, singularly or in small groups. Reason for the decrease in numbers is forest-cutting and agricultural use of lands. Kartli Peony is protected within Lagodekhi Forest Reserve only. Among endemic varieties also are Maiko, Mlokosevich and Vitman Peonies, reduced in number

due to the lack of populations and violation of local conditions (none of them being a protected plant). Peony needs to be entered in the Red Book.

Another unprotected plant is Dimitri Pyrus (*Pyrus Demetrii* Kutath.), which is a tall wide-crown tree and a local endemic plant originated from Kakheti. It grows singularly and not in groups and is left unprotected. Georgian Elm (*Ulmus Georgica* Schchian) is a narrow-local endemic tree of Georgia grown in East Georgia. In Arpha-Dara Gorge, there are some 30 of Georgian Elms, being destroyed due to the reduction of area and lack of protection. Aconite Heracleum (*Heracleum Aconitifolium* Woronow) is a rare endemic perennial grass-like plant in Caucasus only met in Abkhazia (Anchkha-Audkhara). It grows at the edge of the forest and left unprotected. Somie Heracleum (*Heracleum Sommieri* Manden) – also perennial grass-like endemic plant in West Georgia, grown only in Racha and Svaneti on subalpine meadows (Mestia, Nikortsminda) in small groups. It is hard to find and small in numbers due to unattended grazing by cattle (unprotected plant). Caucasian Dioscorea (*Dioscorea Caucasica* Lipsky) – perennial endemic plant with roots grown in Caucasus, mostly found in Abkhazia (Sokhumi, Psirtskha, Bziphi). It grows in small groups, 2-3 at a time, and is destroyed as the roots are used for medical purposes (unprotected specie). Therefore, it is important to draw attention to the protection of natural resources and further development-improvement thereof. Complex terrain of the land in Georgia and its particular regions makes this problem even bigger.

The facts discussed in this document call on society to act reasonably, obliging us not only to preserve rare and almost extinct plants and animals, but also to reproduce them leading to their removal from the Red Book.

Sokhumi State University has an area intended for Sokhumi State University Botanic Garden. This garden will be unique by its nature. The man behind the idea of Botanic Garden is Professor Zurab Khonelidze, Head of Sokhumi State University. This Garden will include only the plants of Georgian origins, including rare, relict and endemic varieties. It will be the second botanic garden in the world after the Washington Botanic Garden in US. The latter includes only the plants originating from Washington and its surroundings. Thus, Prof. Zurab Khvedelidze's decision is not only unique, but also extremely necessary, timely and important. In most botanic gardens in the world, you would see the plants from all over the continent, but you will not be able to see local, indigenous species anywhere except the botanic gardens of Washington and Sokhumi State University.



Pic. 1. Usakhelauri



Pic. 2. Saferavi



Pic. 3. Ojaleshi.



Pic. 4. Zanduri



Pic 5. *Tetraogallus caucasicus*



Pic. 6. *Mertensiella caucasica*



Pic. 7. Bichvinta abiete



Pic. 8. Campanula Engurensis



Pic. 9. Corylus colchica Albov



Pic. 10. *Quercus imeretiana*



Pic. 11. *Caucasica Dioscorea*

5. Conclusion

Georgia is distinguished with large variety of plants. On this small area of land there are 4,500 plant varieties including 161 endemic species. Among them: wheat – 6 varieties, vine – 12 varieties. Georgia is the homeland to variety of relict food, medical and decorative plants. Just Campanula family, with 110 varieties in total, is represented by 70 varieties in Georgia. Georgia is also very rich in terms of animals and birds. According to the incomplete data, there are 61 endemic species of animals, 3 endemic species of birds and 1 endemic specie of reptiles in Georgia. All of them has a huge historic, aesthetic and scientific value.

Importance of the Work and Recognition

The work “Endemic Flora and Fauna of Georgia, Biodiversity and Ecology” is important because it researched and described for the first time the most important endemic plants and animals. It also describes the homeland of this endemic flora and fauna – Georgia, as well as the spread of endemic species and ecological conditions. Main focus of the work is indigenous species of wheat and vine, their diversity, intended purpose and preservation. It is noteworthy, that Georgia has been recognized by the international scientific society as the center of origins for wheat, vine and cheese. The presented work will be interesting for everyone who is interested in the nature of Georgia, flora and fauna, its relict, rare and endemic plants and animals. Part of the work – “Wildlife Nature of Adjara, Its Relict and Endemic Flora and Fauna” – was published in Baku (Azerbaijan) and was greatly appreciated.

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