

The Beşparmak mountains



Seminar contribution to the module "Terrestrial Ecosystems" (2101-230)
Institute of Botany (210a) · University of Hohenheim · Stuttgart
presented by Simon Heselschwerdt on January 21, 2019

Structure

Geology

Topography

Climate

Vegetation

Nature conservation

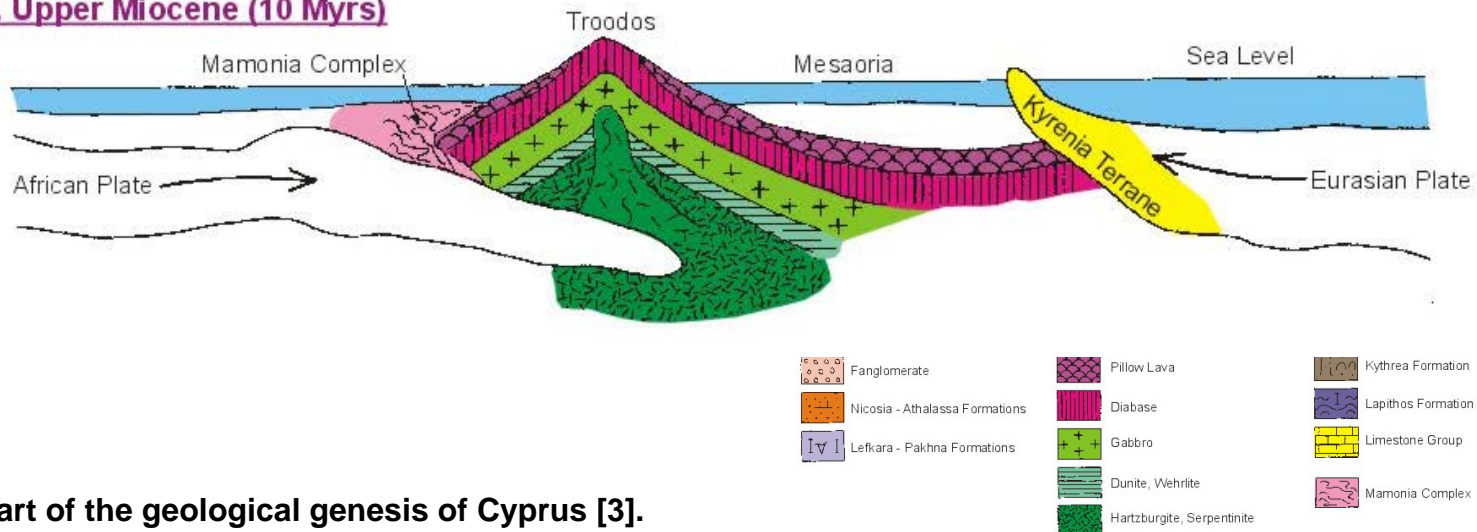


View on the Beşparmak mountain range [2].

Geology

The tectonic evolution of Cyprus can be subdivided into different episodes. Based on tectonic activity of the Eurasian and African Plate in upper Miocene (10 Ma) Beşparmak mountains (here Kyrenia Terrane) were formed. At that time present day Cyprus consisted of two separated islands (see fig. 3). After this formation the uplift of the island continued to an even higher level than today. Due to erosion the islands peaks were deposited to today's heights.

C. Upper Miocene (10 Myrs)



Part of the geological genesis of Cyprus [3].

Geology

The Beşparmak mountains are consisting out of a complex collection of Permian to recent sedimentary (see fig. 4).

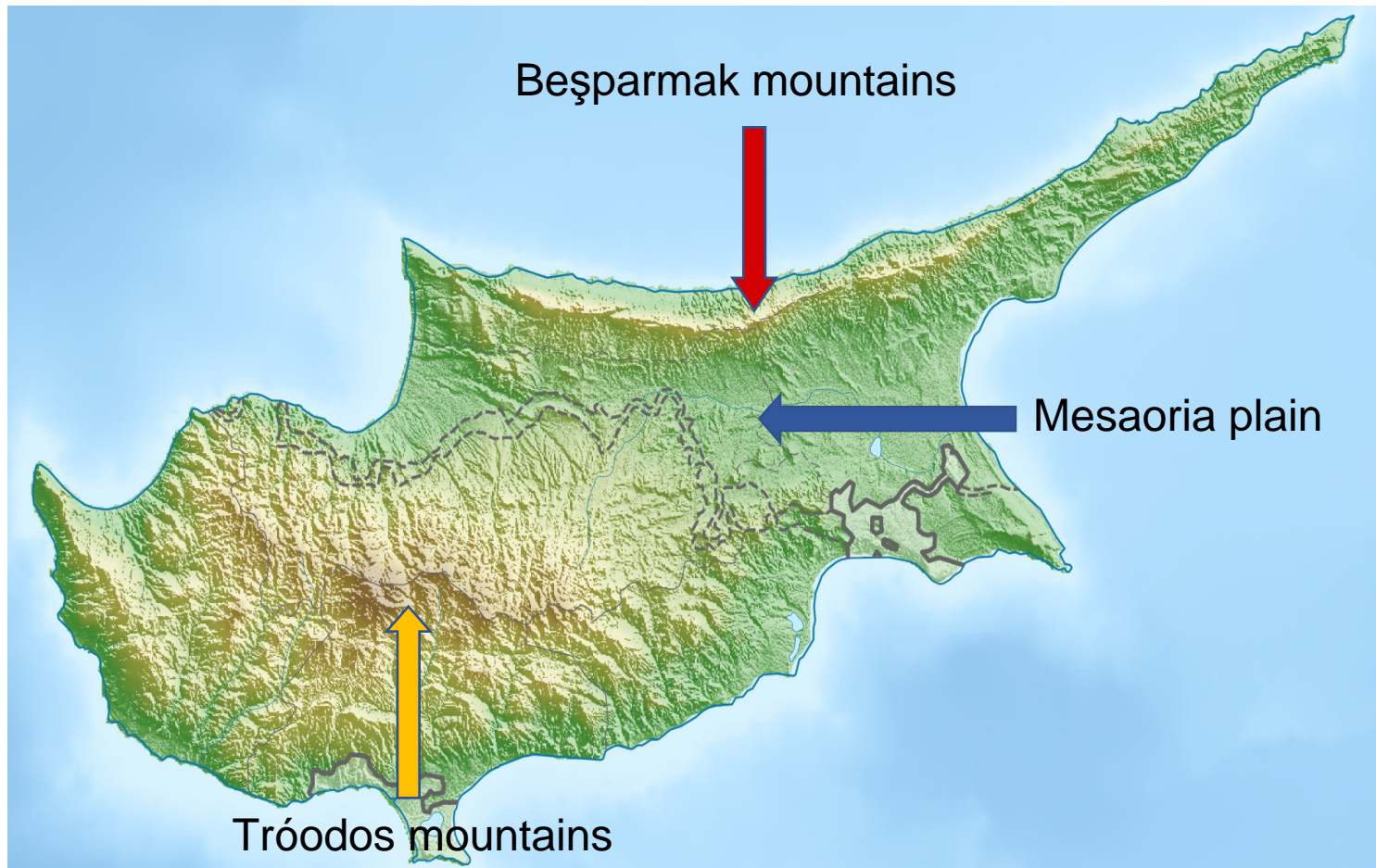
The main carbonate masses are the allochthonous Dhikomo, Sykhari and Hilarion formations.

In the central part of the range imposing rock outcrops out of limestone occur.

Southward and further east the allochthonous formations are merging into younger autochthonous marine sediments, named Lapithos, Kalogrea-Ardana and Kythreas formations. These rock formations consisting out of sandstone and marls.

Trough to karstification of the allochthonous limestones a significant number of springs occurs at the foothills of Beşparmak mountains.

Topography



Map of Cyprus. In the northern part lies the Beşparmak mountain range (red arrow). The Mesaoria plain (blue arrow) and the Tóodos mountains (orange arrow) are located further south [5].

Topography

The small limestone mountain range runs along almost the entire northern coast and is approximately 100 km long.

Further north the range is divided from the sea by a narrow terraced coastal plain, which never exceeds the width of 5 km.

The highest point is Selvili Tepe (Kyparissóvouno) with an altitude of 1.024 m a.s.l. Eponymous mountain is the “five-fingered mountain” Pentadaktylos (Beşparmak) with an altitude of 733 m a.s.l. (see fig. 6).



The Pentadaktylos peak [6].

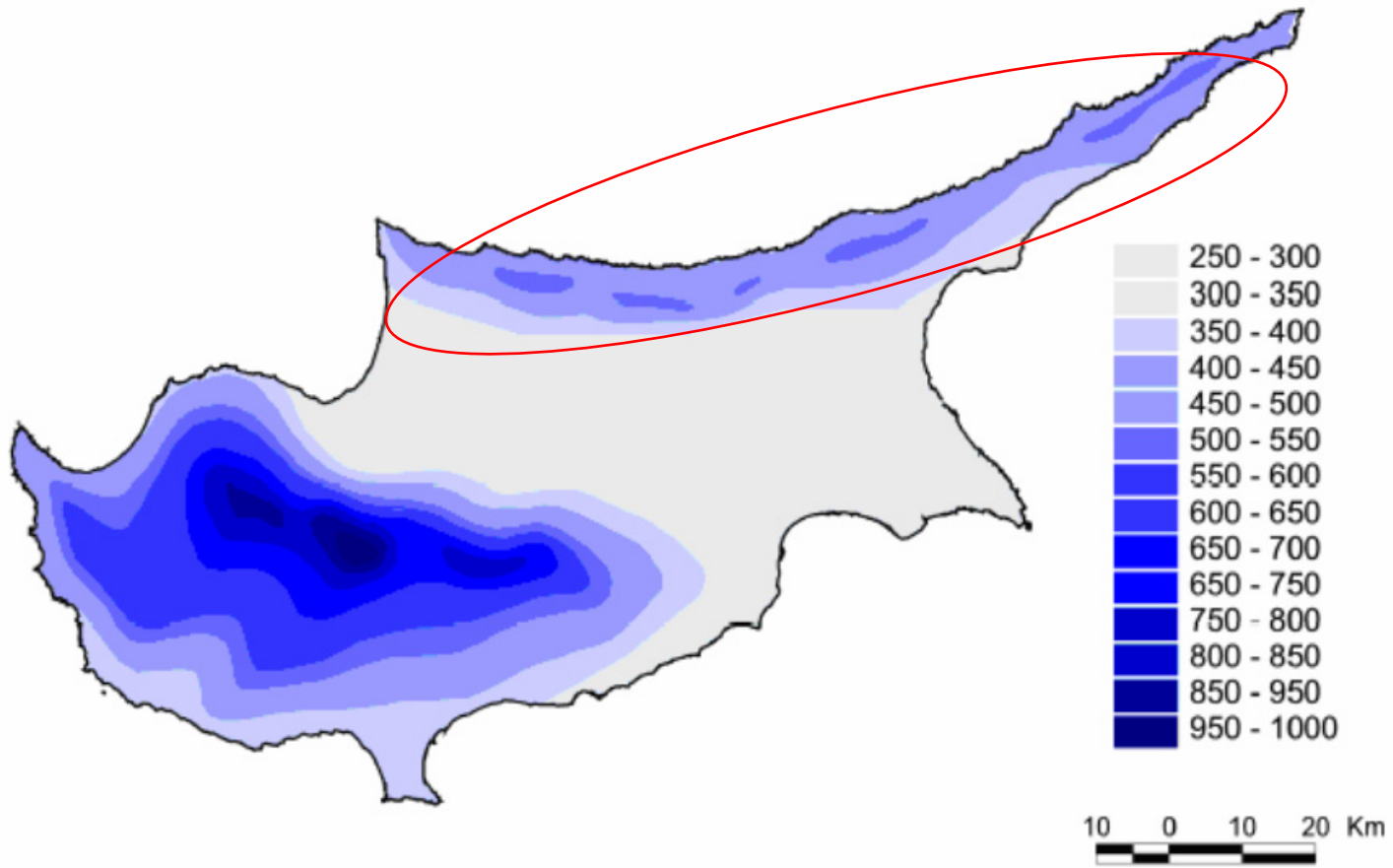
Climate

The climate of the mountain range is mediterranean with long, hot, dry summers and short, mild, wet winters.

Temperature varies dependent on the altitude and to a lesser extent on the distance to the sea. The average temperature ranges from 9°C in winter to 35°C in summer.

On the northern part of Cyprus, the Beşparmak mountains are critical for precipitation. Rain clouds from the north can't cross the mountain range and therefore are forced to rain down. As a consequence, average annual precipitation on the northern side is about 500 mm, whereas only about 300 mm on the south side (see fig. 7).

Climate



Average annual Precipitation on Cyprus [7]. Circled in red is the Beşparmak mountain range.

Vegetation

Due to the low precipitation on the mountains southside and the consequential aridity, mainly macchia or phrygana, consisting of shrubs and herbs, occurs.

As a consequent of the low fouling, increased erosion took part at the steep slopes. Some slopes are not at all overgrown, why rocks become visible.

On the northern side of the Beşparmak mountain range extensive woodlands occur, due to the higher precipitation.

At areas were forest fires or deforestation happens, the forests are degraded to macchia or maquis, consisting out of shrubs and small trees.



Southern side of the Beşparmak mountain range. Due to aridity only low vegetation occurs. Visible is a painted flag of Northern Cyprus on the mountainside [8].

Vegetation

Until 500 years ago the Beşparmak's northern slopes naturally were covered by oak forests consisting of the species *Quercus coccifera* supsp. *calliprinos* (Palestine oak) and *Quercus infectoria* subsp. *veneris* (Aleppo oak).

Since then intense human forest utilisation and natural forest fires decimated the oak occurrence. Today only a small amount of oak populations can be found on North Cyprus.



Quercus coccifera* L. supsp. *calliprinos
(Palestine oak), Fagaceae [9].



Leaves of *Quercus infectoria* subsp. *veneris* (A. KERN.) MEIKLE (Aleppo oak), Fagaceae [10].

Vegetation

Today's main tree species in Beşparmak mountain forests is the Turkish pine *Pinus brutia*, an evergreen pine, which distribution is spread through the whole island. The main distribution, beside the Beşparmak mountains, are in the Troódos mountains.

The Turkish pine can occur in lower regions as well as in heights up to 1300 m a.s.l., depending on the conditions of the montane zone.

Optimal soil conditions are dry and calcareous soils (Rendzina) where the pine trees can reach heights between 12 to 25 metres. Flowering time is from March till Mai.



Pinus brutia TEN. (Turkish pine), Pinaceae [11].

Vegetation

As a fast growing tree, the pine is used for reforestation and as an economical important wood supplier. This could be a reason for today's pine forests in North Cyprus. Root penetration stabilises the soil structure whereby erosion can be avoided.

Moreover Beşparmak's pine forests are an important habitat for different animal and plant species.

As a special feature needles of *Pinus brutia* are condensation points.

Due to that water can accumulate on the needles apex, whereby a kind of drizzling rain can appear and wetting the forests floor.



Branches with needles and cones of *Pinus brutia* [12].

Vegetation

Another important species of Beşparmak's forests is the Mediterranean cypress, *Cupressus sempervierens* L. (Cupressaceae). As the second most tree it occurs on dry sites and is therefore rather located on the southern slopes of the mountain range. Flowering time is from March till April.

On the limestone mountains *Cupressus sempervierens* can reach heights between 20 to 30 metres.

It is an evergreen species which can be used for forestry or as an ornamental tree. Within a lifetime *C. sempervierens* can get over 1000 years old. Known for its high value and rotting-resisting properties, the timber it is often used for further processing.



Cupressus sempervierens L. (Mediterranean cypress), Cupressaceae [13].

Vegetation – companion species

Beside pines and cypresses many other species occur on Beşparmak mountains, which are distributed as companion species in the forests or maquis.

Amongst those is the evergreen Greek strawberry tree , *Arbutus andrachne* L. (Ericaceae).

The white or yellowish green flowers are blooming in spring, at the latest by March.

Preferably growing on lime-poor soils, *Arbutus andrachne* can reach heights between 3 to 5 metres.



Arbutus andrachne L., Ericaceae [14].

Vegetation – companion species

Another typical companion species is the *Pistacia terebinthus* L. (Anacardiaceae), known commonly as terebinth or turpentine tree. Mainly occurring in undergrowth of sparse forests or in macchia, it can reach heights from 2 to 6 metres.

Optimal soil conditions are calcareous and not too dry.

The flowering time of *Pistacia terebinthus* is from April till June.

It's an aromatic evergreen scrub or small tree and a source for turpentine.

Especially in Cyprus the fruits are used for baking a bread.



Pistacia terebinthus L.,
Anacardiaceae [15].

Vegetation – companion species

Styrax officinalis L., a shrub or small tree, is the only species of Styracaceae, which is distributed in the Mediterranean area. It is a deciduous plant and preferably grows on wet soils, where it can reach heights from 2 to 7 metres. From May till April, when leaf budding takes place, white blossoms are formed. Distribution areas can reach altitudes up to 1500 m a.s.l.. Special is that produced seeds are poisonous and fragrant resin is provided by the stem.



***Styrax officinalis* L.,
Styracaceae [16].**

Vegetation – companion species

The azarole, *Crataegus azarolus* L., is a small up to 6 metres high shrub or tree, with a roundish crown and thorny twigs. The leaves are oval to v-shaped and usually with three lobes. 10 to 20 blossoms are flowering from March to April in an inflorescence.

The resultant fruits are yellowish to brownish red and edible.

Crataegus azarolus mainly occurs in bushes or pine forests.



Crataegus azarolus L., Rosaceae [17].

Vegetation – companion species

With 1 to 4 metres height the Mediterranean buckthorn, *Rhamnus alaternus* L. (Rhamnaceae) occurs on calcareous soil in forests. It is an evergreen, thornless and dioecious shrub.

A special characteristic in flowering and fructification is that all individuals of the Mediterranean buckthorn on Cyprus have four-part blossoms and two-part fruits, while every other individual outside of Cyprus has five-part blossoms and three-part fruits.



Rhamnus alaternus L., Rhamnaceae [18].

Vegetation – phrygana



Calicotome villosa (POIR.) LINK (Fabaceae) is an up to 3 metres high shrub-by tree. The twigs are thorny and loosely-branched. Usually, it occurs on acid soils, which has been exposed by deforestation or forest fires [19].



Asphodelus fistulosus L. (Asphodelaceae), known as hollow-stemmed asphodel, is an annual or short-lived perennial plant, which can grow up to 70 centimetres. Usually, it occurs on cultivated or fallow land [20].



Cistus salviifolius L., known as salvia cistus, is a plant of the diverse family Cistaceae. The aromatic smelling shrubs are spreading fast especially after fires [21].

Vegetation – phrygana



Ornithogalum divergens
BOREAU, Asparagaceae
[22].



Allium neapolitanum CIRILLO,
Amaryllidaceae [23].



Ranunculus asiaticus L.,
Ranunculaceae [24].

Other plants often belonging to the phrygana in spring are species of genera like *Ornithogalum*, some leeks like *Allium neapolitanum* and the Persian buttercup, *Ranunculus asiaticus*.

All of them can occur on plains as well as higher regions.

Vegetation – endemic species

All together there are more than 100 known endemic species on Cyprus, with the Beşparmak mountains as an important habitat for 19 local endemic plants.

Arabis cypria HOLMBOE (Brassicaceae) is a perennial plant occurring on shady limestone rocks. It's a rare endemic species on North Cyprus with an endangered habitat.

Delphinium caseyi B.L. BURTT (Ranunculaceae) occurs on rocky cliffs or the cracks of limestone boulders very local near St. Hilarion castle. This endemic plant species has been categorised as 'Critically Endangered' by IUCN.

Brassica hilarionis POST (Brassicaceae) is a hairless perennial that occurs on calcareous rocky slopes. It's a strictly protected plant, endemic to the western Beşparmak mountains, where it grows on chasmophytic habitat from 400 to 850 metres a.s.l..

Nature conservation

Due to the high biodiversity, nature conservation within Beşparmak mountains is critical.

One of the most important objectives is the regeneration of the oak forests. Therefore the „Oak for the Future Project“, founded by EU, is supporting populations of Aleppo Oaks. In this framework oak forests of Southern Cyprus are declared as protected area since 2003. Also Northern Cyprus has made plans for reforestation.

A common challenge for nature conservation are frequent forest fires. Even total prevention of natural forests fires is not possible, there are many campaigns to protect the landscapes or at least to keep the fires small. For example, there are measures like creating fire breaks, installing fire protection systems or carrying out awareness raising campaigns for human population.

Nature conservation

Particular attention is given to special biotopes like wetlands, which are spread out through Beşparmak mountain range. Although only 6 of 35 existent wetlands are of natural origin, all of them are playing an important role in conservation of valuable habitats for plant and animal life in this area.

Even though almost the entire mountain range is a possible Natura 2000 area, there are no official conservation areas within Beşparmak mountains today. The main reason for that is the political situation of Northern Cyprus.

References

- BÄRTELS, A. (2003): Pflanzen des Mittelmeerraumes. – Stuttgart, 2. Aufl.
- BOYDAK, M. (2004): Silvicultural characteristics and natural regeneration of *Pinus brutia* Ten. – a review. – *Plant Ecology* **171**: 153-156.
- BRAUN, R.R. (2016): Zypern. – Erlangen, 5. Aufl.
- DAVIS, P.H. (2008): Flora of Turkey and the East Aegean Islands, vol. 11, 264-265. – Edinburgh.
- DÜLL, R. & I. DÜLL (2007): Taschenlexikon der Mittelmeerflora. Ein botanisch-ökologischer Exkursionsbegleiter zu den wichtigsten Arten. – Wiebelsheim, 1. Aufl.
- FALL, P.L. (2012): Modern vegetation, pollen and climate relationships on the Mediterranean island of Cyprus. – *Rev. Palaeobot. Palynol.* **185**: 79-92.
- FREY, W. & R. LÖSCH (2010): Geobotanik. Pflanze und Vegetation in Raum und Zeit. – Heidelberg, 3. Aufl.
- MEIKLE, R.D. (1977): Flora of Cyprus, vol. 1, I – XII, 1-18. – Kew (UK).
- ROBERTSON, A.H.F. & N.H. WOODCOCK (1986): The Role of the Kyrenia Range Lineament, Cyprus, in the Geological Evolution of the Eastern Mediterranean Area. – *Philosophical Transactions of the Royal Society of London* **317**: 141-177.
- ÖZDEN FULLER, Ö., MERAKLI, M.K. & S. GÜCEL (2016): Important plant areas along the Kyrenia mountains, Cyprus. – *Ecology & Safety* **10**: 349-35.
- SCHMITT, E. (1994): Nordzypern. – Moers.
- SCHÖNFELDER, P. & I. SCHÖNFELDER (2008): Die neue Kosmos-Mittelmeerflora. KosmosNaturführer. – Stuttgart.
- SFIKAS, G. (1992): Wild flowers of Cyprus. – Anixi (GR).
- VINEY, D.E. (1994): An illustrated flora of North Cyprus, I-XVI. – Königstein.

Internet sources

http://www.moa.gov.cy/moa/gsd/gsd.nsf/dmlTectonic_en/dmlTectonic_en?OpenDocument. Query 16.01.2019.

www.moa.gov.cy/moa/gsd/gsd.nsf/dmlPentadaktylos_en/dmlPentadaktylos_en?OpenDocument. Query 16.01.2019.

<http://www.hikr.org/wiki/post49236.html>. Query 22.11.2018.

http://www.plantnet.org.cy/lang1/files/Poster_Biogeography.pdf. Query 21.01.2019.

PHILLIPS, A. & F. BRACEWELL (2001): Protected Areas, a challenge for North Cyprus: report and recommendations following a visit to North Cyprus, 4 -11 February 2001, 1-55. In: http://www.uicnmed.org/web2007/documentos/pa_northcyprus_en.pdf. Query 21.01.2019.

<http://www.philcannings.com/natura2000/OaksProject.pdf>. Query 21.01.2019.

http://www.moa.gov.cy/moa/gsd/gsd.nsf/dmlSediments_en/dmlSediments_en?OpenDocument. Query 21.01.2019.

<http://www.iucnredlist.org/details/161994/0>. Query 21.01.2019.

http://www.moa.gov.cy/moa/fd/fd.nsf/fd51_en/fd51_en?OpenDocument. Query 21.01.2019.

Illustrations

- [1] Titel slide. Changed according to Chneophytouin in:
<https://upload.wikimedia.org/wikipedia/commons/0/03/Halefka.JPG?uselang=de>. Query 19.11.2018.
- [2] Changed according to Atak Kara in: <https://upload.wikimedia.org/wikipedia/commons/8/89/KyreniaMountainRange.jpg>. Query 16.1.2019.
- [3] Changed according to http://www.moa.gov.cy/moa/gsd/gsd.nsf/dmlTectonic_en/dmlTectonic_en?OpenDocument. Query 21.01.2019.
- [4] [http://www.moa.gov.cy/moa/gsd/gsd.nsf/All/43CA34467BC412EAC2256FB30035287E/\\$file/Geological MapOfCyprus_250k_en.jpg?OpenElement](http://www.moa.gov.cy/moa/gsd/gsd.nsf/All/43CA34467BC412EAC2256FB30035287E/$file/Geological%20MapOfCyprus_250k_en.jpg?OpenElement). Query 21.01.2019.
- [5] Changed according to Carportin in https://upload.wikimedia.org/wikipedia/commons/e/ec/Cyprus_relief_location_map.jpg. Query 21.01.2019.
- [6] Changed according to Atak Kara in <https://upload.wikimedia.org/wikipedia/commons/d/d3/Besparmaklar.jpg>. Query 21.01.2019.
- [7] GOKCEKUS, H. GUCEL, S. & U. TURKER (2010), S.122.
- [8] Changed according to A. Savin in https://upload.wikimedia.org/wikipedia/commons/d/d8/Nicosia_01-2017_img17_View_from_Shacolas_Tower.jpg. Query 21.01.2019.
- [9] Changed according to Gideon Pisanty in:
https://upload.wikimedia.org/wikipedia/commons/b/b6/Quercus_calliprinos_tree_1.JPG. Query 21.01.2019.
- [10] Changed according to Veyis Polat in https://upload.wikimedia.org/wikipedia/commons/7/7e/Quercus_boissieri_Izmir.jpg. Query 21.01.2019.
- [11] Changed according to Andrey Fedoseev in:
https://upload.wikimedia.org/wikipedia/commons/e/e2/Pinus_brutia_Avsallar.jpg. Query 21.01.2019.
- [12] Changed according to Vince Smith in:
https://upload.wikimedia.org/wikipedia/commons/b/bd/Pinus_brutia%2C_Findikli_6.jpg. Query 21.01.2019.
- [13] Changed according to Chneophytou in: https://upload.wikimedia.org/wikipedia/commons/9/9c/Cypress_Halefka.JPG. Query 21.01.2019.

Illustrations

- [14] Changed according to Zeynel Cebeci in https://upload.wikimedia.org/wikipedia/commons/0/0c/Arbutus_andrachne_-_Greek_Strawberry_Tree_-_Sandal_Ağacı_04.JPG. Query 21.01.2019.
- [15] Changed according to Javier martin in: https://upload.wikimedia.org/wikipedia/commons/7/77/Pistacia_terebinthus_Habitus_2010-10-10_DehesaBoyaldePuertollano.jpg. Query 21.01.2019.
- [16] Changed according to Eitan f in: https://upload.wikimedia.org/wikipedia/commons/c/c4/Styrax_officinalis_tree.JPG. Query 21.01.2019.
- [17] Changed according to Krzysztof Ziarnek, Kenraiz in: https://commons.wikimedia.org/wiki/File:Crataegus_azarolus_kz10.jpg. Query 21.01.2019.
- [18] Changed according to Jeantosti in <https://upload.wikimedia.org/wikipedia/commons/6/67/Alatern2.jpg>. Query 21.01.2019.
- [19] Changed according to Dan Kenigsberg in https://upload.wikimedia.org/wikipedia/commons/a/a7/Calycotome_villosa.jpg. Query 21.01.2019.
- [20] Changed according to Hans Hillewaert in: https://upload.wikimedia.org/wikipedia/commons/b/be/Asphodelus_fistulosus_%28flowers%29.jpg. Query 21.01.2019.
- [21] Changed according to Alvesgaspar in https://upload.wikimedia.org/wikipedia/commons/0/0b/Cistus_April_2008-1.jpg. Query 21.01.2019.
- [22] Changed according to Krzysztof Ziarnek in: https://upload.wikimedia.org/wikipedia/commons/b/b8/Ornithogalum_divergens_kz6.jpg. Query 21.01.2019.
- [23] Changed according to Jeantosti in <https://upload.wikimedia.org/wikipedia/commons/d/d5/Ailblanc.jpg>. Query 21.01.2019.
- [24] Changed according to SuperJew in https://upload.wikimedia.org/wikipedia/commons/2/23/Persian_Buttercup_01.jpg. Query 21.01.2019.