VIRGIN FOREST
OF UHOLKA

Nature Guide to the Largest Virgin Beech Forest of Europe
A UNESCO World Heritage Site

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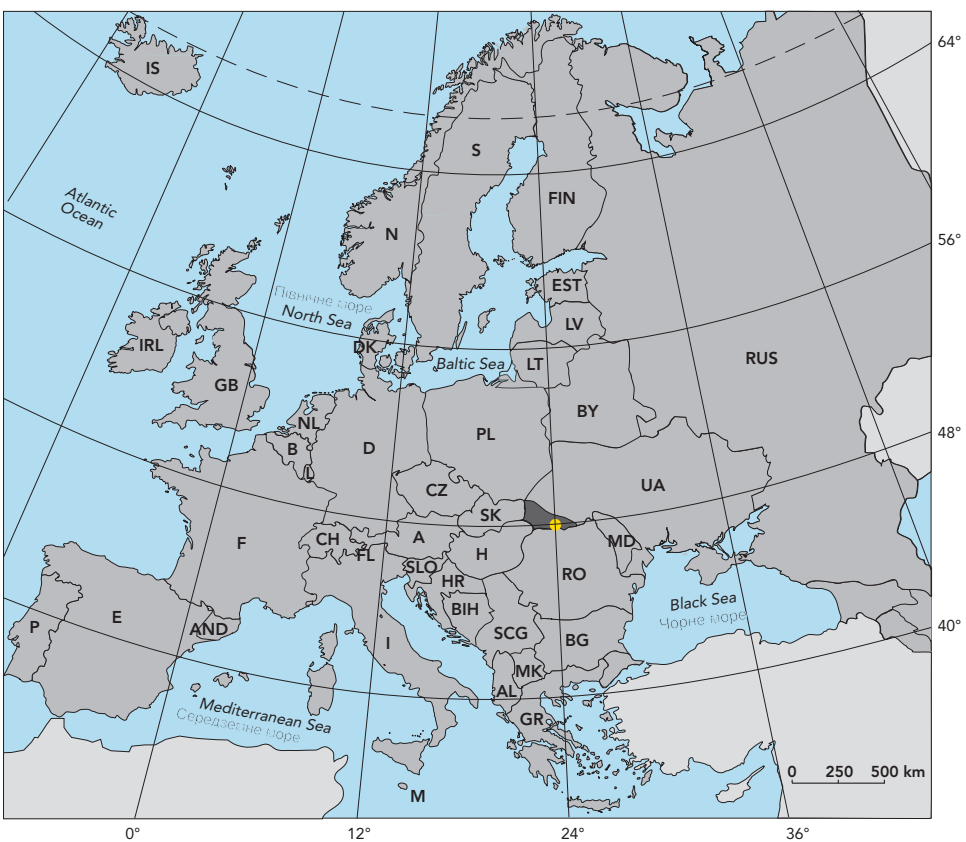


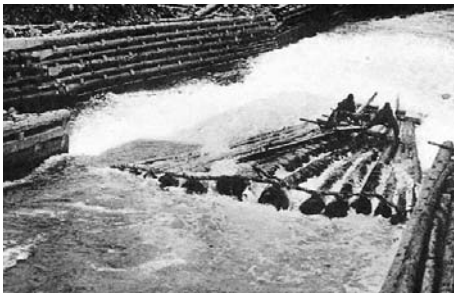
VIRGIN FOREST OF UHOLKA

VIRGIN FORESTS IN THE HEART OF EUROPE

Some regions are significant because of their geographical location. One such region is Transcarpathia, in the south-westernmost corner of Ukraine in the geographical centre of Europe. The prefix "Trans-" refers to the fact that the region is not on the Kyiv side of the Carpathian Mountains but across the range on the other side. Transcarpathia borders on Romania, Hungary, the Slovak Republic and Poland. For many centuries it was part of the Hungarian, Austrian and Austro-Hungarian kingdoms. Its national allegiance changed six times during the 20th century alone. The area has always had close relationships with its western neighbours.

Exploitation of the forest started late and protection early

Transcarpathia's location between East and West has affected settlement in the region and the use of the forest. The region's borders changed so frequently over the centuries that



Rafting timber in Transcarpathia (1945)

industrialization and intensive forest use set in relatively late. For centuries much of the mountain forest remained untouched. Not until the 18th century were German emigrants and Austrian woodcutters settled there by the Habsburgs. Timber from conifers was rafted down the larger rivers. Remote beech forests, like Uholka or mountain forests without any suitable water stretches for rafting, were spared for a long time, sometimes even until well into the 20th century. Other mountain forests were kept as royal hunting grounds and not used for timber. The first forest reserve was established in Transcarpathia in 1908.

The "Jugendstil" houses in Uzhorod, the capital of Transcarpathia, are indicators of the Austro-Hungarian influence

Black woodpecker *(Dryocopus martius)*

These rather special circumstances have made it possible for extensive remnants of virgin forest to persist in Transcarpathia until today. Most of these primeval forests, which in total cover 14,600 ha, are now protected within the Carpathian Biosphere Reserve (CBR).

Unique virgin forests

The virgin forests of Transcarpathia constitute a natural heritage of global significance. This is especially true for the approx. 8800 ha of virgin forest in the "Uholsko-Shyrokoluzhanskyi Massif", which is thought to be the largest virgin forest of European beech. The remaining extensive primeval forests in Europe are mainly in the east and south-east of the continent, apart from the coniferous forests in the north. Most European primeval forests are no larger than 50–100 ha. Continuous areas of 1000 ha, and more especially of broadleaved forest, are very rare. In 2007 the primeval beech forests of the Carpathians (Slovakia, Ukraine) were added to UNESCO'S World Heritage list.

Virgin forests are vital for both humans and nature. They provide us with opportunities to investigate the natural structure, biological diversity, genetic structure and natural processes in undisturbed forests. Findings from studying virgin forests can benefit the near-natural management of exploited forests.

A trip to the Narcissi Valley near Khust is especially worthwhile during the flowering season in April and May

The Carpathian Biosphere Reserve

The CBR is one of the largest and most important protected areas in Ukraine. It was designated a UNESCO Biosphere Reserve in 1992. This shows how much UNESCO appreciated the efforts and achievements of the CBR in conserving biodiversity and promoting sustainable development in the region. Besides protecting the remaining patches of the original natural ecosystems, one of the most important objectives of the CBR is to provide access, albeit limited, for visitors and to enable them to see the enchanting beauty of this unspoilt natural area with their own eyes.

The CBR is made up of 8 isolated regional units (massifs) located in different districts of Transcarpathia (see map, page 10). These represent all the natural and climatic zones of the Ukrainian Carpathians within the reserve. The lowest point of the reserve is in the Narcissi Valley at an altitude of 170 m asl. The highest point is Mt. Hoverla (2061 m asl), which is Ukraine's highest summit. The reserve covers a total area of 53,630 ha.

The administrative offices of the CBR are located in the town of Rakhiv, where there is a small museum with information on the natural and cultural history of the region.

The Church of St.Nicholas (Mykolaivska Church) was built in 1470 and is one of the oldest maintained wooden churches in Transcarpathia. It is in Kolodne along the road to Uholka.

UHOLKA – PEARL OF THE CARPATHIANS

Uholka, the area we recommend you visit, is in the southern part of the "Uholsko-Shyrokoluzhanskyi Massif". This massif covers around 16,000 ha, and is in the central part of Transcarpathia, north of the town of Tyachiv (see map, page 10). It has been protected since 1920. In the virgin forest of Uholka visitors can go on two fascinating round trips. We describe these here, together with some extra information about the area's natural environment.

Sights and site conditions

Uholka's virgin beech forests consitute the region's most valuable treasure. Here beech trees grow well in the fresh, and slightly damp, fertile soil under optimal ecological conditions. Trees can be as much as 140 cm in diameter, and as tall as 46 m. Most of the forests are on hillsides with 15–30 degree slopes, at altitudes of 400–1350 m asl. The climate of Uholka is mild, with mean temperatures in July over 17 °C, and in January around -4 °C. Annual precipitation is about 950 mm.

The massif consists mostly of flysch layers with marls and sandstone, and of jurassic limestone and cretaceous conglomerates. A very special feature of Uholka is the presence of numerous limestone cliffs and karst caves. Uholka contains roughly half of the about 60 karst caves found in the Ukrainian Carpathians, including one famous cave, "Druzhba" (Friendship), which is the largest in the Ukrainian Carpathians. Uholka's main landmark is, however, the "Karst Bridge", a kind of natural rocky arch, which has fascinated people for centuries. The numerous mineral springs are also well known and popular.

Forest types

Once the beech has established itself in an optimal location like Uholka, no other tree species can compete with this shade-tolerant tree. Pure beech forests dominate and comprise 97 % of the total area of primeval forest in Uholka. The main forest associations are Fagetum dentariosum and F. asperulosum, which are very productive and contain some of the tallest beeches in Ukraine.

River Mala Uholka

Beech and book
The Ukrainian name for the Cyrillic alphabet – "azbuka" – is directly connected with the beech tree (beech = "buk" in Ukrainian), as are some other derived words, such as "bukva" (letter) and "bukvar" (book for teaching the alphabet). The German words "Buchstabe" (letter) and "Buch" (book) also take their roots from this tree species.

On warmer sites, there are also mixed beech forests, such as sessile oak-beech and hornbeam-beech forests. At higher altitudes you will find sycamore-beech forests on damp sites. Grey alder woods grow along Uholka's rivers. Other tree species that can be found in Uholka are ash, wych elm, broad-leaved lime, yew and juniper.

In some areas, such as Hrebin and Mala Kopytsya, a number of relic phytocoenoses have been preserved. For example, it is the only habitat for beech-lime forest with Sesleria (Fageto-Tiliaetum sesleriosum) in Ukraine. You can also find natural yew-beech forests sporadically growing on limestone slopes.

Characteristics of virgin beech forests

The most striking and impressive features of these forests are the mighty beeches, the broken-off tree stems covered with fungi and the decaying trunks of fallen trees. The proportion of standing and lying dead wood in Uholka amounts to 15% of the total volume of wood. In managed forests the proportion of dead wood is usually under 2%.

In managed forests beeches are normally harvested when they are around 100 to 150 years, i.e. well before they reach their natural age limit. That is why you hardly ever find giant trees in these forests and their stem diameters are rarely more than a metre. Uholka's beeches, however, can grow to be about 250 years old before they die and start to gradually decompose or are blown down, creating small gaps. These are normally then quickly covered with young beech seedlings. Only where a group of trees have been uprooted at the same time is it possible for a few light-demanding tree species like maple or ash to grow.

Inhabitants of these undisturbed forests

There are around 1000 brown bears *(Ursus arctos)*, 500 wolves *(Canis lupus)* and 400 lynx *(Lynx lynx)* living in the Ukrainian Carpathians. Other important carnivores in Trans-

The redbelt *(Fomitopsis pinicola)* is a perennial pore fungi with a resinous surface that is combustible.

Stock dove *(Columba oenas)*

carpathia are the wild cat *(Felix silvestris)*, the otter *(Lutra lutra)* and a very special animal, the European mink *(Mustela lutreola)*.

One typical forest-dweller here is the black stork *(Ciconia nigra)*. Two or three couples nest in Uholka every year. This bird can only be found naturally in undisturbed old forests, which is why it is now rare worldwide. Another endangered forest bird is the eagle-owl *(Bubo bubo)* – the largest owl in the Carpathian forests.

Dead wood specialists

Old trees and dead wood are important habitats for many typical forest species. Without dead wood, many types of fungi, moss, lichen and insects would have no basis for existence. Uholka's virgin forests provide a paradise for

The lynx

By the beginning of the 20th century the lynx *(Lynx lynx)* had been almost completely eradicated in most of Western Europe. Today the Carpathians are home to one of Europe's few viable lynx populations. Animals from this group are used in re-introduction programmes in places like the Alps and the Balkans. The lynx is a shy creature. A single animal can have a territory as large as 170 square kilometres and is thus seldom seen.

Black stork *(Ciconia nigra)*

dead-wood insects, woodpeckers, bats and other tree-hole dwellers, like the stock dove *(Columba oenas)*. All of Europe's ten varieties of woodpecker can be found in Transcarpathia.

Virgin forests full of dead wood play a very important role in maintaining species diversity. In them you can find rare insects like the hermit beetle *(Osmoderma eremita)*, the stag beetle *(Lucanus cervus)*, the Alpine longicorn beetle Rosalia *(Rosalia alpina)* and the great Capricorn beetle *(Cerambyx cerdo)*, which are all dead-wood dwellers, but also rare butterflies like the Tau emperor *(Aglia tau)*.

The high proportion of dead wood in Uholka's virgin forests means that they contain a much richer variety of fungi than a managed forest. Species like the coral tooth fungus *(Hericium coralloides)* or *Dentipellis fragilis* both depend on old forests and are still relatively frequent in Uholka. In Switzerland, however, they are on the Red List of endangered fungi.

Night flyers

Uholka can also be called "a bat kingdom" as it is full of hollow trees and karst holes. Hollow trees provide homes for bats mostly in summer, but in winter they are too cold for most bats. A few species, however, do hibernate in tree hollows too. Caves in Uholka shelter about 2000 bats belonging to 15 different

The larva of the Alpine longicorn beetle Rosalia *(Rosalia alpina)* usually develops in beech wood

Greater mouse-eared bat *(Myotis myotis)*

Entrance to the "Hrebin" Cave

species. Nine of them are rare, including the greater mouse-eared bat *(Myotis myotis)*, Natterer's bat *(Myotis nattereri)* and the Brown long-eared bat *(Plecotus auritus)*, which are extremely endangered throughout Europe.

Ancient life in caves

The living conditions in the caves have remained practically unchanged until today, enabling a number of ancient fauna species to continue to inhabit them. The isolation of these habitats, however, has prevented many of these species from spreading far from their particular caves. The carabid beetle *Duvalius transcarpaticus* Shill. et Riz is one such species. It is found exclusively in the caves of the Uholka-Shyrokyi Luh Massif. This pale-yellow insect is about 5 mm long and completely blind. Its menu consists of springtails *(Collembola)* of which there are also a large number of special cave species. A previously unknown *Collembola* was discovered in the Druzhba Cave in 1996 and named *Willemia virae Kaprus*.

Some like it wet

Uholka is home to a unique kind of fauna not found anywhere outside the Carpathians, namely the Carpathian newt *(Triturus montandoni)*. It is endemic in the Carpathians and belongs to the caudate amphibians. Another species of caudate amphibian is the fire salamander *(Salamandra salamandra)*, whose bright yellow-black colouring makes it very

The Carpathian blue slug *(Bielzia coerulans)*

Carpathian newt *(Triturus montandoni)*

easily recognizable. The large forest keelback slug Bielzia *(Bielzia coerulans)* is strikingly rainbow-like with its green, blue and violet colouring. During the spawning season, the Danube salmon *(Hucho hucho)*, one of Europe's most endangered fish species, moves upstream from the River Tisza to rivers and streams. Along the rivers you may well spot a dipper *(Cinclus cinclus)* sitting on a rock or diving.

Profuse spring flora

Beech forests have a thick closed canopy through which little light penetrates to reach the forest floor. They therefore do not usually contain many shrubs. The herbal layer consists mostly of early flowering plants that often form carpets of flowers in spring before the beech trees are in leaf: yellow wood anemones *(Anemone ranunculoides)*, the bittercress *(Cardamine glanduligera)*, snowdrops *(Galanthus nivalis)*, honesty *(Lunaria rediviva)* and spring fumewort *(Corydalis solida)*.

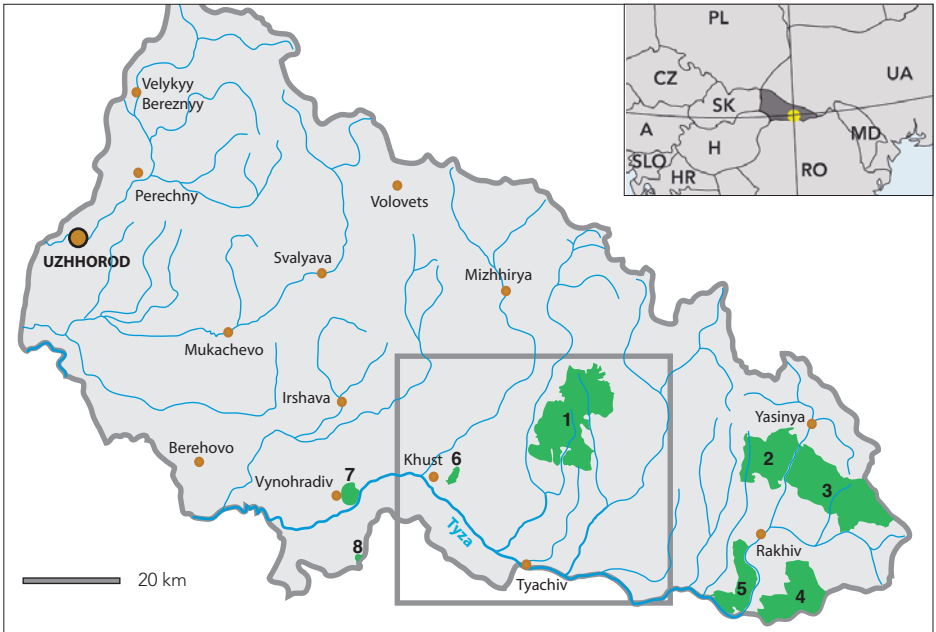
A rare hellebore *(Helleborus purpurascens)*

Aurochs' tongue

The hart's tongue *(Phyllitis scolopendrium)* is known here as aurochs' tongue. This nomenclature, like that of some place names in the region, goes back to the time when there were still herds of aurochs *(Bos primigenius)* grazing in Transcarpathia. This ancient type of cow was common in the region until the 15th century, and became extinct in 1627. The last specimens lived in the forests of Eastern Europe.

About 500 species of vascular plants grow in Uholka. 30 of them are regarded as rare in Ukraine, including some endangered species like: deadly nightshade *(Atropa bella-donna)*, moonwort *(Botrychium lunaria)*, white helleborine *(Cephalantera damasonium)*, spring crocus *(Crocus vernus* ssp. *vernus)*, dogtooth violet *(Erythronium dens-canis)*, plum-scented iris *(Iris graminea)*, Russian belladonna *(Scopolia carniolica)* and *Viola alba*. One new species has been discovered in the area, the Transcarpathian bedstraw *(Galium transcarpaticum)*.

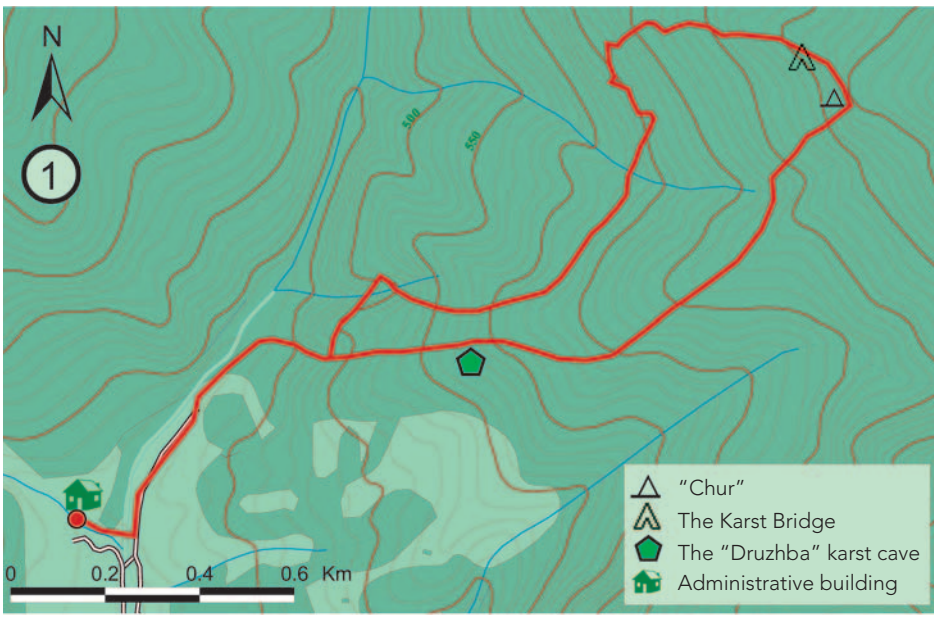
Yellow wood anemone *(Anemone ranunculoides)*



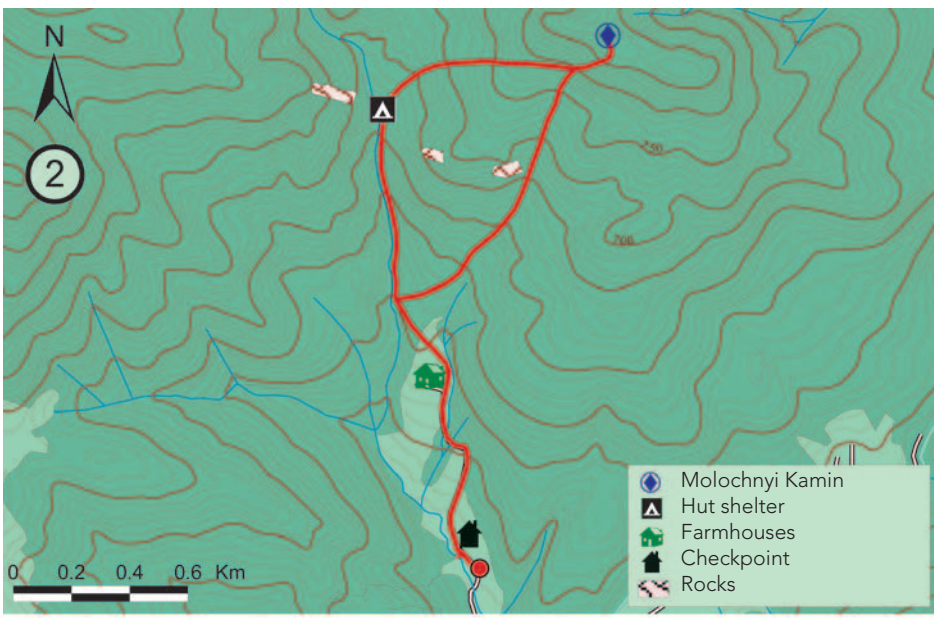
Carpathian Biosphere Reserve CBR in Transcarpathia

Massifs of the CBR:
1 Uholsko-Shyrokoluzhanskyi
2 Svydovetskyi
3 Chornohirskyi
4 Maramoroskyi
5 Kuziyskyi
6 Narcissi Valley
7 Chorno Hora
8 Yulivska Hora

The Mala Uholka Trail



The Velyka Uholka Trail



THE MALA UHOLKA HIKING TRAIL

This circular trail leads through primeval beech forests passing by caves and limestone rocks on the way up to the Karst Bridge. The trail is about 5 km long, with 500 m difference in altitude. The whole trail takes about 2 hours. The best time for visiting is from April to October.

Start in Kicherely

410 m asl

The trail begins at the office of the Carpathian Biosphere Reserve (CBR) in Kitcherely, on the northern outskirts of the village of Mala Uholka. One kilometer down the Mala Uholka River you can visit a working water mill with a 100-year-old wheel made of oak. Cross the river near the office and go past the former hunting lodge of a local count, which today is used as a school.

The Druzhba Cave

400 m from start, 500 m asl

Only 400 m from the beginning of the trail you will find on the edge of the forest one of the most interesting sites in Uholka: the karst cave called "Druzhba" (friendship). The entrance to this cave is via a well 2.5 m in diameter and 22 m deep. It leads to a great underground hall decorated with dripstones. A whole system of corridors leads out of the hall, totalling 1 km in length. Access to the cave is only possible with special speleological equipment. Tourists need a permit to visit it.

Entering the virgin forest

800 m from start, 650 m asl

From the cave the path starts to go up. Roughly 400 m further along you will reach a virgin beech forest. It is a rather damp beech forest containing many ferns and some trees that are 250 to 300 years old. These may be as tall as 40 m with stems up to one metre in diameter.

View towards the South from the "Chur" Rock over the Mala Uholka valley as far as the Romanian Carpathians

Sword-leaved helleborine *(Cephalanthera longifolia)*

Red helleborine *(Cephalantera rubra)*

At the foot of the Hrebin

1200 m from start, 750 m asl

After another 400 m the trail reaches a rocky limestone belt about 1 km long called "Hrebin" (comb). Patches of marbled limestone protude all over it, covered with thick cushions of moss. This green carpet is dotted with various species of fern. As the trail crosses the slope

The Mill at Kicherely in Mala Uholka

View towards the West from "Chur"

Cardamine glanduligera and snowdrops (Galanthus nivalis)

The fumewort *(Corydalis solida)* forms an enchanting flower carpet in spring

horizontally, you will find on your left limestone rocks and boulders. The beech forests here are light and dry with giant beech trees interspersed with lime *(Tilia cordata)* and elm *(Ulmus glabra)*. In spring the slopes are covered with a blue-green-pink carpet of *Cardamine glanduligera* and fumewort *(Corydalis solida)*, dotted with isolated groups of snowdrops *(Galanthus nivalis)*.

The Chur lookout point

2300 m from start, 850 m asl

The path leads to a very picturesque part of the trail – a viewpoint on the top of the Chur rock face. This, according to legend, is a sacred place dedicated to some pagan god. From the top, you can get a wonderful view over Uholka's virgin forests and the valleys of the River Tisza. To the South, on the horizon you can see on a clear day the mountain ranges in Romania across the border. Around the Chur rock face there are dry calceophilous beech forests, and beech-lime stands on rocky sites.

The Karst Bridge

2500 m from start, 800 m asl

Roughly 200 m along the path from the Chur lookout, you reach the highlight of the trail – the Karst or Stone Bridge. This natural wonder is a huge stone arch created through karst-forming processes. The Stone Bridge has always attracted people and in former times was a place for pagan rituals. In 1552 ambassadors of Ivan the Terrible, the Russian Czar, went out of their way to visit the Bridge.

Virgin beech forest

2800–3200 m from start, 700 m asl

From the Karst Bridge the path leads you downhill. After about 250 m you will get to a damp but pure beech stand with an uneven age structure. Here you will find young trees growing right next to mature giants that may be as much as 300 years old. Further on the

trail goes through parts of the forest thinned by windfall where the soil is damp and the vegetation cover extremely rich. Among other plants, you are likely to come across such rare species as perennial honesty *(Lunaria rediviva)* and scopolia *(Scopolia carniolica)*, which blossom from May to July. On the limestone bedrock, hart's tongue *(Phyllitis scolopendrium)* is quite common.

End of the trail

The trail rejoins the forest path you have taken before. It goes down to the river and brings you back to the starting point – the Uholka office of the CBR.

Perennial honesty

Perennial honesty *(Lunaria rediviva)* is a rare plant, but on a warm spring day in Uholka the beech forests are filled with its sweet scent, similar to that of lilac. Its flat silver seed pods are like silver coins, which is why it is also sometimes known as the money plant.

The Karst Bridge – Mala Uholka's special landmark

THE VELYKA UHOLKA HIKING TRAIL

The trail is about 4.5 km in length, with a 400 m difference in altitude. The whole trail takes about 2 hours. The best time to visit is between April and October.

Start at the checkpoint

430 m asl

The trail begins at the Carpathian Biosphere Reserve's checkpoint in Uholka, which is 5 km north of the village of Velyka Uholka. About 100 m from the checkpoint there is a hydrocarbon mineral spring. Its water is still used by the locals to treat ailments. A few centuries ago this area is said to have been rich in thermal springs, but these are no longer here today. From the checkpoint the path leads uphill passing through several meadows. After leaving the last houses you enter a beech forest, where you will at first still find traces of human activity, but the further you go into the forest, the fewer you will encounter.

The path divides

1200 m from start, 530 m asl

Two hundred metres from the forest edge the path splits. Take the left fork as it is not so steep, and you will enter the primeval beech forest after another 300 m.

Cliffs and hidden treasures

1500 m from start, 650 m asl

Walk along the right bank of the Kamyanyi River and take a look at the high limestone rockfaces on the opposite bank. These form the eastern edge of the Hrebin limestone range. Along Uholka's high limestone rocks a large number of relict and endemic plant species can be found.

The slopes are covered mostly with beech trees 15–20 m high, but there are also some yew-trees among them. The limestone rocks

Virgin beech forest near the "Milk Stone"

are full of secret caves and galleries. According to legend, Opryshky (the local name for "robbers") used to hide treasure in these caves, but nobody has ever found any. But the caves still contain a lot of natural "treasures", such as stalactites, selenite or moonstone. The path takes us to a so-called "kolyba" – a small traditional wooden construction, where you can shelter on rainy days and have a rest. From the kolyba the trail continues up the slope. After another 200 metres the path divides. Follow the path on the right.

The Molochnyi Kamin Cave

2100 m from start, 850 m asl

On the highest point along the route is the most significant natural and historical site in the area – the karst cave "Molochnyi Kamin" (Milk Stone). Beeches, limes and elms surround the entrance to the cave, which is white in colour due to the saturated calcium

The rare yew tree

About 1,500 yew trees *(Taxus baccata)* grow in the primeval beech forest of the Uholka-Shyrokyi Luh Massif. The yew can live to be about 5000 years old, and used to be very widespread in the Carpathians. The name of the River Tisza is derived from it. The conifer's valuable wood was intensively exploited between 1400 und 1700. Today it is found almost exclusively in the reserve.

Entrance to the "Molochnyi Kamin" Cave

carbonate that forms it. The milky colouring is what gives it its name – the Milk Stone. The cave is interesting not only because of its size and fantastic stalactites, which resemble huge organ pipes, but also because of its history. Archaeologists have found evidence that Paleolithic people belonging to the bear-hunting culture used to make their homes there. A recent archaeological survey uncovered many Stone Age artefacts.

The Velyka Kopytsya Rockface

2700 m from start, 730 m asl

Right behind the cave the path goes down

View from the huge Velyka Kopyzja Rock over the Velyka Uholka Valley

The fungus *Trametes gibbosa* on a beech tree

Aesculapian snake

The rare Aesculapian snake *(Elaphe longissima)* can be found in Uholka. It is non-poisonous, and may grow up to 2 metres long, which makes it the largest snake in the Carpathians. One of the Aesculapian snake's specialities is climbing bushes and trees using the special scales it has on its belly. This means that it not only feeds on its main prey, i.e. rodents, lizards, snakes and amphibians, but it can also catch birds. Before swallowing its victim, the snake strangles it, which is why this species is often called "the Carpathian boa".

Wolf *(Canis lupus)*

steeply. After several hundred meters you will catch a first glimpse of a lonely rockface, Velyka Kopytsya (Big Haystack), which is 70 m from top to bottom. The only way to get to the summit is along a narrow path on the western slope of the rockface, but it is only suitable for the sure-footed. It is well worth the climb, however, as there is a marvellous view over the whole area from the top. The summit itself is a very special stony garden, where, within a very small area, a number of rare and interesting plant species grow.

After the rockface the path continues and very soon comes back to the intersection where the path divided. From here it is not far to get back to the checkpoint.

The poisonous Russian belladonna *(Scopolia carniolica)*

European brown bear *(Ursus arctos)*

FURTHER INFORMATION

Visiting Uholka's Virgin Forests

To visit Uholka's virgin forests you need a ticket, which you can buy at the local CBR office in Kitcherely (Mala Uholka). There are some parking and camping areas at the park entrance, as well as a few rooms to rent and places to eat. Please contact the CBR headquarters in Rakhiv (see below) before your arrival.

Guided Tours in the Virgin Forests

The CBR offers guided tours with scientists to the different virgin forests. At the Headquarters in Rakhiv you may visit the "Museum of Mountain Ecology and History of Nature Use in the Carpathians".

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Internet: http://www.rakhiv-tour.info

Public transport

The best way to reach the Uholskyi Massif of the Carpathian Biosphere Reserve is by taxi. You can also get to Mala Uholka by bus (departure 3 p.m.) or route taxi (private mini-bus, departure 11:50 a.m. and 5 p.m.) from Tyachiv, but only on workdays. There is also a private bus to Velyka Uholka. Private buses and taxis depart from Koshuta Street 90, opposite the orthodox church. Tyachiv is accessible by train from Uzhhorod or by bus from Uzhhorod, Mukachevo, Rakhiv or Ivano-Frankivsk.

Maps

Maps can be obtained from the tourist information centres in Uzhhorod and Rakhiv as well as in bookstores (e.g. "Kobzar" bookstore, Uzhhorod).

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VIRGIN FOREST OF UHOLKA

Nature Guide to the Largest Virgin Beech Forest of Europe. A UNESCO World Heritage Site

Europe's largest virgin beech forest is located in the Transcarpathian region of Ukraine in the geographical heart of the continent. It constitutes a natural heritage of worldwide significance and is today part of the Carpathian Biosphere Reserve, together with other virgin forests. Far from the noise of planes and light pollution, you can find here many tranquil spots, an authentic rural way of life and above all lots of "pure nature".

In 2007 the primeval beech forests of the Carpathians (Ukraine, Slovakia) were added to UNESCO'S World Heritage list.

Since 1999 the Carpathian Biosphere Reserve (CBR) and the Swiss Federal Institute for Forest, Snow and Landscape Research (WSL) have been jointly analysing the structure and biodiversity of the virgin forest of Uholka.

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