Crossborder Geotrail

Passo Pramollo - Nassfeld

Geoparco delle Alpi Carniche
Geopark Karnische Alpen

Interreg Italia-Österreich
European Regional Development Fund
EUROPEAN UNION

Details

Season	June-September
Length	10.7 km
Ascent	870 m
Difficulty	Moderate
Duration	7:00 hh:mm

The geotrail starts near the little lake of Pramollo: you can reach the Pass of the same name with your own transportation, arriving from Pontebba (Italian side), or from Hermagor (Austrian side). Both routes take about 40 minutes starting from the valley bottom. The geotrail begins right at the back of the Al Gallo Forcello Hotel, where you take the mule track that leads to Casera Auernig.
It is advisable, given the length of the geotrail, to pay attention to the rapid weather changes typical of high altitude, and be equipped with clothing suitable for sudden rains and low temperatures even in summer.

A journey through the forests and low seas of the Late Carboniferous

The Pramollo-Nassfeld cross-border Geotrail allows observing in detail the sedimentary rocks deposited at the end of the Carboniferous, the penultimate period of the Paleozoic Era. The Pramollo section, located between the Italian and Austrian border, is internationally known for its sedimentary rocks rich in marine and continental fossils. They testify to the changes that took place in this area, which was cyclically turned from a marine to a coastal environment and then to a deltaic one. This was due to the periodic rise and lowering of the sea level regulated by an ancient glaciation.
The fossil remains of plants (such as huge tree ferns) that formed extensive forests (whose accumulations also generated small coal deposits exploited in the past), the footprints of large amphibians and even the records of terrestrial arthropods such as scorpions, are unique in the world.
The Cross-border Geotrail includes ten Geostops, which are observation points from which it is possible to briefly retrace the ancient history of the Pramollo section: its rocky succession, called Permo-Carboniferous Pontebbano, was deposited between 310 and 275 million years ago, after the end of the Ercinic (or Variscan) orogeny.

Stopping point

1 Ancient fluvial-delta gravels

Just before Casera Auernig a very particular grey conglomerate emerges: its calcareous pebbles were created by the ancient erosion of a narrow and long rocky promontory that suddenly emerged from the sea due to active faults. Today it roughly coincides with the area that includes Valbertad - Rio Secco Crete – Mount Cavallo – Mount Malvuerich – Mount Bruca. The grey conglomerate (composed of ancient fluvial-delta gravels) is also associated with light grey sandstones, characterized by layers with a thickness of a few tens of centimetres that overlap for many meters. They can be seen on the small rocky ridge just east of the smaller building of the Casera Hut. The layers of light sandstone are also produced by the erosion of the Devonian limestone rocks of Mount Cavallo – Mount Malvuerich. These are ancient delta deposits that spread from the rocky promontory into the sea towards the current Auernig and Carnizza mountains.

2 Calcareous algae boulders

Between the Casera Auernig and the base of the mountain of the same name, there is a large number of large boulders distributed on both sides of the mule track. They collapsed from the steep slope of Mount Auernig in an unknown time, certainly after the Quaternary ice had freed this sector (between 18,000 and 15,000 years ago). Two very different types of rocks can be identified in the boulders: quartz pebble conglomerates and light grey algal limestone. The former correspond to fluvial-delta deposits, the latter are exclusively marine sediments. In the latter, it is possible to observe fragments of calcareous seaweed that look like a tube (Dasycladaceae), and that can reach up to a few centimetres in lenght. The two types of deposit represent the typical rocks of the banks of the Pramollo rocky succession, deposited around 300 million years ago.

3 Traces of oil in blackish limestone

Here, where a small stream crosses the mule track, it is possible to observe a bank of algal limestone still not collapsed. The limestone is blackish in colour, in contrast with the mostly clear one of the Pramollo succession. When struck, this limestone releases a characteristic odour of bitumen The odour and the blackish colour indicate that the bottom of the lagoon, where the algal fragments (thalli) were deposited with mud, was devoid of oxygen: the organic particles that accumulated together with the algal limestone did not undergo putrefaction. For this reason, today these rocks contain traces of "crude oil": this is the ancient organic matter, which was literally cooked underneath the earth's crust with the passage of geological ages.

4 The oldest terrestrial vertebrate discovered in Italy

In this stretch of the mule track, a block of rock was found with an amphibian footprint dating back to the Upper Carboniferous: it is the most ancient finding referable to a terrestrial vertebrate discovered in Italy.
Towards the mountain, the deep incision of a stream has highlighted a succession of rocks in thin layers alternating with occasional banks, both of quartz conglomerate and of light grey algal limestone. The thin layers represent ancient stratified sands and muds that time cemented and turned into sandstones and shales. These sediments were transported by ancient rivers that flowed from north-west to south-east and poured their solid cargo (sand and mud) into a shallow sea. The granules and particles accumulated in successive layers on the seabed, not very far from the line of a delta.

5 Ripple mark rocks

At this stop another stream flows which affects the rocky succession of the Upper Carboniferous and exposes it. About 15 meters lower than the mule track, the large surface of a layer of sandstone can be seen. The layer is still horizontal, and its surface forms a series of symmetrical and parallel ripples. These are small "sand ripples", 1-2 centimetres high, generated by the movement of sand on a seabed just a few meters deep. Their symmetrical pattern reveals that they were produced by oscillating wave motion and not by a current. All this happened around 300 million years ago. It would be worthwhile to reach it, but some caution is needed.

6 Deposits of ancient algal banks

This section crosses the sandstones of the Corona formation along the border area. The layers are rich in plant remains and represent an ancient delta plain environment.
Moving a few ten meters north along the steep path, it is possible to see the only calcareous bank present on the 320 m of this formation. It is only 60 cm thick, and due to the alteration it is yellow on the surface (but dark inside). It is formed by a few millimetres wide algal tubes (thalli) of Dasycladaceae. Some are still gathered in undamaged tufts shaped like the fingers of one hand. The sea, raised by a partial fusion of the ice cap, invaded the delta areas, pushing the ancient coastline inland for many kilometres. Algal limestone settled on the delta, now replaced by the sea.

7 Storm deposits

The rocks at this stop are fine sandstones with characteristic "gibbous", fusiform stratifications. The sands of the seabed were stirred by storm waves every time a weather front passed over the area: the stratification that in these cases resulted was typical of the so-called "storm deposits", capable of moving the sandy granules of the seabed. Finding, as in this case, many overlapping storm layers suggests a low seabed, maybe just ten meters or so deep, as every storm, big or small, left its mark.
At a short distance, there is another rocky wall that is a couple of meters high, where some layers of fine sandstone with intensely convoluted laminae are clearly visible. The deformation was apparently caused by an intense seismic shock while the sediment was still soft and not cemented.

8 The Gartnerkofel and the signs of a fault

Looking north, the majestic remains of an organogenic cliff dating back to the Middle Triassic (Ladinic) rise in the distance. Today these rocks form the Dolomite massif of the Gartnerkofel (2195 m). At the base of its southern wall the rocks of the Pramollo succession develop, they were deposited about 70 million years ago. The two successions, respectively from the Triassic and the Upper Carboniferous periods, are connected along an ancient vertical fault. The fault was created many millions of years ago, initially by lowering by hundreds of meters the sector of the Gartnerkofel compared to that of Pramollo. In more recent times, powerful horizontal movements were added. The activity of this fault fractured and disrupted a layer of fragile dolomitic rocks that were many tens of meters wide. The presence of this tectonic surface can be recognised from afar due to the characteristic light coloured debris that marks its development.

9 A gigantic "water spill" from the sandy Carboniferous marine sediments

This limestone rock comes from Mount Creta Chianevate. It is rich in Crinoids from 380 million years ago. Although their appearance makes them look like flowers, they are actually animals (Echinoderms, related to sea urchins and starfish) that lived anchored to the seabed thanks to a peduncle with roots. At the upper end, however, there was a crown, formed by a flower cup and many arms. In most cases, the fossils found are only some parts of these organisms. In addition to these, you can see corals and even the extinct Stromatoporoids, important reef builders related to sponges, but whose classification is still uncertain.

11 Mountains in motion

Upon arriving at this stopping point, we can cast a glance at our shoulders and easily sense what immense forces are acting in nature. The clear limestone of the Wolayer Formation, on the eastern side, does not continue in the valley, where the limestones of the Findenig Formation can be found. The rock sequence was strained by tectonic movements, which have caused the layers' slip. These movements have fractured the rocks, thus exposing them also to the erosion: therefore, it is frequent that valleys form along areas affected by tectonic lines (faults and/or overthrusts). The Gail Valley itself represents a stretch of one of the longest tectonic lines in Europe, the Periadriatic one, which extends for 700 Km (434 miles).