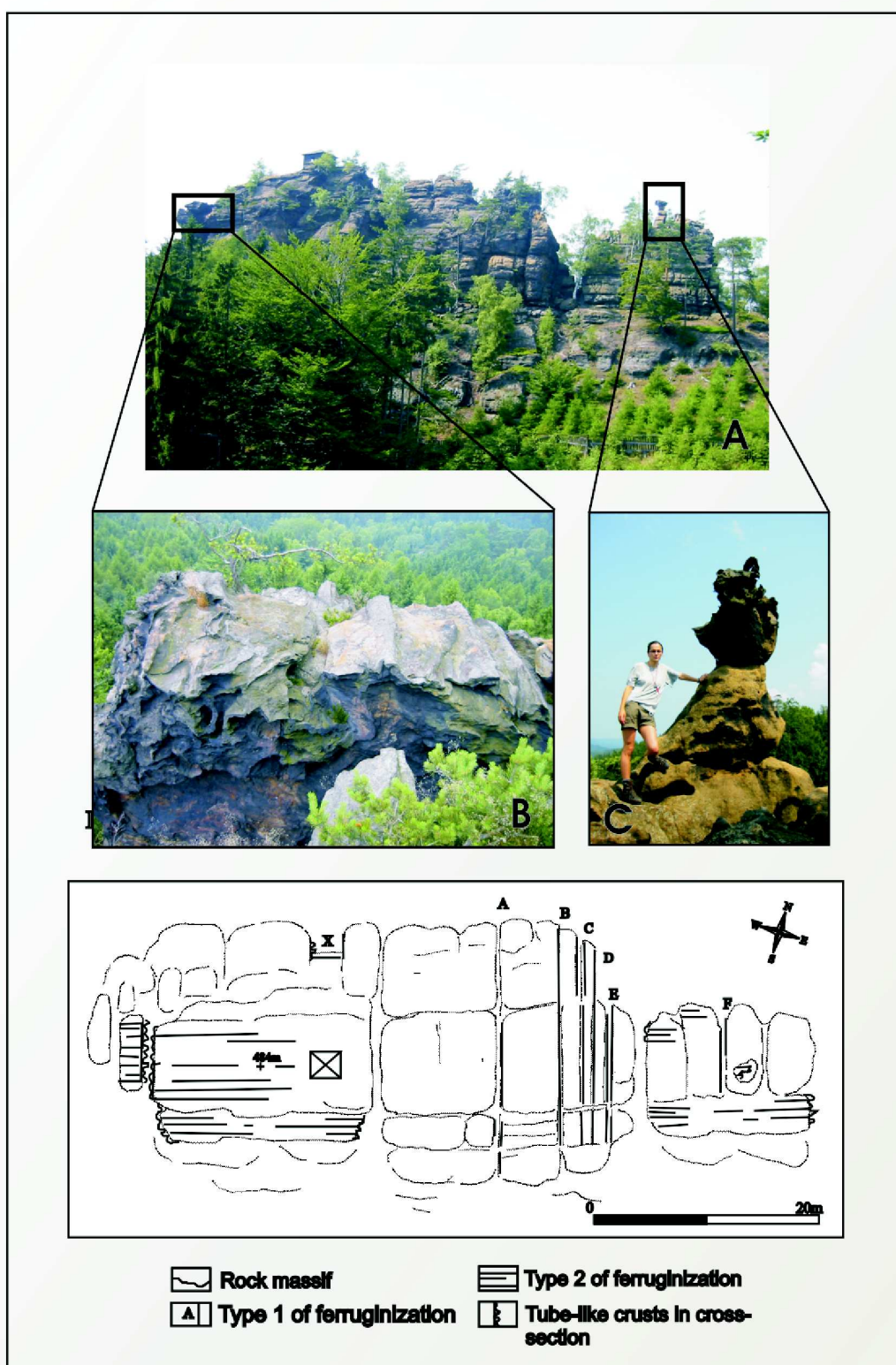




Ferruginization in sandstones of the Bohemian Switzerland National park

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A typical feature of sandstones both in the Bohemian Switzerland National Park and elsewhere in the Bohemian Cretaceous Basin is **Fe-mineralization**. Owing to its higher resistance to weathering and deflation, it acts as a resistant element in the sandstone relief, often creating unique and bizarre forms on the rock walls, thus increasing the aesthetic value of the landscape. From a global perspective, the forms of Fe-mineralization in Cretaceous sandstones in the Czech Republic are possibly unique.

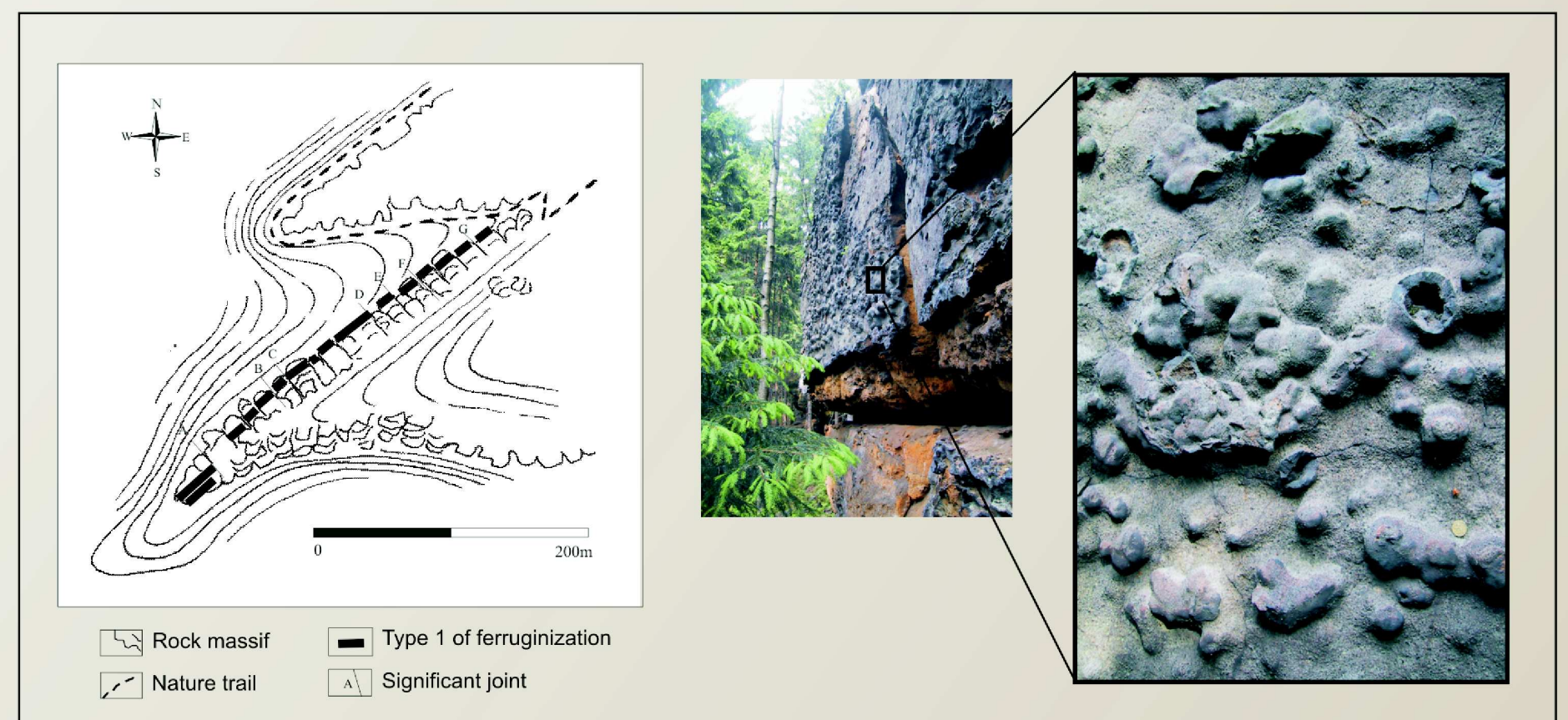


A viewpoint of **Rudolfův kámen** is a typical and possibly the most frequently visited locality of ferruginous sandstones where all three defined types of Fe-mineralization can be found. The entire view to the rock massif (A), subhorizontal tube-like ferruginous crusts in the upper part (B), the mushroom rock formed by ferruginization of Type 2.

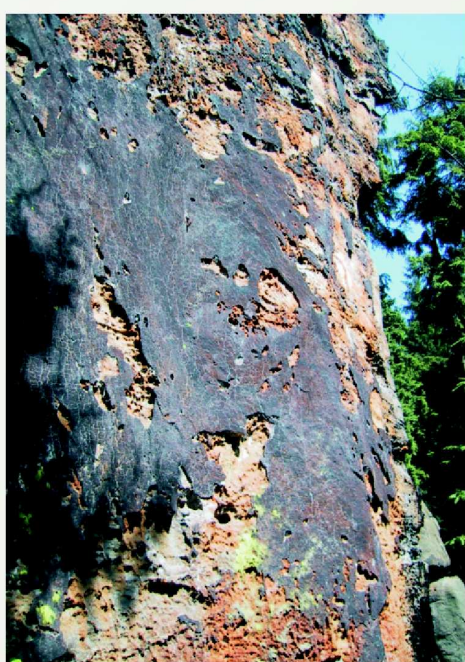
Ferruginization can be found throughout almost the whole area of the national park. It mostly forms subvertical planar tabular bodies along contacts of basaltic dykes with the host sandstone and fillings of open joints and faults (**Type 1**) and irregular, thin undulating parallel crusts, circles or linear concentric tubes in the rock massif (**Type 2**), whose genesis is explained by the *Liesegang phenomena*. **Type 3**, represented by strata-bound subhorizontal bodies, follows conglomerate beds or strata-parallel fracture zones.

The character of Fe-mineralization in sandstones and its relation to basaltic bodies, geological and tectonic conditions was studied by means of field mapping at classical (main and additional) localities. The viewpoint of “**Rudolfův kámen**” is a typical locality of ferruginous sandstones. The following sites are important for the occurrence of ferruginization: **Baldurova jehla**, **Čínská zed’**, **Pod Pravčickou bránou**, **Kyjovské údolí** (Type 1); **Temný důl**, **Nad jeskyní Peklo**, **Tetřeví kout** (Type 2), and the rock formation “**Tri stoly**” with mushroom rocks (type 3).

The measured orientations of encrustations lining joints and of ferruginous tube axes are mostly NE - SW to E - W.



A sandstone rock ridge more than 300 metres long is broken by a tectonic zone with 2 - 4 parallel subvertical tabular bodies of Type 1. They form a zone lining the whole ridge and the surface of particular bodies is covered with bulges and minute protuberances (an average from 2,5 to 10 centimetres), from the locality called **Pod Pravčickou bránou**.



A high rock wall with the conserved subvertical planar body of Fe-oxyhydroxides in the **Táborový důl**.



An appearance of ferruginization of Type 1 under a rock shelter, the locality **Kemp Tramtárie**.



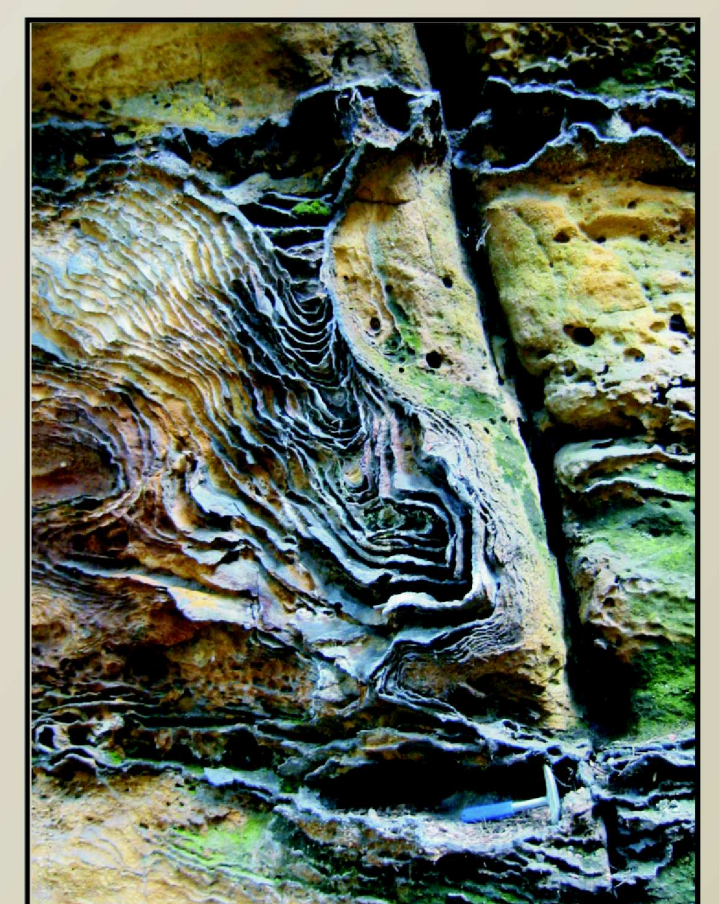
A rock needle used by mountain climbers (**Baldurova jehla**) is formed by the subvertical ferruginous body lining on a joint.



A system of subparallel horizontal ferruginous tubes from the locality **Nad jeskyní Peklo**.



A zone of concentric tube-like ferruginous crusts trending NE - SW is called **Čínská zed'** and stretches at a distance of 950 metres.



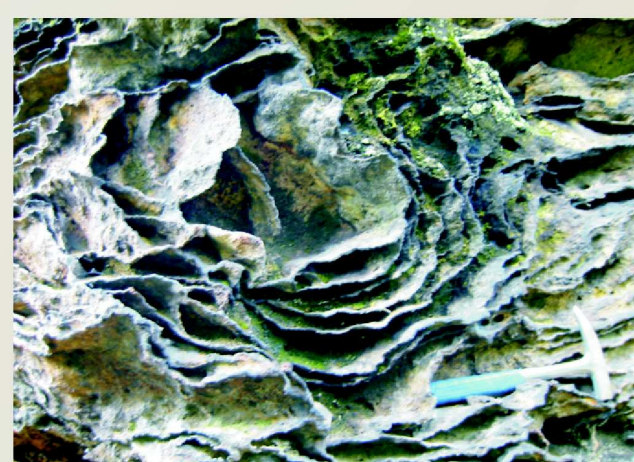
Táborový důl - a specimen locality of transitional features between morphological types 2 and 3.



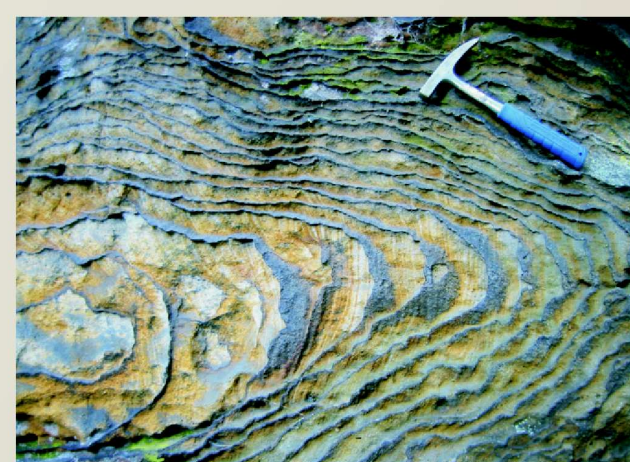
One of the most spectacular monuments in the national park called **Tri stoly** (Three tables) cliff is formed by a subhorizontal body of ferruginous sandstone (Type 3), which gave rise to morphological form known from Kokořín area as **mushroom rocks**.

Accumulations of iron oxide and hydroxide (goethite, less often hematite) probably formed during the main volcanic phase in the Late Oligocene and Early Miocene owing to transport of Fe^{2+} through the mediation of hot mineralizing post-magmatic fluids.

Main source in the national park is probably represented by the Tertiary basaltic rocks: olivine basalt, limburgite, tephrite etc. - Slunečný vrch, Sokolí vrch, Koliště, Kitzenberg, Mlýny, Zámecký vrch, Růžovský vrch, Grosser Winterberg, and also the occurrences of basaltic rocks documented only on the basis of traces after their quarrying.



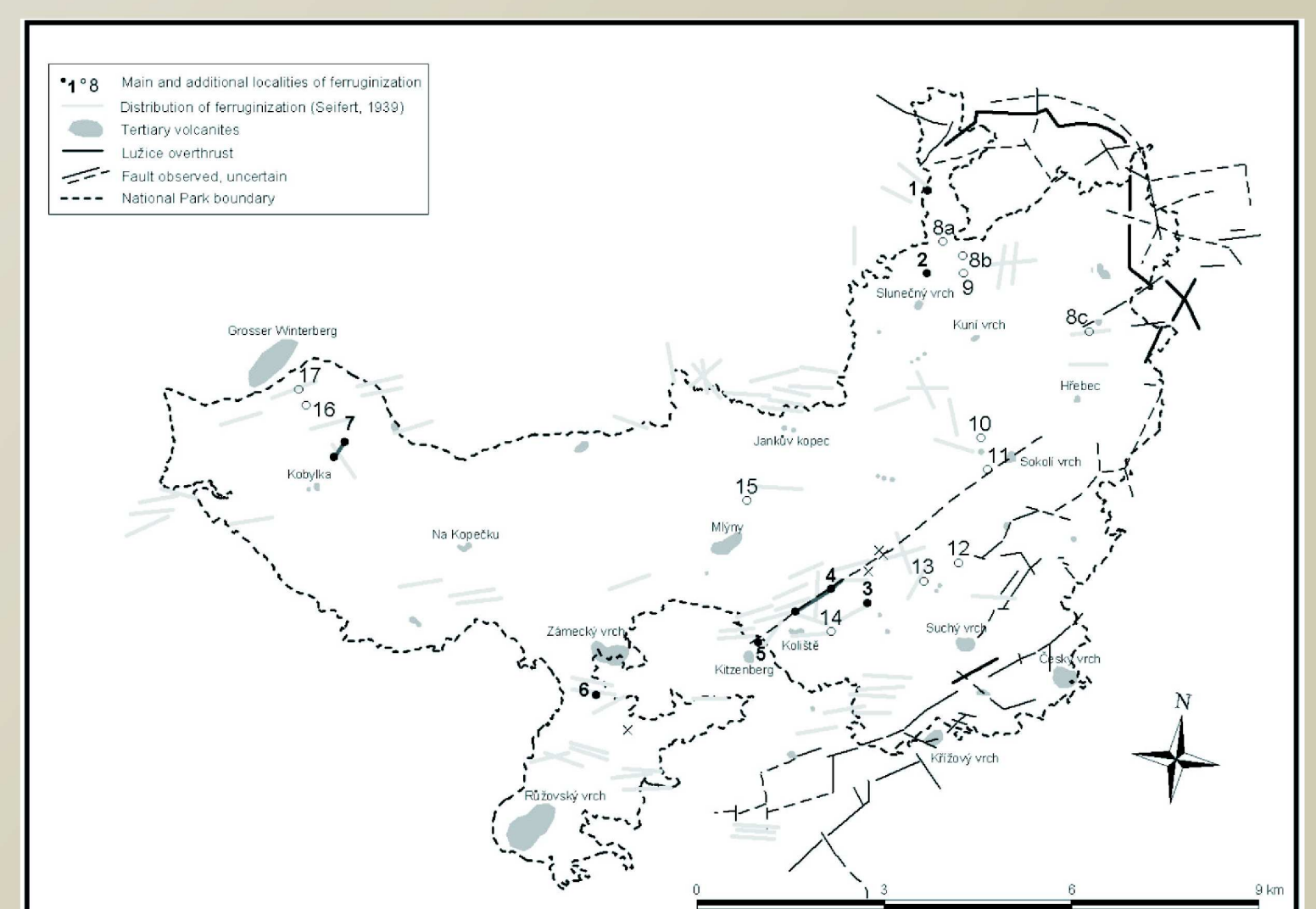
A rose-like appearance of ferruginization of Type 2 developed at the locality **Hřbet nad údolím Suché Bělé**.



A solitary occurrence of concentric thin ferruginous crusts which has formed the impression of rings pattern the locality **Markův kemp**.



Transitional features between morphological types 1 and 2 near the **Táborový důl** Valley.



A map showing the distribution of ferruginization phenomena in the national park, main and additional localities: **Tri stoly** (1), **Temný důl** (2), **Rudolfův kámen** (3), **Čínská zed'** (4), **Baldurova jehla** (5), **Nad jeskyní Peklo** (6), **Pod Pravčickou bránou** (7), **Kyjovské údolí** (8), **Volský důl** (9), **Tetřeví kout** (10), **Markův kemp** (11), **Úzké schody** (12), **Táborový důl** (13), **Pod Pohovkou** (14), **Kemp Tramtárie** (15), **Hřbet nad údolím Suché Bělé** (16) and **Nad Kráčmerovým dolem** (17).