

Stołowe (Table) Mountains

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Stołowe (Table) Mts. are located in the south-western Poland, in the central part of the Sudetes. Stołowe Mts. represent the highest, south-eastern part of ca 42 km long, south-east — north-west trending range, subparallel to the main geological structures of the Sudetes. The middle part of this range — located in the Czech territory — is called the Broumov Highland (Czech: Broumovska vrchovina, Polish: Wyżyna

Broumovska). The north-western part, extending again into the Polish territory in the vicinity of Mieroszów and Kamienna Góra, is known as the Zawory range.

Stołowe Mts. extend for approximately 17 km from the Czech border in the north-west down to the valley of Bystrzyca Dusznicka River and the vicinity of Polanica Zdrój in the south, and toward Chocieszów and Radków to the east (Fig. 1). Stołowe Mts. form a forested plateau with an average elevation of 600–700 m a.s.l. Isolated, flat-topped massifs and peaks of Szczeliniec Wielki (919 m

Highland (Czech: Broumovska vrchovina, Polish: Wyżyna

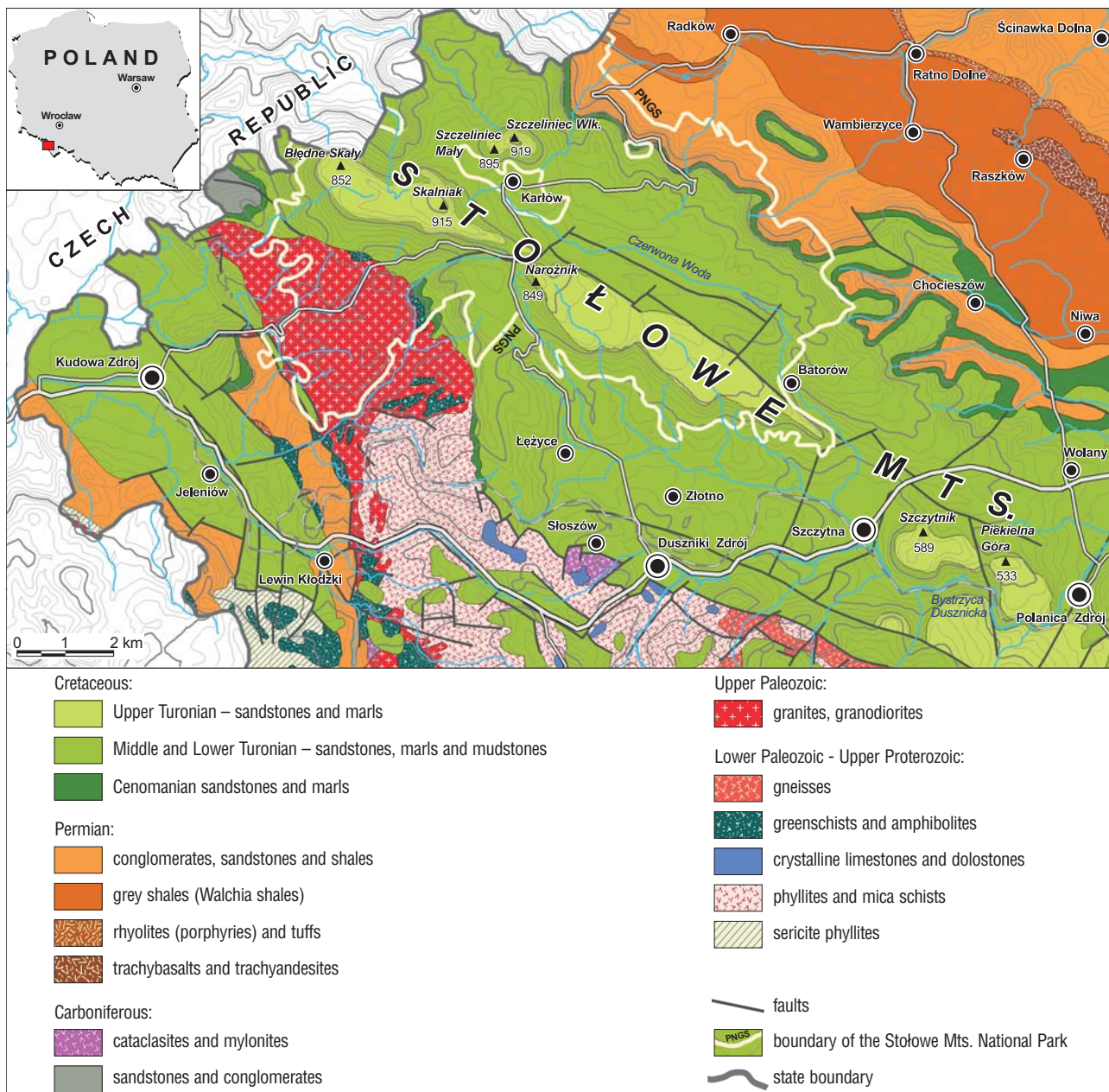


Fig. 1. Geological map of the Stołowe Mts. (modified from Sawicki, 1967)

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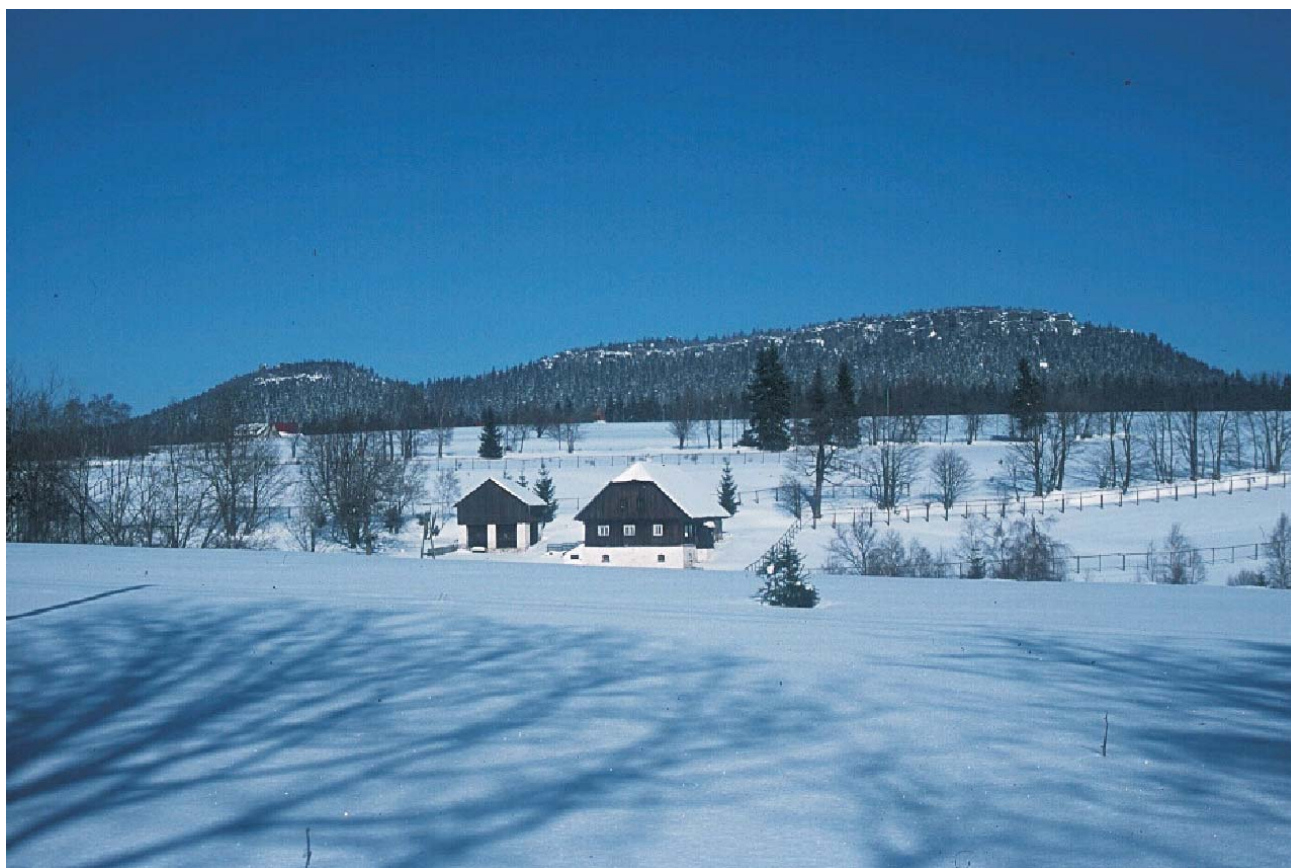


Fig. 2. The highest peak of the Stołowe Mountains, Szczeliniec, is divided into two parts: the larger and higher Szczeliniec Wielki (accessible for tourists) and the smaller and lower Szczeliniec Mały. Karlów Plateau in the foreground. Photo by Z. Gołąb

a.s.l.) and Szczeliniec Mały (896 m a.s.l.), Skalniak (915 m a.s.l.), Narożnik (851 m a.s.l.) and Szczytnik (588 m a.s.l.) rise above the main plateau (Fig. 2).

Stołowe Mts. are considered to be amongst the most beautiful and attractive ranges of the Polish mountains. They are characterized by a platy, table-like structure, creating a unique surface relief, a large variety of various erosional forms of sandstones, and a broad range of sedimentary structures preserved in these rocks (Gawlikowska, 2000). To protect these specific features, the Stołowe Mountains National Park has been established in 1993. The Park covers the area of 6340 ha and comprises the Table Mountains as well as the northern part of the granitic Lewin Hills in the south. Within the Park the tourist access is only available along marked paths and trails (Čech & Gawlikowska, 1999), forming a dense network across the area. The main artery within the Park is *Szosa Stu Zakrętów* (*A Hundred Turns Road*), connecting Kudowa Zdrój and Radków. The E-67 international road Prague–Wrocław–Warsaw runs along the southern edge of the Stołowe Mountains.

There are many mineral springs along the edges of Stołowe Mountains. These are highly carbonated natural waters, with a low overall mineralization. The presence of these springs provided the basis for the foundation of several well-known spas, as Kudowa Zdrój, Duszniki Zdrój and Polanica Zdrój (see Chowaniec & Zuber — page 706).

Stołowe Mountains are built of flat-lying Upper Cretaceous deposits which overlie the folded crystalline basement covered with Paleozoic sedimentary rocks (Fig. 1). Cretaceous deposits were extensively studied by Radwański (1966, 1968, 1975), Jerzykiewicz (1968a, 1968b, 1969, 1975), Jerzykiewicz & Wojewoda (1986), Wojewoda (1997).

The Upper Cretaceous deposits accumulated in a shallow epicontinental sea due to relatively quiet sedimentation. The detritus and other weathering products were supplied from adjacent, elevated blocks, including the West Sudetic Island (the Iżera and Karkonosze Mountains) and the East Sudetic Island (the Sowie Mountains), and deposited on the sea floor. Sandstones accumulated in shallow, near-shore zones. The sandstones form thick, compact beds characterized by regular, prismatic joints. Three successive, thick horizons of these jointed sandstones are distinguished as the lower, middle and upper sandstone. The three horizons are separated from one another by layers of marls, mudstones and claystones, with intercalations of cherts and limestones, which formed during the deepening of the sea.

The marine origin of these rocks is confirmed by the presence of glauconite and numerous fossils of marine fauna, mainly bivalves, ammonites and echinoids. The lithofacial subdivision of these deposits has been based mainly on the bivalves of the *Inoceramus* group.



Fig. 3. Viewing terrace over a rocky crag at Szczeliniec Wielki, with a panorama of the surrounding mountains. Figs. 3, 5 photo by W. Bobiński



Fig. 5. A part of the tourist trail along the bottom of one of the largest fissures of Szczeliniec Wielki



Fig. 4. In the rocky labyrinth of fissures on Szczeliniec Wielki. Figs. 4, 6, 7 photo by F. Nowacki



Fig. 6. *The Hen Rock*



Fig. 7. *The Giant's Head Rock*



Fig. 8. *The Monkeyman Rock.* Figs. 8, 10 photo by Z. Gołąb



Fig.10. *The Rock on Szczeliniec Mały*



Fig. 9. *The Camel Rock* — cross-bedded sandstones. Photo by E. Gawlikowska

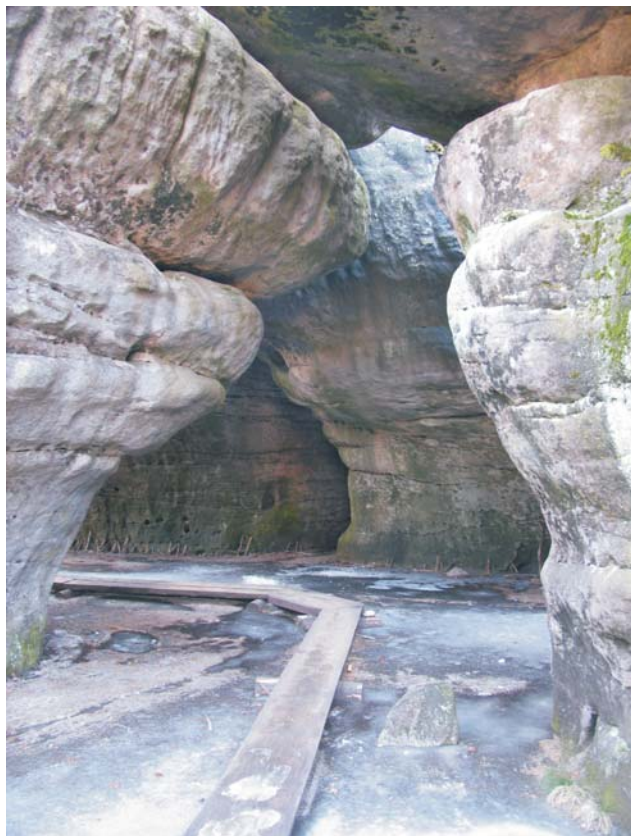


Fig. 11. *Some of the passages in the labyrinth in Błędne Skały.* Photo by F. Nowacki



Fig. 16. A view from Narożnik toward Łężyce. Figs. 16–22 photo by W. Bobiński



Fig. 19. A view from Narożnik toward Lewińskie Wzgórza



Fig. 17. The slope of Narożnik



Fig. 20. Rocky monadnocks at Narożnik



Fig. 18. Picturesque rocks at the edge of Narożnik



Fig. 21. Steep edges of Narożnik



Fig. 22. The Owl Rocks — an old quarry incised in the edge of the middle sandstone horizon

The lowermost and oldest level of Stołowe Mountains is made up of Cenomanian glauconitic sandstones containing *Actinocamax plenus* (the lower sandstone horizon), clayey-limy sandstones, marly sandstones, mudstones and clayey marls. These deposits underlie the whole area of Stołowe Mountains, but crop out mainly at the edges of this area, and also in some deep river valleys and as erosional remnants. The thickness of these deposits reaches 30 m.

The lower and middle Turonian deposits are found above. They are represented by siliceous marls with *Inoceramus labiatus*, with the maximum thickness of up to 35 m. On top of these deposits there are arcose sandstones, forming the middle sandstone horizon, over 80 m thick. Many layers of these sandstones show cross-bedding and a variable grain size, indicating uneven relief of the sea floor where they accumulated.

The sandstones are intercalated, and overlain by, siliceous marls with *Inoceramus lamarki* with total thickness of ca 80 m. In surface morphology, these marly deposits form a wide, almost flat plateau. However, the outcrops of the middle sandstone horizon are marked by morphological edges (cliffs) up to 200 m high. These edges separate Stołowe Mts. from their foreland. The north-eastern edge is

known as the Radków Edge, and the southern one as the Batorów Edge. There are numerous picturesque rocks (e.g. mushrooms, towers, maces, ambos) near the edges.

The third, uppermost plate is formed by the youngest (upper Turonian) sandstone horizon — quartz sandstones, up to 100 m thick, with *Inoceramus schloenbachi*. These rocks make up the highest, solitary peaks and monadnocks of Stołowe Mts.: Skalniak with Błędné Skały, Szczeliniec Wielki and Szczeliniec Mały, Narożnik with Białe Skały, Szczytnik. The sandstones form numerous fancy rocks, labyrinths and rocky towns in the upland part of Stołowe Mountains.

The modern relief of Stołowe Mts. developed rather recently — in the Tertiary and Quaternary. In the Tertiary, during the Alpine orogenic movements, the thick plates making up Stołowe Mts. cracked into several blocks, and subsequently uplifted by ca 300 m. During the periods of tectonic quiescence three denudation surfaces were formed: the upper surface, currently at 850–919 m a.s.l. (the uplands of Wielki and Mały Szczeliniec, Skalniak and Narożnik), the middle surface, currently at 500–800 m a.s.l., covered by a thick weathering apron of marls (the Karłów plateau), and the lower surface in the north-eastern part of the mountains at 400–500 m a.s.l. These

processes shaped the stair-and-step-shaped mountains, with wide flat plateaus bordered by steep edges. They resemble tables, especially the Szczeliniec Wielki — the highest peak, and this similarity gave the name to the whole range.

The erosion of the sandstone massif, under the influence of atmospheric factors (mainly water), has been continued since the Tertiary. Due to this process the sandstone plates of Stołowe Mts. undergo a further cracking and become dismembered, and the water migrating along the fissure system underwashes the whole massif. Therefore the fissures become wider, and large sandstone blocks tilt more and more, with time. The geo-lab located at Szczeliniec Wielki registers rock displacements at a rate reaching 0.5 mm/y (Cacoń, 1996).

The more resistant masses of sandstones were sculptured by weathering into unique rock forms, representing the highest rank sightseeing attractions. The most beautiful rocks are located at Szczeliniec Wielki, within the Błędne Skały massif, in the area of Skalne Grzyby (the north-eastern part of the mountains), in the vicinity of Białe Skały at the margin of Narożnik, and also at Radkowskie Skały near *A Hundred Turns Road* (Staffa, 1992).

Szczeliniec Wielki forms a rocky bastion with an extensive upland, ca 600 m long and 300 m wide, bordered by several tens of meters high cliffs along all its sides. The upland consists of several interesting rocks forming so called rocky town, with numerous fissures, labyrinths and deep passages where the winter snow lasts sometimes as long as till June (Figs. 3–5). There are numerous picturesque rocks with fancy shapes resembling humans and animals (Figs. 6–10). The most well known include *Matpolud (the Monkeyman)*, *Wielbłąd (the Camel)*, *Fotel Pradziada (the Great-grandfather's Armchair)* which is the highest point of Szczeliniec, *Kwoka (the Hen)*, *Świątynia Indyjska (the Indian Temple)*. The name Szczeliniec comes from the Polish word *szczelina*, which means a fissure. The largest of the fissures is *Piekielko (the Little Hell)*, ca 100 m long and 20 m deep. A track built of 682 stony steps leads from Karlów to the upland of Szczeliniec, where a tourist lodge *Na Szczelińcu Wielkim* and viewing platforms are located.

The Błędne Skały (Errant Rocks) area represents a rocky labyrinth covering an area of 22 ha. Similarly to Szczeliniec, it is also developed within the upper sandstone horizon of Stołowe Mountains, in the western part of the Skalniak massif. This labyrinth comprises several hundred of intersecting tunnels and passages, extending in three main directions, 6–11 m deep, sometimes very narrow, dark and gloomy, closing upwards. A few hundred-meter-long tourist path leads across this picturesque *rocky town* with numerous passages, rocky mushrooms, maces, towers and other fancy-shaped rocks (Figs. 11–13²). Many rocks have their own unique names such as *Kasa (The Cashier Desk)*, *Tunel (The Tunnel)*, *Kuchnia (The Kitchen)*, *Kurza Stopka (The Chicken Foot)*. A vast panorama of the surrounding mountains can be seen from the rocky terrace over a cliff.

A group of picturesque rocks with the shapes of mushrooms, maces, towers, gates and walls, called Skalne Grzyby (the Rocky Mushrooms) (Figs. 14–15²), extends for ca 2 km at 680–700 m a.s.l. along the north-eastern edge of the middle horizon of the sandstones. These rocks are denudation monadnocks, narrower at their bases (composed of less resistant marly sandstones) and widening towards their upper parts (composed of more resistant quartz sandstones).

Another geotouristic attraction are rocky edges and other rock-forms: walls and various towers near the northern edge of the Narożnik massif (Figs. 16–21), known as Białe Skały (White Rocks). They are located at 780–800 m a.s.l. and reach the height of 20–30 m. They are composed of light-colored quartz sandstones of the upper sandstone horizon. In the south-eastern part of the massif Skały Puchacza (the Owl Rocks), with an old sandstone quarry, are located (Fig. 22).

The northern edge of Stołowe Mountains, up to nearly 100 m high, is called Radkowskie Skały, and it is composed of the sandstones of the middle horizon. Individual rocks or their groups are separated by steep gullies. This area is one of the most picturesque places in Stołowe Mountains.

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² Figs. 12, 13, 14, 15 see page 712

Stołowe (Table) Mountains (see page 699)



Fig. 12. The Rock in Błędne Skały. Figs. 12, 13 photo by F. Nowacki



Fig. 14. The rocky mushrooms. Photo by Z. Gołąb



Fig. 13. One of the most characteristic rocks in Błędne Skały — *the Chicken Foot*



Fig. 15. The rocky mushrooms. Photo by W. Bobiński