The mainly Sarmatian age of first phase of andesite dykes from this quarry, which are parallel and subparallel with the northern boundary fault of the PKB, radiometrically determined as 12.5–12.8 Ma (K-Ar method) (Birkenmajer & Pécskay, 2000; Trua *et al*., 2006). The second, younger generation of dykes follows transversal faults, which cut the older generation (Birkenmajer, 1962) and is dated on 10.8–12.2 Ma (Birkenmajer & Pécskay, 2000; Birkenmajer, 2001). These calc-alkaline andesites interpreted by Birkenmajer (2001) as products of hybridization of primary mantle-derived magma over subducted slab of the North European Plate (Birkenmajer & Pécskay, 1999) connected with collision-related post-Savian tectonic, compression event. The newest results of andesitic rocks investigations indicate partial melting derived from an ancient metasomatized, sub-continental lithospheric mantle. Generation of the calc-alkaline magmas in the upper lithospheric mantle was effect of collision of the Alcapa block with southern margin of the European platform (Anczkiewicz & Anczkiewicz, 2016; see also Trua *et al*., 2006).

These andesitic rocks cut Upper Cretaceous and Palaeogene flysch deposits of the autochthonous Magura Nappe (the Szczawnica, Zarzecze and Magura formations), which is the southernmost flysch tectonic unit of the Outer Carpathians – near northern strike-slip–type faults of the PKB. Near the entrance to this quarry contact metamorphism and hydrothermal activity within flysch sandstones are good visible (Birkenmajer, 1958b; Gajda, 1958; Małkowski, 1958; Michalik A., 1963; comp. Szeliga & Michalik, 2003). Two stages of magmatic activity resulted also in chemical variation in composition of surrounding sandstones (Pyrgies & Michalik, 1998). The similar Miocene volcanic activity is widespread within whole Carpathian-Pannonian region and can be use to geodynamic interpretation of syn-orogenic magmatic events of these regions (e.g., Kováč *et al*., 1997; Anczkiewicz & Anczkiewicz, 2016 with references cited therein).

Wżar Mount is one of the geological objects classified for the entry into the European network of GEOSITES (Alexandrowicz, 2006) and mining activity of prospecting and excavation of magmatic ore deposits connected with Pieniny andesites were known since beginning of the 15th century (Małkowski, 1958). Finally, when looking southward, we can see perfect panorama of Tatra Mountains, Pieniny and Podhale trough with Czorsztyn Lake, and looking northward of Gorce Mountains are visible (see Golonka *et al*., 2005b).

From the Snozka Pass we are descending into Krośnica village across Magura Nappe and going uphill into Pieniny Mountains, which belong to the geological structure known as PKB. The Pieniny Mountains belong to the Polish Pieniny National Park (Pieniński Park Narodowy) and its Slovak equivalent Pieninský Narodný Park. The idea of the National Park was given by Władysław Szafer in 1921 after Poland gain her independence. The Park was established in 1932 in Poland and in 1967 in Slovakia (Kordováner *et al*., 2001b; Tłuczek, 2004). The Pieniny National Park area is 4,356 ha, 2,231 ha on the Polish (Kordováner *et al*., 2001a, 2001b; Tłuczek, 2004). One quarter of this area belongs to special nature sanctuaries, the most important ones are: Macelowa Góra, Trzy Korony, Pieniński Potok valley, Pieninki and Bystrzyk (Kordováner *et al*., 2001b; Tłuczek, 2004). 60% of the park area are forests mainly beech woods, the rest are meadows, agricultural areas and rocks. The Pieniny National Park fulfills its nature preservation role, conducting also scientific research, education and touristic activities (Kordováner *et al*., 2001b; Tłuczek, 2004; see also Museum of Pieniny National Park at Krościenko n/Dunajcem).

Stop 9 – Flaki range – Jurassic deposits of the Branisko Succession (Figs 35, 37, 38)

(*Michał Krobicki*)

At road cutting through the Flaki Range we can see an outcrop of the Branisko Succession developed as: grey crinoid-cherty limestones and overlying greenisch micritic limestones and green chamosite-bearing marls (Flaki Limestone Formation), black-brown manganiferous and green radiolarites of ?Bathonian-Callovian-Oxfordian age (Sokolica Radiolarite and Czajakowa Radiolarite formations) (Birkenmajer, 1977) (Fig. 38). These rocks are surrounded by less resistant Upper Cretaceous marls and flysch siliciclastics belonging to different tectonic units of the PKB. At the road cut in the Flaki Range, the Branisko Succession crops out in tectonically overturned position. They are deep-water stratigraphic equivalent of shown earlier in the Czorsztyn Castle shallow-water facies of crinoidal and red nodular limestones of the Czorsztyn Succession (Myczyński, 1973; Birkenmajer, 1977, 1979, 1985). The Flaki Limestone Formation represents a condensed sequence of grey filament limestones, spiculites and green filament marls with ferruginous (chamositic) oncoids. The filament limestones and marls consist of pelagic bivalve *Bositra* shells.

In several radiolarite beds of Middle Jurassic manganiferous radiolarites (Sokolica Radiolarite Formation), normal graded bedding is noted in layers. In the layers trace fossils are abundant (common *Planolites* and *Chondrites*, less frequent *Taenidium* and *Teichichnus*, rare *Siphonichnus* and *Zoophycos*) (Krobicki *et al*., 2006). They belong to ichnogenera produced in the deepest tiers in the sediment. The trace fossil assemblage is typical of deep-sea fine-grained sediments deposited in well-oxygenated sea floor. Very little ichnological data come from radiolarites, however lately Kakuwa (2004) presented their ichnofabric from the Triassic and Jurassic of Japan.

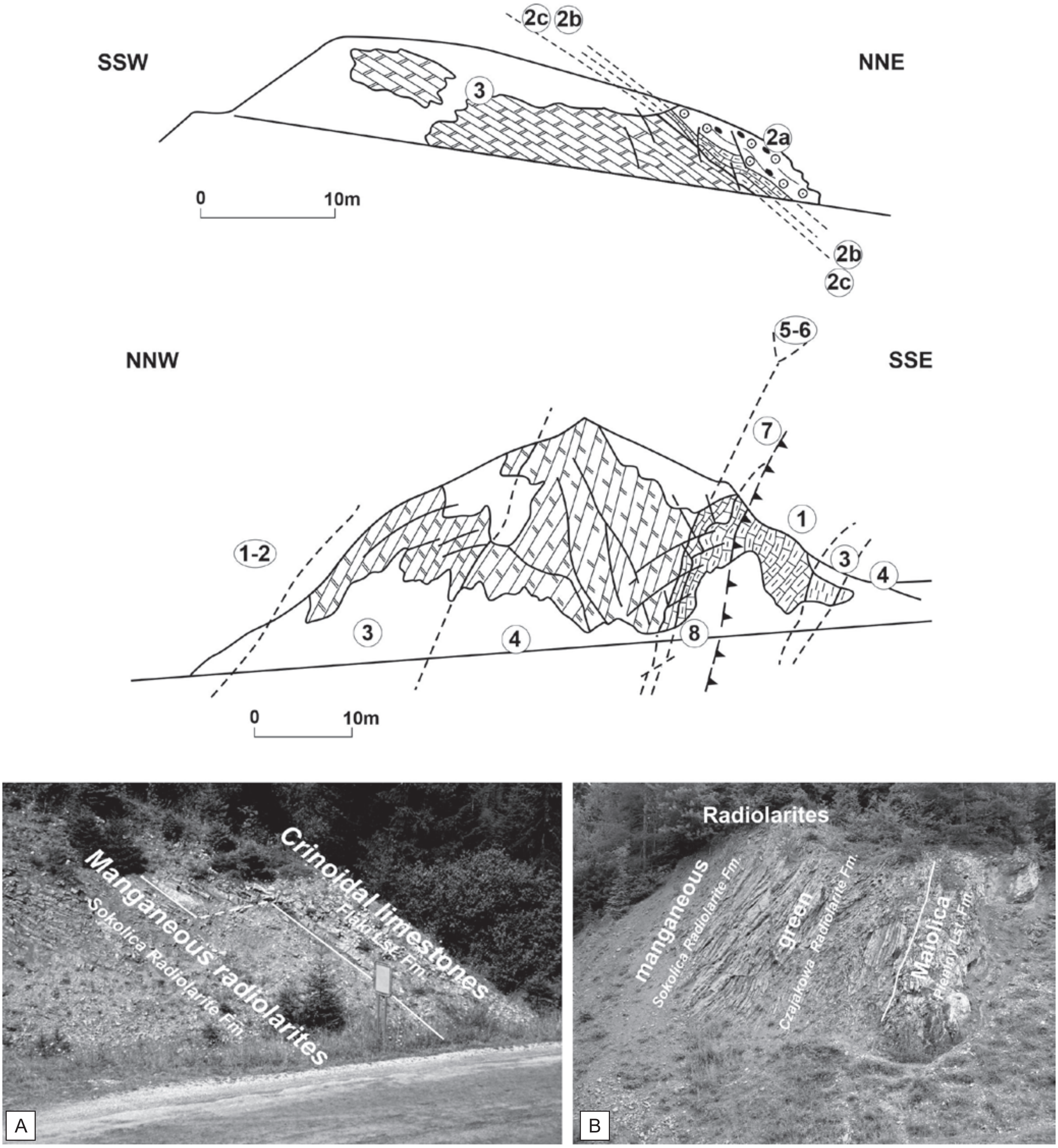

Fig. 37. View of the Flaki Range sections; Branisko Succession (lower part: A – western side; B – eastern side) and general sketch of studied sections (upper part) (after Birkenmajer *et al*., 1985). Lithostratigraphical units: 1 – Podzamcze Limestone Fm.; 2 – Flaki Limestone formations (grey crinoidal limestones with cherts in upper part (2a) and grey-green limestones (2b) and marls with chamosite concretions (2c); 3 – Sokolica Radiolarite Fm. (grey-black manganiferous spotty radiolarites); 4 – Podmajerz Radiolarite Mbr of the Czajakowa Radiolarite Fm. (green radiolarites); 5–6 – Czajakowa Radiolarite Fm. (Buwałd Radiolarite Mbr – red radiolarites) and Czorsztyn Limestone Fm. (Upszar Limestone Mbr – white nodular limestones) exposed upslope further east; 7 – Pieniny Limestone Fm. (micritic limestones with cherts of the maiolica-type facies) (strongly tectonically reduced); 8 – Kapuśnica Fm. (greenish spotty marls/limestones)

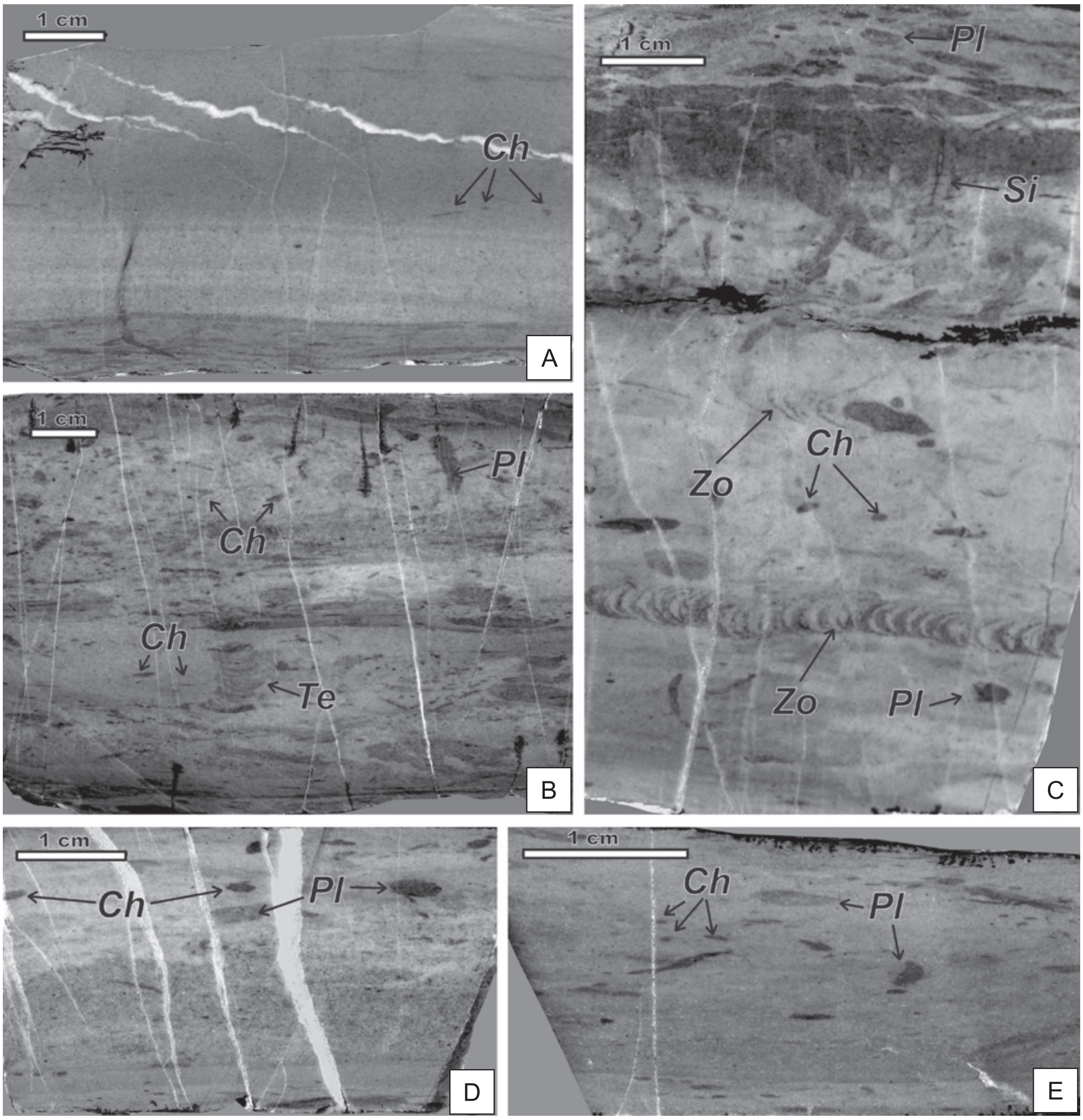

Fig. 38. Trace fossils within Sokolica Radiolarite Formation in the Flaki Range, Branisko Succession: Ch – *Chondrites*; Pl – *Planolites*; Si – *Siphonichnus*; Te – *Teichichnus*; Zo – *Zoophycos* (after Krobicki *et al*., 2006, 2023)

Stop 10 – Litmanová village (Slovakia) – Jurassic-lowermost Cretaceous sequence of the Czertezik Succession of the Pieniny Klippen Belt (Figs 35, 39)

(*Andrzej Wierzbowski*, *Roman Aubrecht*, *Michał Krobicki*, *Bronisław Andrzej Matyja*, *Ján Schlögl*)

In the Litmanová village the best outcrop of the Czertezik Succession of the Pieniny Klippen Belt occurs in the eastern part of the Litmanovské Klippen. The oldest are black marly shales with discoidal spherosiderite concretions of the Skrzypny Shale Formation (see – Fig. 9). Younger deposits are grey coloured, fine-grained, well-bedded crinoidal limestones of the Smolegowa Limestone Formation which thickness is rather small, when usually has dozens meters. Near the base of this limetsones a thin condensed level marked by occurrence of small dark phosphatic nodules, abundant glauconite grains, and rich fauna of Early Bajocian ammonites (*Stephanoceras* (*Skirroceras*) sp.) and *Nonnolytoceras polyhelictum* (Boeckh), belemnites and brachiopods. The crinoidal limestone is a packstone with a marked admixture of detrital quartz grains. The topmost part of the bed is laminated – the laminae are wackestones and packstones of filamentous-crinoidal microfacies.