

## New lithostratigraphic units in the Klippen Belt

MILAN MIŠÍK, ROMAN AUBRECHT, MILAN SÝKORA, LADISLAVA OŽVOLDOVÁ

Department of Geology and Paleontology, Faculty of Sciences, Comenius University,  
Mlynská dolina - G, 842 15 Bratislava

**Abstract.** New lithostratigraphic units distinguished in the Slovak part of the Pieniny Klippen Belt (Pienidic units only) are summarized in this paper. They are as follows: Lúty Potok Limestone represents Lower Jurassic (Sinemurian to Pliensbachian), Krasín Breccia (Upper Bajocian-Bathonian), Bohunice Limestone Formation (Oxfordian to Lower Tithonian), Horná Lysá Limestone (Upper Berriassian to Hauterivian), Samásky Formation (Bajocian to Bathonian), Horné Slnie Limestone Member (Berriassian to Lower Valanginian) and Revišné Limestone (Lower Tithonian).

**Key words:** Pieniny Klippen Belt, Jurassic, Lower Cretaceous, lithostratigraphy

During the last two years we have identified strata which were not included in the thorough list of the lithostratigraphic units concerning the Pieniny Klippen belt by BIRKENMAJER (1977). Concise definitions of the new members will be done here.

### Lúty Potok Limestone

**Lithology:** Crinoidal limestones.

**Thickness:** 30 m. Light-grey biosparites with brown chert nodules represent their lower part; upper part is formed by red sandy biomicrite without cherts, with skeletal fragments of the siliceous sponges (bafflestone intraclasts) with a horizon containing dolomite clasts to 7 cm (tempestite?); rare neptunian dykes with mostly red laminated symsedimentary filling.

**Fossils:** brachiopods *Liospiriferina rostrata*, *Cirpa fronto* etc. (determined by M. SIBLIK), ammonites *Juraphyllites* sp., *Androgynoceras* sp. (determined by M. RAKÚS), belemnites, crinoidal stems, sponges.  
**Age:** Sinemurian - Pliensbachian.

**Unit:** Nižná Succession.

**Locality:** Lúty Potok W from Krivá, Skalka near Sedliacka Dubová (Orava), Pieniny Klippen Belt.

**Terrigenous admixture:** disintegrated granitoid material, small fragments of Permian acid volcanites,

Triassic dolomites, Lower Triassic silicites. It is interesting that the material is identical with that one of the Middle Jurassic crinoidal limestones of the Czorsztyn Unit.

Further information: MIŠÍK, SÝKORA, SIBLIK & AUBRECHT, 1995.

### Krasín Breccia

**Lithology:** Breccia is composed by clasts to blocks of pink, grey, rarely violetish crinoidal limestones (mostly biosparites) in the crinoidal limestone matrix (mostly biomicrites); it is penetrated by neptunian dykes with symsedimentary filling.

**Thickness:** about 60 m. The clasts differ mutually by colour, amount of terrigenous admixture and micrite content. Krasín Breccia was laid down along the foot of a submarine scarp formed by symsedimentary fault with accompanying fissures (neptunian dykes). **Fossils:** crinoidal detritus, sponge spicules (mainly rhaxa), bryozoan fragments, nubularid and lagenid foraminifers, rarely bivalvians and brachiopods. Voids and fissure fillings are represented by red laminated micrite containing coelobite ostracods *Pokornyopsis*; their recent descendants are also adapted to the life in the submarine caves.

**Age:** Upper Bajocian - Bathonian (established indirectly; in the immediate underlying strata ammonite *Teloceras* ex gr. *blagdeni* was found (determined by M. RAKÚS).

**Locality:** Krasín quarry near Dolná Súča.

**Unit:** Czorsztyn Succession.

Further information: MIŠÍK, SÝKORA & AUBRECHT, 1994.

### Bohunice Limestone Formation

**Lithology:** creamy and pink biomicritic limestones, locally with bivalves and brachiopods.

**Thickness:** about 10 m.

**Fossils:** in the lower, Oxfordian part, the *Globuligerina* ("protoglobigerina") microfacies with radio-

laridians and *Colomisphaera*; in the Kimmeridgian part *Saccocoma* microfacies with globochets, juvenile ammonoids etc.; some brachiopods with internal sediment (polarity structures) *Nucleata bouei*, *Lacunosella* aff. *spoliata* (det. by M. SIBLÍK); the upper part belonging to Lower Tithonian with *Saccocoma*, *Globochaete*, *Parastomiosphaera malmica* and small originally aragonitic bivalvians coated by black Mn-Fe films.

Age: Oxfordian - Lower Tithonian.

Unit: Czorsztyn Succession. Locality: Babiná quarry near Bohunice, Mestečská skala klippe.

Further information: MIŠÍK, SIBLÍK, SÝKORA & AUBRECHT, 1994.

### Horná Lysá Limestone

Lithology: Micritic limestones with dispersed crinoidal detritus and calciturbidite intercalations.

Thickness: 20 m. Light-grey, pink, rarely violet to reddish layered limestones; in their upper part with black and brown chert nodules.

Fossils: crinoidal detritus, small aptychi, skeleton fragments of lithistid sponges, radiolarians, foraminifers, *Cadosina fusca* etc. The allodapic intercalations are not sharply limited. Shallow-water bioclasts were repeatedly transported into the shallower bathyal; they represent thin-bedded channelized grain-flows and debris-flows. Small lithoclasts of biomicrites with *Cras-sicollaria* (Upper Tithonian) and microoncolites with *Saccocoma* (Kimmeridgian - Lower Tithonian) are noteworthy.

Age: Upper Berriassian - Hauterivian (based in the upper part on radiolarians extracted from the cherts, U.A.14, Upper Valanginian-Upper Hauterivian - Lowermost Barremian?).

Locality: Horná Lysá, Vršatec area near Pruské.

Unit: Kysuca Succession (adjacent to Czertezik succession).

Another locality: Zadné Skálie klippe near Kyjov (Eastern Slovakia) belonging to the Czertezik Succession.

Further information: MIŠÍK, SÝKORA, OŽVOLDOVÁ & AUBRECHT, 1994.

### Samášky Formation

Lithology: rythmical alternation of the grey and yellowish layers of crinoidal limestones (calciturbidites) with claystones, marlstones and fine-grained sandstones.

Thickness: 35-40 m. In the lower parts of the crinoidal limestone layers a fine-grained conglomerate sometimes occurs; the top of the beds possess often parallel lamination, sometimes selectively silicified.

Fossils: crinoidal detritus, thick-shelled ostracods, fragments of punctuate brachiopods, bryozoans, echinoid spines, lagenid foraminifers, sponge spicules. The heavy mineral assemblage is garnet-dominated, less with zircon, rutile, tourmaline and apatite.

Age: Bajocian-Bathonian (without direct paleontological evidence).

Locality: Horné Sfnie Samášky, Pruské Succession (AUBRECHT & OŽVOLDOVÁ, 1994). Older evidence: ANDRUSOV (1945) considered it as an equivalent of the Birkenmajer's "flysch-Aalenian" (present Szlach-towa Formation). Samášky Formation represents a facial link between Smolegowa + Krupianka Limestone Formations of the Czorsztyn Unit (shallow-water, sedimented on the elevation) and Flaki Limestone Formation of the Kysuca (Branisko) Unit (distal turbidites in the pelagic environment)

Further information: AUBRECHT & OŽVOLDOVÁ, 1994.

### Horné Sfnie Limestone Member

Lithology: massive pink micritic limestone.

Thickness: 140 cm. Skeletal debris and cross-sections of ammonoids are visible macroscopically.

Fossils: ammonoids, calcified radiolarians, crinoidal fragments, bivalve shells, aptychi, bryozoan fragments (*Trepostomata*) and foraminifers e.g. *Lenticulina* sp. are present. Foraminifers *Globuligerina* sp. are relatively frequent in the limestone, which is atypical for this stratigraphical level. Tintinids *Calpionellopsis oblonga* (CADISCH), *Calpionellopsis simplex* (COLOM), *Remaniella dadayi* (KNAUER), *Tintinopsella longa* (COLOM), *Tintinopsella carpathica* (MURGEANU et FILIPESCU) and rare *Calpionella alpina* LORENZ can be observed in thin sections also. No siliciclastic admixture has been observed.

Age: Berriassian to Lower Valanginian.

Locality: Horné Sfnie-Samášky, Pruské Succession (AUBRECHT & OŽVOLDOVÁ, 1994). Older evidence: It ranks most probably to the Lysa Limestone Formation sensu BIRKENMAJER (1977) according to its stratigraphical position. No one from the members mentioned by BIRKENMAJER (l.c.) has the features characteristic for this member. According to the description it is most similar to the Harbatova Limestone Member, which differs by the thin bedding.

Further information: AUBRECHT & OŽVOLDOVÁ, 1994.

### Revišné Limestone

Lithology: white to light-grey nodular limestone with thin (1 cm) greenish clay intercalations.

Thickness: indetermined.

Fig. 2 Krasin Breccia (Krasin - Dolná Súča section)

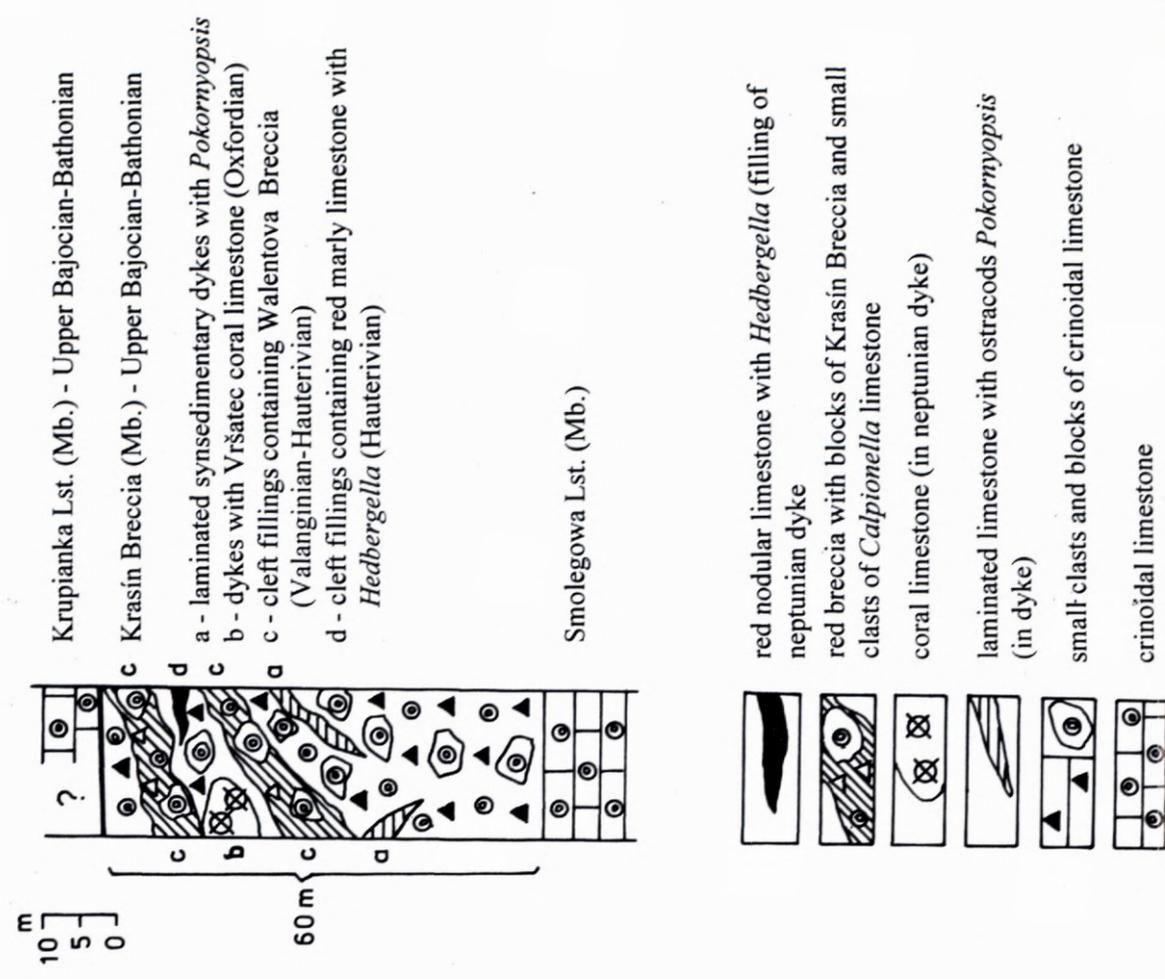


Fig. 1 KLIPPE IN THE LÚTY POTOK VALLEY

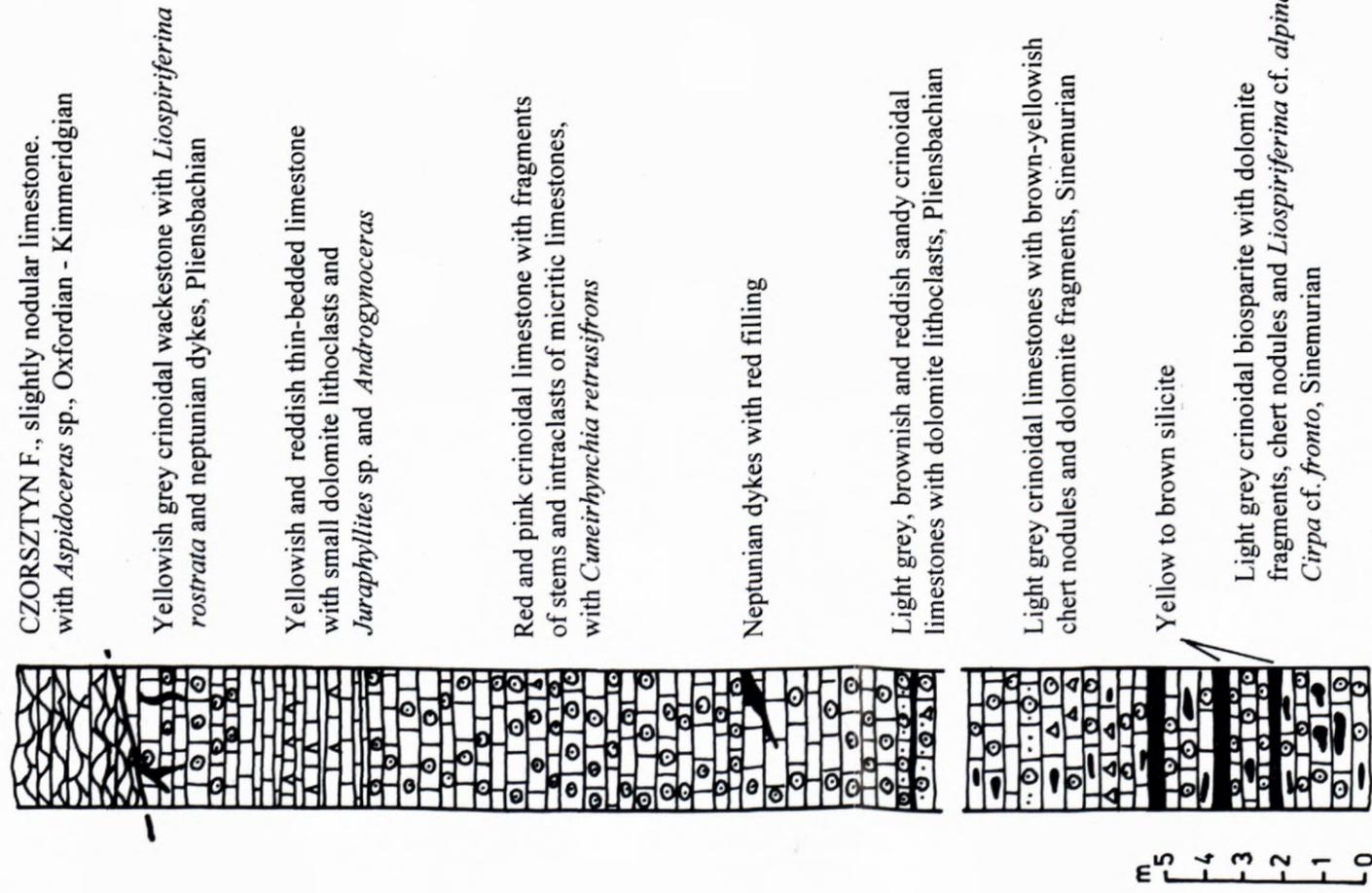


Fig. 3 Bohunice Formation (Babiná section)

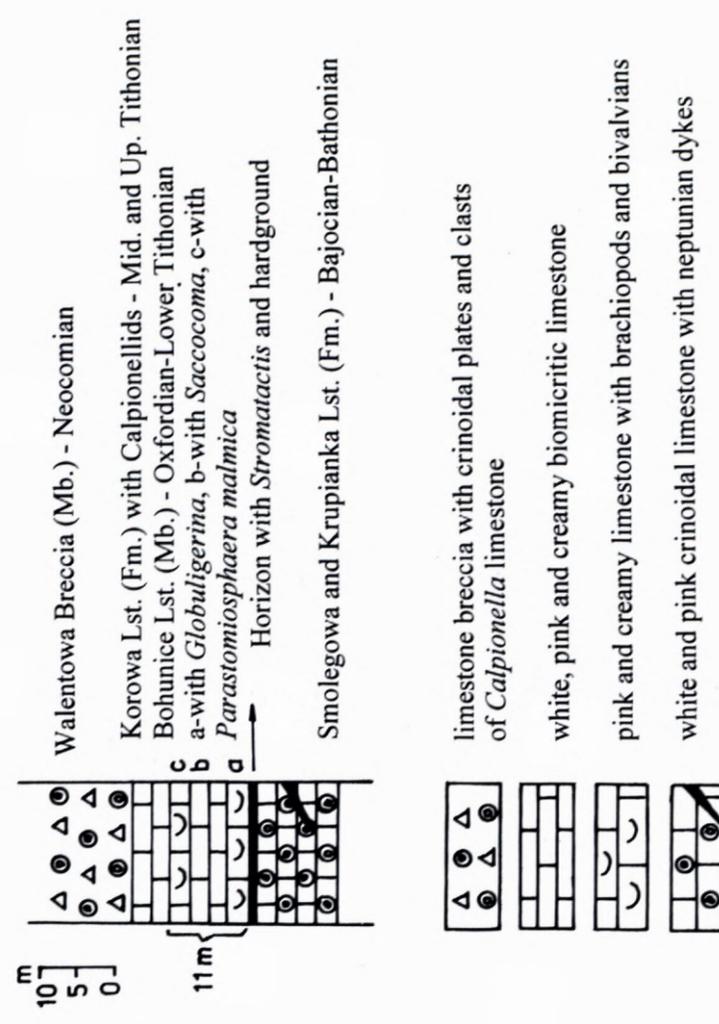


Fig. 5 Samášky Formation  
Horné sŕnie Member (Samášky section)

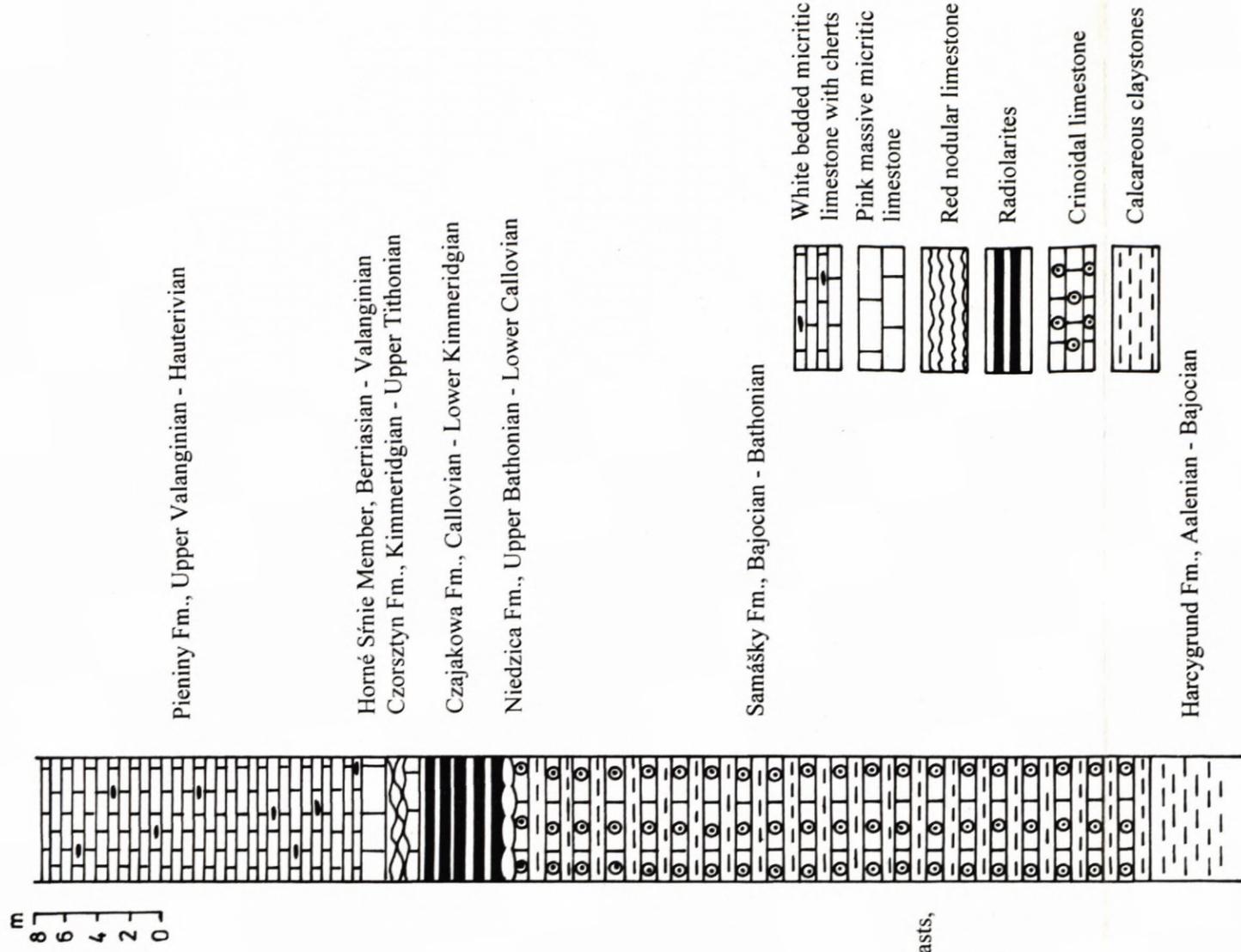


Fig. 4 KLIPPE HORNÁ LYSÁ

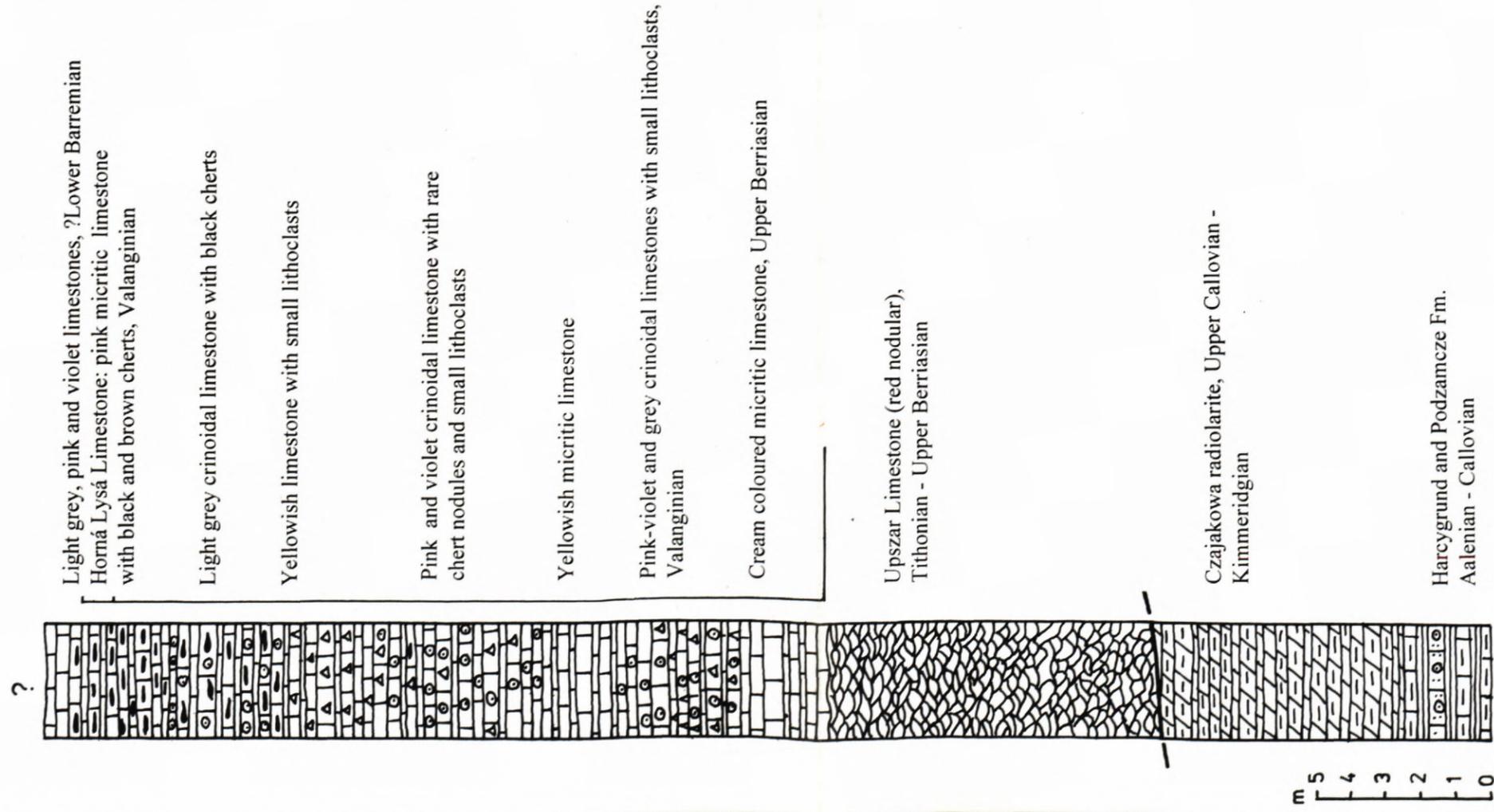
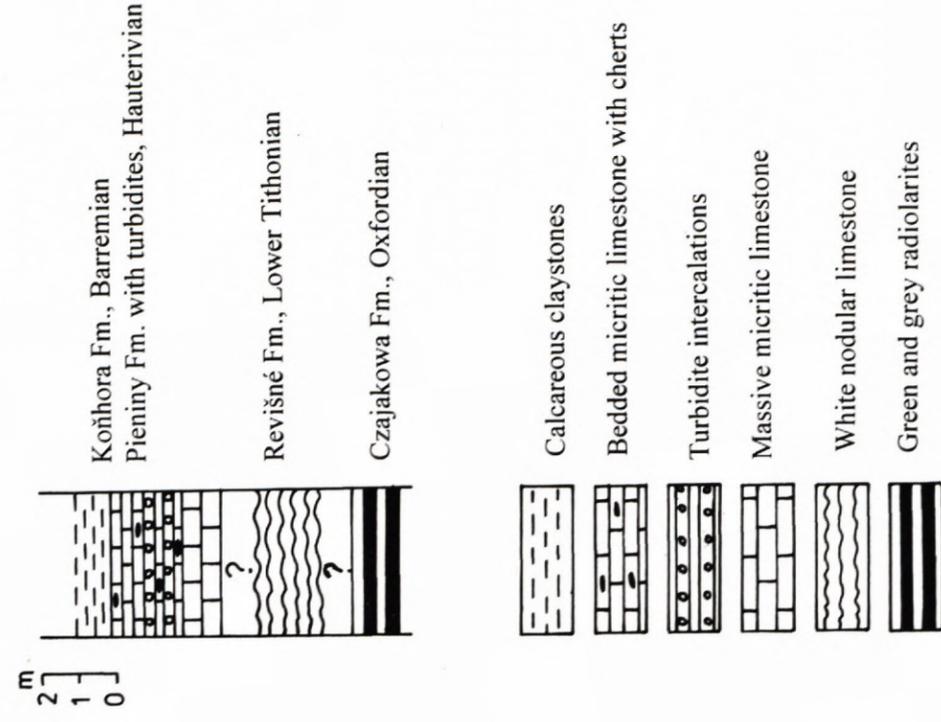


Fig. 6 Revišné Formation  
(Ištebné section)



Calcareous claystones and clayey limestone

Other explanations see fig. 1.

Fossils: aptychi, dissolved casts of ammonoids, *Parastomiosphaera malmica* (BORZA), *Colomiosphaera pulla* (BORZA), *Colomiosphaera minutissima* (COLOM), *Cadosina parvula* NAGY and seldom *Saccocoma*. Less frequent detritus from bivalvian shells and radiolarian ghosts are observable. No calpionellids have been found.

Age: Lower Tithonian. Locality: Istebné, Kysuca Succession Further information: AUBRECHT, 1994.

### References

- AUBRECHT R. & OŽVOLDOVÁ, 1994: Middle Jurassic - Lower Cretaceous development of the Pruské Unit in the Western Part of the Pieniny Klippen Belt. *Geologica Carpathica* (Bratislava), 45, 4, 211-223.
- AUBRECHT R., 1994: Hauterivian turbidites in the Kysuca Unit (Pieniny Klippen Belt, West Carpathians). *Mineralia Slovaca* (Košice), 26, 4, 250-254.
- BIRKENMAJER K., 1977: Jurassic and Cretaceous lithostratigraphic units of the Pieniny Klippen Belt, Carpathians, Poland. *Stud. Geol. Pol.* (Warszawa), 45, 1-158.
- MIŠÍK M., SÝKORA M., OŽVOLDOVÁ L. & AUBRECHT R., 1994: Horná Lysá (Vršatec) - a new variety of the Kysuca Succession in the Pieniny Klippen Belt. *Mineralia slovaca* (Košice), 26, 7-19.
- MIŠÍK M., SÝKORA M. & AUBRECHT R., 1994: Middle Jurassic scarp breccias with clefts filled by Oxfordian and Valanginian-Hauterivian sediments, Krasín near Dolná Súťa (Pieniny Klippen Belt). *Geologica Carpathica* (Bratislava), 45, 6, 343-356.
- MIŠÍK M., SÝKORA M., SIBLÍK M. & AUBRECHT R., 1995: Sedimentology and brachiopods of the Lower Jurassic Lúty Potok Limestone, (Slovakia). *Geologica Carpathica* (Bratislava), 46, 1, 41-51.
- MIŠÍK M., SIBLÍK M., SÝKORA M. & AUBRECHT R., 1994: Jurassic brachiopods and sedimentological study of the Babiná klippe near Bohunice (Czorsztyn Unit, Pieniny Klippen Belt). *Mineralia slovaca* (Košice), 26, 255-266.