Frajová-Eliášová (1962), Houša (1976) and Menčík *et al.* (1983) interpret carbonate blocks as tectonic klippen separated from the carbonate platform in the course of Silesian Nappe overthrust. According to Eliáš & Stráník (1963), Eliáš (1979), Eliáš & Eliášová (1984, 1986), large and also smaller blocks were formed by the disintegration of the platform and redeposition of limestones into younger deposits at the foot of slope of the Baška ridge. None of the mentioned theories, however, explains completely the chaotic character of limestone-bearing deposits in the Štramberk area.

As stated by Picha *et al*. (2006) (in Picha & Golonka 2006), the truth lies somewhere in between both the opinions. The Štramberk carbonate platform rimmed by coral reefs was a source of clastics and debris. Gravitational slides and turbidite currents transported smaller and also larger blocks and fragments from the rim (edge) of platform as far as the foot of the adjacent basin. On the other hand, in the course of later tectonic transport, large tectonic pieces of carbonate platform were separated from softer, less competent rocks situated on the slopes of the platform. The result is a melange in which larger blocks from the carbonate platform have the characters of klippen. Smaller blocks and debris correspond to foot clastic sediments that developed especially in the Early Cretaceous and the early stage of Late Cretaceous.

Houša (1975, 1990) and also Houša in Houša & Vašíček (2004) proved that after the ending of sedimentation of Štramberk Limestone in the Štramberk area, the sedimentation of Early Cretaceous carbonates still continued intermittently (Fig. 50). This is proved by calpionellids and ammonites. Of these Lower Cretaceous carbonates, the Kopřivnice Limestone is the most famous. Suess (1858) described it under the name Kalke von Nesseldorf (German name of Kopřivnice). The type locality is the upper Blücher quarry between Štramberk and Kopřivnice. The Kopřivnice Limestone contains, in addition to abundant brachiopods and echinoderms, Upper Valanginian ammonites (Houša & Vašíček, 2004). Limestones of the Kopřivnice type are brown-red and red micrites, clayey micrites, biomicrites, intrabiomicrites, intramicrites etc.

Picha *et al*. (2006) included all local Cretaceous deposits and local lithostratigraphic units in the area of Štramberk under the name Kotouč Facies. In the original version, the Kotouč development was however defined, namely by Eliáš & Stráník (1963), as dark grey to black-grey pelitic deposits of variable sand content with layers of tilloid conglomerates, and others. At present, the Kotouč Facies represents all the above-mentioned (carbonate, pelitic, conglomerate) specific Cretaceous deposits linked prevailingly to the area of Štramberk.

From paleogeographic viewpoint, the block accumulations form a part of the succession of the continental rise facies of the Baška development below the hypothetical Baška cordillera. They include slumps, slides, fallen blocks (olistholiths), rarely also turbidites (especially proximal), the material of which comes – along with the allodapic limestones of the Baška Formation – from both the carbonate platform (Malm to Coniacian) and the reef complex (Malm/Lower Cretaceous boundary) on the Baška cordillera and its slopes.

Stop 17 – Leszna Górna quarry – carbonate flysch (lowermost Cretaceous, Berriasian) (Figs 51–54)

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Within the active quarry in Leszna Górna village, formations of the Cieszyn Limestone Formation (“Lower and Upper Cieszyn limestones”) are exposed, formed as medium- and coarse-rhythmic limestone flysch. At several exploitation levels of the quarry, both the lithofacies differentiation of these layers and the very visible phenomena of fold and fault tectonics can be observed. The total thickness of the deposits exposed here reaches about 120 meters. This flysch is mainly represented by calciturbidites and calcifluxoturbidites (cf. Malik, 1994), with a full range of sedimentary features typical of both the inner part of the fan (depositional lobes) and the outer fan of the model of submarine turbidite sedimentation (cf. Mutti & Ricci Lucchi, 1975; Stow, 1986; Mutti & Normark, 1987; Ghibaudo, 1992; Reading & Richards, 1994; Lowe, 1997; Shanmugam, 2000).

The main part of the formations exposed here is Berriasian in age, only the oldest parts of the lowest mining levels in the quarry may be of Upper Titonian. A striking feature of these formations is their facies formation corresponding to fine- and coarse-rhythmic calciturbidites, with stratigraphically higher beds characterized by a series of beds thickening upwards and thus corresponding to the facies ensemble of depositional lobes and their margins. The older, fine-rhythmic sequence would then correspond to the facies complex of the outer cone (Malik, 1994). In both complexes, many features of sedimentary sediments can be observed, indicating a very lively sys-sedimentary tectonics, expressed by a large number of reseded formations: landslides and undersea flows; large, large and small lithoclasts (especially clay-marly) in limestones; coarse biodetrital limestones with fractional graining, etc. Full Bouma sequences can be read in many calcareous beds, terminating in marly portions of intensely bioturbated sequences. A brief description of the most important features of the deposits exposed here was presented by Malik (1994), but it should be noted that due to the progress of exploitation over the last 15 years, at least a dozen to twenty meters of the older part of the formation have been exposed. By the way, this site is still waiting for detailed sedimentological profiling and, on this basis, a broader palaeoenvironmental and palaeogeographical interpretation (Waśkowska-Oliwa *et al*., 2008) is connected with destruction of shallow-sea carbonate platforms and the areas surrounding them and resedimented into the deeper parts of the basin.

Fig. 51. General view of Leszna Górna quarry (A) with intensive folded deposita of the Cieszyn Limestone Formation (B–E) (after Waśkowska-Oliwa *et al*., 2008)

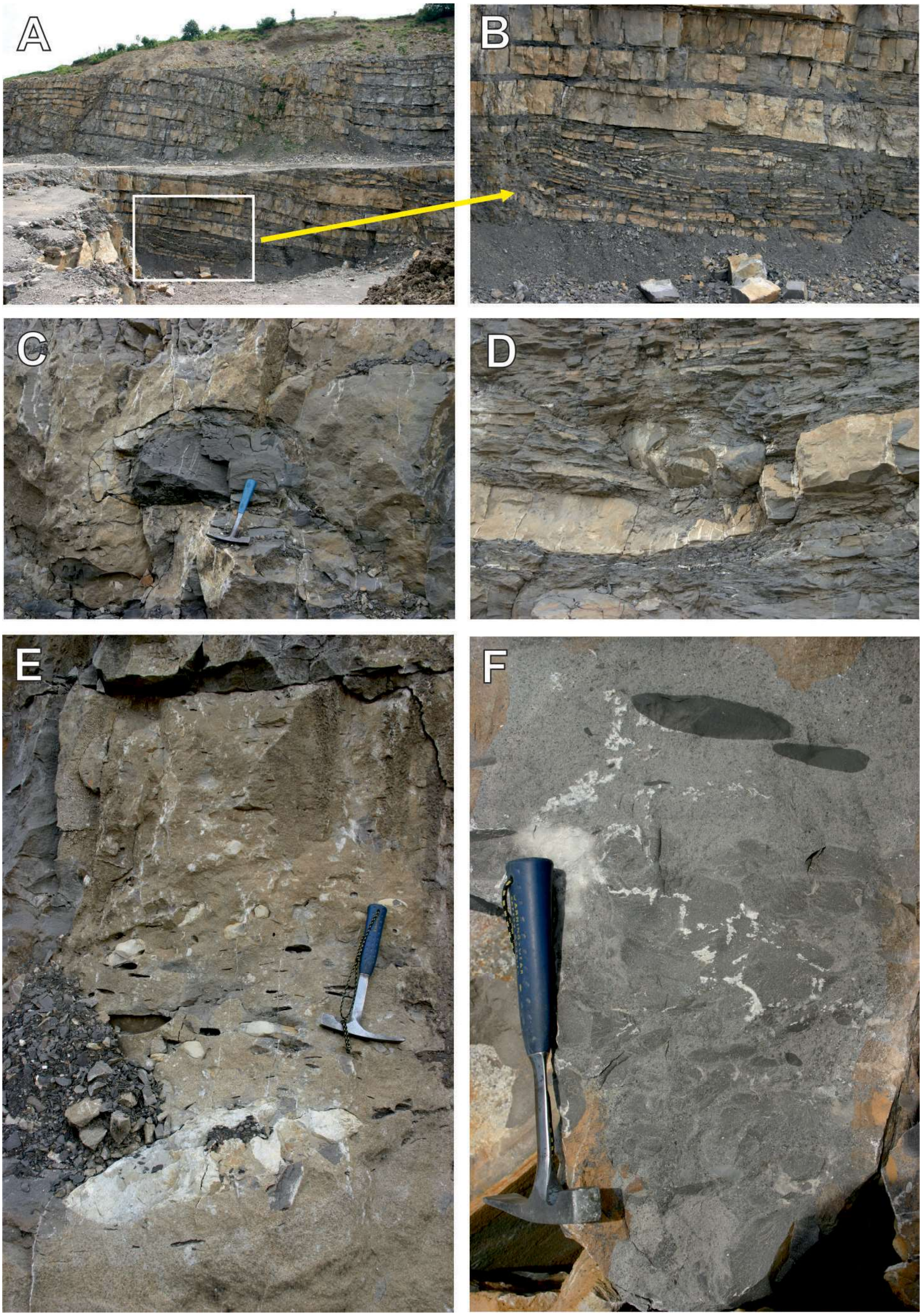

Fig. 52. Synsedimentary features of submarine mass movements in the Cieszyn Limestone Formation in Leszna Górna active quarry represented by: small submarine debris flow (A, B), huge resedimented shales and carbonate clasts (C, D) sometimes with fractionation in fine detritic limestones (E, F) (after Waśkowska-Oliwa *et al.*, 2008)

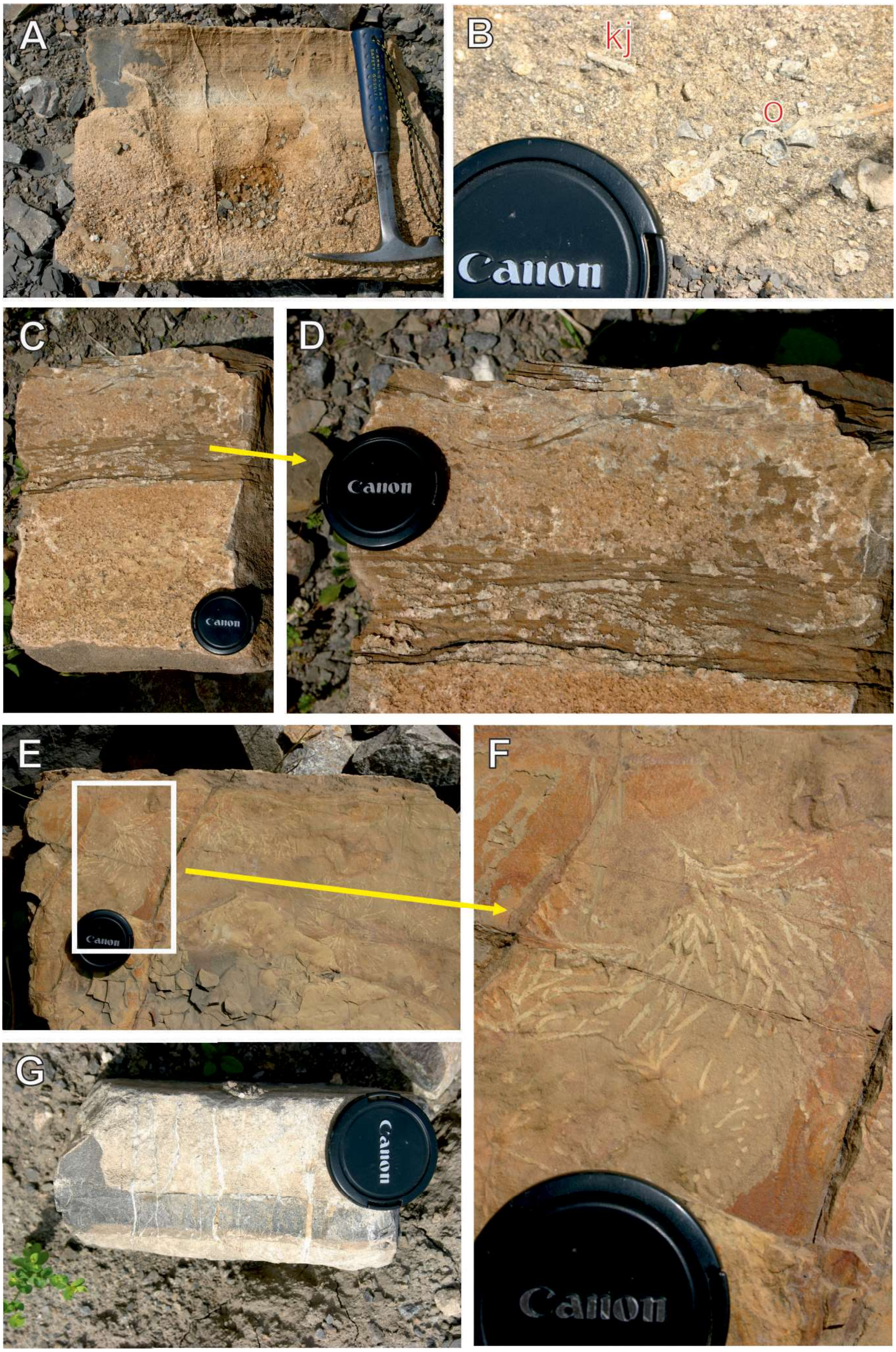

Fig. 53. Organodetrital limestones with gradational fractionation (A, C) sometimes with identifiable fossils at the base beds (B: o – *Nanogyra* sp. oyster; kj – echinoid spine) and convolution in the top (C, D) and trace fossils in more marly parts of bed (ER, F – *Chondrites* isp.), and rarely with cherts (G) (after Waśkowska-Oliwa *et al.*, 2008)

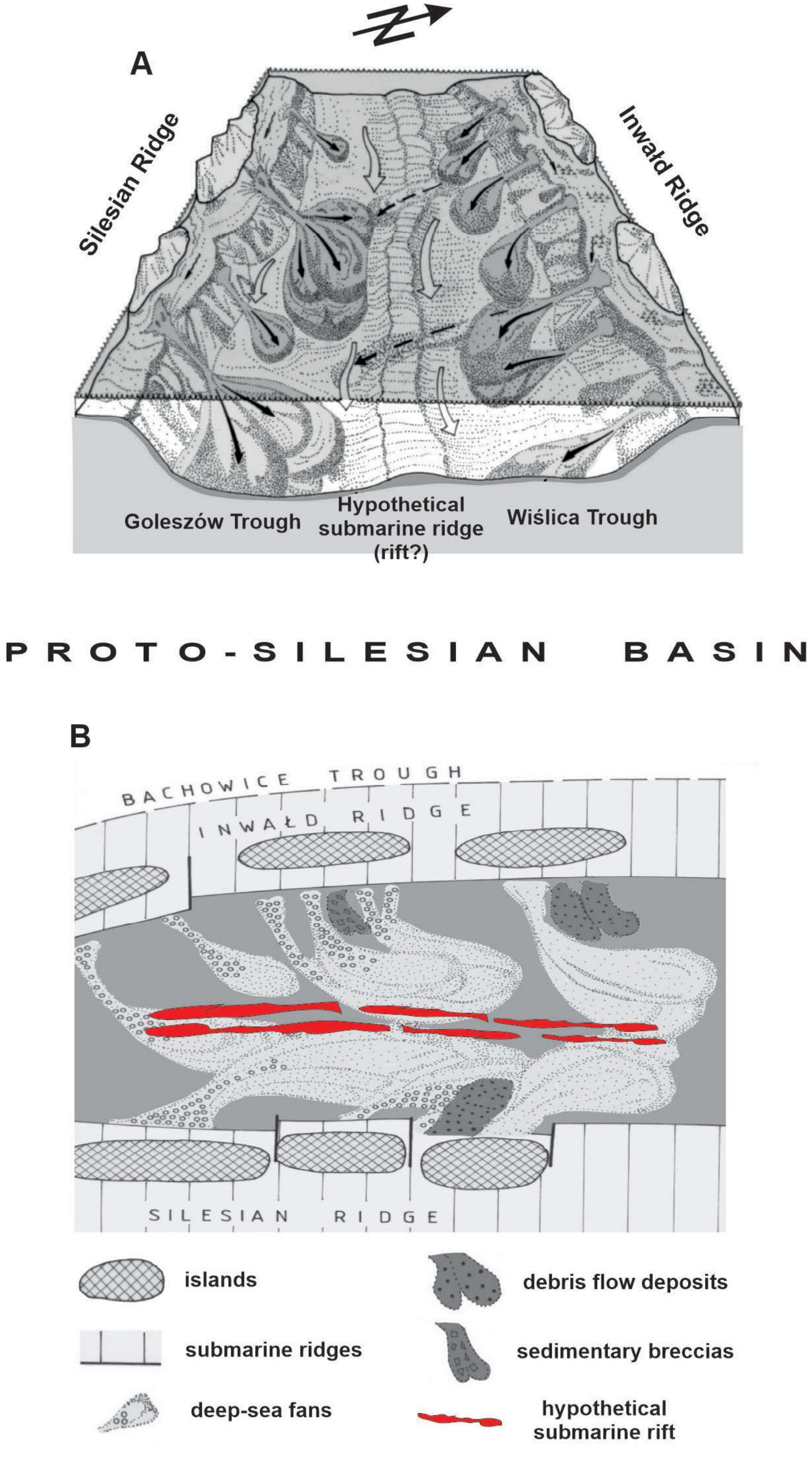

Fig. 54. Palaeogeographical blockdiagram of sedimentation of the oldest flysch deposits in the Proto-Silesian Basin (Jurassic/Cretaceous transition – Tithonian/Berriasian) (A) and its hypothetical palaeogeographical sketch (B) (after Słomka 1986a; slightly modified)

In turn, the consistent uplift of the source areas, which at that time were the Silesian and Baška-Inwałd ridges surrounding the proto-Silesian basin, led to the sedimentation of coarse-movement formations in the form of olistoliths, marl gravels, slides of limestone blocks of the Štramberk type (Nowak, 1973; Słomka, 1986b, 2001). This would not have been possible if not for the intense synsedimentary tectonic movements in this part of the Tethys associated with the Neo-Cimmerian movements of the Alpine orogeny (Krobicki, 1996a, Golonka *et al*., 2003; cf. Middleton & Hampton, 1973; Stampfli *et al*., 1998; Shanmugam, 2002; Dasgupta, 2003; Payros & Pujalte, 2008 with literature cited there).

The Beriasian episode of resedimentation in the Proto-Silesian basin was almost exclusively associated with the destruction of carbonate platforms and uplifted calcareous flysch formations of the Cieszyn Limestone Formation. In the Valanginian, the bedrock erosion occurred (the first exotics of igneous and metamorphic rocks) and the increasing amount of clastic material led to the replacement of calcareous flysch sedimentation by silicoclastic flysch (Słomka, 2001).

The limestone flysch of the Late Jurassic/Early Cretaceous of the Cieszyn Limestone Formation finds good counterparts in many flysch/flysch-like systems in Europe and beyond (Payros & Pujalte, 2008 with literature cited there) and it is striking that, as in the Carpathians (Matyszkiewicz & Słomka, 1994), in many cases, one of the basic grain components of these formations are ooids, as resedimented grains from shallow-sea carbonate platforms, which are the source areas for calcareous turbidite/fluxoturbidite systems (Price, 1977; Ruiz-Ortiz, 1983; Wright & Wilson, 1984; Eberli, 1987; Cooper, 1989, 1990; Zempolich & Erba, 1999; Wright, 2004; Robin *et al*., 2005; Brookfield *et al*., 2006). On the other hand, within the resedimented formations, fragments (as olistoliths/exotics) of organic structures such as coral-algal reefs or microbial-sponge mud mounds can be found (Karpaty – Matyszkiewicz & Słomka, 2004, other locations – Payros & Pujalte, 2008), which document a wide range of shallow-water facies of carbonate platforms in source areas.

Taking into account all the threads mentioned – from the reconstruction of shallow-water carbonate sedimentation environments in the source areas, through the synsedimentary Neo-Cimmerian tectonics catalysing the formation of various resedimented formations, to the isochronous beginnings of submarine volcanic activity (teschenite – Grabowski *et al*., 2003, 2004), they should be associated with the increasing geotectonic activity of the Silesian Cordillera (Poprawa *et al*., 2004, 2005). Originally, it was probably a fragment of the East European platform, detached from it as a result of a short-term, abortive rift, which probably did not lead to full oceanization of the Proto-Silesian basin (Narębski, 1990) (Fig. 54), despite its inclusion in a continuous rift system between the opening Atlantic in the west, through the Ligurian – in the center to the Chornohora-Sinaia branch of the Ukrainian-Romanian Carpathians in the east (Mišík, 1992; Golonka & Krobicki, 2004; Krobicki *et al*., 2005; Rogoziński & Krobicki, 2006 with the literature cited there).

Stop 18 – Krakow vicinity – Middle-Upper Jurassic and Upper Cretaceous deposits

In Krakow and its vicinity the Mesozoic rocks of the North European platform are exposed. The platform is dissected by numerous faults into several horsts and grabens. The grabens are filled with the Miocene Molasse deposits, while horsts elevate Jurassic (mainly Oxfordian) limestones which sometime are covered by the Upper Cretaceous deposits of the Peri-Tethys realm of the northern margin of the Tethys Ocean.

Outcrops? Rocks? Palaeoenvironments? – a surprise for you… – thanks for coming, interesting conversations and company. See you next year in Krakow again on the 36th HKT (Himalaya–Karakorum–Tibet) Workshop at AGH University of Krakow – Welcome…!

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