

Review of the paper of authors J. Soták, J. Bebej & A. Biroň: Detrital analysis of the Paleogene flysch deposits of the Levoča Mts.: evidence for sources and paleogeography.

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After publication of the above introduced paper (Soták, Bebej & Biroň, 1996) the competent workers of Geological Survey of Slovak Republic feel at least to be embarrassed from both technical and ethic point of view.

The works connected with the research of the Levoča Mts. region (- Poprad Depression, Hornád Depression, Levoča Mts. and Šariš Paleogene/, financed by a common source and coordinated by common control bodies, were conducted in the way that all geologists and geophysicists of cooperating institutions were fully informed about the progress on the work and, above all, they were informed about new consequences resulting from the work. The common discussions and excursions provided a concrete acquaintance with problems directly in the field at selected localities.

In spite of maximum effort of the authority which ordered the work in order to apply a team work, which seemingly was really good and almost without problems, it seems today that the authors of the above mentioned paper do not want to accept or to see somehow the work of the team from the Geological Survey of Slovak Republic. The work, which was achieved by this team consisting of mappers, palaeontologists and petrographers working at the Geological Survey in Bratislava and Košice, is proved by results.

The paper, except not enough proved ideas, gives incorrect information, in many aspects it is deceitful, informs wrongly and unambiguously violates basic ethical principles.

1. On the one hand the authors ignore the introduced and in the Inner-Carpathian Paleogene commonly used terms (Borové, Huta Formation....) substituting them by genetic-lithologic descriptions (transgressive lithofacies, clayey lithofacies), on the other hand they use new terms (Kežmarok Beds, Kluknava Beds), which are often used only in manuscripts. Not even in one case they quote a source from which they take information.

Kežmarok Beds were first described and named in manuscripts of Gross et al. 1994, 1995, 1996, Filo et al. 1994, 1995, the definition of the term has been ready for publishing today (Gross in press). It would be ethical to refer above mentioned works, which are archived at Geological Survey of Slovak Republic and at Nafta Oil Company a.s., Gbely.

Tomášovce Beds were described and named in manuscripts of Filo et al. 1994, 1995, Karoli et al. 1994, Gross et al. 1996, the definition of the term has been submitted according to the rules of the stratigraphic classification in the paper of Filo and Siránova 1996.

Kluknava Beds - the term in this form has not yet been published. It is not clear whether it was not used by authors in their manuscripts, which are not publicly available. Even in this case the quotation is missing. Andrusov (1965) used for basal Paleogene in the northern part of the Spiš - Gemer Rudohorie Mts. only a term kluknava development of Súľov Formation. Filo et al. (1994) used a modified form (kluknava development) to mark continental conglomerates and sandstones in the surroundings of Hrabušice.

Use of new lithostratigraphic formations without any closer description is extremely improper and evokes a terminologic chaos and undesirable synonymy (definition of the lithos-

trigraphic unit, probably identical to Kluknava Beds, is submitted to press (Filo and Siránova in press).

2. Authors state that ... the studied area was probably overlain by transgression in the Early Oligocene (when numulite base is missing). The marine transgression entered here by flat promontories of alluvial fan deposits (kluknava deposits). The transgressive lithofacies is represented by tomášovce beds...

- The Oligocene age of Borové Formation (transgressive lithofacies) is not proved by anything, on the contrary, all the data available (macrofauna of the lower part of Borové Formation, macrofauna and macroflora of Tomášovce Beds, microfauna, microflora and nanoflora of the overlying Huta Formation - Volfová 1961, 1962, 1963, Gross, Papšová and Kohler 1973, Plička 1987, Korábová 1990, Raková and Snopková in Nagy et al. 1994, Raková, Samuel, Snopková and Zecová in Gross et al. 1996 etc.) suggest that the transgression had to start (at the latest) during the Priabonian. The absence of numulites is not caused by Oligocene age of the Borové Formation, but it is caused by other factors (decrease of salinity and high sediment content in the nearshore areas determined by entering rivers and in the substantial part of the area unsuitable non-carbonatic substratum).

-Tomášovce Beds only represent the uppermost part of the Borové Formation, e.g. the termination of transgressive cycle. This lithostratigraphic unit is specific for Hornád Depression and Saris upland, it absents in other regions (Liptov Depression, Poprad Depression, Orava region etc.). The really basal transgressive lithofacies in the area is represented by several tens of meters thick carbonate and polymictic conglomerates, breccias, sandstones and sandstone limestones with marine fauna underlying Tomášovce Beds. They are excellently exposed for example in the break gate of the Hornád river in the surroundings of Čingov (Marschalko and Gross in Mahel et al. 1963, Filo et al. 1994, Gross et al. 1994, Volfová 1961, 1962, 1963). A question of the presence of the transgressive lithofacies in areas, where the Tomášovce Beds are underlain by deposits of continental (fluvial) resp. deltaic origin (Marschalko 1970, Filo et al. 1995) is up to discussion.

3. ... The flysch of the Late Oligocene has a distal character in the region, proved by non-cyclic structures of lobes....

- It is not clear for us, how is the distality of the Late Oligocene flysch (how was proved the Late Oligocene??) related to the Kežmarok Beds, which characteristics is too far from distal deposits. It is a thick rhythmic flysch where medium and coarse-grained sandstones and gravelit fraction on the base of beds (Ta division sensu Bouma 1962) strongly prevail.

4. There is a blockdiagram on Fig. 2 showing evolution of so called East-Slovakian collision zone in the Late Oligocene.

-It does not appear to us logic that in the Oligocene the Inner-Carpathian Paleogene Basin immediately neighbours the Magura trough along a fictive plate line. How can touch one marine basin the another? It had to be a sufficiently wide, geologically variable mainland at that time, which separated two marine provinces with entirely different bed units and different sedimentary regime.

5. ... besides axial currents (E-W direction), coarse-detritic deposits also entered the basin laterally... the source of the deposits occurred on slopes of the active Central-Carpathian plate...

- What is considered by authors as an active margin if we can not find it in the blockdiagram? Might they be some non-emergent submarine slopes?

6. The authors of the paper write further: ... the occurrence of serpentinite sandstones were found in the most distal flysch facies occurring at the contact of Šambrone zone with Klippen Belt... The origin of the serpentinite detrit is necessary to seek in the oceanic crust (oceanic plate) pull up at the collision edge with the plate of Central-Carpathian plate, in the zone of the subducting trench...

-A question again emerges how is it possible to talk about trench (or about a margin of a continental block) if it is not depicted on Fig. 2. As it is known from numerous boreholes, the deposits of Paleogene Subtatric Group in the area are directly underlain by rock complex of Choč nappe in the south, Križnan nappe in the northern part (as far as to the boundary with Klippen Belt). Do perhaps authors think that the Magura trough is underlain by oceanic crust and that the crust would possibly form an emergent mainland (trench) in areas of the Late Eocene "Klippen Belt"?

The presence of pebbles consisting of ultramafic rocks (of the type of enstatite dunit from Sedlice) with serpentinite (Šalát 1954) is known in the Paleogene conglomerates occurring in the surroundings of Margecany. Is it not simpler to seek for the source of serpentinite occurring in the described sandstones in the above mentioned areas (what would be consistent with dominant palaeocurrent directions - Marschalko 1978)? Our mapping and petrographic studies proved that basically there are two local occurrences of serpentinite sandstone. This type of the sandstone has not been found at other localities of the region. Is it necessary immediately look for oceanic crust, territorially not closer localized, on the basis of local small occurrences?

7. Authors assume in the "structure of Šambron zone" (Šambron Beds? or tectonic Unit?) occurrence of conglomerates or coarse-grained clastics with clasts which should partly originate in the contemporary exposed rock units of Inačevo-Kričovo Zone. They prove it by (except findings of the clasts from the Inner Carpathians) occurrence of granitoid clasts and crystalline rocks (gneisses, mica schists, amphibolites, quartzite etc.) and by a certain part of dark phyllites, calcareous phyllites and marmors. They also describe a long time known fact of the carbonate detritus decreasing (in sandstones and conglomerates of the upper formations as Borovo Formation) in the Levoča Mts.. It should also prove that in the Late Oligocene (there were not given evidence about this age!!) Inačevo-Kričovo Unit was also exhumed in the east.

- Authors did not notice a fact, that it is possible to find the lithologic types of pebbles, which they named, nearly everywhere in Slovakia where the upper formations of the Paleogene Subtatric Group occur. Whether it goes about the region of Paprad Depression, Liptov area, Orava area or Horná Nitra area etc. generally a decrease of the carbonate detritus is observed from the base (Borové Formation) upward and coevally increasing content of very variable rock types of granitoid characters, crystalline schists, quartz etc. (Gross et al. 1980, 1993). The rock types described by them are not possible to consider as an exact evidence of exposed Inačevo - Kričovo zone supplying sediments because manifestation of this zone could be evidenced even in Horna Nitra region (what is perhaps already nonsense). As to the age, this variable clastic should vary from Priabonian to the Early Oligocene.

Considering the above given lithologic content of conglomerates (calcareous and dark phyllites, marmors etc.) as an evidence for today completely colmated zone which is only known from sporadic boreholes, seems to us not much reliable, more wished as proved. We do not have any reasons to negate existence of Inačevo-Kričovo Zone as a possible source area of a part of clastic material, but the facts given are not convincing.