GEOLOGICKÝ ZBORNÍK — GEOLOGICA CARPATHICA, 31, 4, BRATISLAVA DECEMBER 1980, PP. 603—608

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NEW DATA ON YOUNG (QUATERNARY) TECTONICS IN EAST SLOVAKIAN LOWLAND

(Figs. 1—5)

Abstract: The existing data on the East Slovakian lowland can now be complemented with the results of detailed geological, stratigraphical and paleogeographical investigations. They revealed new Quaternary neotectonic units, their age, duration and intensity of movements in the Pleistocene and postglacial times.

Резюме: Более подробные геологические исследования, стратиграфические и палеогеографические результаты способствовали дополнить знания о новых четвертичных неотектонических единицах, их возрасте, длине и интенсивности движений в плейстоценном и послеледниковом времени в Восточнословацкой низменности.

Pre-Quaternary tectonics in the East-Slovakian lowland was most intensive in the Upper Badenian and Lower Sarmatian times. By the end of the Sarmatian the tectonic activity decreased. Faults were in the Pliocene, partly in the Earliest Pleistocene and there they faded out.

Quaternary neotectonic movements proceeded in a new, in areal extension and in character independent phase which began in the Early Pleistocene (V. Baňacký, 1967).

Quaternary geological processes (deluvial, proluvial, fluvial, eolic) in the East-Slovakian lowland resulted in various genetic groups of sediments, whose genesis and structure were markedly affected by neotectonics and by exogenic factors.

Between marginal mountain range and the lowland are morphologically conspicuous *piedmont terraces.* They are mostly composed of pre-Quternary sedimentary and volcanic sequences covered by Quaternary deposits of various types. They have a form of piedmont upland dissected by dells and chutes. The upland has a character of gentle uplift, and it formed in the Pliocene — Early Pliocene time.

In a piedmont terrace beneath the Slánske vrchy Mts. two neotectonic Quaternary N—S faults can be observed. One is running northward from the Zemplínske vrchy Mts. through Trebišov and Parchovany. The other extends from the north of Trebišov to Parchovany. The two faults confine gently uplifted *Parchovany elevation* (A_1) commencing in the Neogene and continuing in uplifting since the Mindelian. The structure prevented the Cabov Riss and the Bačkov Würm proluvia from extending farther eastward. So the elevation must have preceded the Riss glacial. The Bačkovský potok brook also changed its original W—E direction and after meeting the elevation, turned southward.

Another fault line commencing south of Trebišov runs along the eastern periphery of Sečovce to terminate at the Albínovská hôrka (hummerck) on the north.

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Most continuous is the fault running from the Zemplínske vrchy Mts. along the western periphery of Sečovce to Cabov and farther northward. In the southern part the fault line is connected with a brook with flood-plain deposits, Würm fluvial gravels, and Holocene inundation muds. Flows from the Slánske vrchy Mts. transported proluvial fans, changed their direction because of the fault, connected and were eroded and in the fault line deposited the transported gravels. The fault commenced in the later Würm glacial and crossed the Riss and the Würm proluvial sequences.

Above the plain relief are conspicuous elevations and horsts, like the *Pozdišovský chrbát* ridge (A_2) extending from the north to Trhovište in the south to sink there and to emerge again at Malčice.

The ridge consists of Neogene sedimentary rocks (approximately south of Lesné) covered by gravels and clays of the Pozdišovce formation overlain by deluvia, loess, and loessy loams.

In the north is a terrace confined by steep straight fault-like slopes. These are indicative of both morphological and tectonic elevations.

The *Biela hora* (A_3) hill near Michalovce is confined by faults and covered with relicts of gravels of the Pozdišovce formation as proved by the erosion remnant of the Early-Pleistocene proluvial fan beneath the northern piedmont of the Biela hora hill.

The characteristic *Zálužice horst* (A_4) consists of Neogene pelites covered with eluvial-deluvial, and partly loessy loams. Uplift of the structure began in the Early Pleistocene — as proved by Early Quaternary variegated beds in the western part of sub-Vihorlat depression with the elevated Zálužice horst. The horst did not reach in the eastern part of the depression and the variegated beds underwent denudation process. The gradual uplifts are also evidenced by the Čierna voda brook structure (J. K v i t k o v i č, 1961).

The horst at *Porostov* (A_4) is most likely associated with the Zálužice structure.

Volcanic bodies (A^6) like the *Chlmecké pahorky* (hills), *Tarbucká hora* (hill), *Sirník—Brehov* and the *Zemplínske vrchy* Mts. (A_5) are also horst structures.

In the course of the development of the East-Slovakian lowland it slowly subsided. Some parts sank more quickly and resulted in individual synsedimentary depressions forming since the Early Pleistocene through post-Glacial up to the Recent.

South of the Vihorlat and Popričný moutains is the *sub-Vihorlat depression* divided by a fault line into the *western* (B_1) and the *eastern* (B_2) *depressions*.

The top parts of the basal parts of the variegated beds in the western part are Early Quaternary. Then the Upper Pleistocene sedimentation and subsidence faded out (V. B a ň a c k ý, 1968).

Neotectonic rejuvenation in the Mindel Glacial caused subsidence of the eastern part of the depression by 18—22 m (near Úbrež) and uplift of the *Sobrance* horst (B_3) buried in later periods of the Pleistocene.

In the $Riss_1$ the subsidence continued to 10 m, in the $Riss_2$ to 18—20 m.

The eastern part of the sub-Vihorlat depression is filled with loamy-gravel material of proluvial fans including conspicuous Mindel-Riss interglacial and the $Riss_1$-$Riss_2$ interstadial.

In the western part of the sub-Vihorlat depression the period of tectonic

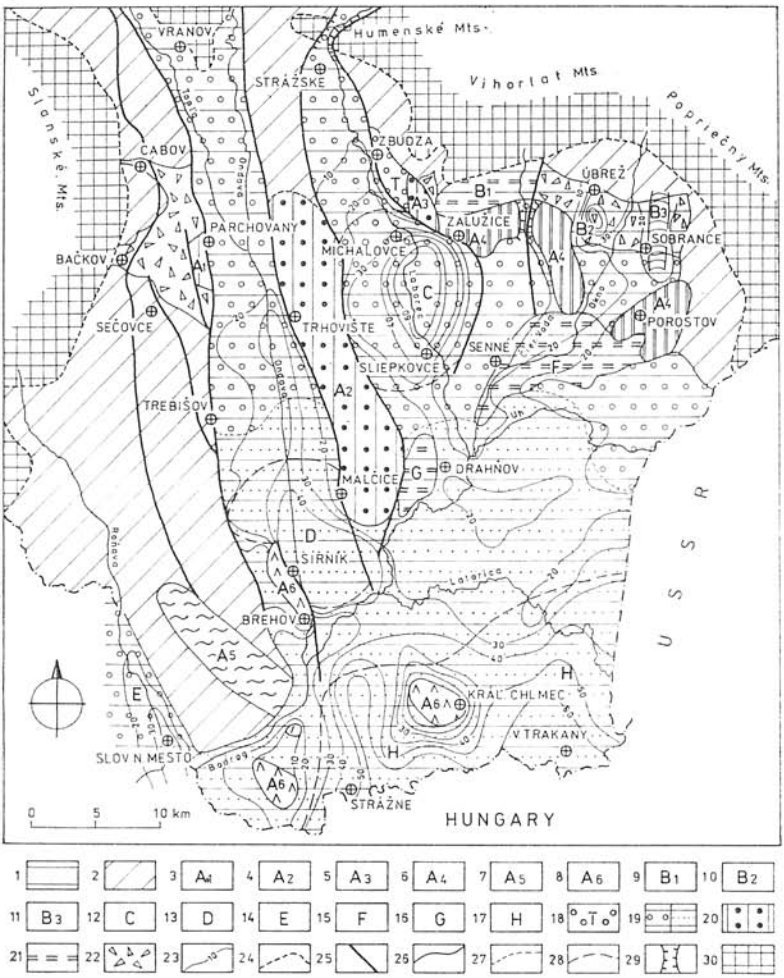

Fig. 1. Spatial distribution of neotectonic units in East-Slovakian lowland (V. Baňacký, 1979).

1 — plain, 2 — piedmont terraces, 3 — Parchovany elevation, 4 — Pozdišovský chrbát ridge, 5 — horst structure Biela hora, 6 — Zálužice horst, 7 — Zemplínske vrchy Mts, 8 — volcanic bodies, 9 — western part of Sub-Vihorlat depression, 10 — eastern part of Sub-Vihorlat depression, 11 — buried Sobrance horst, 12 — Michalovce-Sliepkovce depression, 13 — Sirník depression, 14 — Roňava depression, 15 — Senné depression, 16 — Drahňov depression, 17 — Strážne-Trakany depression, 18 — gravels of Zbudza terrace, 19 — fluvial gravels and sands, 20 — gravels of Pozdišovce formation, 21 — fluvial loamy and sandy sediments with nekron muds and peat, 22 — prolupial loamy-gravelly sediments, 23 — thickness isohypses of Quaternary, 24 — border of marginal mountain ranges, 25 — lines of Quaternary faults, 26 — border of tectonic units, 27 — lithological boundary between fluvial gravels and sands, 28 — borders of depressions, 29 — antecedent valley, 30 — marginal mountain range.

and sedimentation calm lasted up to the beginning of Würm. Subsidence commenced in Würm and continued to sub-Recent. It is proved by the genesis of organic sediments in individual periods of post-glacial.

As for stratigraphy, tectonics and ground water resources important is the *Michalovce—Sliepkovce* depression (C) confined by fault lines on both sides (V. Baňacký — J. Harčár — A. Sabol, 1965). On the north is the uplifted Upper Badenian block, on the south, near Sliepkovce, the depression gets shallower.

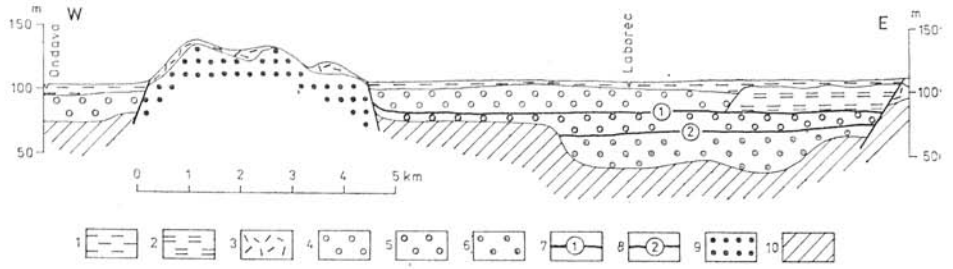

Fig. 2 Schematic section through the Pozdišovce ridge (A_2) and Michalovce-Sliepkovce depression (C) (V. Baňacký, 1979).
1 — Holocene, 2 — loessy loams, 3 — loamy deluvia (Pleistocene-Holocene), 4 — fluvial gravels and sands (Würm), 5 — fluvial gravels and sands (Riss), 6 — fluvial gravels and sands (Mindel), 7 — interglacial (Riss/Würm), 8 — interglacial (Mindel/Riss), 9 — Pozdišovce gravel formation, 10 — pre-Quaternary formations.

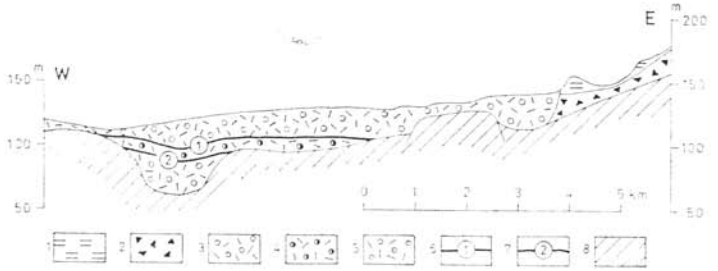

Fig. 3. Schematic section of eastern part of sub-Vihorlat depression (B_2) (V. Baňacký, 1979).
1 — loessy loams (Würm), 2 — solifluction-rocky deluvia (Pleistocene), 3 — proluvial gravels ($Riss_2$), 4 — proluvial gravels ($Riss_1$), 5— proluvial gravels (Mindel), 6 — interstadial ($Riss_1$—$Riss_2$), 7 — interglacial (Mindel/Riss), 8 — pre-Quaternary basement.

In accordance with the results of hydrogeological research by P. Pospíšil (1965) the ground waters between Lastomír and Sliepkovce disperse in fan-like form owing to the transversal fault terminating the southern part of the depression.

The depression is filled with 70 m thick sequence of fluvial gravels and sands with interglacial and interstadial clayey-loamy layers. According to

the complex geological results of paleontological and sedimentary-petrographical research the depression commenced in the Early Pleistocene. The extent of the depression increased with the increasing intensity of subsidence.

The subsidence of 50 m took place in the Würm, in the Early and Middle Pleistocene, and 30 m in the Holocene (V. B a ň a c k ý, 1968).

The intensity of tectonic processes in the Michalovce—Sliepkovce depression is illustrated by the conditions in the adjacent *Zbudza* terrace (T). The terrace was broken, and subsided in later Riss and Würm periods (V. B a ň a c k ý, 1968).

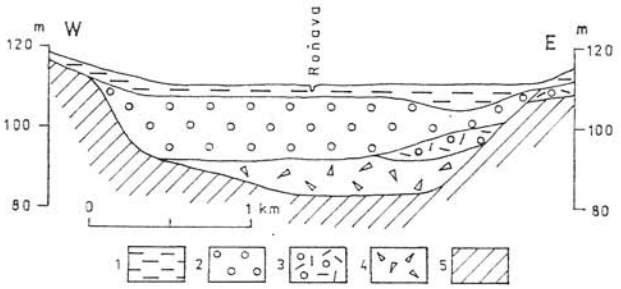

Fig. 4. Schematic section of Zbudza terrace (T) (V. B a ň a c k ý, 1979).
1 — Holocene, 2 — loessy and fluvial loams (Würm), 3 — fluvial gravels (Würm), 4 — fluvial gravels (Riss), 5 — proluvial mostly loamy sediments (Mindel), 6 — pre-Quaternary formations.

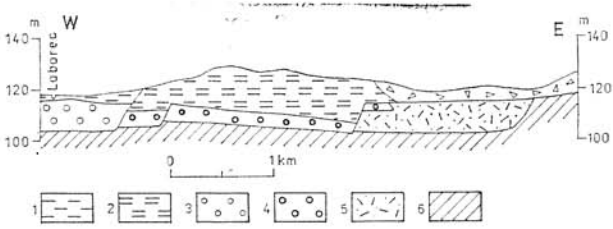

Fig. 5. Schematic section of Roňava depression (E) (V. B a ň a c k ý, 1979).
1 — Holocene, 2 — fluvial gravels and sands (Würm), 3 — solifluction-rocky deluvia (Riss$_2$), 4 — proluvial gravels (Riss$_1$), 5 — pre-Quaternary formations.

In the southernmost part of the lowland is the *Strážne—Trakany* depression (H). It is the continuation of the northern part of the neo-tectonic depression of the Veľká Dunajská kotlina (Great Danube Basin). Maximal subsidence is about 60 m. The subsidence increases down to 80 m at Rics in Hungary (south of the frontiers).

In the depression is a clayey-loamy horizon of Riss—Würm interglacial dividing the fluvial sandy filling of the depression into the lower Riss and the upper Würm sequence.

Drulling near the colcanic body Sirník—Brehov intercepted Early Quaternary sediment (prevented by volcanic rocks from erosion). They also deposited in the Strážne— Trakany depression and underwent erosian in Later Pleistocene. So the Strážna—Trakany depression is Early Pleistocene.

The *Sirník* depression (D) in the southern part of the Ondava river plain is confined from the west by a submerging piedmont terrace of the upland below the Slánske vrchy Mts. and by southern slopes of the Sirník—Brehov volcanic bodies. On the east the Sirník depression is confined by the elevated Pozdišovský chrbát ridge. The genesis of the depression commenced in the Mindel glacial and synsedimentary subsidence continued in the Riss and Würm. Then it was already associated with subsidence of the Ondava river plain. During the genesis of the depression the psammitic and psephitic material underwent intensive erosion.

At the contact of the Zemplínske vrchy Mts. and the Tokai—Zempléni hegység in the Roňavská brána gateway is a fault line which gave rise to the *Roňava* depression (E).

The genesis of the Roňava depression commenced in the $Riss_1$. In that time the depression was filled with proluvial gravelly material. In later times, mainly in the Würm glacial the subsidence continued with deposition of fluvial gravel and sand. In the southern, larger part of the depression the subsidence is about 40 m, in the northern — 10 m.

The *Senné* depression (F) began to form in the Würm by intensive subsidence in a plain. The depression belongs among the youngest, still developing depressions. Its young age is proved by sand dunes and loess buried under the youngest fluvial loams, sandy loams and sands.

By drilling east of Stretávka, loessy loams were found 19 m deep beneath a thick cover of flood mud of the Čierna voda brook. Subsidence of the depression ranges from 5 to 20 m.

The *Drahňov* depression (G) is the youngest. It formed in the time between the Late Glacial to the Relent. The depression is filled with flood muds sequence including sapropel, peat and the youngest eolic sands deposited on a thick sequence of fluvial psammites. The depression is confined by the Drahňov eolic complex in the east and a loess plateau in the west. Subsidence ranges from 4—8 m.

Neotectonic synsedimentary subsidence of depressions and comparatively slower uplifts proceeded during the whole Quaternary time and they are reflected in the general morphology of the East—Slovakian lowland.

Translated by E. Jassingerová

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Manuscript received May 6, 1980