

## TERRACES OF THE MIDDLE MÜRZ VALLEY

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Soft sediments of the Middle Mürz river valley have been subject to investigations i.a. by H. P. CORNELIUS (1938, 1952), J. E. GOLDBRUNNER (1979) and J. NIEVOLL (1984). Two formations are represented there: Tertiary (Miocene and presumably Pliocene) and Quaternary (Pleistocene and Holocene). The former consists of freshwater, lacustrine and alluvial sediments of the "Norischen Senke", the latter – of fluvioglacial, alluvial and gravitational sediments. The both are mostly clastic stuff and bear no or very little age markers. This was a source of a confusion as for the distinguishing between Tertiary and Quaternary sediments. H. P. CORNELIUS in his early studies of (l.c.) classified most soft sediments occurring above the valley floors as Tertiary, except for gravel terraces in vicinity of Hönigsberg and Mürzzuschlag. Later works, particularly by J. Nievoll (l.c.), revealed a tendency to recognize more Pleistocene sediments and landforms, based on petrographic composition of gravels and geomorphological evidence.

In the present study further geomorphological and lithological hints were found that point to younger age of some sediments and terraces in the Middle Mürz valley as well as in its main tributaries. Moreover, a consistent scheme of the Quaternary terraces in the valley was suggested. Tertiary sediments were not a subject to the study.

Five main levels of terraces and fans can be seen over the valley floor. The lowest one is formed of the fans of tributaries (Figs. 1 and 2). The fans are well pronounced in the landscape. Their height above the Holocene valley floor is usually 2 – 5 m. Some of them are quite vast, attaining a length up to 1 km and a width up to 2 km, as e.g. the fan of the Fresnitzbach by Krieglach. It seems that a formation of main masses of the fans took place at the climax of the last glaciation. Proglacial waters running out from melting glaciers of the Stuhleck ridge and Hochveitsch massif supplied the valleys with the rock debris in quantities big enough to form such vast fans. Formation of the fans continued in Holocene. Natural forestation of the catchment area hindered the process and stabilized the fans. However, dissection and accretion of sediments occur even quite recently, particularly intensely during heavy rainfalls.

Lower level („low terrace”) is well pronounced as well. It is formed of the "terrace shelves" of various width of 50-500 m stretching mainly along the left valley slopes and fans at the mouths of tributaries. The largest fans spread at the outlets of the Steinbach, Treibach and Fresnitzbach valleys. The area of the two latter is where the terrace is the widest, moreover.

The age of sediments forming the lower terrace and fans is not quite clear. J. NIEVOLL (l.c.) assigned Riss or even pre-Riss age to the fans of the Fresnitz, Treibach and Ganz valleys as well as to the terrace shelf E of Krieglach and S of Hönigsberg. Other fragments were recognized as the Würm-age sediments. It is noteworthy however, that the landforms in question form surfaces located at similar heights above the river level, i.e. ca. 20 m close to their lower edges and ca. 45 m in upper, distant parts. Some bigger fans, spreading further up the tributary valleys, reach a height of up to 60 m above the Mürz river. Fans on the right slopes of the Mürz and Fröschnitz valleys have heights bigger at ca. 10 – 20 m than those on left sides. Also higher are fans on both sides of the Mürz valley up from Mürzzuschlag. This is due to some asymmetry of the landforms (and geology) NW and SE of the Semmering - Mürzzuschlag - Bruck line, discussed further on. It seems that, despite this differentiation, described terrace shelves and fans form a single level and are, thus, of the same age.

Formation of such pronounced and widespread sediments must have proceeded during melting out large masses of glaciers and snow in the mountains. Their location just above the late Pleistocene/Holocene fans points to the Würm age.

Next, upper level ("middle terrace") is preserved worse. Fans and remnants of the terrace are built of coarse to fine gravels, pebbles and boulders that cover the valley slopes in the height range ca. 40-60 m (max. 100 m) above the river. They occur only on the left slope of the Mürz valley and in the valleys of left tributaries. The largest fan developed at the outlet of the Traibach valley in Schwöbing. Relatively well pronounced terrace is visible between Schwöbing and Hönigsberg. Here again the age is not certain. Most fragments of the level in question were considered as pre-Riss in age by J. NIEVOLL (l.c.). Similar hints as in case of the Würm terrace and fans point to relation of the gravel and pebble of the 40-60 m level to the climax of montane glaciation. In this particular case it was presumably the Riss glaciation. Its extent was larger than the extent of the Würm glaciation (H.P. CORNELIUS, 1933), thus fluvioglacial sedimentation was more intense. Indeed, the extent of the fluvioglacial fans of the upper level is impressive. Originally it should have been much larger, if we take into account intensive erosion in the Riss/Würm interglacial.

Older fluvial and fluvioglacial sediments are preserved only in small patches. They are gravels and pebbles dispersed on a surface or in a loam covering slope flattening N of Wartberg and Mitterdorf at the height of 70-100 m above the river bed, E of Schwöbing (80-120 m), S of Langenwang (60-70 m) and W of Mürzzuschlag (ca. 140 m). Almost all of those places are located at the outlets of the valleys of tributaries and mark ancient fans of pre-Riss (Mindel ?) age. As there is still very little information on the extent of the Mindel glaciation in the area of the middle Mürz valley, we can only suspect, that the formation of the fans in question could have taken place towards the end of the glaciation, when the main valleys were free of ice.

The highest remnants of fluvial and/or fluvioglacial pebbles and boulders can be found on top of Wartbergkogel (ca. 710 m a.s.l., 100-140 m above the river bed), W of Mitterdorf (Am Berg, 120-140 m), on Feistrizbeg (80-100 m), SE of Langenwang (Pichlwang; 80-100 m), E of Hönigsberg (Kranzbauer; 90-130 m), on the SE ridge of the Ganzstein (140-200 m) and on the watershed between Fröschnitz and Steinbach valleys (ca 200 m). The only hints as for the age and origin of the sediments are high relative position and coarse fraction. The former points to definite pre-Riss (early Quaternary ?) age, the latter – to rather fluvial, fluvioglacial or glacial sedimentary environment than lacustrine, more typical for Tertiary environment. It cannot be excluded, however, that the highest pebbles and boulders represent rests of alluvial and gravitational sediments of the Miocene age.

Distribution and heights of the terraces and fans in the Mürz and Fröschnitz valleys reveal striking asymmetry. They occur mainly on the left sides of both valleys while on the right sides their remnants are scarce and small. Fans and terraces are preserved very poorly in the Mürz valley upstream from Mürzzuschlag. Moreover, terraces and fans on the right sides have bigger heights than those on the left sides. This can be due to two factors, that can coincide together: relative uplift of the area NW of the Semmering-Mürzzuschlag-Bruck line against the area SE of the line and much more intense fluvioglacial sedimentation of left Mürz and Fröschnitz tributaries than the right ones. The latter can be explained on a basis of significant differences in bedrock geology of the source areas. The Stuchleck ridge built mainly of quartz phyllites was much more susceptible to glacial erosion and yielded much more debris than limestone massif of the Hochveitsch.

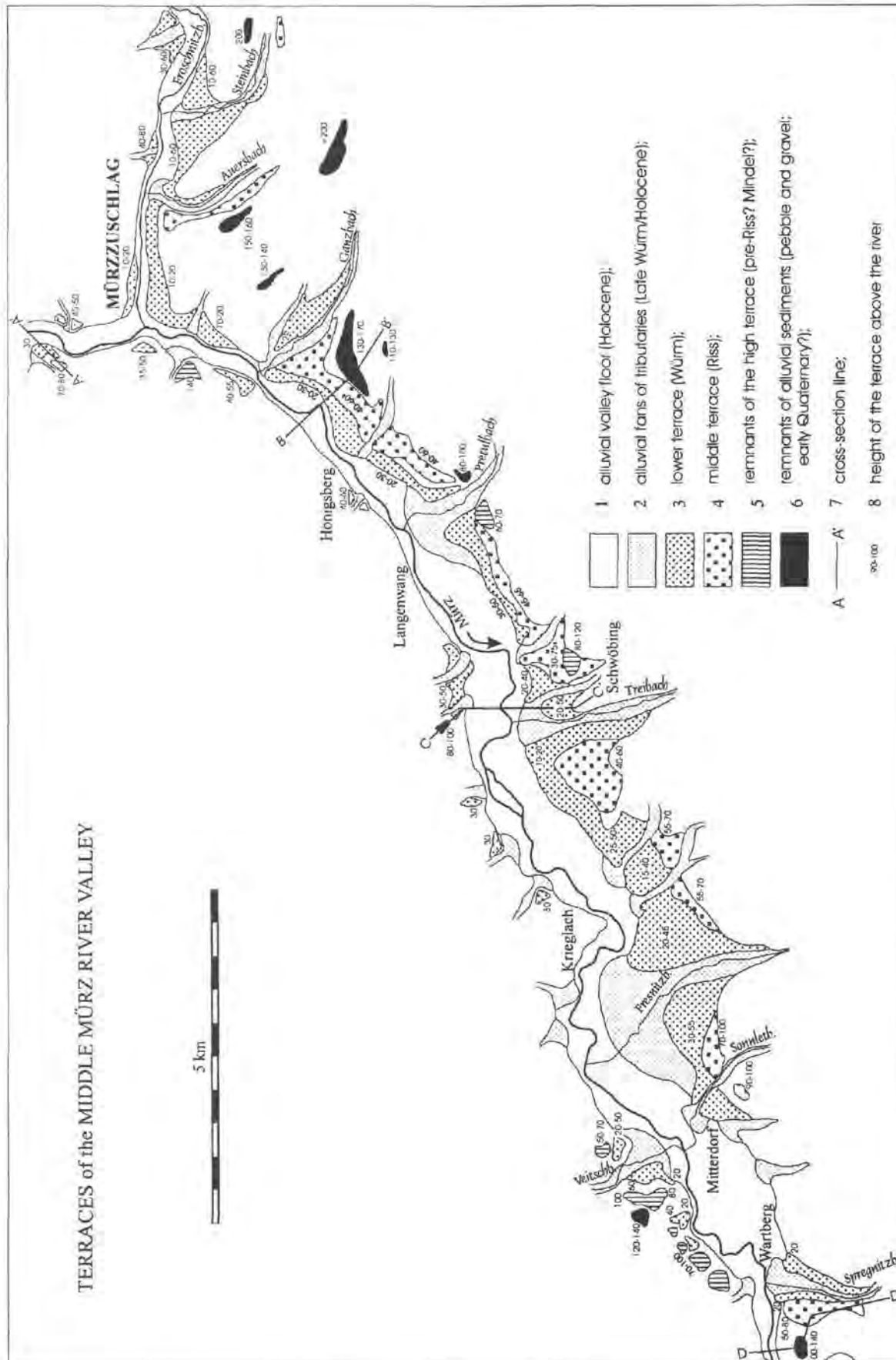


Fig. 1: Terraces of the Middle Mürz valley.

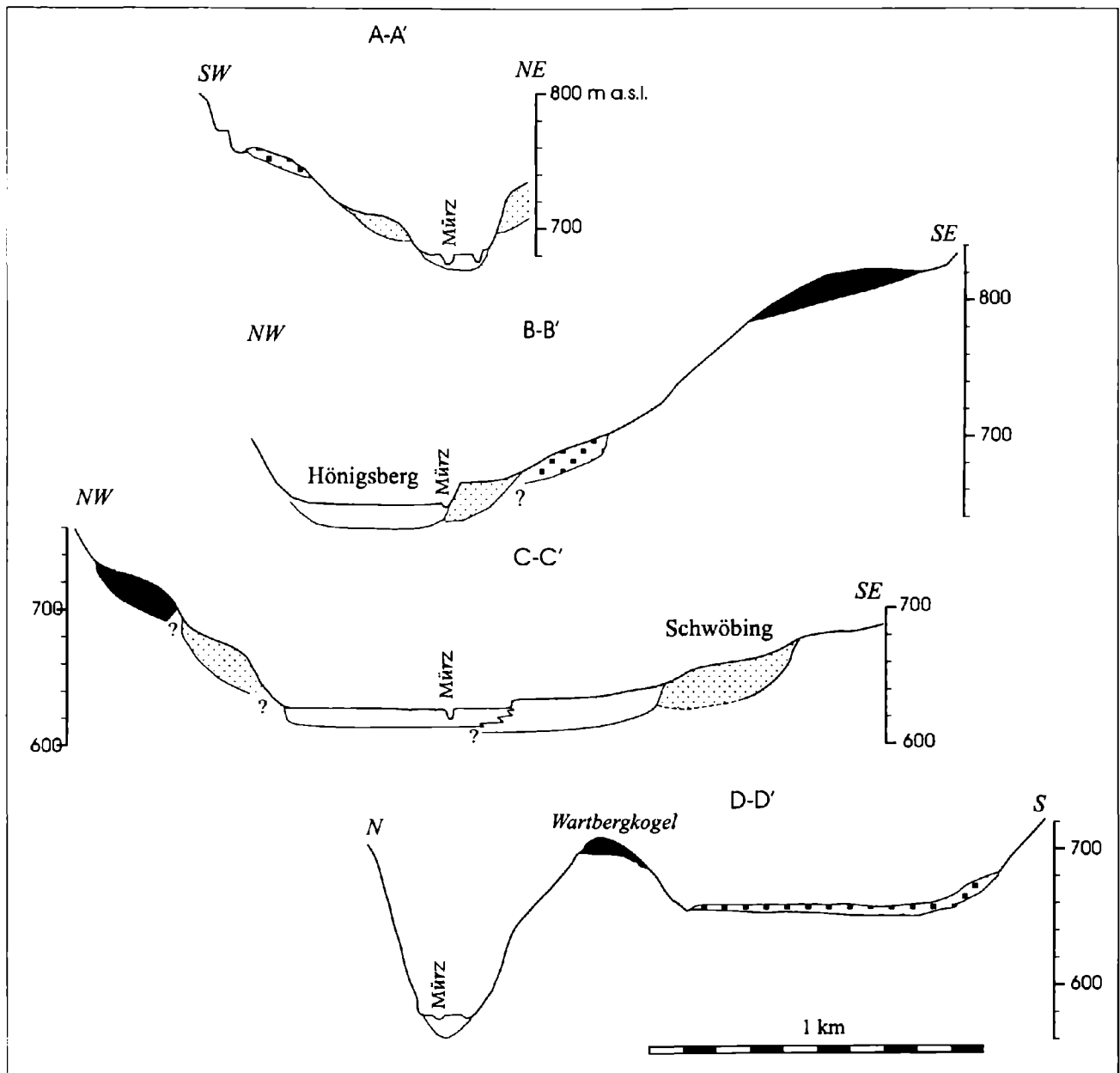


Fig.2: Cross-sections of the Middle Mürz valley;  
Explanation of fill patterns as in Fig. 1.

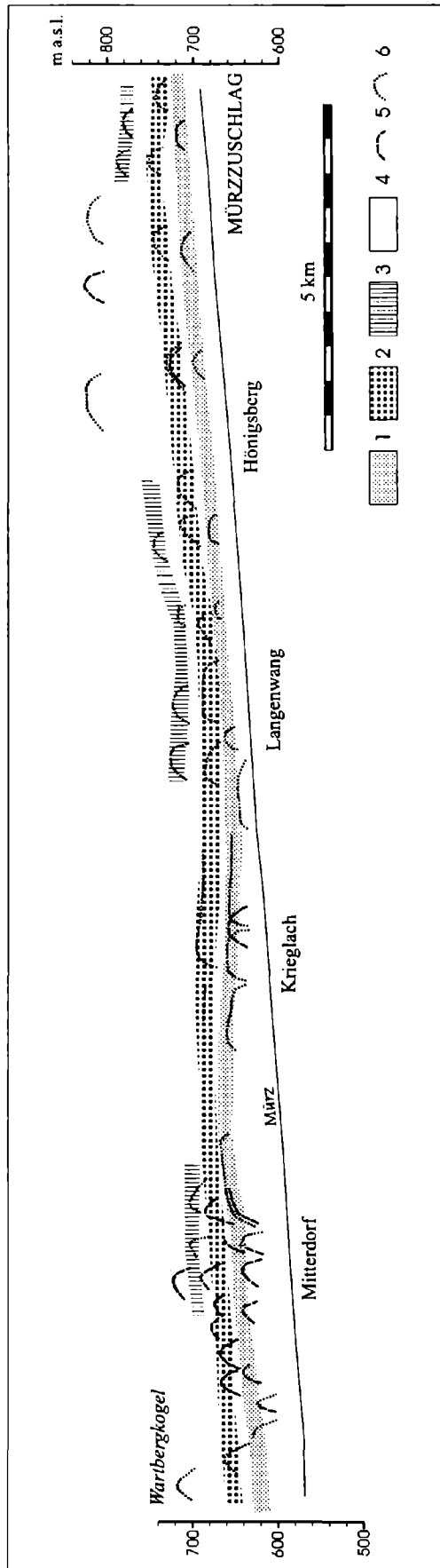


Fig. 3. Longitudinal profile of the Middle Mürz valley;

- 1 lower terrace (Würm);
- 2 middle terrace (Riss);
- 3 remnants of the high terrace (pre-Riss? Mindel?);
- 4 remnants of alluvial sediments (pebble and gravel; (early Quaternary?);
- 5 right exposures and landforms on the valley slopes;
- 6 left

Recent tectonic activity of the Mürz valley zone („Mürz-Mur Furche“) is well known (e.g.: J. DRIMMEL, 1980). It reflects not only in mentioned above horizontal asymmetry but also in vertical deformation of the terraces (fig. 3). All levels (i.e. terraces and fans) occupy the highest positions above the river bed downstream of Krieglach, while their heights are the smallest between Krieglach and Hönigsberg. Upstream of Hönigsberg the Mindel and early Quaternary levels climb up considerable again, while Würm and Riss levels attain only slightly higher positions. Moreover, postglacial alluvial sediments of the valley floor are the thickest downstream of Langenwang (up to ca. 17 m) and dramatically thin upstream (down to ca. 6-8 m), showing the bedrock in Hönigsberg (J. E. GOLDBRUNNER, 1979).

It seems therefrom, that the rate of the river incision varied over a time and a space. In the valley reach upstream of Hönigsberg the incision was the largest in the middle of Quaternary (Mindel-Riss), then reduced in late Pleistocene and grew up again in Holocene. In the area of Langenwang the rate of incision was moderate and more or less stable throughout the Quaternary. In the reach downstream of Krieglach incision was generally big and became particularly intensive in the late Würm, then almost stopped.

It is not reasonable to calculate values of the Quaternary incision/uplift in the middle Mürz valley zone at the present stage of research. Investigations are continued.

The work was done with the support of the Geologische Bundesanstalt in Vienna (field works) and University of Mining and Metallurgy (AGH) in Cracow (within statute research project 2001).

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