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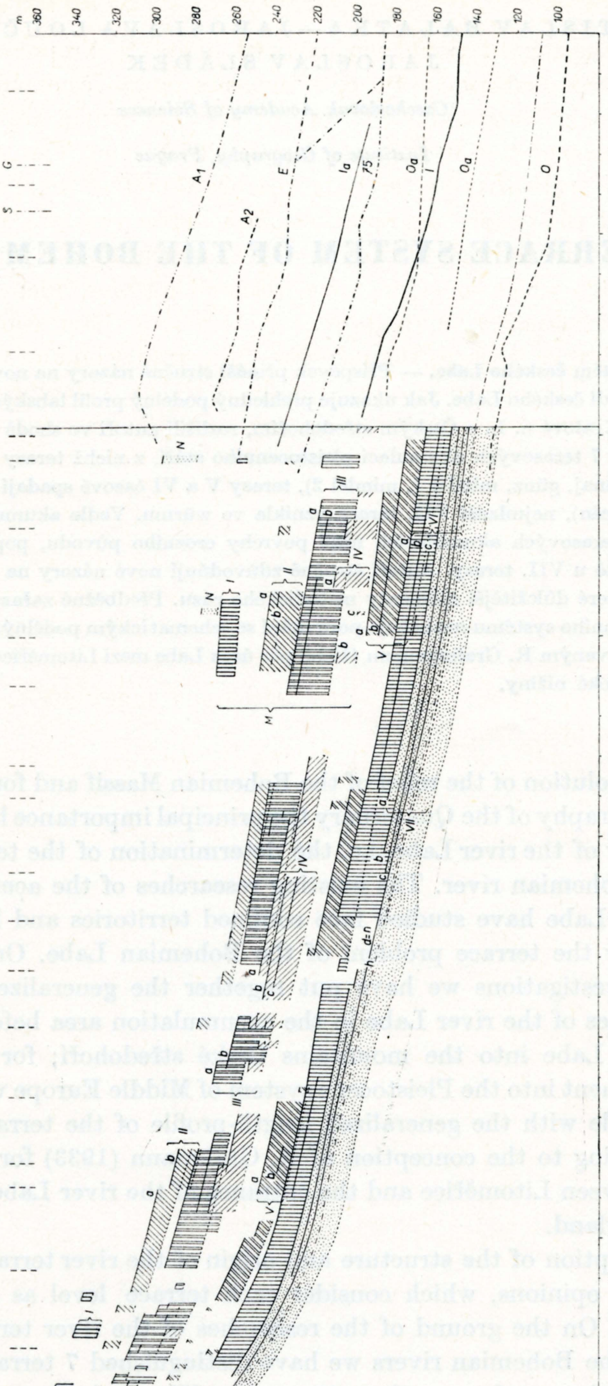
THE TERRACE SYSTEM OF THE BOHEMIAN LABE

Terasový systém českého Labe. — Příspěvek přináší stručné názory na nové pojetí terasového systému v povodí českého Labe. Jak ukazuje přehledný podélný profil labskými terasami v úseku mezi Dvorem Králové n. L. a Českým středohořím, rozlišili autoři ve shodě s poměry na jiných českých řekách 7 terasových akumulací pleistocenního stáří, z nichž terasy I až IV jsou staropleistocenní (dunaj, günz, mindel 1, mindel 2), terasy V a VI časově spadají do rissu 1 a rissu 2 (střední pleistocén), nejmladší VII. terasa vznikla ve würmu. Vedle akumulačních úrovní vytvořily se v terasových akumulacích nižší povrchy erozního původu, popř. vložené trerasy, nejlépe vyvinuté u VII. terasy. Autoři stručně zdůvodňují nové názory na genezi teras a upozorňují na některé důležitější momenty metodického rázu. Předběžné zařazení do středoevropského pleistocenního systému naznačuje porovnání se schematickým podélným profilem terasami Labe zkonstruovaným R. Grahmannem (1933) pro úsek Labe mezi Litoměřicemi a vstupem řeky do Severoněmecké nížiny.

For the evolution of the relief of the Bohemian Massif and for the recognition of the stratigraphy of the Quaternary the principal importance has the evolution of the valley of the river Labe, i.e. the determination of the terrace system of this main Bohemian river. The existing researches of the accumulation areas of the river Labe have studied face confined territories and have not solved satisfactorily the terrace problem of the Bohemian Labe. On the ground of our own investigations we have put together the generalized length-profile of the terraces of the river Labe in the accumulation area before the entrance of the river Labe into the mountains České středohoří; for the purpose of the arrangement into the Pleistocene system of Middle Europe we have compared this profile with the generalized length-profile of the terraces of the river Labe according to the conception of R. Grahmann (1933) for the river reach of Labe between Litoměřice and the entrance of the river Labe into the North German Lowland.

Our conception of the structure and origin of the river terraces differs from the existing opinions, which consider each terrace level as an independent aggradation. On the ground of the researches of the river terraces in a great number of the Bohemian rivers we have distinguished 7 terrace aggradations with the thickness of more than 25 metres. We mark them from the oldest level to the youngest one I to VII. At individual terraces we distinguish on


PIRNA
Bílina
LOVOSICE
Ohře
ROUDNICE n. L.
Vltava
NERATOVICE
Jizera
LYSÁ n. L.
NYMBURK
Cidlina
KOLÍN
TÝNEC n. L.
PŘELOUČ
Chrudimka
Loučná
Orlice
Metuje
KUKS
m
km

the one hand the aggradational surface (with index "a") representing the level of the highest sedimentation of the river deposits, on the other the lower surfaces of erosional origin (with index "b" or "c" or "d"), which are best preserved with the terraces of the Middle and Upper Pleistocene. The general number of the terrace levels of the river Labe reaches therefore more than double of the number of the terrace aggradations. This terrace system differs from the classification of the terraces of the river Vltava according to the conception of Q. Záruba (1942), which considers some erosional levels as independent terraces.

As shows the structure of the terrace system there have cooperated at the origin of the terrace surfaces the processes of aggradation and the processes of lateral erosion. The lateral erosion that leads to the widening of the valley is bound as to the processes of vertical cutting, as to the processes of aggradation. This evolution of the valley has shown itself just in the valley of the Bohemian Labe, which is built of comparatively incompetent and homogeneous rocks of Upper Cretaceous. On the contrary in those areas, which are built of more resistant rocks, the process of lateral erosion is restricted on the least degree, so that at downward cutting of the valley there is renovated more or less the width of the former valley bottom and the erosion levels can be preserved only in the rare cases. The origin of the river terraces cannot be explained by means of simple processes of vertical cutting and aggradation, what has been presumed till now.

For the construction of the terrace length-profile and for the recognition of the origin of the terraces the most important river reaches are that ones in which the complete aggradation of terrace deposits has been preserved, i.e.

The generalized length-profile of the terraces of the river Labe.

N — gravels and sands of Late Tertiary (Neogene), I to VII — Pleistocene terraces of the Bohemian Labe, a — aggradational surface of the terrace, b, c, d — erosional surface of the terrace, n — surface of valley plain, h — river level. The terraces of the river Labe according to R. Grahmann: A_1, A_2 — Pliocene terraces (rock substratum), E — terrace of Praegünz-Günz (rock substratum), 75 — problematical level (rock substratum), I — terrace of Mindel (rock substratum), I_a — gravel terrace I (aggradational level), O — terrace of Riss (rock substratum), O_a — gravel terraces O (secondary erosional levels), G — limit of Elster glaciation, S — state frontier, M — terraces of the river Vltava.

Přehledný podélný profil terasami Labe.

N — štěrky a písky mladotřetihorní (neogenní), I—VII — pleistocenní terasy českého Labe, a — akumulační povrch terasy, b, c, d — erozní povrch terasy, n — údolní niva, h — hladina řeky. Terasy Labe podle R. Grahmanna: A_1, A_2 — pliocenní terasy (skalní podloží), E — terasa praegünz-günz (skalní podloží), 75 — problematická úroveň (skalní podloží), I — terasa mindel (skalní podloží), I_a — štěrková terasa I (akumulační úroveň), O — terasa riss (skalní podloží), O_a — štěrkové terasy O (druhotné erozní úrovně), G — hranice halštrovského zalednění, S — státní hranice, M — terasy Vltavy.

the base of the terrace in its lowest level and the aggradation surface (abandoned valleys from the period of each terrace). From that point of view the situation in the accumulation area of the Bohemian Labe is especially favourable, for in consequence of the complicated evolution of the stream system in course of the Pleistocene Period many abandoned valley reaches from the periods of various terrace levels have been preserved here. Therefore in the study of the river terraces we are obliged to start with the geomorphological situation of the researched area.

The regular course of the individual terrace levels demonstrates that the evolution of the stream system and the formation of the terraces have not been substantially influenced by the Quaternary tectonic movements with the exception of a short river reach in the middle part of the valley of the Bohemian Labe under the mountains Železné hory, where the base of the youngest terrace

	Surface	Base
Gravels of Late Tertiary:		
at the foot of the mountain Říp	160	—
at Rovné and on Sovice	124	116
Pleistocene terraces:		
I	115	106
IIa	91	75
b	85	
IIIa	76	55
b	71	
IVa	60	
b	54	43
c	47	
Va	40	16
b	33	
VIa	26	
b	21	0
c	18	
VIIa	12	
b	9	—10
c	5—6	
d	3—4	

(VII) forms a clear depression in a level by 7 metres lower than the normal level of the rock substratum of this terrace. It is possible to interpret this anomaly by means of subsidence at the foot of Železné hory. In the area of the confluence of the both largest Bohemian rivers — Vltava and Labe — the terrace levels are characterised by these relative heights (in metres above the river level). (Tab. on page 34).

In the comparison of our profile of the Labe terraces with that one of R. Grahmann it follows that the course of the Pleistocene terraces does not show substantial influence of the Quaternary tectonics (even in the river reach in České středohoří and Děčínské mezihoří). Only at the Neogene level A_1 R. Grahmann supposes a divergence caused by the elevations (thrust faults) in the area of České středohoří. The Grahmann's terrace A_2 is situated in the level of the Pliocene terrace in the surroundings of Praha, his terrace E corresponds in the length-profile to the terrace I, the aggradational level of the Grahmann's terrace I corresponds to the aggradational surface of our terrace II, while the base of the Grahmann's terrace I is situated in the level of the rock substratum of our terrace III (or IV). The Grahmann's so called 75 metres

	B. Balatka J. Sládek 1962	Q. Záruba 1942	R. Grahmann 1933
Neogene:			A_1 A_2
Pleistocene: Donau	I	La Lb	E
Günz	II	Ia	I
Mindel 1	III	Ib IIa	
Mindel 2	IV	IIb	O
Riss 1	V	IIIa IIIb	
Riss 2	VI	IIIc	
Würm	VII	IVa IVb	U

level represents approximatively the continuation of the base of our terrace II. The aggradational surface of the Grahmann's terrace O is situated in the level of our terrace IV (or V), the lower surface of the terrace O corresponds to the aggradational surface of our terrace VI. The Grahmann's informations about the situation of the rock substratum under the contemporary level of the river Labe relate to the base of our terrace VII. From this comparison it follows that R. Grahmann supposes theoretically the large terrace aggradations at the terraces I and O (with a thickness to more than 50 metres), which have not been proved even by bore holes; therefore there are in both cases two independent terraces; that has been proved by some abandoned valley reaches in the river basin of the Bohemian Labe.

On the ground of the relation of the river terraces to the aeolian deposits, of the paleontological discoveries and after the comparison with the terrace system of the river Vltava (Q. Záruba 1942) and the lower course of the river Labe (R. Grahmann 1933) we put the terraces into the Pleistocene system in this manner. (Tab. on page 35).

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