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Abstrakt

Ropařské vrty provedené v Rakousku a v ČSSR v oblastech karpatské a alpské předhlubně (molasy), flyšového pásma a vídeňské pánve přinesly důkazy, že krystalinikum a paleozoikum na jv. svazích Českého masívu pokrývají uloženiny mezozoika. Výskyty téměř identických litologických a stratigrafických jednotek v Rakousku a Československu po obou stranách státní hranice podmínily stálou spolupráci při jejich výzkumu. Společný výzkum se soustředil na definování a doložení nejdůležitějších litostratigrafických jednotek. Přiložené tabulky dokumentují současný stav výzkumů. Podáváme přehled paleogeografických a strukturních poměrů. Uvádíme dosavadní výsledky detekce uhlovodíků a možné aspekty jejich vyhledávání ve vztahu ke kolektorským, zdrojovým a strukturním podmínkám.

Zusammenfassung

Bohrungen für Kohlenwasserstofferkundung in Österreich und der ČSSR haben den Nachweis eines autochthonen mesozoischen Sedimentmantels an der Ostflanke des Kristallin-Paläozoikumspornes der Böhmischen Masse unter Molasse, unter der alpin-karpatischen Externzone und unter dem Wiener Becken erbracht. Die nahezu identischen stratigraphisch-faziellen Einheiten beiderseits der Grenze bedingten eine kontinuierliche Kooperation beider Länder. Es wurden die wichtigsten dieser Einheiten stratigraphisch definiert und dokumentiert. Der neueste Stand dieser Gliederung wurde in einem gemeinsamen Schema dargestellt.

Ebenso werden die paläogeographischen und strukturellen Ergebnisse übersichtsmäßig wiedergegeben. Die Ergebnisse der Kohlenwasserstofferkundung und die künftigen Aspekte werden im Zusammenhang mit Speicher- und Muttergesteinsfragen sowie den strukturellen Gegebenheiten erörtert.

PALEOGEOGRAPHY AND STRATIGRAPHY OF THE AUTOCHTHONOUS PALEOGENE ON THE SOUTHEASTERN FLANK OF THE BOHEMIAN MASSIF

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The Nesvačilka and Vranovice canyons, filled with autochthonous Paleogene sediments, were discovered in the south Moravian part of the Bohemian Massif in the late sixties. Natural gas was found in Paleogene sandstones in the early eighties, which put this formation into the centre of attention of the Moravian Oil company. In this region, the author (R. Jiříček, 1981, 1986) studied the stratigraphic and facies division of sediments in relation to gradually transgression and troughs evolution. Autochtonous Paleogene rocks were identified in 42 boreholes from which 233 cores and some cuttings correlated by means of electric logging (Table 1) were recovered for lithological and micropaleontological purposes. Seismic sections were used not until in the paper presented that gives more precission to previous results. For some of the boreholes, the presumed autochthonous Paleogene rocks were placed into the autochthonous Eggenburgian or into the overthrusted Nikolčice Unit of the parautochthone.

1. The age of the autochthonous Paleogene is seen individually. Originally, the Paleogene sediments of Arta-H2 borehole were classified as Aquitanian to Burdigalian (K. Friedl, 1937). Later they were assigned, together with the equal layers of the adjoining Brno-1 borehole, to the Lower Oligocene (M. Dlabač, 1946,; R. Grill, 1947). In accordance with the bethos foraminifers present, they were determine as ranging from the Upper Eocene to the Lower Oligocene or Rupelian in Nesvačilka-1 borehole (M. Holzknecht, in V. Homola et al., 1961). The occurence of Nummulites and Discocyclines at Uhřice placed them into the Middle Eocene (E. Benešová, 1969). J. Krhovský (1988) basing on a revision of the benthos forams, concluded, after all, that age was Paleocene to Oligocene.

According to the author (R. Jiříček, 1986), the problem of disagreement consist in the fact that the abundant benthos fauna is of deepwater nature similar to that of the Upper Eocene to Lower Oligocene faunas of eastern Europe reported by M. Holzknecht (1961), but that is also resembles Paleocene faunas of western Europe, described under other species names, by J. Krhovský (1988). The occurrence of Eocene age, indicates the possible survival of a large part of the faunas from the Paleocene to the Eocene. Typical faunas including Bulimina parisiensis („B. trigonalis") extend from Lower Eocene into Paleocene pelites. In addition, a number of mollusc faunas are present there that resemble those in the Lower Oligocene Pouzdřany Unit not altered throughout the Paleogene. For this reason, the upper part of the Paleogene seems to be composed of Upper Eocene perhaps to Lower Oligocene sediments linking up with the primary molasse extending from the Perialpine region into southern Moravia (R. Jiříček, 1981). The lower part of the Paleogene is regarded as Middle and Lower Eocene and Paleocene (M. Holzknecht—J. Krhovský, 1988; B. Hamršmíd, 1988).

2. The determination of the internal stratigraphy of the autochthonous Paleogene was equally difficult as that of the age of the sediments. On the basis of well cores, V. Homola et all. (1961) identified several horizont; a few of them could be correlated with the aid of electric logs to the closest proximity of the Nesvačilka boreholes (F. Němec, 1973), but not to regions more distant. Presently the clastic Těšany formation, westwards replaced by darkgrey claystones of the Lower Nesvačilka Member, can be identified in the centre of the Nesvačilka canyon. The two units are covered by grey-green claystones of the Upper Nesvačilka Member. Brown Uhřice marls, present mainly near Uhřice, have developed in the terminal part. Black bituminous Vranovice claystones, divided into several subhorizons in conformance with the results of GK and RAG logging, have been racognized throughout the cross section (R. Jiříček, 1986)

Age		Vranovice canyon	Nikolčice ridge	Nesvačilka canyon	
EOCENE	Upper	Vranovice claystones	Vranovice claystones	Uhřice marls	
	Middle				
	Lower			Upper Nesvačilka clayst.	
Paleocene		?	—	Lower Nesvačilka claystones	Těšany clastic Formation

The biostratigraphic division of the Paleogene into several foraminiferal horizons for Nesvačilka-1 borehole (M. Holzknecht, 1961) could not be applied to other boreholes. Later, when comparing the forams and ostracods from the two canyons, several regional horizons could be defined (R. Jiříček, 1981, 1986). The nanoplankton zones NP 1—20 of the Paleocene to the Upper Eocene were defined in the Nesvačilka canyon (B. Hamršmíd, in the press). However, their correlation pose many problems in the boreholes. That is why we can adjust the original biostratigraphy of forams to the Paleogene stages in the following table:

Age	Zones	Horizons
Upper Eocene	Bolivina aenariensis-Bolivina fastigia	Uvigerina costellata Uvigerina jacksonensis Uvigerina (cut-off shells) Globigerapsis index
Middle Eocene	Uvigerina hantkeni	Bulimina rugirefa Discocyclina-Nummulites
Lower Eocene	Bulimina parisiensis-Bulimina rugifera	four fluctuation of both Bulimina species
Upper Paleocene	Bolivinopsis spectabilis	Bulimina parisiensis-rugifera Höglundina — Gyroidina Bulimina rugifera — Clavulina—Plectina Trochammina pacifica

The correlation of the Vranovice and Ždánice (Uhřice boreholes) Paleogene is easy to be made, but it is problematic with respect to the centre of the Nesvačilka canyon.

The Upper Paleocene of M. Holzknecht — J. Krhovský (1988) can we correlated with the biozone of Bolivinopsis spectabilis of R. Jiříček (1986). In the centre of the Nesvačilka canyon, it comprises the Těšany clastic formation, up to 500 m thick, grading into Lower Nesvačilka claystones. The basal levels of the Trochammina pacifica horizon are typical of zone A in the electric-log division. The middle levels comprise a horizon with Plectina apicularis-Bulimina rugifera of zone B-C. The upper levels represent a horizon with Gyroidina girardana-Höglundina elegans-Serpula spec. of zone D. Zone E with Bolivinopsis spectabilis and Bulimina rugifera-Bul. parisiensis represents the Upper Nesvačilka claystones. A pelitic facies was identified within zones D-E on the Nikolčice ridge. In the Vranovice canyon the Paleocene begins with Bolivinopsis spectabilis too. Its occurence with Uvigerina hantkeni characterizes more likely the connection with the Middle Eocene.

The Lower Eocene (M. Holzknecht — J. Krhovský, 1988) begins with the Bulimina parisiensis-Bulimina rugifera zone of the Upper Nesvačilka Claystones (R. Jiříček, 1986). This pelitic section of zones F-H extends to the terminal parts of the Paleogene in the Nesvačilka boreholes. The species B. parisiensis Kaaschietter (= Bul. trigonalis Ten Dam) and B.rugifera Flaessner (= Bul. „jarvisi" Nuttal) alternate in four fluctuation horizons there. The highest brown marls of zone H may belong to the Middle Eocene. When correlating this Lower Eocene from the centre of the Nesvačilka canyon, to the Ždánice slope, the whole Bulimina section within zones F-G was found to be absent near Uhřice. The brown marls of zone H rest discordantly on the pelites of zone E (R. Jiříček, 1981), or the Bulimina zone facially alternates with the Bolivina one and the higher parts of the Uhřice or Vranovice Paleogene correspond to zone F only (R. Jiříček, 1986). The first supposition appears to be probable if considering the seismic data.

The Middle Eocene is developed on the Ždánice slope of the Nesvačilka canyon. The basal sandstones and limestones with Discocyclina and Nummulites or Lithothamnium (Uhřice-1)are typical (L. Švábenická, 1980). The upper pelites have no typical rare fauna with Bolivinopsis spectabilis and Bulimina rugifera. In the Vranovice canyon this fauna related to the Uvigerina hantkeni zone.

The Upper Eocene is developed on the Ždánice slope and in the Vranovice canyon with the Bolivina aenariensis-Bolivina fastigia zone. They are the very typical Uvigerina spec. cut-off shells on a discordant base. Two horizons with Globigerapis index there occur there. The middle part is characterized by Uvigerina aff. jacksonensis and the top of the Upper Eocene by an Uvigerina costellata horizon. The Lower Oligocene with psychrosphaeric ostracods have been found in the parautochthonous Pouzdřany Unit, only.

3. The genesis of the canyons in the autochthonous Paleogene has been explained in a variety of ways by many authors. A. Dudek (1980) related the Nesvačilka section to the tectonic parting of the crystalline basement into a „southern" and „central" section. This type of tectonics was interpreted by J. Dvořák (1987) as a boundary responsible for the diversified evolution of the Paleozoic. R. Jiříček (1982), however, classified the faults as Jurassic and resulting from the remote rifting of the Tethys. V. Homola et al. (1961) and F. Němec (1973) considered the Nesvačilka and Vranovice grabens to be bounded by Paleogene tectonic faults. According to M. Dlabač — E. Menčík (1964), erosive action showed up in addition to faulting tectonics during the Paleogene. F. Pícha (1978) related Paleogene and Mesozoic development to the aulacogene that predisposed the formation of submarine canyos moddeled by turbidity currents. F. Čech (1984) talks about pseudoaulacogens of the grabens. F. Chmelík et. al. (1981) means that the existence of submarine canyons on the margin of Tethys is douptful. R. Jiříček (1981) demonstrates, the canyons originate initial on the continent.

Actually quite different structural levels from various periods are involved. Their elevations and depressions cannot be combined into a single geological structure. The oldest of them is the **Měnín depressed area** with the centre of the 1,500 m thick Old Red clastics in Měnín-1 borehole. From Nikolčice-4 borehole Southwards the pseudothickness of its clastics is reduced from 676 m to 34 m in Nikolčice-3 borehole. Similar is the case northeastwards, in Těšany-1 borehole, where 150 m thick clastics are present that reduce their thickness to a minimum at Uhřice. They completely disappear in Kobeřice-1 a 4 boreholes (J. Brzobohatý, 1986), and Devonian carbonate rocks occur on the uplifted slope. The axis of the depression runs roughly westwards to the deep basin below the thrusted Moravian Moldanubic complex that separates the high elevations of the Dyje and Svratka domes (Moravikum). This relief is a pre-Devonian one, possibly generated during the Caledonian folding.

In the course of Hercynian folding new structures were formed, e.g. the overthrust of the Moldanubic complex over the Moravic one, and its thrusting over the superficial nappes of Paleozoic sediments overlying the disturbed Brno massif. Primary early molasse, possibly belonging to the Myslejovice sequence with Račice and Luleč conglomerates of Upper Visean to basal Namurian rocks, was formed ahaed of the fronts of the nappes (J. Dvořák, 1978). The last **Namurian A molasse** only terminated geosynclinal sedimentation in the region under study. Its beds, up to 1,000 m thick, extend from the Němčičky boreholes in the depression zone probably towards Příbor and Ostrava and, thus, they have nothing in common with the S-N elongated structure of the Nesvačilka area.

The Epihercynian platform, disturbed by rift tectonics during the formation of the Boskovice furrow in Permo — Carboniferous time, was generated after Hercynian folding. A second stage of faulting tectonics occured in Lias and Middle Dogger, when the margins of the Bohemian Massif were broken into blocks as a result of remote Tethyan rifting. The Lednice fault-zone appeared at that time and should be rotated to a NE-SW direction across Lednice to Hollabrunn (R. Jiříček, 1982). Up to 2,000 m of the Gresten Formation were deposited on the **sunken Waschberg block** (F. Brix et.al., 1977). Upper Jurassic (Kelloway — Tithon) sediments transgressed over this tectonics structure on the crystalline of the **Lifted South Moravian block.** The tectonically bounded Nesvačilka graben was formed there in perpendicular NW-SE direction. The whole horst between the Nikolčice fault and that of the Boskovice furrow became a source area from which Paleozoic sediments almost disappeared. The rest of the Devonian sediments, together with the crystalline, were unconformably covered with Jurassic beds. On the lifted Nikolčice block, basal Devonian layers wedge out towards the SW, whereas, on the sunken Nesvačilka block, Old Red to Namurian A have been preserved with sediments wedging out northeasterly below Jurassic and Paleogene layers.

A Jurassic unconformity in the early Kelloway covered the tectonic blocks and generated an **unfaulted depressed area** from the faulted Nesvačilka graben, and a **fault-free** slope facing the Waschberg depression from the Lednice fault-zone. Both depressed areas lasted from the Kelloway to the Lower Cretaceous, with marine Albian sediments at Nové Mlýny-2 (J. Řehánek, 1984) and at Kuřim locality north of Brno (I. Krystek — O. Samuel, 1979). A repeated transgression changed the Blansko trough into a channel connecting the Clement and the Bohemian Cretaceous from Upper Cenomanian to Senioan time. Relics of the Clement Cretaceous have been preserved on the Jurassic sediments in the large area from Mikulov to Vienna. They obliquely crop out to the basin of Neogene levels in a belt crossing Ameis-1 with Coniacian-Santonian and in a belt crossing Poysdorf-2 with Campanian-Maastrichtian sediments (R. Fuchs et. al., 1984).

The whole Mesozoic area of sedimentation seems to have been bordered by the upliftied slopes of the Moldanubic and Moravic zones on the southwestern side. The marine sediments of the Bohemian and Moravian Cretaceous ended on the Moldanubic slope, with the denudation rests on the Svratka-Polička crystalline. The Blansko Cretaceous, Kuřim Albian and Olomučany Jurassic ended near the Svratka Moravicum. The Clement Cretaceous and Jurassic, perpendiculary passing below the Vienna basin to the town Baden, had their end on the Dyje and Tulln Moravicum, before the Moldanubic slope (Berndorf-1 borehole). The Silesian nappe with Štramberk-type Tithonian limestones has its origin on a Helvetic slope (on a gravimetric low?).

Towards the end of the Cretaceous, the Bohemian Massif rapidly began to emerge, which resulted in an enormous lowering of the erosin level of the rivers at its margin. In the early Paleocene, this event led to the formation of deep **erosion canyons** following an intensive drainage pattern oriented from the Bohemian Massif to the South Moravian and partly also in the Lower Austrian regions. The Blansko channel became a river valley for the main stream following SSW into the Boskovice furrow. Near Kuřim a secondary channel branched-off that crossed Brno to incise the Nesvačilka depression as an erosion canyon cut to a depth of 1,500 m in its Mesozoic and Paleozoic rocks. Another channel branched-off from the Boskovice furrow at Moravský Krumlov crossing the SE slopes towards Hustopeče to form there deep erosion walls of the Vranovice canyon incised into Jurassic carbonate and crystalline rocks. The two erosion canyons were separated by the narrow and high Nikolčice ridge. On the southern and southeastern sides, the canyons were disturbed by secondary erosion trenches of the Hustopeče, Rašovice and Žarošice channels. The incission of the erosion canyons was accompanied by the disintegration of the Jurassic platform which can be compared to the geomorphological relief of present „Bohemian-Saxon Switzerland". The Tulln erosion channel generated (perhaps from Třeboň syncline) in the Moosbierbaum drilling district at the today's Danube in the Krems-Tulln area (Fig.1).

The Nesvačilka canyon extended southeasterly below the present Carpathian flysh and Neogene of the Vienna basin probably as far as the Little Carpathians. It submerged to the present depth of about 8—10 km between the Týnec and Skalica elevations. The Vranovice canyon, by contrast, turned towards Břeclav and its slopes were situated roughly at Maustrenk-ÜT1 and Zistersdorf-ÜT2 boreholes.

Three evolutional stages of Paleogene canyons appear to have existed: In the **first stage,** V-shaped southeasterly erosion canyons, more than 100 km long, 10—15 km wide and 1,5 to 2 km deep, were incised. Their upper parts, 40—50 km long, are localised on the present SE flank of the Bohemian Massif below the Neogene molasse and below the nappes of the Ždánice and Pouzdřany Units. The middle parts occupy the deep basement below the Alpine orogene in the Vienna basin. On a gravimetric low or as far as the Little Carpathians, Helvetis slopes are thought to have existed, where the erosion canyons turned into submarine canyons, with turbidity erosion in the basement of the Submenilite Paleogene of the Subsilesian (Ždánice) nappes. This is evidenced by the in tense mixing of Cretaceous and Paleogene faunas.

An immense amount of clastics derived from rocks that disappeared from the two canyons should extend into flysch trough at the foot of the bathyal zone. Pebbles of Jurassic limestones and marlites, Namurian sandstones, Culm shales, greywackes, conglomerates, Devonian limestones and conglomerates, and crystalline rocks are thought to have their origin in the Nesvačilka canyon. Pebbles of Jurassic limestones and marlites, with granodiorites of the Brno massif could be derived from the Vranovice canyon.

If putting back the overthrust flysch nappes to Egerian time, i.e. beyond Berndorf-1 borehole and if considering the rotation related to the bending of the nappes around the SE extremity of the Bohemian Massif, we can suppose a W-E direction of the front of the Magura flysch (R. Jiříček, 1986). In Upper Austria and Bavaria, the Rupelian molasse too follows this direction along the SW flank of the Bohemian Massif. The Tulln, Vranovice and Nesvačilka canyons are oriented in the same way.

It is possible, therefore, that the distal cones of these canyons could be situated, as conglomerates of the Upper Soláň Member of the Paleocene, at the margins of the Račany flysch. The flysch of the Vsetín region actually comprises pebbles of Jurassic and Carboniferous rocks, Culm greywackes and shales, Devonian quartz limestones, me-

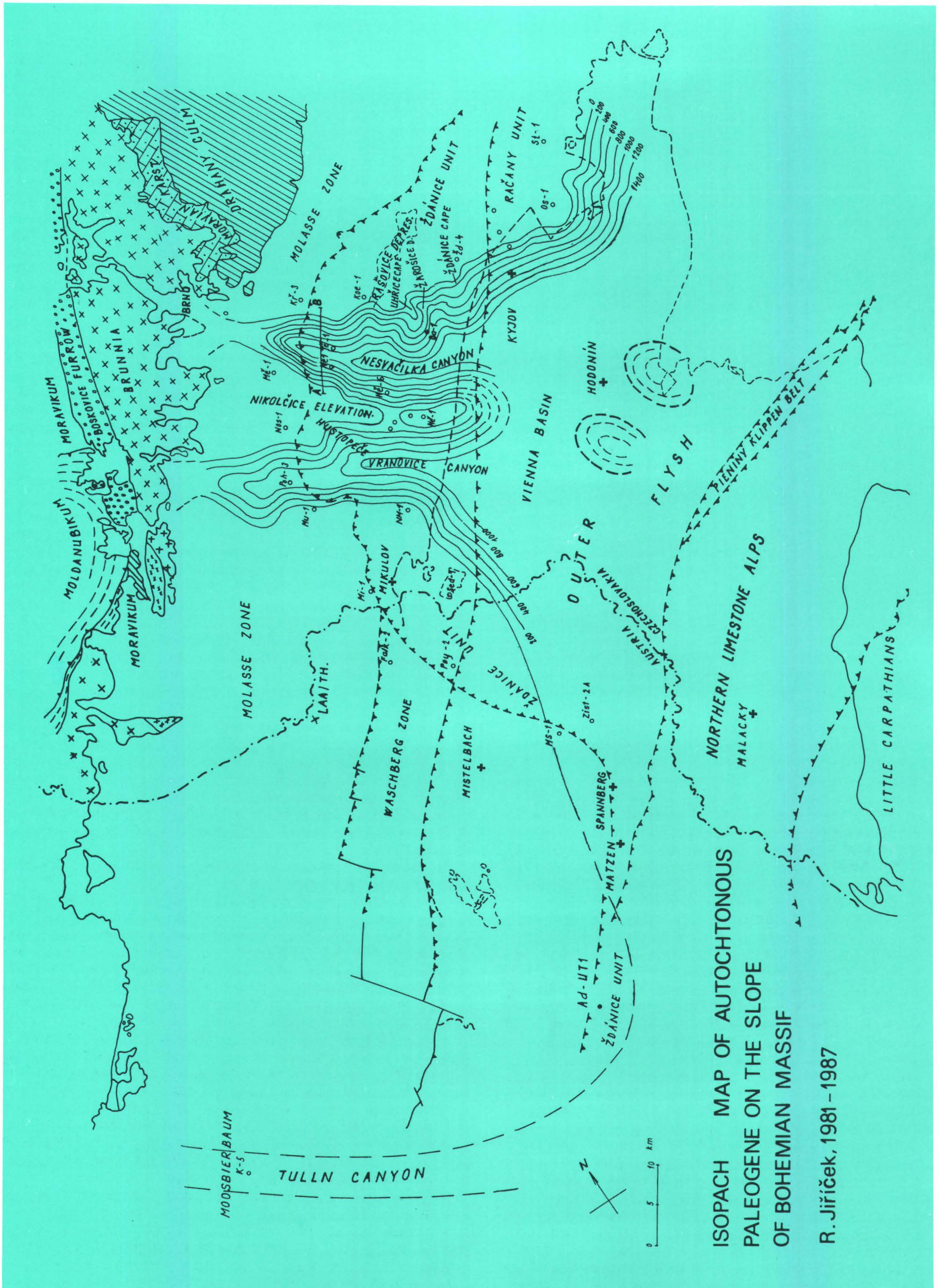
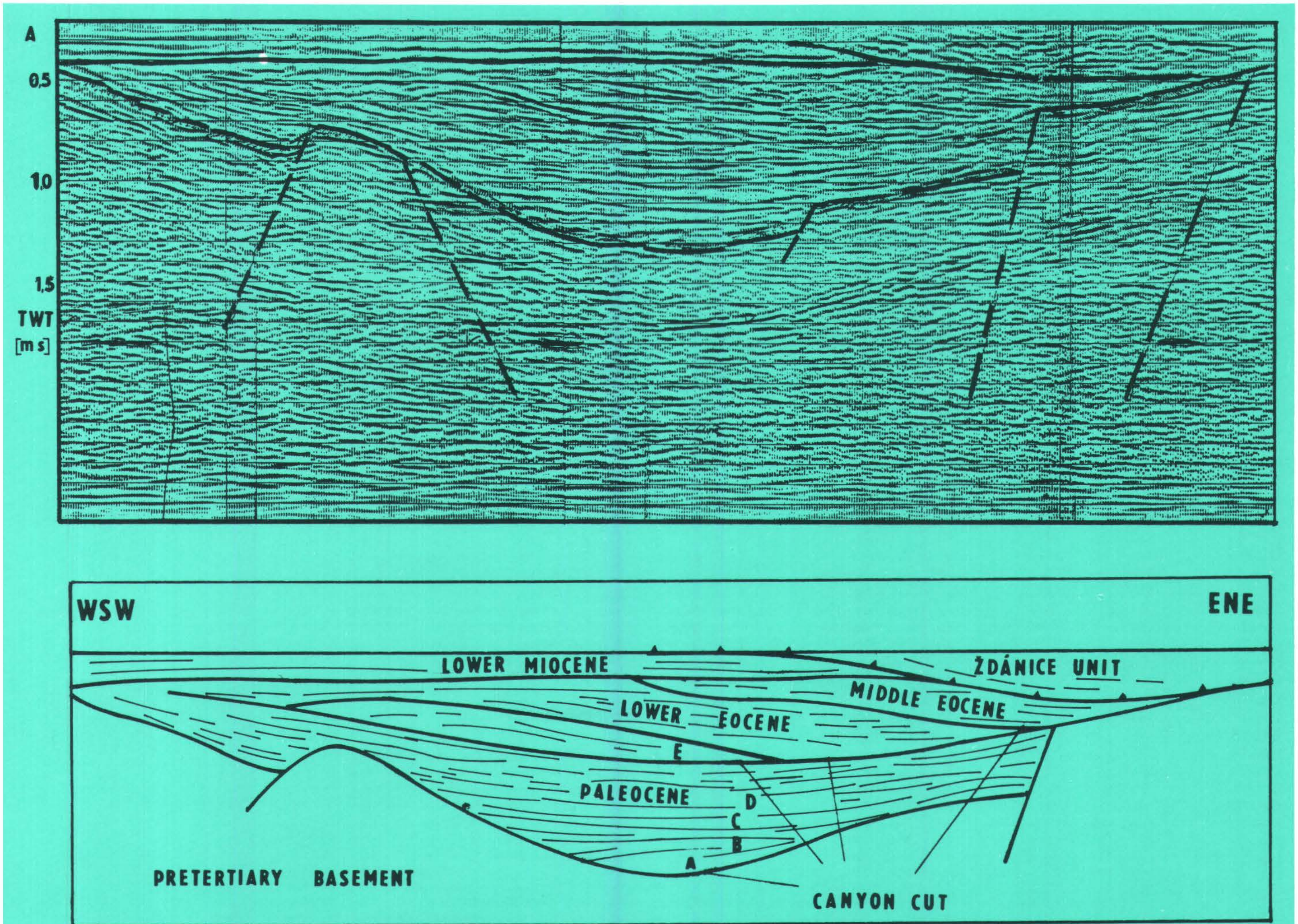

ISOPACH MAP OF AUTOCHTONOUS
PALEOGENE ON THE SLOPE
OF BOHEMIAN MASSIF
R. Jiříček, 1981-1987
MORAVIKUM
MOLDANUBIKUM
BOSKOVICE FURROW
BRUNNIA
MORAVIAN KARST
DRAHANY CULM
BRNO
MOLASSE ZONE
ŽDÁNICE UNIT
RAČANY UNIT
ŽDÁNICE CAPE
NESVAČILKA CANYON
NIKOLČICE ELEVATION
HUSTOPEČE
VRANOVICE CANYON
KYJOV
HODONÍN
VIENNA BASIN
OUTER FLYSH
PIENINY KLIPPEN BELT
MIKULOV
WASCHBERG ZONE
MISTELBACH
SPANNBERG
MATZEN
NORTHERN LIMESTONE ALPS
MALACKY
LITTLE CARPATHIANS
AUSTRIA
CZECHOSLOVAKIA
TULLN CANYON
MOOSBIERBAUM
0 5 10 km
N

Fig. 1.



SEISMIC PROFILE AND LINE-DRAWING INTERPRETATION OF PALEOGENE SEDIMENTS (ZONE A-E) TROUGH THE NESVAČILKA CANYON R. JIŘÍČEK, 1988

Fig. 2.

tamorphites and granodiorites closely resembling thouse of the Brno massif. However, the large olistolith Brno granitoids with hexagonal biotites at Bílava near Holešov demonstrates only short transport many of pebbles perhaps from the Silesian cordillera (or front of nappes) of the Helveticum.

In the second stage, the river-eroded valleys were transgressed, from the SE, by Paleogene sea that first filled the axial sections of the canyons and then spread laterally. Up to 500 m of clastic rocks were deposited in the axis of the Nesvačilka canyon. Their structures indicate the downslope transportation of debris by gravity rather than turbidity currents (turbidity currents were supposed by F. Pícha, 1978, to have excavated the submarine canyons). Bottom currents transported coarse clastic breccias and conglomerates, debris flows, grain flows, mudflows, etc. These rocks are frequently accompanied by sandstones and conglomerates with graded bedding or laminated claystones closely resembling deposits derived from turbidity currents as documented well by F. Pícha (l.c.). On no account, however, they do not represent flysh rocks with distal and proximal cones. The pebbles contain fragments of granites, diorites, gneises, greywackes, conglomerates, arkose sandstones and some Devonian and Jurassic limestones from which abundant redeposited rhaxes of Spongiae originate. All these rocks deposited from the canyon walls and higher-seated channel-ways, because the bottom of the Nesvačilka trough had already been covered with clastics. Lower pebble contents are supposed for the extension of the Vranovice canyon below the Lednice slope. The clastics of the Tulln canyon comprise metamorphites (F. Brix et. al., 1977). Silty claystones were deposited in non-active channels only. The repeated transportation of clastics alternated with calm periods during which laminated claystones were deposited.

In the third stage, the sea level extended beyond the erosion margins of the canyons, flooding the neighbourhood with a shallow shelf with abundant minor Cibicides faunas indicating algal growth. The erosion walls became slopes of **submarine canyons,** in which some mudflows, slips and paraconglomerates were generated in the Eocene. After the sea level and ceased to rise and stabilized, the Nikolčice slope prograded eastwardw moving thereby the bottom of the Nesvačilka canyon to the same direction, which caused lateral and bottom erosion and a hiatus with respect to the older Paleogene. This suggests that prograding had brought into contanct, from the W to the E, zones F/E (Nesvačilka-1 borehole), G/E (Těšany-1), H/E near Uhřice-13. A horizon with Bulimina parisiensis wedges out eastwards as a downlap on the dipping slopes. The nature of the later was recognized on seismic profile 250/86 (Fig. 2.).

A similar hiatus was also found in the Vranovice canyon (R. Jiříček, 1986). We suppose, that existe the same progradation there. A horizon with Bulimina parisiensis wedges out too as a downlap on the slopes. The layers of

DEPTH AND THICKNESS OF AUTOCHTHONOUS PALEOGENE LAYERS ON SE SLOPE OF THE BOHEMIAN MASSIF

Well	Top-off	Basis	Thickn.	Top-wall	Underground	Final Depth
Poh-1	508	890	382	Eggenb?	Crystall.	1000 m
Poh-3	692	1358	666	Eggenb?	Crystall.	1425 m
Iv-1	556	652	96	Carpath.	Jurassic	1250 m
Pou-1	986	1202	216	Eggenb.	Paleogene	1202 m
Str-1	1298	1391	93	Eggenb.	Jurassic	2600 m
Pop-1	1605	2242	637	Pozdř.	Crystall.	2450 m
Pop-2	1188	1702	514	Ždánic.	Crystall.	1805 m
Vr-1	812	1173	361	Ždánic.	Jurassic	1750 m
Nik-3	1145	1156	11	Eggenb.	Jurassic	1392 m
Nik-7	1184	1356	172	Eggenb.	Jurassic	1504 m
Nik-8	1678	1801	123	Eggenb.	Jurassic	2000 m
Něm-6	1641	2112	471	Ždánic.	Jurassic	5220 m
Necfl	367	473	106	Eggenb.	Paleogene	473 m
Ne-1	417	1571	1154	Carpath.	Devonian	1589 m
Ne-2	417	1275	858	Carpath.	Paleogene	1275 m
Ne-3	286	1385	1099	Eggenb.	Culm	2484 m
Ar H2	186	650	464	Eggenb.	Paleogene	650 m
Brn-1	245	607	362	Eggenb.	Culm	658 m
Br-41	236	304	68	Carpath.	Paleogene	304 m
Új-1	298	645	347	Carpath.	Culm	2300 m
Tě-1	849	1905	1056	Eggenb.	Culm	4500 m
Žar-1	1522	1862	340	Ždánic.	Culm	2867 m
Dam-1	2018	2710	692	Ždánic.	Namurian	4482 m
Uh-1	2208	2763	555	Ždánic.	Carbonif.	3960 m
Uh-2	1705	1992	287	Ždánic.	Carbonif.	3450 m
Uh-3	1512	1543	31	Paraut.	Jurassic	2595 m
Uh-5	1529	1644	115	Ždánic.	Devonian	2050 m
Uh-7	1369	1438	69	Ždánic.	Carbonif.	3101 m
Uh-8	1533	1840	307	Ždánic.	Carbonif.	2800 m
Uh-9	1688	1880	192	Ždánic.	Carbonif.	2800 m
Uh-10	1903	2410	507	Ždánic.	Carbonif.	2911 m
Uh-11	1317	1394	77	Paraut.	Jurassic	1711 m
Uh-13	867	1498	631	Ždánic.	Carbonif.	2700 m
Uh-14	1777	2065	288	Ždánic.	Carbonif.	2850 m
Uh-16	1640	2060	420	Ždánic.	Carbonif.	2800 m
Uh-17	1659	1908	249	Ždánic.	Jurassic	3320 m
Uh-18	1520	1812	292	Ždánic.	Jurassic	3300 m
Uh-19	1855	2183	328	Ždánic.	Jurassic	3623 m
Uh-20	1820	2188	368	Ždánic.	Jurassic	3700 m
Uh-21	1444	1865	421	Ždánic.	Carbonif.	1900 m
Uh-22	1281	1575	294	Ždánic.	Carbonif.	1800 m
Jež-2	2150	2240	90	Ždánic.	Jurassic	3000 m

The boreholes: Pohořelice, Iváň, Pouzdřeny, Strachotín, Popice, Vranovice, Nikolčice, Němčičky, Nesvačilka, Arta, Brno, Újezd, Těšany, Žarošice, Dambořice, Uhřice, Ježov.

Middle Eocene are in contact with the Upper Paleocene beds. The main progradation is again between the Middle and Upper Eocene sediments. Perhaps in the Eocene activised the small secondary channels as Hustopeče, Rašovice and Žarošice, ones. The displace of channels was accompanied by redeposition and mixing of faunas.

4. In conclusion it may be stated that the enormous decline of the sea level from the Senonian to the Paleocene seems to be related, in this region too, to a global decline emphasized by Laramide deformation of nappes in the Carpathians. The decline was followed by a rise in sea level with a consecutive transgression of Paleogene sediments into the canyons.

If relating the D/E or E/F boundary to the Paleocene/Eocene boundary in the Nesvačilka centrum, the argument would be that a global sea level decline with partial stabilisation, emphasized by Illyrian deformation in the Carpathians, could have occured. It could be associated with prograding slopes a hiatus between the Paleocene and Lower Eocene sediments in both of canyons. The same global decline of level was between the Lower and Middle Eocene and the Middle and Upper Eocene, when migrated the main channels, where the new channels activised.

Primary molasse was formed in front of the flysh nappes in the Alpine-Carpathian realm in the flysh nappes in the Alpine-Carpathian realm in the late Priabonian to Lower Oligocene. The Globigerina marls of the Submenilite Upper Eocene Formation appeared in the Helvetic zone overlain by cherts of the Lower Oligocene Menilite Formation troughout the Carpathians. The appearence of cherts could to have resulted from the shift of the carbonate-compensation-depth lysocline to shallower depths owing to global cooling. Indications of cooling can also be found in the Lower Oligocene brown Pouzdřany marls, in which V. Pokorný (1981) determined psychrospharic ostracodes. These marls pass into the Upper Eocene brown Uhřice marls from which they were separated during the overthrusting of nappes.

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Abstrakt

V autochtonním paleogénu na JV svazích Českého masivu byla vymezena 3 pásma a 8 zón. Spodní část s Bolivinopsis spectabilis lze korelovat s paleocénem, střední část s Bulimina rugifera — Bulimina parisiensis se spodním eocénem a svrchní část s Bolivina aenariensis — Uvigerina hantkeni se středním až svrchním eocénem. V autochtonním paleogénu jsou vymezeny vranovický a nesvačilský příkop. Jejich vznik byl původně spojován se zlomovou tektonikou nebo s podmořskými kaňony. Pomocí zonací bylo prokázáno, že marinní sedimenty paleogénu transgredovaly do už existujících erozívních kaňonů.

Zusammenfassung

Im autochthonen Paläogen an den SO-Hängen der Böhmischen Masse in Südmähren wurden aufgrund der Foraminiferen und E-log-Diagramme 3 Komplexe und 8 Zonen abgegrenzt. Der untere Teil mit Bolivinopsis spectabilis ist dem Paläozän, der mittlere Teil mit Bulimina rugifera — Bulimina parisiensis dem unteren Eozän und der obere Teil mit Bolivina aenariensis — Uvigerina hantkeni dem mittleren und oberen Eozän gleichzustellen. Im autochthonen Paläogen wurden der Vranovice- und der Nesvačilka-Graben abgegrenzt. Ihre Entstehung wurde ursprünglich mit der Bruchtektonik oder mit den submarinen Cañons in Zusammenhang gebracht. Mittels der Verteilung auf Zonen wurde klargelegt, daß die marinen Sedimente des Paläogens in bereits bestehende erosive Cañons transgredierten.

PALEOGEOGRAPHY OF THE NEOGENE IN THE VIENNA BASIN AND THE ADJACENT PART OF THE FOREDEEP

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Introduction

The Vienna basin is the NW-part of the Pannonian intracarpathian basinsystem and is situated in the external zone of the Alpine — Carpathian thrust belt, covering 200 km length in the NE-SW extension and 60 km in width. Separated by the Alpine — Carpathian thrust sheets of the Waschberg — Ždanice zone the Molasse foredeep extends parallel to the Vienna Basin along the SE-flank of the Bohemian Massif with a width of 8 km near Brno up to 30 km in the Austrian part (see fig. 1 below).

Several geologists dealt with the paleogeography of the Neogene sediments of the Vienna Basin and the adjacent Alpine-Carpathian foredeep. In the Austrian part of the Molasse zone, paleogeography was provided by Braumüller (1961), Grill (1953, 1961), and Brix (1977), in the Vienna Basin by Krobot (1977) and Turnovsky (1976). In the Czechoslovakian part, paleogeography of the Molassezone was investigated by Buday (1965) and Jiříček (1983), of Ždanice unit by Špička (1971) and Chmelík (1981) and in the Vienna Basin by Buday (1960), Špička (1967) and Jiříček (1977—1983). The last two authors studied the paleogeography during the construction of the formation thickness maps. Jiříček (1978, 1986) worked on the Neogene paleogeography in the whole Vienna basin and its surroundings in the Lower Austrian to South Moravian areas in the classical and in the palinspastic view as well.

The existing paleogeographic and isopach maps, which were worked out before 1975, can no longer be used. Because of the introduction of the neostratotypes in the Central Paratethys (1968), the range of the stratigraphic units changed and was again modified later on in the different basins.

It was clearly incorrect to assume, as some geologists did, that it would be enough to define the new stages by a convergence chart in which the former Chattian and Aquitanian were compared with today's Egerian, the former Lower Burdigalian with the Eggenburgian, the Upper Burdigalian and Helvetian (Lower Helvetian) with the Ottnangian, the Upper Helvetian with the Karpatian, the Tortonian with the Badenian and the Sarmatian, Pannonian and Pontian with the same stages nowadays (Cicha et al., 1971).

With the modification of the neostratotypes their range, revised in hundreds of wells in some basins, was also changed (see fig. 2). The thickness maps of the Neogene in the Czechoslovakian part of the basin (Špička 1967) included in the former Lower Burdigalian not only Eggenburgian sediments of Hodonín-Lužice in the wells, but also the Ottnangian of Tynec-Gbely and the Karpatian of Malacky Lab.

The coloured Kúty beds with 400—1 000 m thickness were also placed in the Lower Badenian, although they actually belong to the Upper Karpatian. Because there existed no division of Badenian in an upper, middle and lower part like nowadays, the boundary was placed between the Lanzendorf and the Devin series in the midst of the middle Badenian. Sometimes the boundary Badenian-Sarmatian is situated 500 m deeper than the former boundary between Tortonian and Sarmatian. As now has been proved, the coloured series between them belongs to the Sarmatian and not to the Badenian. The coal series of Zone F, which was classified into the upper Pannonian, was included in the Pontian. The coloured series on its top, which used to be compared with the Pontian or Dacian earlier, belongs to the