REGIONAL GEOLOGICAL SUBDIVISION OF THE BOHEMIAN MASSIF ON THE TERRITORY OF THE CZECH REPUBLIC

Report of the Working Group for Regional Geological Classification of the Bohemian Massif at the former Czechoslovak Stratigraphic Commission

(6 text-figs.)

The progressing knowledge of geological history and structure of the Bohemian Massif on the territory of the Czech Republic results in increasing need of objective classification and terminology of geological units.Although a scheme of subdivisions and terminological principles was published in 1976, new data and views made a revision necessary.

The former Czechoslovak Stratigraphic Commission initiated in 1991 the establishment of a working group which evaluated written comments of about 30 workers in regional geology of Bohemian Massif and prepared a new revised version of regional tectonostratigraphic subdivisions. This was later subject to discussions at several meetings and scientific seminars.

The Working Group, composed of S. Čech, I. Chlupáč, A. Dudek, M. Eliáš, V. Holub, J. Pešek, Z. Pouba, O. Shrbený, J. Tyráček, J. Valečka, Z. Vejnar and J. Zapletal, submitted the final proposal in the second half of 1992, and after the expert evaluation made by J. Dvořák, J. Petránek and V. Zoubek, the Stratigraphic Commission approved the new scheme (June 17th, 1992).

The Czech version was published in the Journal of Mineralogy and Geology vol. 37, No. 4 (1992). As the defined subdivisions are of general interest for many workers dealing with the geology of the Bohemian Massif, the English version is presented.

I. Crystalline units and the pre-Variscan Paleozoic

The present state of knowledge allows the distinction of only principal tectonostratigraphic units in terms of the Variscan orogenic belt with incorporated older elements. Whilst the major subdivision of European Variscides exceed the scope of the report, two hierarchic categories, namely the regions and their parts, are defined.

The intrusive bodies are generally ranged with unit within which they occur, regardless of their age. The term pluton is applied for complex bodies of larger extension, the term massif is used for smaller intrusive masses with simpler internal composition.

1. The Moldanubian Region (Moldanubicum)

The southern part of the Bohemian Massif formed by metamorphic complexes in amphibolite to granulite facies of Precambrian and Paleozoic (?) age, penetrated by large plutonic bodies of granitoids. The area is bordered by the Kutná Hora–Svratka Region in the N, the Moravian–Silesian Region in the E, and the Central Bohemian Region in the NW. The southern continuation is covered by sediments of the Alpine Foredeep. The Moldanubicum can be subdivided on the territory of the Czech Republic into the following parts:

a) **The Moldanubicum of the Český Les Mts.:** the NW prolongation of the Moldanubicum up to the junction with the Saxothuringian region in the NW, and delimited by the Czech and Bavarian Quartz Lodes (Pfahl) in the E and SW.

b) **The Moldanubicum of Šumava and Southern Bohemia:** a part of Moldanubicum bounded by the deep-seated Central Bohemian Fault in the NW, the Bavarian Quartz Lode (Pfahl) in the SW, the Přibyslav Fault in the E, and the Rataje Zone in the N.

c) **The Strážek Moldanubicum:** the north-eastern marginal part of the Moldanubicum between the Svratka Crystalline Complex in the N, and the Třebíč Massif in the S.

d) **The Moldanubicum of Western Moravia:** the part of Moldanubicum situated southward of the Třebíč Massif and continuing into the Waldviertel area of Austria. It is bounded by the Přibyslav Fault in the W, and by the Moldanubian overthrust over the Moravicum in the E. The granitoid massifs of Třebíč, Jihlava and Rastenberg also belong to this unit.

e) **The Central Bohemian Pluton:** the complex intrusive suite which intruded along the deep-seated Central Bohemian Fault. It is situated between the towns Říčany, Klatovy and Tábor, and built by strongly differentiated plutonic rocks (from olivine gabbros to granites).
f) **The Moldanubian Pluton:** a suite of intrusive massifs in central part of the Českomoravská vrchovina Upland, in the Waldviertel area and in the Šumava and Český les Mts. The granitoid bodies attain a larger extent in their subsurface parts and beneath the cover of metamorphic mantle rocks.

2. The Kutná Hora–Svratka Region

Crystalline complex of Precambrian age in central and eastern Bohemia and in Western Moravia, bordering the Moldanubian Region in the N. It contacts the Central Bohemian Region in the N, and the Moravo–Silesian Region in the E. The main distinguishing features from the Moldanubicum are: a lower-grade metamorphism, the primary lithology of metamorphics and the absence of Variscan granitoid massifs. Three units of a lower rank may be distinguished:

a) **The Kutná Hora Unit:** the metamorphic unit bounded by the Blanice Furrow in the W and the Rataje Zone in the S; it submerges beneath the sediments of the Bohemian Cretaceous Basin in the N.
b) **The Čáslav Unit:** the metamorphic unit connected with the Kutná Hora Crystalline Complex in the NW, occurring mainly in the Čáslav Depression and in the southern part of the Železné hory Mts., partly covered with sediments of the Bohemian Cretaceous Basin.
c) **The Svratka Unit:** the metamorphic complex adjacent to the north–eastern border of the Moldanubicum between the Hlinsko Paleozoic in the NW and the Moravicum in the E. It contacts the Polička Crystalline Unit in the N.

3. The Central Bohemian Region (Bohemicum)

This region includes late Proterozoic and early Paleozoic complexes cropping out in the central, western and eastern Bohemia and in western Moravia. Metamorphism is absent or very low-grade in the central part, progressively increasing towards the periphery. The region contacts the Moldanubicum at the Bohemian Quartz Lode in the W, the Saxothuringicum at the Litoměřice Fault in the NW. The Central Bohemian Pluton and the Kutná Hora Region delimits the Bohemicum in the S and SE, the Boskovice Furrow constitutes the eastern limit. The rocks of the Central Bohemian Region continue as the basement of the Bohemian Cretaceous Basin up to the Elbe Line (Lusatian Fault and its south-eastern continuation). The structure of the region is complex and several rather separate units can be distinguished:

a) **The Barrandian:** unmetamorphosed and weakly metamorphic Proterozoic and Paleozoic sequences (Cambrian to Devonian) in the Central and Western Bohemia. Two principal tectonostratigraphic subunits may be distinguished:
The Barrandian Paleozoic – sedimentary and volcanic rocks of Cambrian, Ordovician, Silurian and Devonian age in the Barrandian. As local subunits of lower rank may be treated, for example, the Brdy Cambrian, the Skryje–Týřovice Cambrian, the Křivoklát–Rokycany Belt, the Barrandian Ordovician etc. (Comment: The terms such as the Příbram–Jince Basin and the Prague Basin are paleogeographic terms not belonging to regional or tectonostratigraphic units.)
The Proterozoic of the Barrandian constitutes the dominant part of the Barrandian between the towns Kralupy nad Vltavou and Domažlice. Smaller belts, such as Dobříš, Kralovice, Kralupy, Blovice, Klenčí and Tachov, or volcanic belts (Svojšín, Stříbro–Plasy, Davle–Jílové etc.) can be distinguished.

Comment: The Proterozoic and Paleozoic successions continue from the Barrandian eastward into the basement of the Bohemian Cretaceous Basin. Near Hradec Králové, a sequence of the transgressive Upper Devonian and Lower Carboniferous is represented. The limit with the West Sudetes Region, which also forms basement of the Bohemian Cretaceous Basin, is uncertain as yet.

b) **Metamorphic "Islets"** (roof pendants)**:** metamorphic mantle of the Central Bohemian Pluton formed by Proterozoic and Paleozoic rocks. The individual "islets", such as the Tehov, Voděrady–Zvánovice, Čerčany, Zbořený Kostelec, Netvořice–Neveklov, Křečovice, Sedlčany–Krásná Hora, Mirovice and Kasejovice "Islets", can be distinguished. The occurrence of the Paleozoic rocks

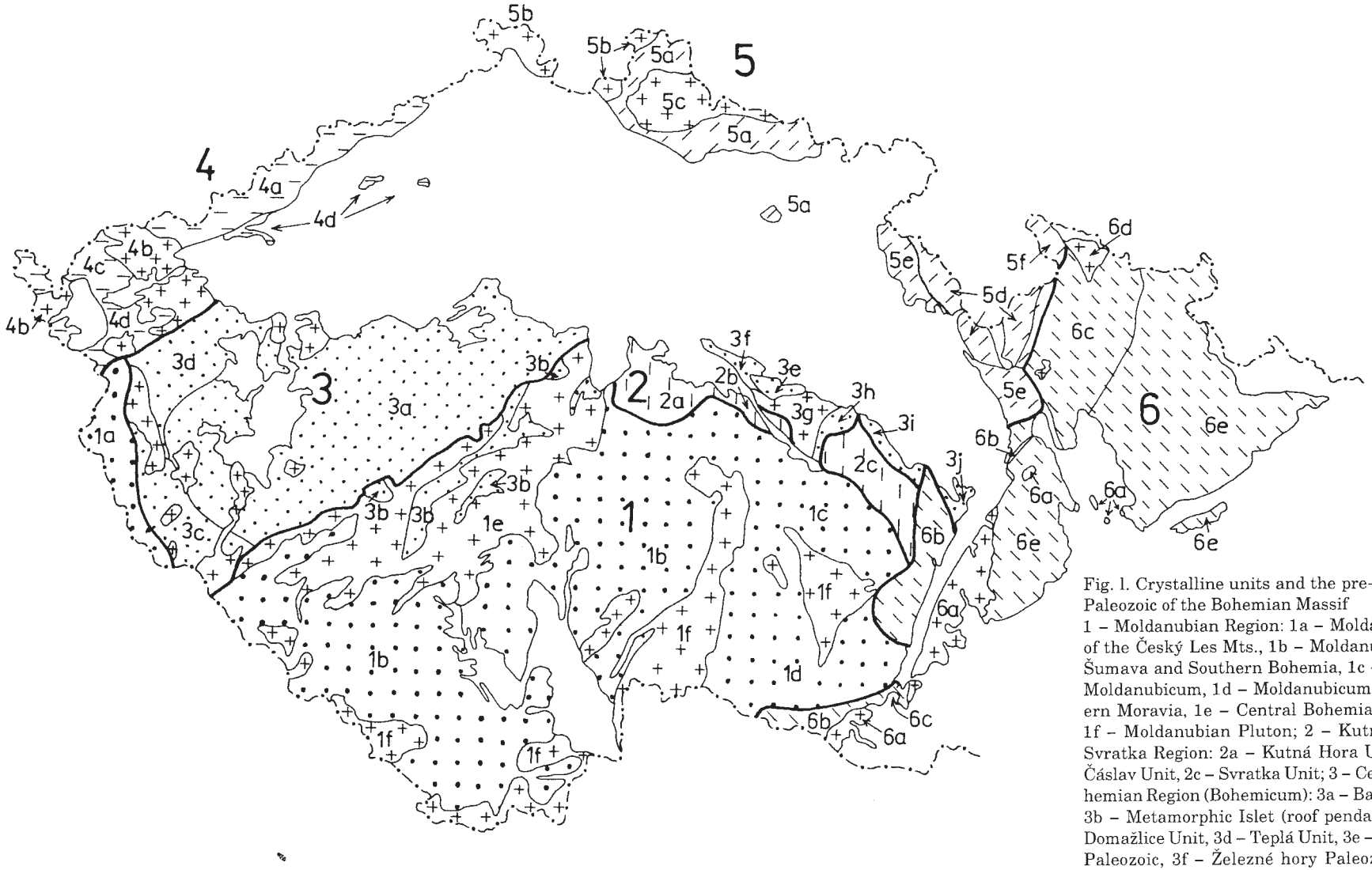

Fig. 1. Crystalline units and the pre-Variscan Paleozoic of the Bohemian Massif
1 – Moldanubian Region: 1a – Moldanubicum of the Český Les Mts., 1b – Moldanubicum of Šumava and Southern Bohemia, 1c – Strážek Moldanubicum, 1d – Moldanubicum of Western Moravia, 1e – Central Bohemian Pluton, 1f – Moldanubian Pluton; 2 – Kutná Hora–Svratka Region: 2a – Kutná Hora Unit, 2b – Čáslav Unit, 2c – Svratka Unit; 3 – Central Bohemian Region (Bohemicum): 3a – Barrandian, 3b – Metamorphic Islet (roof pendants), 3c – Domažlice Unit, 3d – Teplá Unit, 3e – Chrudim Paleozoic, 3f – Železné hory Paleozoic, 3g – Železné hory Pluton, 3h – Hlinsko Paleozoic and Proterozoic, 3i – Polička Unit, 3j – Letovice Unit; 4 – Saxothuringian Region: 4a – Krušné hory Unit, 4b – Krušné hory Pluton, 4c – Thuringian–Vogtland Paleozoic, 4d – occurrences of metamorphic rocks in the area of Tertiary basins; 5 – Lusatian (West Sudetes) Region: 5a – Krkonoše–Jizera Unit, 5b – Lusatian Pluton, 5c – Krkonoše–Jizera Massif, 5d – Orlice–Sněžník (Snieznik) Unit, 5e – Zábřeh Unit, 5f – Staré Město Unit; 6 – Moravo–Silesian Region: 6a – Brunovistulicum, 6b – Moravicum, 6c – Silesicum, 6d – Žulová Massif, 6e – Moravo–Silesian Paleozoic

near Rožmitál pod Třemšínem (the Rožmitál "Islet") is regarded by some authors as a part of the Barrandian.

c) **The Domažlice Unit:** extends from the Kdyně Massif in the S up to the town Bor u Tachova. It contacts the Moldanubicum at the Bohemian Quartz Lode in the SW and passes into the weakly metamorphosed Proterozoic of the Barrandian in the NE (the biotite isograde represents the conventional boundary). A succession of metamorphic zones from the biotite to the sillimanite zones is characteristic. Smaller massifs of mafic plutonic rocks (Kdyně and Domažlice Massifs etc.) or granitoids (Bory, Kladruby, Stod and Babylon Massifs) are minor subunits.

d) **The Teplá Unit** with the Mariánské Lázně Complex[1)] constitutes the north-western part of the region between the Bohemian Quartz Lode in the SW and platform deposits of Carboniferous, Permian and Cretaceous age in the NE. The progressive metamorphism (biotite zone to eclogite facies) towards the NW is characteristic. The area contacts in the NW the Saxothuringian Region (the Slavkovský les Mts.)

e) **The Chrudim Paleozoic:** a complex of Cambrian to Devonian rocks in the Železné hory Mts., continuing northwards into the basement of the Bohemian Cretaceous Basin (the neighbourhood of the towns of Přelouč, Heřmanův Městec and Chrudim). It constitutes the Přelouč and Vápenný Podol Synclines.

f) **The Železné hory Proterozoic:** weakly up to mesozonally metamorphosed complexes forming the Železné hory Mts. and continuing northwards into the basement of the Bohemian Cretaceous Basin. It consists of the Chvaletice Proterozoic and Podhořany Crystalline Complex.

g) **The Železné hory Pluton:** a complex of strongly differentiated intrusive rocks (gabbros to granites) occurring in the south-eastern part of the Železné hory Mts.

h) **The Hlinsko Paleozoic and Proterozoic:** a belt of low-grade metamorphic rocks of NNE-SSW strike between the Železné hory Pluton and the Svratka Antiform.

i) **The Polička Unit:** mesozonally metamorphosed Proterozoic rocks bordering the crystalline Svratka Unit in the NE. It contacts in the E the Moravo-Silesian Region being covered by sediments of the Bohemian Cretaceous Basin in the N.

j) **The Letovice Unit:** a mesozonally metamorphosed complex of Proterozoic sediments and volcanics (ophiolites[2)]) cropping out between the Svratka Dome of the Moravicum, the Boskovice Furrow, and the southern limit of the Bohemian Cretaceous Basin. The assignment to the Central Bohemia Region is discussed.

4. The Saxothuringian Region (Saxothuringicum)

On the Czech territory, this region is represented by metamorphosed Proterozoic and Paleozoic rocks and large Variscan granitoid plutons. The south-eastern contact with the Central Bohemian Region is marked by the Litoměřice Fault. The Central Saxony Overthrust delimits the region in the NE. The major part of the region is outside the Czech territory and only few units developed in the NW Bohemia are reported.

a) **The Krušné hory Unit:** medium to high-grade metamorphic rocks forming the Krušné hory and Smrčiny (Fichtelgebirge) Mts., bounded in the SE by the Krušné hory Fault.

b) **The Krušné hory Pluton:** The smaller Smrčiny (Fichtelgebirge) and the larger Nejdek-Eibenstock Massif constitute this plutonic body in the south-western part of the Krušné hory crystalline Unit. Apart of these, numerous smaller massifs (Fláje, Cínovec etc.) are present here.

c) **The Thuringian-Vogtland Paleozoic:** epizonal metamorphic complexes (Cambrian to Silurian, according to data from Germany) cropping out on the Czech territory only in a depression zone between the Smrčiny (Fichtelgebirge) and the Nejdek-Eibenstock Massif.

d) Occurrences of metamorphic rocks in the area of Tertiary Basins: Medium to high-grade metamorphic complexes mostly covered by Neoidic sediments and volcanites between the Krušné hory and the Litoměřice Faults. Examples: Dyleň Micaschists, the Ohře crystalline Complex, Slavkov unit, metamorphics of the Opárenské údolí valley.

[1)]Editors remark: The Mariánské Lázně Complex, comprising mainly amphibolites, metagabbros, eclogites, serpentinites and some metasedimentary gneisses, corresponding to a dismembered meta-ophiolite complex, is considered by some geologists as a separate unit.

[2)]Editors remark: some workers regard these rocks as of Paleozoic age.

5. The Lusatian (West Sudetes) Region (Lugicum)

This heterogeneous region contains mostly metamorphic Proterozoic and Paleozoic sequences and plutons of Cadomian and Variscan granitoids. It represents the northern border part of the Bohemian Massif from the Elbe Line in the W and SW up to the Nýznerov and Ramzová Overthrusts in the E (contact with the Silesicum of the Moravo–Silesian Region). The southern limit with the Central Bohemian Region is covered by sediments of the Bohemian Cretaceous Basin. The substantial part of the region is situated on the German and Polish territories. On the Czech territory, the following units may be distinguished:

a) **The Krkonoše–Jizera Unit:** metamorphic rocks of Proterozoic to early Carboniferous age affected by several tectonometamorphic processes. They crop out westwards of the Intrasudetic Basin.
b) **The Lusatian Pluton:** a large body of Cadomian granitoids cropping out mostly on the territory of Germany between Dresden and Görlitz. The minor part on the Czech territory extends up to the Lusatian Fault.
c) **The Krkonoše–Jizera Massif:** a rather uniform body of Variscan granitoids between the towns Liberec and Jelenia Góra. It constitutes a substantial part of the Krkonoše and Jizerské hory Mts.
d) **The Orlice–Sněžník (Snieznik) Unit:** the area SE of the Intrasudetic Basin built of metamorphic rocks with predominance of orthogneisses and micaschists of probably Precambrian age. It forms the core of the Orlice–Klodzko Antiform. It contacts the Staré Město Unit in the E.
e) **The Zábřeh Unit:** epi– to mesozonal metamorphic complexes of Proterozoic and Paleozoic age bordering the Orlice–Klodzko Antiform in the W and S, partly covered by Cretaceous sediments. The assignment to the Lusatian Region is problematic.
f) **The Staré Město Unit:** a narrow belt of medium–grade (mesozonal) metamorphics with common sills and dykes of tonalites and ultrabasic bodies. It represents the border unit at the contact between the Lusatian (West Sudetes) and the Moravo–Silesian Regions.

6. The Moravo–Silesian Region

The Moravo–Silesian Region consists of pre–Variscan metamorphic and magmatic rocks with overlying transgressive sequences of Paleozoic age. Its constituents are:

a) **The Brunovistulicum:** Pre–Devonian (Precambrian) crystalline rocks, including Cadomian plutonites and metamorphites, which form the basement of Variscan units in the Moravo–Silesian Region. Substantial parts of the Brunovistulicum are covered by Neogene deposits of the Carpathian Foredeep and flysch nappes of the Western Carpathians in Moravia. The Brno and Dyje Massif are the largest surface occurrences of the Brunovistulicum.

   Comment: Small occurrences of metamorphic rocks in the Hornomoravský úval and the Kladky Phyllite in the Drahanská vrchovina Upland probably belong to this unit. Equivalents overprinted by Variscan metamorphism and deformations are represented in central parts of the Moravicum and Silesicum Domes. The Deblín Group and the Svratka Granite in the Svratka Dome, mylonitized granitoids of the Svinov–Vranov Belt and of the Nectava Crystalline may be ranged here too.

b) **The Moravicum:** dominant mesozonal metamorphic rocks with the body of the Bíteš Orthogneiss bordering the eastern margin of the Moldanubicum and thrusted over the Brunovistulicum. The Moravicum crops out in large Dyje and Svratka Domes, its equivalents are believed to be incorporated into the Svinov–Vranov Belt and Nectava Crystalline (except mylonitized granitoids belonging to the Brunovistulicum).
c) **The Silesicum:** a suite of metamorphic complexes which includes the Paleozoic rocks affected by Variscan metamorphism, the overprinted Brunovistulicum and overthrusted Proterozoic and metamorphosed Paleozoic units. The Nýznerov and Ramzová Thrusts constitute the western limit, the Bušín Fault the southern one. The metamorphic Vrbno Group (Devonian) comprises the easternmost constituent. The mafic Massifs of Jeseník and Sobotín and the Šumperk granodiorite Massif also belong to the Silesicum.
d) **The Žulová Massif:** a rather small Variscan granitoid massif in the northern part of the Silesicum. It submerges beneath the Miocene and Quaternary sediments in the N.
e) **The Moravo–Silesian Paleozoic:** sequences of low–grade or non–metamorphic sedimentary and volcanic rocks of Paleozoic age (Silurian, Devonian, Lower Carboniferous) overlying the

Brunovistulicum. The following smaller units or surface occurrences can be particularly included: the Moravian Karst, the Němčice Belt, the Konice–Mladeč Belt, the Šternberk–Horní Benešov Belt, occurrences in the Hornomoravský úval (the Čelechovice Devonian as an example), in the Drahanská vrchovina Upland (Stínava, Ptení), at the eastern border of the Boskovice Furrow and in the neighbourhood of the town Znojmo. The principal areas with dominant Lower Carboniferous sediments comprise the Drahany Culm, the Jeseník Culm, the Mírov "Culm", and the Maleník Horst, smaller occurrences crop out in the central and southern Moravia.
The Devonian and Lower Carboniferous sequences are widely distributed in the basement of the Neogene Carpathian Foredeep and of the flysch nappes of Western Carpathians.

Comment: The locality of anchimetamorphic Silurian at Stínava in the Drahany Upland is not regarded as a separate tectonostratigraphic unit, as its relations to underlying and overlying sequences are not clear and its local extent is very small. The paleogeographic significance of this occurrence, however, is noteworthy.

Compiled by A. Dudek and I. Chlupáč
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II.The Late Carboniferous and Permian

1.The Late Carboniferous of Moravia and Silesia

It includes Upper Carboniferous paralic and continental deposits in Moravia and Silesia

a) **The Upper Silesian Basin** on the territory of the Czech Republic: the whole basin is situated in the area between the towns of Ostrava, Cracow and Góry Tarnowskie. The Czech part is defined in the W by a line of the outcropping Štúr's Marine Band, by the state border in the N and E. The southern and SE margins are burried under nappes of the West Carpathians (the Beskydy Mts.). The Czech part of the basin is filled with Namurian and Westphalian A coal-bearing sediments. These are mostly overlain by Tertiary (Carpathian foredeep) and Quaternary cover. The southern part is covered by Cretaceous and Tertiary units of the Beskydy nappes. It is divided by the Kopřivnice–Třinec–Příbor elevation in two parts– the Ostrava–Karviná part and the sub–Beskydy part. The Ostrava–Karviná and Příbor–Těšín coal districts are confined to the Ostrava–Karviná part of the basin.
Improper synonyms:Czech part of the Upper Silesian Basin, the Ostrava–Karviná Basin.

b) **The Němčičky Basin**: It represents occurrences of the Late Carboniferous (Namurian) in central and southern Moravia which were found, for instance near Němčičky and Popice where seams of bituminous coal were identified in the upper part of the Ostrava Formation. The basin is buried under deposits of the Carpathian foredeep. These occurrences are likely to represent remnants of Carboniferous sediments extending southward from the Upper Silesian Basin.
Improper synonyms: the Ždánice basin, the Kyjov basin, South Moravian bituminous coal basin.

2.Sudetic (Lugicum) Late Paleozoic

It includes Carboniferous and Permian deposits of north–eastern, northern and eastern Bohemia, lying on the crystalline basement of the West Sudetes. In the N, these sediments stretch out as far as to the Sudetes marginal fault, in the E to the Ramzová Overthrust and Moravian line, in SE they border the Boskovice Furrow along the Malonín elevation. In the W, this formation extends to the Maršov–Bezděz elevation and to its continuation to SE. The western border is built of the Krušné hory crystalline complexes. Stratigraphic sequence consists of sediments and volcanic rocks of the Lower Carboniferous through the Upper Carboniferous up to the latest Permian whose megacycle ends as late as in the Triassic.

a) **The Intra–Sudetic Basin** (Czech part): it is located between the Krkonoše–Jizerské hory crystalline complex in NW, Soví hory Mts in Poland in NE and Orlické hory Mts in SE. The Hronov–Poříčí fault forms its SW border. The basin is filled with Lower and Upper Carboniferous, Permian and Triassic deposits. The major part of the basin consists of sediments starting with the Namurian up to the Late Permian. This basin exhibits the most complete sequence of strata among all Permocarboniferous basins of the Bohemian Massif. The roof is composed of Creta–

ceous sediments of the Police Basin. The basin comprises coal mining districts of Žacléř, Svatoňovice and Hronov (Žďárky).
Improper synonyms: the Inner Sudetic depression, the Lower Silesian Basin, the Lower Silesian–Czech basin; partial synonym – the Žacléř–Svatoňovice Basin.

b) **The Krkonoše Piedmont Basin**: it is located at the foot of the Krkonoše–Jizerské hory crystalline complex. Its eastern border is formed by the Hronov–Poříčí fault, the western border by the Lusatian fault and the Rovensko dislocation. The southern border runs between southern vicinity of Hořice towards Jaroměř and Náchod. The basin is filled with continental deposits of the Late Carboniferous (from Westphalian C upwards), Permian and Triassic. The Trutnov–Náchod Depression represents a part of this basin.
The basin is filled with post–Saalian sediments. The Krkonoše Piedmont Basin is accompanied by a cluster of denudation occurrences on the Hořice elevation and at Zvíčina.
Improper synonyms: Permian at the foot of the Krkonoše Mts, The Krkonoše piedmont synclinorium, the Hronov–Poříčí graben or the Trutnov–Náchod Depression, the Zbečník graben, the Rtyně basin shaped valley, etc.

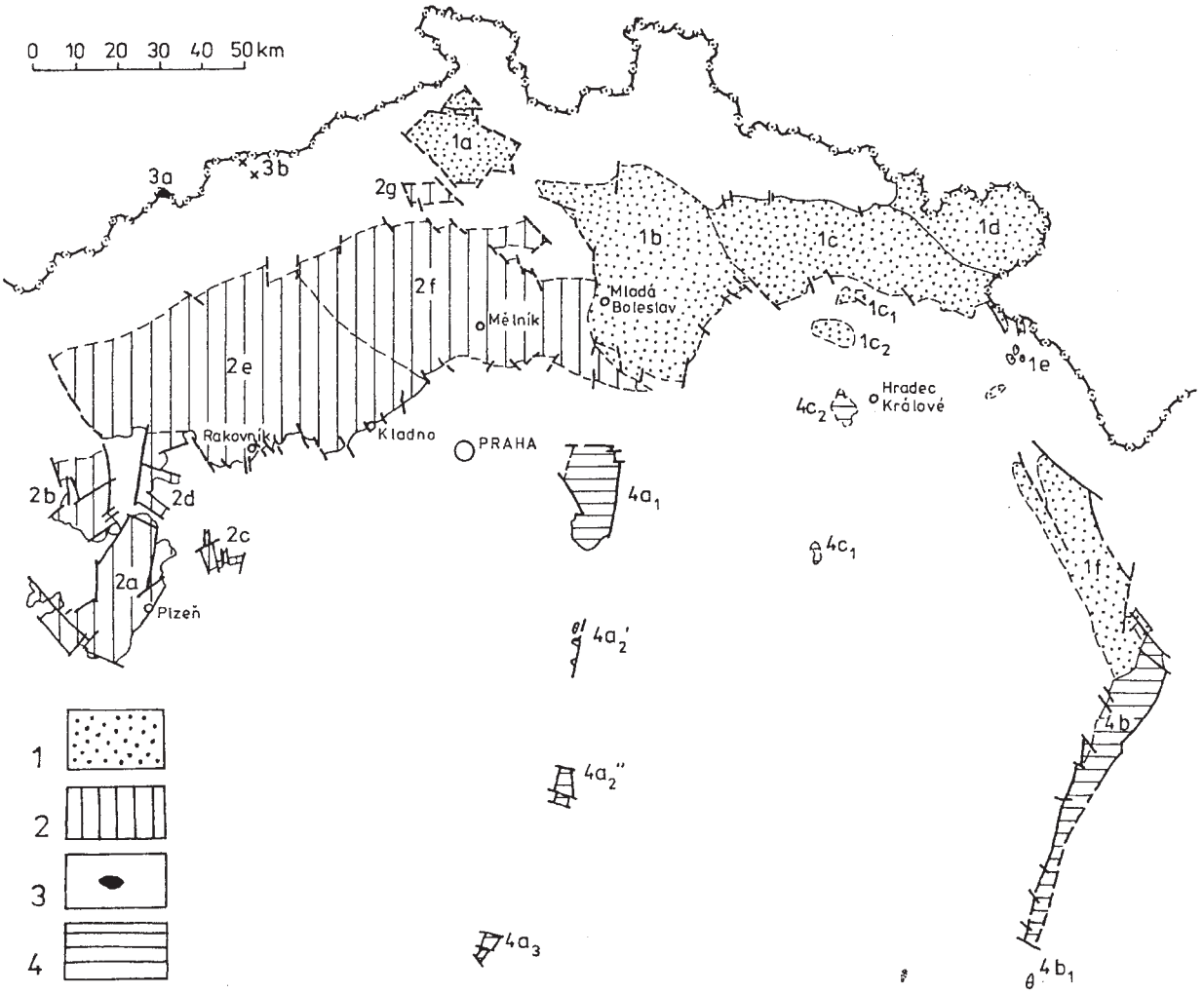

Fig. 2. Continental Late Carboniferous and Permian of the Bohemian Massif
1 – Sudetic Late Palaeozoic: 1a – Česká Kamenice Basin, 1b – Mnichovo Hradiště Basin, 1c – Krkonoše Piedmont Basin (with an occurrence near Zvičina – $1c_1$ and at the Hořice elevation – $1c_2$), 1d – Intra–Sudetic Basin (Czech part), 1e – Permian occurrences in the Orlické hory Mts, 1f – Orlice Basin; 2 – Late Palaeozoic of Central and Western Bohemia: 2a – Plzeň Basin, 2b – Manětín Basin, 2c – Radnice Basin, 2d – Žihle Basin, 2e – Kladno–Rakovník Basin, 2f – Mšeno–Roudnice Basin, 2g – local occurrence near Kravaře; 3 – Late Palaeozoic of the Krušné hory Mts: occurrences near Brandov (3a) and between Moldava and Teplice (3b); 4 – Late Palaeozoic of furrows: 4a – Blanice Furrow – $4a_1$ northern section (Český Brod region), $4a_2$ – central section, $4a_2$ occurrences in the Vlašim region, $4a_2$ occurrences near Tábor, $4a_3$ – southern section (near České Budějovice), 4b – Boskovice Furrow ($4b_1$ –occurrence near Miroslav), 4c – Jihlava Furrow ($4c_1$ occurrence in the Železné hory Mts, $4c_2$ – occurrence near Hradec Králové)

c) **The Mnichovo Hradiště Basin**: It is located west of the Krkonoše Piedmont Basin and east of the Mšeno–Roudnice Basin. The sedimentation started in the Westphalian D and was terminated in the upper Autunian. Its filling consists mostly of volcanic rocks and is mostly burried under Cretaceous sediments. Its western boundary forms also the boundary between the Sudetes and Central Bohemian Paleozoic; the northern boundary is built of the Heřmánky granitoid massif; towards SE it runs over the Maršovice–Bezděz elevation as far away as to the river Jizera, north of Mladá Boleslav. Further south it extends to the western margin of the Luštěnice elevation. Its southern limit is defined by the course of the Luštěnice elevation and its extension to SE. In the E, the boundary follows the Lusatian fault and the Rovensko dislocation. The north–western boundary lies between the towns Česká Lípa and Liberec. Surface occurrences are outcropping along the Lusatian fault north of Turnov.

d) **The Česká Kamenice Basin**: It is located between the Mnichovo Hradiště Basin in ESE and the crystaline complex of the Krušné Hory Mts in NW, between Děčín, Cvikov, Zákupy, Úštěk and SE vicinity of Ústí nad Labem. The basin is filled with sediments of the Stephanian C and Autunian.Partial units are represented by the Žandov and the Srbsko–Kamenice depressions which were incorrectly classified as separate basins.

e) **The Orlice Basin**: Its name comes from the river Orlice. The basin includes Permian sediments of not exactly established age (perhaps the Autunian and Saxonian). It is located between the Trutnov–Náchod depression and Permian occurrences in the Orlické hory Mts in NW, and the Boskovice Furrow in the S which borders it along the Malonín elevation. The basin lies in the foothills of the Orlické hory Mts, NW of the Drahanská vrchovina Plateau. Northern limits are formed by an erosion line Žamberk–Potštejn. In the W, the border runs from Potštejn to the northern vicinity of Letovice. In the S, it extends from here to Jevíčko. The ENE border is of tectonic nature and extends from Žamberk to Moravská Třebová.
Improper synonyms: The Poorlice furrow, the Podorlice furrow, the Orlice graben,the Podorlice graben, the Poorlice graben.

f) **Permian occurrences in the Orlické hory Mts**: they represent denudation remnants which are likely to be of Saxonian age. They seem to indicate original linkage of the Orlice basin and the Trutnov–Náchod depression. They are located in the eastern vicinity of Náchod and NE of Dobruška.

3. The Late Paleozoic of the Krušné hory Mts

Small occurrences of the Carboniferous – Westphalian A–C and the Permian located in the Czech part of the Krušné hory Mts. They have genetic relationship with both the Central Bohemian Late Paleozoic and the occurrences in the German side of the mountains.

The occurrence near Brandov, near the boundary with Germany north of Chomutov, is linked with an occurrence near Olbernhau on the German side.

Improper synonym: the Brandov basin.

Small occurrences between Moldava and Teplice (particularly Mikulov in Bohemia) crop out at several localities but they are mostly known from boreholes. These are Carboniferous occurrences whose coal–bearing sequence is associated with volcanic rocks and volcaniclastics of the earliest eruption phases of the Teplice rhyolite.

4. The Late Paleozoic of central and west Bohemia

It includes deposits of the Westphalian B,C,D, Stephanian and Autunian. The dividing line with the Sudetic Late Paleozoic basins is formed by the Heřmánky granitoid massif in the north and the Maršovice–Bezděz elevation in NE. The eastern boundary is described in paragraph dealing with the Sudetic Late Paleozoic.In the south, the central Bohemian Late Paleozoic is separated from the Permo–Carboniferous of the Blanice Furrow by an elevation between Stará Boleslav and Nymburk which is burried under Cretaceous sediments.

The filling of the Central Bohemian Late Paleozoic is distributed in several basins. The names of basins are of historical origin and have nothing to do with geological structure.

The basins are rimmed by small occurrences in the south and west. These small occurrences were earlier improperly called basins.

a) **The Plzeň Basin**: it is characterized by sediments from the Westphalian B up to Stephanian C. It is situated between the townships of Plasy–Heřmanova Huť and Dobřany. It includes the

coal mining districts of Zbůch and Nýřany.

b) **The Manětín Basin**: it is filled with reduced sequence consisting of the Westphalian D and Stephanian. It is located between townships of Močidlec–Komárov–Čbán and Lité.

c) **The Radnice Basin**: it is filled only with deposits of the Westphalian B to D. The basin is built of a series of sunken blocks in the vicinity of Radnice. The basin includes coal mining districts of Břasy, Vejvanov and Svatý Kříž which some authors used to call basins.
The significance of the Radnice Basin is derived from the fact that geological and stratigraphic investigations of the west Bohemian Carboniferous started there in the first half of the 19th century.

d) **The Žihle Basin**: it is filled with deposits of the Westphalian B and C and Stephanian. It contains sediments located between the villages Malměřice–Petrohrad–PLasy. The northern border of the basin runs from NE margin of the Tis massif towards NW bulge of the Čistá massif.
Improper synonyms: The Žihle depression and/or basin shaped valley.

e) **The Kladno–Rakovník Basin**: the filling consists of deposits of the Westphalian, Stephanian and Permian. Basin sediments cover an area between Protivec near Žlutice – Kralupy nad Vltavou – Čížkovice and Rokle near Kadaň. The eastern boundary of the basin runs from Kralupy and Vltavou along the Vltava river to the north as far as to Nová Ves and then towards NW through Přestavlky, Vrbičany and Čížkovice. The central and N part of the basin is mostly burried under Cretaceous and locally Tertiary sediments and volcanics. The basin is divided in two parts – the western Rakovník part, and the eastern Kladno part. The boundary between both parts is the Bílichov elevation and its extention to NWN. The boundary runs through the townships of Ruda near Nové Strašecí, Louny a Mnichov near Louny. The basin includes the Rakovník, Kladno and Slaný coal mining districts which are sometime improperly called basins.

f) **The Mšeno–Roudnice Basin**: it is filled with the Westphalian D (exceptionally even with reduced Westphalian B and C), Stephanian and Permian. The Late Paleozoic of the Mšeno–Roudnice Basin is burried under Cretaceous and locally also Tertiary sediments and volcanic rocks. It is located between the townships of Kralupy nad Vltavou – Milovice – Hrdlořezy near Mladá Boleslav – Čížkovice. The boundary between the Roudnice and Mšeno parts of the basin runs from the southern margin of the Mšeno–Roudnice Basin north of Neratovice along the Labe river up to the confluence with Liběchovka river and then towards the north as far as to Zátyní, NW of Dubá.

5. The Late Paleozoic of the furrows

Furrows are represented by narrow, mostly tectonically confined sedimentary occurrences elongated along NEN–SWS line.

a) **The Boskovice Furrow** (referred herein to the Late Paleozoic of the Boskovice Furrow): it is located between the Malonín elevation (in southern vicinity of Moravská Třebová) in the north and Moravský Krumlov in the south. An isolated occurrence lies near Miroslav (NE of Znojmo). The furrow is filled with sediments of the Late Carboniferous (Stephanian C) and Permian (Autunian) age. Smaller part of the Late Paleozoic is burried under Cretaceous and Tertiary sediments. Partial units are represented by the Rosice–Oslavany depression (with a coal mining district), the Tišnov–Kuřim elevation and the Boskovice depression.
Improper synonym: the Rosice–Oslavany basin (used for the southern part of the Boskovice Furrow).

b) **The Blanice Furrow**: It represents isolated occurrences of the Late Paleozoic between Český Brod in the north and České Budějovice in the south, arranged in a strip trending NEN–SWS. The northern boundary is built of post–Cretaceous elevation situated between Stará Boleslav and Nymburk which also includes the Kounice ridge. In the south, the Late Paleozoic sediments were found as far as near České Budějovice.
The furrow is filled with sediments of the uppermost Carboniferous (Stephanian C) and the Early Permian (Autunian). From the regional viewpoint, the occurrences within the Furrow can be divided in three parts: a) northern part with outcrops near Český Brod and Kostelec nad Č.Lesy which represent the largest areal distribution of the Late Paleozoic sediments, b) central part with occurrences in the vicinity of Vlašim and Tábor, and c) southern part with outcrops near České Budějovice (including the Lhotice coal district).
Synonyms (for partial units): the Český Brod Permian, the Český Brod island, the Český Brod basin, the Vlašim Permian, the Chýnov Permian, the České Budějovice Permian, the Vlašim Permian, the Chýnov island, the Lhotice basin, etc.

c) Occurrences of the Late Paleozoic in the Železné hory Mts (localities Kraskov, Seč) and those burried under Cretaceous sediments in the vicinity of Hradec Králové (localities Žižkovec, Urbanice). These occurrences are interpreted by some authors as remnants of a furrow which was situated in the area between the western vicinity of Hradec Králové and Pardubice in the north and Jihlava in the south.

Compiled by V.Holub and J.Pešek

III. Jurassic

The distribution of Jurassic rocks in the Bohemian Massif is subordinate and limited to rather small occurrences:

a) **Jurassic occurrences in northern Bohemia** belong to the basement of the Bohemian Cretaceous Basin. They crop out close to the Lusatian Fault near Doubice, Kyjov, Brtníky and in the valley of the river Bělá, having facies analogues in Saxony.

b) **Jurassic occurrences in the Moravian Karst** (localities Olomučany, Rudice, Habrůvka, Babín etc.) and in the close proximity of **Brno** (Stránská skála, Švédské valy, Hády, Nová Hora) overlie the Devonian and Lower Carboniferous strata or rocks of the Brno Massif. Near Brno they are mostly surrounded by Miocene sediments of the Carpathian Foredeep.

Subsurface Jurassic occurrences are more widely distributed in southern Moravia where they underlie the Miocene deposits of the Carpathian Foredeep and the flysch deposits of the Outer Carpathians, being traceable from the border with Austria up to the connecting line between towns Brno– Hodonín. They constitute the slopes of the Nesvačilka Graben and their NE vicinity ranged with the Western Carpathians.

Compiled by M. Eliáš

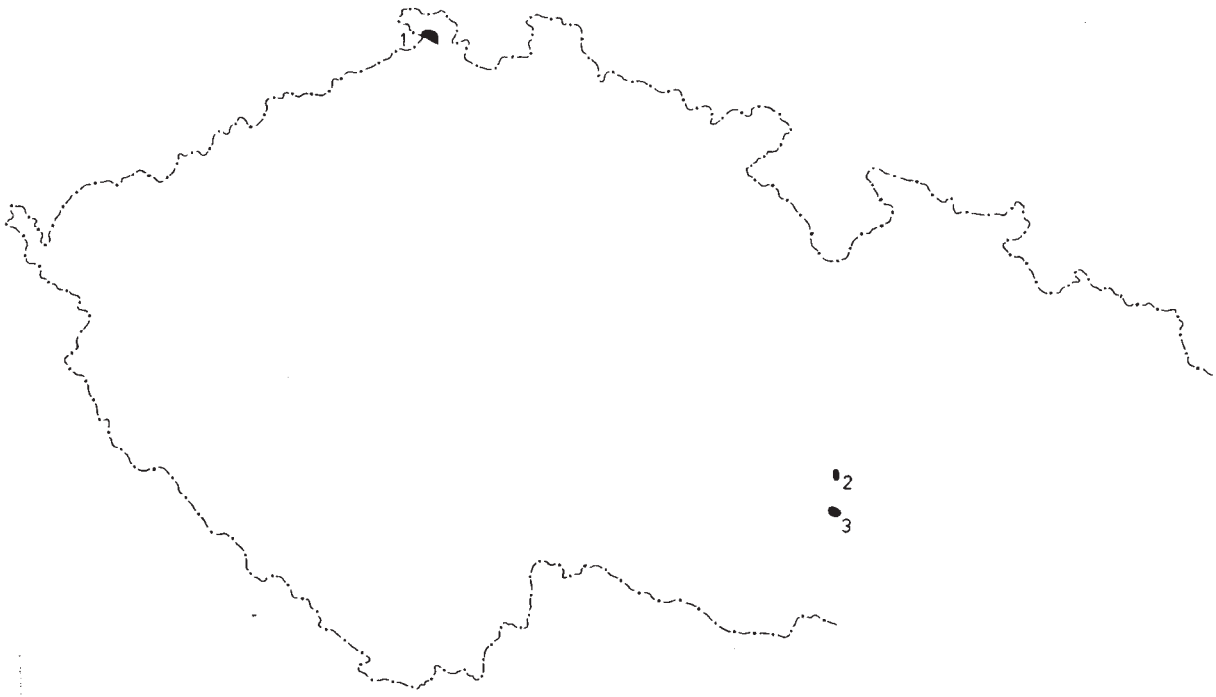

Fig. 3. Jurassic in the Bohemian Massif (outcrops)
1 – occurrences in northern Bohemia; 2 – occurrences in the Moravian Karst; 3 – occurrences at Brno

IV. Cretaceous

The Cretaceous sediments are widely distributed on the Czech territory of the Bohemian Massif, especially in the Bohemian Cretaceous Basin with predominant marine deposits. Other occurrences are in the South Bohemian Basins (prevailingly continental deposits). Small relics at Osoblaha corre-

spond in facies and stratigraphy to the Bohemian Cretaceous Basin, though they belong to the Opole Basin. Cretaceous relics near Rudice and Kuřim (near Brno) and sediments covering the south-eastern border of the Bohemian Massif exhibit a different paleogeographic, stratigraphic, and facies development.

1. The Bohemian Cretaceous Basin

Within the Bohemian Cretaceous Basin, which extends on the Czech territory from the north-western Bohemia up to the north-western Moravia, different developments are distinguished based on dominant or typical lithofacies. As the facies development of Cretaceous sediments influenced the recent morphology, the limits of some of these developments corresponds to orographic units (cp. Balatka et al. 1973). The boundaries of individual developments are supplemented according to new investigations (Fig. 4).

a) **The Lusatian Development** is characterized by quartzose sandstones in all lithostratigraphic units. The bodies of quartzose sandstones in the uppermost parts of the progradational cycles of the Jizera Formation exhibit the maximum areal extent.

b) **The Jizera Development** constitutes the south-eastern continuation of the Lusatian Development with markedly decreasing proportion of quartzose sandstones. The clayey and calcareous, fine-grained sandstones of the Jizera Formation are typical.

c) **The Labe Development** represents the greatest areal extent of the calcareous mudstones and marlstones, alternating in the Jizera Formation with clayey and biomicritic limestones. A narrow belt along the Labe (Elbe) river indicates connection with the Ohře Development which shows close facies analogies.

d) **The Orlice-Žďár Development** is characterized by calcareous, commonly fine-grained and glauconitic sandstones which constitute upper parts of the progradation cycles within the Jizera Formation. The main distribution falls in the eastern part of the basin but smaller relics in the Valchov and Blansko Grabens in Moravia and near the Železné hory Fault (southern part of the Dlouhá mez structure) also belong to this development.

e) **The Ohře (Eger) Development** is distinguished by dominant calcareous mudstones and marlstones alternating in the Teplice Formation with clayey biomicritic limestones. The distribution is concentrated in the western part of the basin, in the drainage area of the river Ohře (the synonymous designation is the Ohře-Středohoří area in Soukup and Klein 1964).

f) **The Vltava-Beroun Development** (synonymous with the Prague area of Soukup and Klein 1964) shows a progressive denudation of the Cretaceous sequence. The facies with hard spiculite marlstones (*opuka*) is characteristic of the Bílá hora Formation.

g) **The Kolín Development** also shows a progressive denudation with commonly exhumed basement. Near-shore biosparitic limestones and conglomerates with carbonate matrix are confined to basement elevations. The distribution is limited to the southern border of the basin.

h) **The Hejšovina Development** is marked by two thick sandstone bodies of the Jizera and Teplice Formations. The older body consists of feldspar-rich sandstones, the younger one, preserved as a relic, is formed by quartzose sandstones. Spiculite sediments (spongolites) with chert lenses and intercalations near the limit of the Korycany and Bílá hora Formations are characteristic. The sediment filling of the Police Basin and the Divoká Orlice Graben belong to this development.

i) **The Bystřice Development** forms the fill of the Králíky Graben, i.e. the prolongation of the Klodzko Graben continuing from Poland to the Czech Republic. The anomalous thickness (400-500 m) of flysch-like sediments (mudstones with fine-grained micaceous sandstones - tempestites) which represent the whole succession of the Březno Formation is typical.

2. The Cretaceous at Osoblaha

This occurrence represents a projection of the Opole Cretaceous Basin in Silesia. The lithofacies is analogous as in the Ohře Development of the Bohemian Cretaceous Basin.

3. South Bohemian Basins

The two South Bohemian basins, namely the **České Budějovice** (a) and **Třeboň** (b) **Basins,** contain the late Cretaceous sediments (thickness several hundreds meters) represented by a predominantly

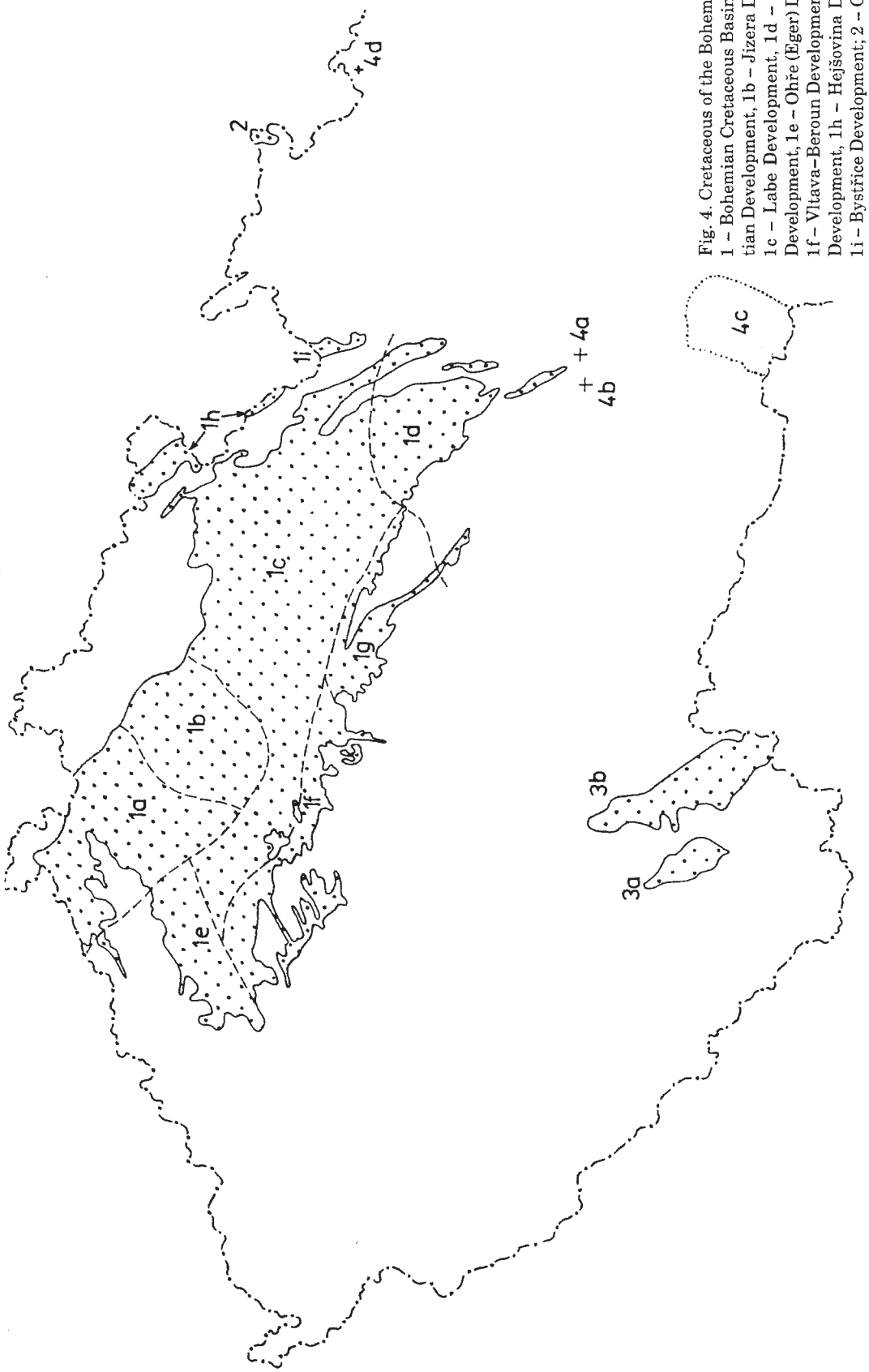

Fig. 4. Cretaceous of the Bohemian Massif
1 – Bohemian Cretaceous Basin: 1a – Lusatian Development, 1b – Jizera Development, 1c – Labe Development, 1d – Orlice–Žďár Development, 1e – Ohře (Eger) Development, 1f – Vltava–Beroun Development, 1g – Kolín Development, 1h – Hejšovina Development, 1i – Bystřice Development; 2 – Cretaceous at Osoblaha; 3 – South Bohemian Basins, 3a – České Budějovice Basin; 3b – Třeboň Basin; 4a – Cretaceous near Rudice, 4b – Cretaceous near Kuřim, 4c – Cretaceous on the southeastern slopes of the Bohemian Massif, 4d – Cretaceous near Hněvošice

continental sequence of clastics and coal–bearing strata with distinct cyclicity . Cretaceous deposits are partly covered by Tertiary filling of the basins.

4. Other occurrences

a) Cretaceous near **Rudice:** a sequence of variecoloured claystones and less indurated sandstones with limonitic iron ores at the base, constituting the fill of karst depressions on the Paleozoic and Jurassic limestone bedrock. Owing to geologic position and lithology, the occurrences are ranked within the Lower Cretaceous.
b) Cretaceous near **Kuřim:** a relic of carbonates and breccias with calcareous matrix NW of Brno. The marine microfauna points to the early Cretaceous age.
c) Cretaceous on the **south–eastern slopes of the Bohemian Massif:** several boreholes in the vicinity of Mikulov (southern Moravia) encountered Cretaceous sediments in the autochthonous position on the older rocks of the Bohemian Massif. They are overlain by Tertiary sediments of the Carpathian Foredeep and the Vienna Basin, or by nappes of the Outer Carpathians.
d) A relic of Cretaceous deposits (Coniacian?) is reported from the borehole at Hněvošice near **Opava** in Silesia. It is covered by Tertiary deposits.

Compiled by S. Čech and J. Valečka

V. Tertiary

The Tertiary rocks are predominantly concentrated to the NW and N Bohemia, where they are confined to a zone trending WSW–ENE between Marktredwitz in Germany and Lubań in Poland. Fresh–water sediments are commonly associated with alkaline volcanics. Other important occurrences of Tertiary fresh–water sediments are concentrated in South Bohemian Basins located on the Moldanubian basement.

Relics of fresh–water Tertiary sediments, mostly of fluviatile origin, are otherwise scattered in different parts of the Bohemian Massif. Relics of predominantly marine deposits belonging to the Carpathian Foreland are preserved on the eastern margin of the Bohemian Massif. Bodies of volcanics occur mostly in the northern part of the Bohemian Massif.

1. Krušné hory Piedmont Basins and associated Volcanic Uplands

a) **The Cheb Basin:** the westernmost basin of the Krušné hory Piedmont Graben, filled by Eocene to Pliocene fresh–water sandy and clayey sediments, local coal beds and alkaline volcanics.
b) **The Sokolov Basin:** the basin in the southwestern part of the Krušné hory Piedmont Graben. The ridge of crystalline rocks near Chlum nad Ohří delimits the basin from the Cheb one, the volcanics of the Doupovské hory Mts. constitute the border with the Most Basin. Fresh–water Eocene to Miocene sandy and clayey sediments contain coal seams and products of alkaline volcanism.
c) **The Most Basin:** the largest Tertiary basin situated between the Krušné hory Mts., the Doupovské hory Mts., and the České středohoří Mts. It is filled with Eocene to Miocene fresh–water sandy and clayey sediments with maximum thickness of coal seams and with products of alkaline volcanism. The basin can be subdivided into the Pětipsy, Žatec, Chomutov, Most s.str., Bílina and Teplice–Ústí parts. Improper synonyms are the Chomutov–Most–Teplice Basin, the North Bohemian Brown Coal Basin, the North Bohemian Basin.
d) **The Doupovské hory Mts.:** the large complex of Eocene to Miocene alkaline volcanics situated between the Sokolov and Most Basins. The flows of basaltoids alternate with pyroclastics; tuffites are more common near the base. The subvolcanic bodies are represented by basaltoid and subordinate trachytoid rocks.
e) **The České středohoří Mts.:** the large complex of alkaline volcanics closely associated with the Most Basin in the W. Effusions of basaltoids and deposits of pyroclastic, tuffitic, epiclastic and biogene sediments originated in time of the maximum volcanic activity starting with the Eocene and ending in the Miocene. Basaltoids, basaltoid breccias and frequent trachytoids constitute subvolcanic bodies.

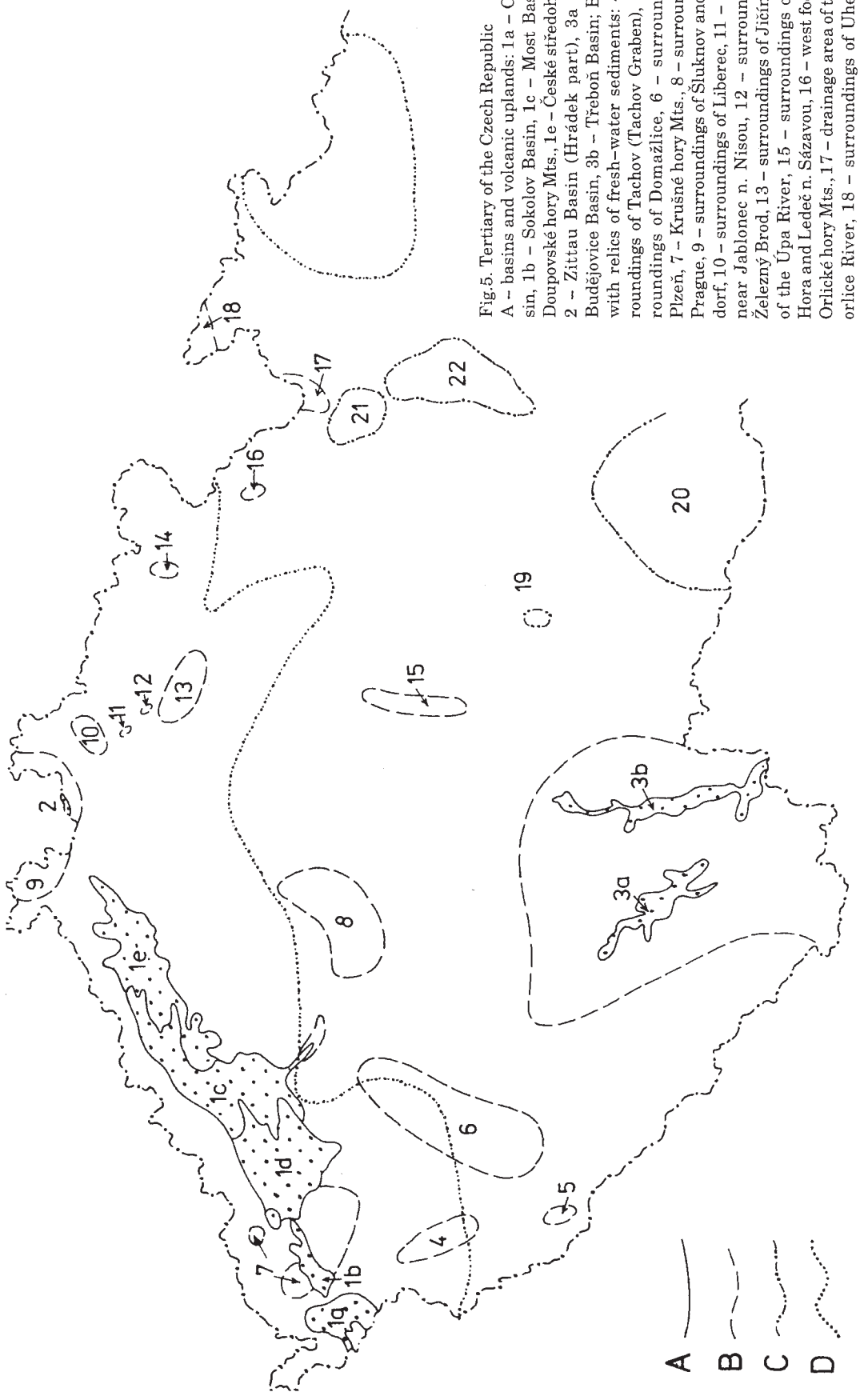

Fig.5. Tertiary of the Czech Republic
A – basins and volcanic uplands: 1a – Cheb Basin, 1b – Sokolov Basin, 1c – Most Basin, 1d – Doupovské hory Mts., 1e – České středohoří Mts., 2 – Zittau Basin (Hrádek part), 3a – České Budějovice Basin, 3b – Třeboň Basin; B – areas with relics of fresh–water sediments: 4 – surroundings of Tachov (Tachov Graben), 5 – surroundings of Domažlice, 6 – surroundings of Plzeň, 7 – Krušné hory Mts., 8 – surroundings of Prague, 9 – surroundings of Šluknov and Varnsdorf, 10 – surroundings of Liberec, 11 – Rychnov near Jablonec n. Nisou, 12 – surroundings of Železný Brod, 13 – surroundings of Jičín, 14 – W of the Úpa River, 15 – surroundings of Kutná Hora and Ledeč n. Sázavou, 16 – west foothills of Orlické hory Mts., 17 – drainage area of the Tichá orlice River, 18 – surroundings of Úhelná and Vidnava; C – areas with relics of Carpathian (prevalently marine) sediments: 19 – surroundings of Jihlava, 20 – surroundings of Moravské Budějovice and Znojmo, 21 – surroundings of Česká Třebová and Lanškroun, 22 – area of the Boskovice Furrow; D – south margin of the extent of scattered volcanics

2. The Zittau Basin

The major part of this basin is situated on the German and Polish territories, in Bohemia it extends only in the vicinity of Hrádek nad Nisou (i.e. the Hrádek part of the Zittau Basin). The Eocene to Miocene fill is represented by fresh–water sandy and clayey sediments, coal seams and alkaline volcanics.

3. South Bohemian Basins

a) **The České Budějovice Basin:** the basin situated roughly between the towns České Budějovice and Písek.
b) **The Třeboň Basin:** the basin between the towns Nové Hrady, České Velenice (at the border with Austria) and Tábor.
The Tertiary fill of both basins, Oligocene to Pliocene in age, consists of fresh–water sandy and clayey sediments (with marine influences in the Mydlovary Formation), diatomites, coal–bearing and moldavite–bearing deposits.

4. Relics of fresh–water Tertiary sediments

Significant relics of fresh–water Tertiary deposits (except of those in the close vicinity of basins) are concentrated near Tachov (the Tachov Graben), Domažlice, Plzeň, in the Krušné hory Mts., near Prague, Šluknov, Varnsdorf, Liberec, Rychnov near Jablonec nad Nisou, in the neighbourhood of Železný Brod and Jičín, W of the Úpa River, near Kutná Hora, Ledeč nad Sázavou, on the western piedmont of the Orlické hory Mts., in the drainage area of the river Tichá Orlice and near Uhelná and Vidnava.

5. Scattered alkaline volcanics

Occurrences of volcanic rocks in the western Bohemia, Krušné hory Mts., on the territory of the Bohemian Cretaceous Basin, in the West–Sudetian (Lugicum) Region, in the Nízký Jeseník Mts. and in the Ostrava–Karviná part of the Upper Silesian Basin are ranged here.

6. Relics with predominance of marine Tertiary sediments

Relics with predominance of marine Tertiary sediments are found in the eastern part of the Bohemian Massif, namely in the vicinity of the towns Jihlava, Moravské Budějovice, Znojmo, Česká Třebová and Lanškroun, in the Boskovice Furrow and in the Oderské vrchy and Nízký Jeseník Mountains. They overlap from the nearby Carpathian Region.

Compiled by O. Shrbený

VI. Quaternary of the Bohemian Massif

The development of the Quaternary sediments differs strongly from the deposits of older formations. This is the reason for a different approach to their regional geological classification.

The main differences are:

1. The Quaternary sediments are not bound to the accumulation areas only like the deposits of older formation to the sedimentary basins. In contrast, they appear scattered on the whole territory.
2. All Quaternary sediments of the Bohemian Massif are continental in origin. Individual genetic types of sediments are therefore morphology–dependent or are at least partly controlled by local relief.

The Regional classification of the relief of ČSSR (Czudek et al. 1973) is used for the classification of the Quaternary deposits. Two fundamental units are distinguished on the territory of the Czech Republic: A – Quaternary of the denudation areas and B – Quaternary of the accumulation areas.

A. Quaternary of the denudation areas

This unit incorporates all uplands and mountains of the Bohemian Massif. In the higher relief, where the denudation prevails, only limited number of genetic types of sediments occur. They are represented practically by two types, i.e. fluvial and slope sediments. The river terraces are preserved along larger watercourses where they can form marked terrace systems in suitable sectors of the valleys. The slope sediments are represented by the whole catena of deposits starting with the fine-grained sheet- and rill- washed deposits to very coarse-grained and even bouldery periglacial accumulations.

The loesses and loess loams occur in lower sectors of uplands. A marked admixture of coarser clasts is typical of the so called upland facies of loess. Other types of sediments include mixed eolian-deluvial or deluvio-eolian deposits representing the transitional facies from the upland loess to typical slope sediments. Plentiful in places are peat bogs and fens. In some mountains the sediments of local mountain glaciations are preserved. They are usually late Middle and Upper Pleistocene in age. Relatively frequent, even in middle altitudes, are the morphological forms controlled by a periglacial climate like frost cliffs, pseudocirques, nivation depressions, glacier cirques, solifluction trains, stone glaciers, block fields etc.

The karst areas with fossiliferous sediments and rich archaeological content deposited in karst depressions, caves and karst "pockets" as well as fresh-water carbonates deserve a particular attention.

B. Quaternary of the accumulation areas

This unit is subdivided into 1. Areas of the continental glaciation and 2. Extraglacial areas.

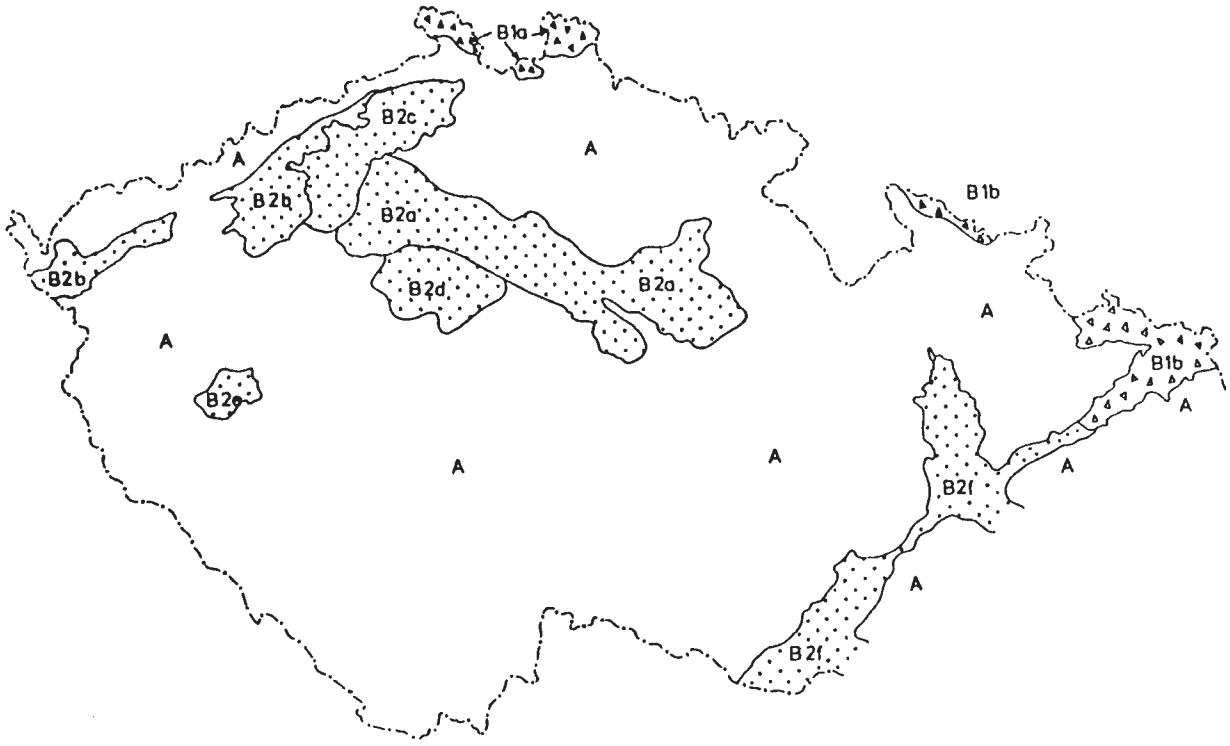

Fig. 6. Quaternary of the Bohemian Massif
A – Quaternary of the denudation areas; B – Quaternary of the accumulation areas: Quaternary of the continental glaciation: B1a – Northern Bohemia, B1b – Odra area. Quaternary of the extraglacial areas: B2a – middle course of Labe, B2b – West Bohemian Tertiary Basins, B2c – České středohoří Mts., B2d – Prague plateau, B2e – Plzeň Basin, B2f – Moravian Basins

1. Quaternary of the continental glaciation areas

The sediments of the continental ice sheets prevail in this regions. They are particularly tills, glacifluvial and fluvioglacial sediments and the deposits of ice-dammed lakes. Beside them the fluvial, proluvial and eolian (loess loams as the noncalcareous facies of loess) sediments also appear in a subordinate extent.

a) **The area of North-Bohemian continental glaciation** includes the marginal part of the Scandinavian (North-European) glaciation in Šluknov and Frýdlant uplands as well as in the NW part of the Žitava basin. The regional distribution is uneven. Sediments are preserved in patches scattered irregularly all over the mentioned areas. The transfluence of the Ještěd mountain range and the communication of the ice-sheet with the Ploučnice River valley is particularly important for dating the Labe River terrace system.
The deposits of both middle Pleistocene glaciations i.e. Elsterian and Saalian are preserved here.

b) **The Odra area** incorporates the Odra part of the Moravian Gate (N part of the Carpathian foredeep), the Ostrava basin and adjoining sectors of the surrounding uplands (Podbeskydská and Opavská pahorkatina) including the marginal parts of the Osoblaha lowland, Zlaté hory and Žulová uplands all being affected by the Scandinavian ice-sheet. This areas are marked by large regional extent of continental glaciation sediments that cover predominant parts of the whole region. The sediments can reach a remarkable thickness which exceeds in places 100 m. The relationship of the glacial sediments to the terraces of the river Odra and its tributaries (Baltic drainage area), the transfluence of the ice sheet the main European watershed and the communication with the Bečva River valley (drainage area of the Black sea) are particularly important for direct correlation of north European and Alpine stratigraphic schemes.
In sedimentary sequence there are preglacial gravel deposits superposed by fluvial and fluvioglacial sediments and finally by eolian loess loams with fossil soils. Quite frequent are the glacitectonic features. Sediments of both the Elsterian and Saalian glaciations are preserved including the respective interglacials. Eolian sediments are mostly represented by non-calcareous loess loams, the wind blown sands are subordinate. In the marginal higher parts particularly at the foot of the Beskydy Mountains large proluvial accumulations (fluvial and alluvial fans) up to several tens of meters thick occur.

2. Quaternary of the extraglacial areas

For the Quaternary in the extraglacial accumulation areas a significant development of complex sequences of loess accumulations with fossil soils and fossil pedocomplexes is typical. Wind blown sands, fluvial deposits as well as slope sediments occur quite frequently. In the tectonically active sectors lake sediments and complex bodies of large fluvial fans occur. They developed instead of terrace systems.

This area falls into several smaller districts, characteristic by particular development of Quaternary.

a) **The area of Polabí** (along the middle course of Labe – for details see Czudek et el. 1973) is characterized by extensive loess accumulations overlying the terrace systems of Labe and its tributaries. In addition to the main types the wind blown sands, oxbow lake sediments, limnic chalks and calcareous fens appear.

b) For the **Cheb, Sokolov and Most Tertiary basins** well developed terrace systems of Ohře and Bílina Rivers are typical. Moreover, huge accumulations of proluvial deposits, alluvial and fluvial fans and slope deposits occur particularly at the foot of the Krušné hory Mts. and around larger neovolcanite hills. Loess and loess loam form areally extensive but relatively thin blankets.

c) **Quaternary of the České středohoří Mts**character and is mostly represented by thick proluvial and slope sediments controlled partly by huge landslides. The fluvial and eolian sediments are of a relatively small extent but on the other hand they form important terrace systems and thick and complex sedimentary sequences respectively.

d) **Pražská plošina (Prague plateau)** incorporates beside the Prague plateau proper a part of the Kladno plateau and adjoining sectors of Křivoklát and Hořovice uplands. This area is marked by regionally extensive, thick loess sequences with many intervening fossil soils and fossil pedocomplexes, which, in relation to the terraces of Vltava and its tributaries, document stratigraphic range of the whole Quaternary including the youngest part of Tertiary.

e) **The Plzeň basin** has well developed and well preserved terrace systems. The eolian and slope sediments are of lesser extent and significance.

f) **Moravian basins** lie at the contact of the Bohemian Massif with the West Carpathians. They overlap both mentioned larger units and are characterized by a different development of Quaternary when compared with the remaining part of the Bohemian Massif. This region incorporates the Upper Moravian Basin, including the Bečva part of the Moravian Gate, the Vyškov Gate and the Dyje–Svratka Basin. For the basins thick complexes of fluvial, fluviolimnic and limnic deposits are typical. Thick loess accumulation articulated by intervening fossil soils and fossil pedocomplexes are typical for the eastern slopes of the Bohemian Massif (Brno–Červený kopec). The index horizon of the main terrace, separating Elsterian and Saalian glaciations traceable along the Bečva and Morava Rivers as far as the Danube plays a special role in the stratigraphy of the Czech Republic and even in the whole central Europe. Paleontological and archaeological finds from the loess and travertine bodies in the environs of Přerov (Předmostí, Tučín, Kokory) are important as well.

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