

CONTENTS

I. INTRODUCTION	9
I.1. Context of prehistoric lithic research in Central Europe	10
I.1.1. Second half of the 19 th and the first two thirds of the 20 th century	10
I.1.2. Late 20 th and early 21 st centuries	11
References	13
I.2. Defining the research area	14
I.3. Geomorphological characterization	16
References	18
I.4. Overview of geology considering potential sources of lithic raw materials	18
I.4.1. Bohemian Massif (Český masiv, Böhmische Masse, Masyw czeski)	18
I.4.1.1. Moldanubian Region (Moldanubicum)	19
I.4.1.2. Kutná Hora – Svratka Region	22
I.4.1.3. Central Bohemian Region (Bohemicum)	23
I.4.1.4. Saxothuringian Region (Saxothuringicum)	25
I.4.1.5. Lusatian Region (Lugicum)	26
I.4.1.6. Moravo-Silesian Region (Moravosilesicum)	27
I.4.1.7. Limnic Upper Carboniferous and Permian	30
I.4.1.8. Platform cover of the Bohemian Massif	30
I.4.2. Małopolska Massif (Małopolska Highland)	35
I.4.3. Western Carpathians	36
I.4.3.1. Outer Western Carpathians	36
I.4.3.2. Central Western Carpathians	38
I.4.3.3. Inner Western Carpathians	39
I.4.4. Eastern Alps	40
I.4.5. Pannonian Basin System	41
I.4.6. Fennosarmatian Platform	41
References	41
I.5. Applied methods	43
I.5.1. Determination of chipped lithic artefacts	43
I.5.2. Determination of polished stone tools and the other lithic industries	45
References	46
II. RAW MATERIALS OF CHIPPED LITHIC ARTEFACTS	47
II.1. Classification of the raw materials for chipped artefacts	48
References	49
II.2. Silicites and their sources. The terms silicite, chert, and flint	49
References	50
II.2.1 Silicites of glaciogene or glacial sediments (erratic silicites, prevalently flints)	51
References	54
II.2.2. Silicites of Bohemia	55
II.2.2.1. Proterozoic phthanite	55
II.2.2.2. Ordovician spongolite	57
II.2.2.3. Silurian silicified shale to chert of the Liteň Formation	57
II.2.2.4. Silurian cherts of the Kopaniny and Přídol Formations	59
II.2.2.5. Devonian cherts of the Radotín and Kotýz limestones	59
II.2.2.6. Devonian cherts of the Dvorce-Prokop limestone	60
II.2.2.7. Devonian cherts of the Zlíchov limestone	60
II.2.2.8. Devonian cherts of the Třebotov limestone	60
II.2.2.9. Devonian radiolarites of the Choteč limestone (cherts of the Bohemian Karst type)	61
II.2.2.10. Upper Carboniferous and Permian limnic silicites (cherts) of the Krkonoše Piedmont Basin	62
II.2.2.11. Permian limnic silicites (cherts) of the Intra-Sudetic Basin	63
II.2.2.12. Upper Carboniferous and Permian limnic silicites (cherts) from Líně near Plzeň	63
II.2.2.13. Bohemian Jurassic cherts	64
II.2.2.14. Cretaceous spongolites of eastern Bohemia (type Ústí nad Orlicí)	64
II.2.2.15. Cretaceous spongolites of the Intra-Sudetic Basin	65
II.2.2.16. Bohemian Tertiary limnic silicites	65
II.2.2.17. Layered chert of the Putim type	65

References	66
II.2.3. Silicites of Moravia and Czech Silesia	
Silicites of the Bohemian Massif in Moravia and Czech Silesia	68
II.2.3.1. Devonian to Lower Carboniferous radiolarites of the Ponikev Formation	68
II.2.3.2. Devonian to Lower Carboniferous cherts of the Hády-Říčka limestone	69
II.2.3.3. Moravian Jurassic cherts	70
II.2.3.4. Jurassic cherts of the Stránská skála Hill (Brno-Slatina)	71
II.2.3.5. Jurassic cherts of the Bílá hora Hill (Brno-Židenice)	75
II.2.3.6. Jurassic cherts of the Švédské vally Hill (Brno-Slatina)	75
II.2.3.7. Jurassic cherts of the Hády Plateau (Brno-Maloměřice)	76
II.2.3.8. Jurassic chert from Olomučany (Moravian Karst)	77
II.2.3.9. Jurassic cherts of the Rudice Formation (Moravian Karst)	78
II.2.3.10. Cherts of the Krumlovský les type (SW Moravia)	79
II.2.3.11. Cretaceous spongolites of the West-Moravian origin and their secondary southward occurrences	82
II.2.3.12. Cretaceous spongolites of the Osoblaha (Czech Silesia) and Głubczyce (Polish Silesia) regions ..	84
Silicites of the Western Carpathians in Moravia and Czech Silesia	84
II.2.3.13. Jurassic cherts of the Pavlovské vrchy Highland	84
II.2.3.14. Cherts of Mesozoic limestones at the head of the Magura Group flysch nappes	85
II.2.3.15. Baška chert	85
II.2.3.16. Menilite cherts	86
II.2.3.17. Cherts of the Krumlovský les type and other cherts in the Vienna Basin (South Moravia)	87
II.2.3.18. Chert of the Boršice type in the Vienna Basin	88
II.2.3.19. Révaite (opalized silty claystone to chert)	88
II.2.3.20. Chert of the Troubky-Zdislavice type (the Carpathian Foredeep)	89
II.2.3.21. Jurassic radiolarites in Moravia	90
References	91
II.2.4. Silicites of Lower and Upper Austria	94
II.2.4.1. Radiolarites from Wien-Mauer	94
II.2.4.2. Radiolarites and cherts from gravels of the Danube and its predecessors	95
II.2.4.3. Menilite cherts of the Zellerndorf Formation (the Carpathian Foredeep)	95
References	96
II.2.5. Silicites of Thuringia, Saxony and Bavaria (Germany)	96
II.2.5.1. Palaeozoic (prevalently Silurian) silicified shale (Kieselschiefern)	96
II.2.5.2. Triassic cherts (Karneol, Muschelkalkhornstein, Keuperhornstein)	96
II.2.5.3. Cherts of the Jurassic limestones at the Lusatian overthrust in Saxony	97
II.2.5.4. Jurassic cherts of the Fränkische Alb Hilly land to the west of Regensburg (the region between Donau and Altmühl)	97
II.2.5.5. Cherts from relics of Jurassic limestones between Regensburg and Passau (Ortenburger Kieselnieren-Kalke, Flintsbach-Hardt)	98
References	99
II.2.6. Silicites of Poland	100
II.2.6.1. Ordovician chalcedony cherts, Góry Świętokrzyskie Mts.	100
II.2.6.2. Silurian siliceous shales with lydites (lupki krzemionkowe z litytami), Góry Kaczawskie and Góry Świętokrzyskie Mts.	100
II.2.6.3. Devonian Kostomloty chert, Góry Świętokrzyskie Mts.	100
II.2.6.4. Devonian radiolarite of the Bardo type (rogowiec bardski in Polish)	100
II.2.6.5. Permian limnic silicites of the Intra-Sudetic Basin	101
II.2.6.6. Triassic cherts of the Górażdże Beds (warstwy górażdzańskie, Wyżyna Śląska, Góry Świętokrzyskie)	102
II.2.6.7. Silicites of the Cracow-Częstochowa Jurassic, southern part (the Cracow area)	102
II.2.6.8. Silicites of the Cracow-Częstochowa Jurassic, central part (variety G)	103
II.2.6.9. Silicites of the Cracow-Częstochowa Jurassic, northern part (variety Gojść)	104
II.2.6.10. Silicites of the Opole-Groszowice type	105
II.2.6.11. Cretaceous chert of the Wielka Wieś type, the Cracow-Częstochowa Highland (Wyżyna Krakowsko-Częstochowska)	106
II.2.6.12. Banded silicite of the Krzemionki type (krzemień pasiasty)	106
II.2.6.13. Chocolate silicite (chocolate flint, krzemień czekoladowy)	108
II.2.6.14. Dark Cretaceous Ożarów silicite (Ożarów flint, krzemień ożarowski)	108

II.2.6.15. Spotted Świeciechów silicite (Świeciechów flint, krzemień nakrapiany, krzemień świeciechowski)	109
II.2.6.16. Silicified marls of the Opole Cretaceous	110
II.2.6.17. Cretaceous opoka from Zagaje Stradowskie (Świętokrzyskie Voivodeship)	111
Silicites of the Carpathians in Poland	111
II.2.6.18. Jurassic radiolarites of the Pieniny Klippen Belt	111
II.2.6.19. Cretaceous Mikuszowice chert (rogowiec mikuszowicki) of the Silesian Unit, Carpathian Flysch Belt	112
II.2.6.20. Palaeogene Bircza silicite (Bircza flint, krzemień z Birczy) of the Skole Unit (Carpathian Flysch Belt)	112
II.2.6.21. Palaeogene menilite chert of the Dukla Unit (Carpathian Flysch Belt)	113
II.2.6.22. Palaeogene Jawornik silicified marlstone to chert of the Dukla Unit (Carpathian Flysch Belt) ..	114
II.2.6.23. Palaeogene Dynów silicified marlstone of the Skole Unit (Carpathian Flysch Belt)	115
References	115
II.2.7. Silicites of Slovakia	118
II.2.7.1. Lower Palaeozoic lydites (radiolarites) of the Gelnica Group (Gemericum) and of the Harmónia Group (Malé Karpaty Mts., Tatricum)	118
II.2.7.2. Upper Carboniferous and Permian limnic silicites (geyserites)	118
II.2.7.3. Triassic radiolarites of the Meliata Unit, SE Slovakia	119
II.2.7.4. Triassic and Lower Jurassic cherts from the core mountains of the Tatricum	119
II.2.7.5. Jurassic radiolarites	119
Middle- to Upper Jurassic radiolarites of the Pieniny Klippen Belt	120
Radiolarite of the Vršatské Podhradie type (NE of the Vlára Pass)	120
II.2.7.6. Uppermost Jurassic to Lower Cretaceous cherts	123
II.2.7.7. Palaeogene menilite cherts of the Dukla Unit (Carpathian Flysch Belt)	123
II.2.7.8. Palaeogene silicified claystone to chert of the Magura Group flysch nappes (so called Ondava or brown chert)	124
II.2.7.9. Palaeogene nummulitic cherts in southern Slovakia	124
II.2.7.10. Miocene limnic silicites	124
References	126
II.2.8. Silicites of Hungary	127
II.2.8.1. Palaeozoic silicites (lydites)	128
II.2.8.2. Triassic Buda chert	128
II.2.8.3. Upper Triassic and Lower Jurassic cherts from the Bakony Mts., Keszthely Mts. and Balaton Highland	129
II.2.8.4. Jurassic radiolarite of the Szentgál type	129
II.2.8.5. Jurassic radiolarite from Bakonycsérnye	130
II.2.8.7. Jurassic radiolarites from Lábatlan and Dunaszentmiklós (Gerecse Mts.)	130
II.2.8.8. Jurassic radiolarite to radiolarian chert from Tata (Gerecse Mts.)	131
II.2.8.9. Upper Jurassic to Lower Cretaceous chert from Sümeg	131
II.2.8.10. Cretaceous Tevel flint	132
II.2.8.11. Palaeogene nummulitic cherts	132
II.2.8.12. Tertiary geyserites (hydroquartzites), limnic silicites and limnic opalites (for example Miskolc, Korlát, Erdőbénye)	132
References	133
II.3. Silica minerals	134
II.3.1. Quartz	134
References	136
II.3.2. Rock crystal, citrine, smoky quartz, rose quartz	136
II.3.2.1. Moravia	138
Sources of citrine, rock crystal and smoky quartz SE of Žďár nad Sázavou (western Moravia) ..	140
Sources of rock crystal and smoky quartz south of Brtnice near Jihlava (western Moravia) ..	140
Sources of smoky quartz and rock crystal in the surroundings of Bílovec (northern Moravia) ..	141
II.3.2.2. Czech and Polish Silesia	141
Source of rock crystal at Žulová-Andělské domky (Czech Silesia)	141
Source of rock crystal at Jegłowa near Strzelin (Polish Silesia)	142
II.3.2.3. Southern Bohemia	142
II.3.2.4. Austria	143
II.3.2.5. Slovakia	143

II.3.2.6. Hungary	144
II.3.2.7. Significance of rock crystal, citrine and smoky quartz from the Bohemian Massif	144
References	144
II.3.3. Hydrothermal chalcedony and its varieties (jasper, agate) from Permian volcanic rocks	146
II.3.3.1. Kozákov jasper	146
II.3.3.2. Bezděčín chalcedony	147
II.3.3.3. Jasper and chalcedony from the Polish part of the Intra-Sudetic Basin	148
References	148
II.3.4. Opals from Tertiary volcanic rocks of the Western Carpathians	148
II.3.4.1. Central Slovakia	148
II.3.4.2. Eastern Slovakia	149
II.3.4.3. Northern Hungary	150
References	150
II.3.5. Siliceous weathering products of serpentinites and of other metamorphic rocks	150
II.3.5.1. Western Moravia	151
II.3.5.2. Lower Austria and Burgenland	153
II.3.5.3. Southern Bohemia: the Křemže Basin	153
II.3.5.4. Southern Bohemia: the areas of Písek, Bechyně and Strakonice	154
II.3.5.5. North-western Bohemia	155
II.3.5.6. North-western Moravia: Moravská Třebová and Boršov	155
II.3.5.7. Lower Silesia	156
II.3.5.8. Eastern Slovakia	156
References	157
II.4. Natural glasses	158
II.4.1. Carpathian obsidian and perlite	160
II.4.1.1. Source of obsidian in the Zemplínské vrchy Mts., SE Slovakia	160
II.4.1.2. Source of obsidian in the Tokaj-Zemplén Mts., NE Hungary	161
II.4.1.3. Source of obsidian and perlite in Transcarpathian Ukraine	161
II.4.1.4. Source of perlite from the Szabó skála Rock, Hliník nad Hronom, central Slovakia	162
II.4.1.5. Use of obsidian in prehistoric times of Central Europe	162
II.4.2. Kozákov tachylite	163
II.4.4. Moldavites	164
References	169
II.5. Clastic siliceous rocks	171
II.5.1. Quartzites (orthoquartzites)	171
II.5.1.1. Ordovician quartzites of the Barrandian	171
II.5.1.2. Quartzite of the Lipnice type (southern Bohemia)	171
II.5.1.3. Bečov quartzite (NW Bohemia)	173
II.5.1.4. Tušimice quartzite (NW Bohemia)	174
II.5.1.5. Skršín quartzite (NW Bohemia)	175
II.5.1.6. Kamenná Voda quartzite (NW Bohemia)	176
II.5.1.7. Profen-Zauschwitz quartzite (Saxony and Saxony-Anhalt)	176
II.5.1.8. Quartzite to quartz conglomerate called sun boulder (Bohemia, Moravia, Lower Austria)	176
II.5.2. Chert breccia	177
References	178
II.6. Other rocks	180
II.6.1. Porcellanites and hornfelses	180
II.6.1.1. Porcellanites from the Bohemian Cretaceous Basin	180
Porcellanite from the Kunětická hora Hill near Pardubice	180
II.6.1.2. Porcellanites from the Krušné hory Piedmont Basins (NW-Bohemia)	182
II.6.1.3. Porcellanites from southern Moravia	182
Porcellanite from the Bučník Hill near Komňa	182
Porcellanite from Medlovice near Uherské Hradiště	183
II.6.1.4. Hornfelses at the contacts of the teschenite-picrite association in the Carpathian Flysch Belt	183
II.6.1.5. Porcellanite from the Góra Św. Anny Hill (Polish Silesia)	184
II.6.1.6. Hornfelses in Bohemia	184
II.6.2. Fine-grained volcanic, subvolcanic and volcanoclastic rocks	184
II.6.2.1. Permian acid subvolcanic rocks from southern Bohemia	184
II.6.2.2. Permian silicified banded tuff of the Gmandstein type (Saxony)	185

II.6.2.3. Triassic felsitic metarhyolite ("quartz porphyry") from the Bükk Mts. (Hungary)	185
II.6.3. Silicified corals of the Příbor-Klokočov type	186
II.6.4. Silicified woods	186
III. RAW MATERIALS OF POLISHED STONE TOOLS.	189
References	190
III.1. Metamorphic rocks	190
III.1.1. Thermally metamorphosed metabasite and greenschist	190
III.1.1.1. Amphibole-rich metabasite from the Jizerské hory Mts. (northern Bohemia)	192
III.1.1.2. Metabasite from Želešice (southern Moravia)	195
III.1.1.3. Greenschist from Felsőcsatár (western Hungary)	196
III.1.1.4. Metabasite from the Malé Karpaty Mts. (western Slovakia)	197
III.1.1.5. Greenschist from Pyszczyńska Góra Mt. (SW Poland)	198
III.1.2. Amphibolites	198
III.1.3. Metabasites generally	200
III.1.4. Serpentinities	200
III.1.4.1. Mnichov serpentinite (western Bohemia)	201
III.1.4.2. Serpentinities from the Blanský les Mountains (southern Bohemia)	202
III.1.4.3. Serpentinite from the Jańska Góra Hill and the Gogolów-Jordanów Massif (Lower Silesia, southern Poland)	202
III.1.4.4. Serpentinite from Bernstein (Burgenland, Austria)	204
III.1.5. Jadeitite	204
III.1.6. Nephrite	207
III.1.7. Eclogite	208
III.1.7.1. Eclogite from the Beigua Massif (Liguria, north-western Italy)	209
III.1.8. Marbles	210
III.1.8.1. Marble from the Bílý Kámen Hill near Sázava (central Bohemia)	212
III.1.9. Quartz-sillimanite rocks, fibrolites (western Moravia, southern Bohemia)	213
III.1.10. Other metamorphic rock	214
References	214
III.2. Igneous rocks	218
III.2.1. Diorite, porphyritic microdiorite (formerly diorite porphyry)	218
III.2.1.1. Massive amphibole diorite of the Brno Batholith (southern Moravia)	219
III.2.1.2. Porphyritic microdiorite (formerly diorite porphyry) from the Brno Batholith (southern Moravia)	221
III.2.2. Andesite and palaeoandesite	221
III.2.3. Melaphyre (Permo-Carboniferous basaltic palaeoandesite)	223
III.2.4. Gabbro	223
III.2.5. Basaltic rocks (including basanite, nephelinite, tephrite)	224
III.2.6. Diabase, metadiabase, metadolerite (palaeobasalt, doleritic palaeobasalt)	225
III.2.7. Spilite and spilite volcanoclastic	226
III.2.8. Teschenite and picrite	227
III.2.9. Phonolite	228
III.2.10. Granites, granodiorites, quartz diorites, rhyolites, dacites	228
References	228
III.3. Sedimentary rocks	230
III.3.1. Lower Carboniferous (Culm) siltstone, silty shale and greywacke	230
III.3.2. Sandstones	232
III.3.3. Palaeogene claystone (eastern Slovakia)	232
III.3.4. Limestones (carbonate rocks)	233
III.3.5. Bituminous siderite claystone (Kounov sapropelite, "švartna" in Czech)	234
III.3.6. Březina shale (southern Moravia)	235
III.3.7. Iron ores	235
III.3.8. Other sedimentary rocks	236
References	237
IV. RAW MATERIALS OF WRISTGUARDS.	239
References	240

V. RAW MATERIALS OF WHETSTONES	241
References	243
VI. RAW MATERIALS OF CRUSHERS, SADDLE QUERNS, ROTARY QUERNS AND MILLSTONES	245
VI.1. The Neolithic to Hallstatt Period	246
VI.2. La Tène period	247
VI.3. Early Middle Ages	248
VI.4. Biotite granite of the Říčany type and granitoids of the Central Bohemian Pluton	249
VI.5. Biotite granite from the Ślęża Mt. (Lower Silesia, southern Poland)	250
VI.6. Rhyolitic ignimbrite from Žernoseky (Oparno Valley, northern Bohemia)	251
VI.7. Trachybasalt (tephritic phonolite) from the Kunětická hora Hill near Pardubice, eastern Bohemia ...	252
VI.8. Rhyolites from Central Slovakian Miocene volcanoes	253
VI.9. Andesites from Central Slovakian Miocene volcanoes	254
VI.10. Orthoquartzites and conglomerates from Lipoltice (eastern Bohemia)	254
VI.11. Lower Carboniferous (Culm) greywackes and conglomerates	254
VI.12. Arkoses and arkosic sandstones of the limnic Permian and Upper Carboniferous	256
VI.13. Mica schists	257
VI.13.1. Tourmaline mica schist from Čučice near Oslavany, SW Moravia	258
VI.13.2. Tourmaline mica schist from Altenhof near Gars am Kamp, Lower Austria	258
References	259
VII. RAW MATERIALS OF STONE SPINDLE WHORLS	263
VII.1. Proterozoic pink slate from Ovruch (Ukraine)	265
VII.2. Cretaceous limestone from Opole (southern Poland)	266
VII.3. Clay siltstone and silty shale from Uherské Hradiště-Sady (southern Moravia)	266
VII.4. Cretaceous opoka (eastern Bohemia, Lesser Poland)	267
VII.5. Talc schist from Prachatice (south-western Bohemia)	267
References	268
VIII. ROCK SALT (HALITE)	269
VIII.1. Miocene rock salt from the vicinity of Prešov (eastern Slovakia)	270
VIII.2. Miocene rock salt from Marmarosch Solotvino (Akna Slatina, Marmaroska ulohovyna Basin, Transcarpathian Ukraine)	271
VIII.3. Miocene salt from Wieliczka near Kraków (southern Poland)	271
VIII.4. Permian to Lower Triassic salt from Salzkammergut (Austria)	271
VIII.5. Permian salt of the Stassfurt – Halle area (eastern Germany)	274
References	274
IX. USING OF FOSSILS AND OTHER LITHIC RARITIES IN PREHISTORIC TIMES	275
References	280
X. STONE PSEUDO-ARTEFACTS AND FAKES	281
References	283
XI. PICTURE SUPPLEMENT	285