




SEMPER FIDELIS. IN HONOREM MAGISTRI MIRCEA IGNAT

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Dumitru Boghian



Editura Istros a Muzeului Brăilei  
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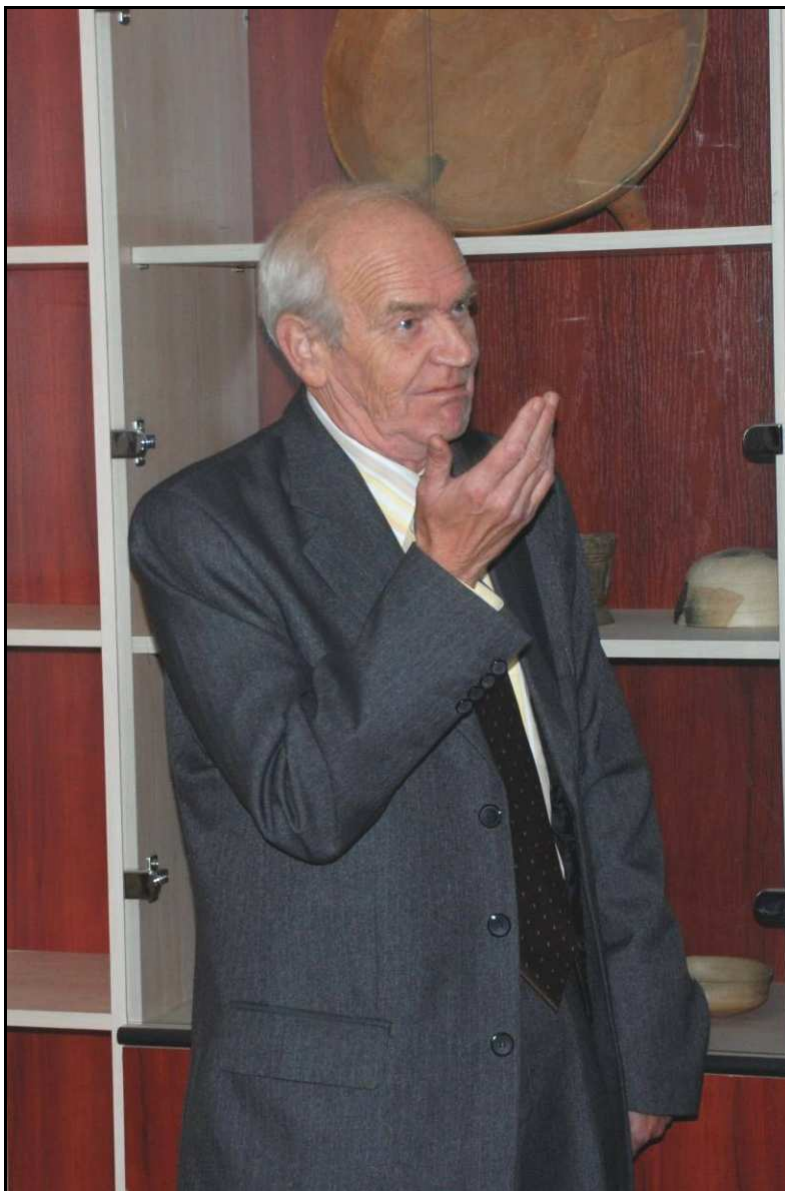
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# THE WORKS OF BALTHAZAR HACQUET – SOURCES FOR THE STUDY OF THE NATURAL RESOURCES USED BY THE PRE-HISTORICAL AND HISTORICAL COMMUNITIES FROM THE NORTH-EASTERN CARPATHIAN AREA

Dumitru BOGHIAN

**Rezumat:** În lucrarea de față, autorul prezintă știrile despre resursele naturale cuprinse într-o serie de lucrări ale geologului Balthasar (Belsazar) Hacquet, realizate în urma călătoriilor sale de la sfârșitul secolului al XVIII-lea, în Carpații de nord-est și zonele adiacente. Pe baza acestor relatări, se demonstrează existența a numeroase resurse minerale (roci, silix, compuși de fier și de mangan, cupru, aur, izvoare sărate etc.), aflate în poziție primară sau secundară, necesare devenirii comunităților umane pre-, proto- și istorice. Coroborarea acestor date cu cele oferite de cercetările arheologice, îi permit autorului să arate că resursele existente în zonă au fost utilizate de diferitele comunități umane, cu mult înainte de exploatarea industrială intensivă, din epocile modernă și contemporană, și au avut efecte favorabile și asupra densității habitatului uman din arealul vizat.

**Cuvinte cheie:** Hacquet, Bucovina, Carpații de nord-est, resurse naturale, spațiul nord-est carpatic, preistorie, protoistorie.

**I. Introduction.** Natural resources (ground and underground) played a determining part in the foundation of the human habitat, during all historical eras, but mostly during prehistory and proto-history. The human communities exploited, under the environmental conditions and necessities, related to the scale of historical times, many of the primary natural resources, which were immediately available (minerals, compounds and rocks found in outcrops, salt, flowing and stagnant water, wood and forest, grazing and crop fields with developing soil). Following the interventions, more and more pronounced in the ecosystem, man brought a significant contribution to the natural environment (*landschaft*), which partly became, an anthropic environment.

Otherwise, the *landschaftarchäologie*, *ecosystem archaeology* / *landscape archaeology* as a multi- and interdisciplinary comprehensive approach, follows, among others, the identification of useful natural resources (minerals and non-minerals), that were used during pre-, proto- and history by the human communities (Lüning 1997, 277-285; Zimmerman 2002, 17-38; Zimmerman, Richter, Frank, Wendt 2004, 37-97; Kuna, Dreslerová 2007, 150). At the same time, considering that some resources were found especially in underground deposits and in mountain areas, the

branches of mining and / or mountain archaeology appeared (Haupt 1866; Freise 1908; Schwarz 1936, 35-38; Wilsdorf 1964, 54-71; Antonacci-Sanpaolo 1992; Bailly-Maître 1993, 237-264; Bailly-Maître, Ploquin 1993; Di Lemia, Galiberti 1993; Steuer, Zimmermann 1993; Weisgerber 1995, 23-29; Wollmann 1996; Stöllner 2008, 149-178), which could bring important contributions to the direct or indirect construction of some economic, social and ethno-cultural processes.

The geological researches, different sources written from the previous times (maps, travelling notes, descriptions etc.) documentary sources, especially Austrian ones (Ceașu 1982, 377-392), and the archaeological researches revealed the presence of significant natural resources, in the area of Bucovina Carpathians, the piedmont one, sub-Carpathian and the tableland one, which were used by the pre- and proto-historical communities.

**II. Objectives.** In the current study we intend to present some of the important historical sources from the XVIII<sup>th</sup> century and from the beginning of the following one (Hacquet 1791; Hacquet 1792; Hacquet 1794; Hacquet, 2002; Ровенчак 2000, 56-62), owed to Balthasar (Belsazar) de la Motte Hacquet, on the basis of which, under the circumstances of absence or lack of previous knowledge about Moldavian medieval documents, they can enlighten us, even partially, on the image of the existence of some important natural resources in the North-Eastern Carpathian area, which are likely to have been exploited in the pre or proto-history. We refer to the remarkable works *Hacquet's neueste physikalisch-politische Reisen in den Jahren 1788 und 1789 durch die Dacischen und Sarmatischen oder Nördlichen Karpathen* (1791), *Neueste physikalisch-politische Reisen in der Jahren 1791, 92 und 93 durch die Dacischen und Sarmatischen oder Nördlichen Karpathen Dritter und vierter Theil* (1794) and *Physischen und sechniethen Beschreibung der Flintensteine, wie sie in der Erde vorkommen und deren Zurichtung zum oekonomischen Gebrauche* (1792).

### III. Data and Discussions.

**III. 1. B. Hacquet. Some bio-bibliographical data.** Balthazar Hacquet (Belsazar de la Motte Hacquet, 1739/40 – 1815) is a well-known Austrian scientist of French origin, of Enlightenment formation: medic, naturalist, geologist, ethnographer, journalist, professor at Laibach / Ljubljana (1780), Lemberg / L'viv (1788) and Cracovia (1805), explorer who, serving the Habsburg Empire, travelled through Banat, Transylvania, Wallachia, Croatia, Iliria, Bucovina and Galitsia, the Russian Empire, Ottoman Empire etc. and left important descriptions regarding natural,

ethnographic and socio-political facts from the places he had known directly (Fig. 1.1-2). After his studies at the Jesuitic College in Pont-à-Mausson and then in Paris, he left France and studied at Vienna both medicine and law.

He had an adventurous youth, being involved as a surgeon in several military operations, in the Austrian army, mainly during the Seven Years War (1756–1763). He combined with great skill the scientific observation and the field research, during several expeditions, some financed by Maria Theresa (1717–1780) and Joseph II (1741-1790), with his didactic activity and the publication of his investigations results in renowned scientific magazines of German expression of the time, and as well as in independent volumes. Withdrawn in Vienna, he died on the 10<sup>th</sup> of January 1815 (Reichardt 1879, 300; Jakob 1930, 223-237; Kranjc 2006, 163-168; Klemun 1988, 5-13; Klemun 2007, 49-61; Južnič 2004, 167-187; Byczkiewicz 2007, 419-429; Ivanov, 2007, 54-56; Flügel, Wach 2011, 1-50).

The reception of Balthazar Hacquet's writings in Romania is extremely pale. His expeditions in the East-Carpathian area were made public for the first time in Romanian by Nicolae Iorga (Iorga 1981, 427-433), and only very late, in 2001, in the collection *Călători străini despre Țările Române* (*Foreign travelers about the Romanian Countries*), (Călători străini 2001, 809-859) and 2002 they were translated, on the occasion of the realisation of the series *Cyclopaedia of Bucovina in Studies and Monographs*, chapters I, III and IV from the first part of the work *Hacquet's neueste physikalisch-politische Reisen in den Jahren 1788 und 1789 durch die Dacischen und Sarmatischen oder Nördlichen Karpathen*, Im Verlag der Raspischen Buchhandlung, Nürnberg, 1790 (Hacquet 2002), (Figure 1.3).

The other parts and chapters, with references to Hacquet's travels in the Northern Carpathian area, in Galitsia, the Russian Empire (Scharr 2004), are not, unfortunately, known or used in the Romanian historiography. Referring to our topic, we show that in the Eastern Carpathians and the North-Eastern Carpathian area Balthazar Hacquet followed different routes making careful geological, botanical, ethnic, social, political observations etc. (fig. 2). On these occasions, he made references to some natural resources found in different regions: geological structures, rocks, minerals, saliferous sources, mineral waters. One of the declared objectives of his expeditions was also the study of flint deposits of good quality from the Podolo-Volhynian Tableland, so necessary in the manufacturing of the fire giving apparatus for the rifles and pistols in the XVI<sup>th</sup>–XVIII<sup>th</sup> centuries and even the beginning of the next one (*pierre à fusil*), the so called *flints* (romanian *flintă*).

**III. 2. Information regarding the mineral resources.** Arriving in Moldavia from Transylvania, Hacquet made ample observations on the Eastern Carpathians in his first chapter *Von den in der obern Moldau oder den Transalpinischen Dacien, Zara de Sus oder dem obern Lande, befindlichen Karpaten, deren Steinarten, Pflanzen, Mineralien und Wassern; ingleichen von den Wallachen oder Moldauern u.z.w.* [About the Carpathians from Upper Moldavia or Transalpine Dacia, the High Country, about the types of rocks, plants, minerals and their waters, and also about Wallachians and Moldavians, etc.] (Hacquet 2002, 2-5). There are mentioned deposits of slate, quartz, limy gritstone, granite from the Pietrele Roșii (Red Stones) area (that formed *trium confinium* between Moldavia, Bucovina and Transylvania), brown porphyry that compose the Căliman [Koliman] Mountain, mines of gold, silver and lead from Rodna, for which Hacquet, having very little knowledge of Slavonic language, tries to give an etymological explanation [*ruda*, *rudnic* = mine, ore] (Hacquet 2002, 4-5), a source of galena in schists, gneiss, limestone and granite on the Cucurata Mountain, porphyry, granite, jasper, amphibole, feldspar, shale, black tourmaline in the open sections of the Neagra and Negrișoara brooks and the Dorna river (Dorna Depression) (Hacquet 2002, 6-9), a demolished mine of oripigment (red arsenic) at Șaru Dornei (Hacquet 2002, 11).

Going on, Hacquet mentions the rocks that are sectioned by the Golden Bistrița (granite, limes, argillaceous schists etc.) showing that “now (1788, n. B.D.) you couldn’t find anyone to clean the gold, not for the lack of gold, but due to war turmoil” (Hacquet 2002, 12- 13), (the Austro-Russian-Turkish war, 1787–1792, n. B.D.). Coming back to 1789, in the Iacobeni mine exploitation area and the surrounding areas, as shown in the III<sup>rd</sup> chapter of the same volume, entitled *Von der kaiserlichen Moldau oder Bukowina, deren Gebirgen, Bergwerken, Goldwäschereyen, Salzsiedereyen, von den Lipowannern u.s.w.* [About Imperial Moldavia or Bucovina, mountains, mines, gold cleaning, salt mines, about Lippovans, etc.] Hacquet presents how the gold was cleaned in the flood-plain of the Golden Bistrița river, upstream and downstream Iacobeni, in the same manner as in Hungary and Transylvania, using a plank with transverse cuts angled at 22°, on which the alluvia from the river were put. The gold grains remained in the deeper parts of the plank. It was 23 karat gold, only rarely was it alloy (Hacquet 2002, 84-85).

As far as cleaning the gold is concerned, it is mentioned the existence of the alluvial iron ochre (haematite), cleaned from the iron deposits downstream Iacobeni “The gold is cleaned in the Golden Bistrița or, better said, in the ooze that the river left on the banks and the gulfs or its

enlargements, having a great quantity of iron ochre or powder hematite, so that the banks can be seen from far away coloured by these elements at a width of several feet; the more they are, the more gold the cleaners hope to find." (Hacquet 2002, 84-85)... "So the gravel drawn from the precipices and from the mountain dikes (several hours upstream Iacobeni, n. B.D.) get altered, the iron oxide pieces separate from the camouflaged precious metals, in such a manner that many times the greasy ochre covers the gold, as it is shown while cleaning the gold, this being a reason why the gold cleaners prefer that ooze coloured by ochre. The small river meanders and gulfs naturally replace what should be done in other parts through digging holes, where the deposit appears after the drainage of the water." (Hacquet 2002, 86-87). Among the places where the gold was cleaned, there are reminded "the few enlargements" on the Golden Bistrița / Bistrița from Ciocănești, Vatra Domei, Tarnița and Holda, upstream as far as the border with Maramureșul, between Suhard and Obcina Mestecănișului. The grains of gold were bigger in the mountain area than downstream (Hacquet 2002, 86-87). The attempts of exploiting the gold from the deposit had failed because of the weakness of the deposits as it was the case at Fundul Moldovei and Tonegar (Tonograd) Mountain, on the eastern side of Obcina Meștecănișului, where the gold could be found in the massif of granite, schist and gravel, along with the cooper, iron and lead compounds (chalcopyrite, galena) (Hacquet 2002, 88-91).

Going on from Bistrița valley to Moldova valley, at Găinești (in Obcina Voroneț), Hacquet remarks the decrease of the mountains made of argillaceous schists and sedimentary rocks (calcareous gritstones) (Hacquet 2002, 12-13). Arriving at Baia [*Baja* or *Banya*], "a miserable village" that could be found on a plain surrounded by small mountains, the geologist feels the need to correct several inadvertences transmitted by Franz Joseph Sulzer (Sulzer 1781) showing that the mines that could have existed there, could not have been productive because of the limestone layers from the small southern mountains (Stânișoara Mountains).

Thus, he lays emphasis on the fact that the inhabitants called it Baia de Aramă (*Sic!*) and considers that sometime in the past cooper was exploited (Hacquet, 2002, 12-13). Talking about the mountains between the Moldova and Suceava valley (especially Obcina Mare n. B.D.), beside the lower altitude, Hacquet remarks that the mountains are stratified and contain amphibole and flint: "*Pyromachus, silex ignarius niger et cinereus*", about which it is shown that appear in clays and sand and they are of

inferior quality compared to those from marl and chalk, couldn't be used to obtain lamellas for riffles (Hacquet 2002, 14-15).

For the Botoșani area (Middle Prut Depression, n. B.D.), Hacquet claims that the good quality of the clay useful for ceramics and bricks (Hacquet 2002, 14-15), and also clayey schists, gritstone, amphibole and limestone carried by Siret and Prut, from the Carpathians downstream (Hacquet 2002, 16-17).

Going over the Prut he arrived, through Briceni and Cruglic in "the Turkish Moldavia, or the country of the Hotin (Hoczim, Raja de Hotin)" (Hacquet 2002, 16-17), on the shores of the middle Dniester, where he could see the layers cut by this long river, containing shell limestone, sands, clays, sedimentary rocks, bituminous schists, amphibole and flint in marl layers, of good quality, appropriate for riffles. It is also interesting the mention according to which, in the Hotin area, there were small deposits of "sphere shaped iron ore, *ferri pisiformis niger* (sphere-shaped siderite, n. B.D.) but not in such sufficient quantities" to be industrially used (Hacquet 2002, 18-19).

Hacquet's journey continued on the left bank of the middle Dniester, at Okopy, between Podhorzi (Podhory) and the Dniester, at Swanitz (Zvaniec) and Kamienec Podolskj (Podilskj), in the second chapter describing *Von des zeitlichen oder Vorgebirgen Podoliens, welche zwischen dem Spruce oder Podhorce und dem Dniester- oder Niesterfluß liegen, den darinnen befindlichen Flintensteinen, u.s.w.* [About the past Podolian mountains feet, situated between Zbrucz and Podhorcze and the river Dniestr or Nistr, the flint that can be found in them, etc.]. From the view point of the approached subject, the chapter is extremely important because it emphasises the existence of a good quality flint in the Podolian Tableland of grey, black or mixed colour, in the quarries between Zbrucz, Podhorcze, Hlemboka [Hliboka] Dolina and the Dniester, which could be found in sedimentary rocks, gritstone, marl, bituminous schists and limestone. He designates this variety of flint as *Galitsian flint*. That is so because the Austrians started in 1788 to build a flint lamella factory for guns (Hacquet 2002, 28-29; Hacquet, 1791, 38-82), when Hacquet's investigations were extremely actual and necessary. Nevertheless, in the same period, Hacquet's investigations concerning the Podolian flint are stored in a work where the geologist draws the attention of the Austrian riffle "rocks" industry that this source was of a better quality, in comparison to the flint imported from France (Hacquet 1792, 2-7). Other sources of flint are signalled in Marianpol, Nizhniow, Zaleshchik and in Pokuttya (Hacquet 1792, 2-7).



Going back towards “Imperial Moldavia” (Bucovina), Hacquet travelled through Horodenca and Snyatin towards Cernăuți [Czemowitz / Chemivtsi], remarking that in the Sub-Carpathians from that area the limestones were predominant, along with conglomerates, amphiboles, gritstones and clays (Hacquet 2002, 30-31). He reaches Vicov, “at the feet of the Carpathians” and the author mentions not less than six rivers (Slatina Vicovului, Din jos la Preluce, A lui Coroamă, Lubonca, Slatina de la Runc and Bahna), last two of which having a bigger saltcontent than the others that were used by the inhabitants with the permission of the authorities (Hacquet 2002, 32-35).

The geologist remarks that “Upstream Suceava, as far as Straja”, there could be found in the gravel brought from the mountains (Obcina Mare n. B.D.): black basalt, coloured clays, different varieties of limestone, amphiboles, quartzite, good quality schists and flint, blackish brown in the interior, semitransparent, whitish blue in patinated breach, claiming that this last one should be closely observed (Hacquet 2002, 36-37). In the woods of Straja he found birch bark distillation furnaces where terpene/tar could be obtained (Hacquet 2002, 34-37), as a liquid version of the betuline.

Later on, Hacquet arrived at Putna, Rădăuți, Marginea, Sucevița and over the Pleșa Mountain, made up of grey gritstones, at Solca, where the two salty springs from Pleșa and Plosca were mentioned, and where drillings were made in order to identify the halite and where boilers were used to evaporate the water from the salty waters (roumanian *slatine*) and to obtain crystallized salt in cones. East of them, other three springs are mentioned, each of them having an evaporation boiler: Slătioara, Trestieni and Pârtești (Porteczie). The production of the “five little factories” was quite important, generating 354 salt quintals in 14 days (Hacquet 2002, 48-51).

Leaving further, towards Capul Codrului and Gura Humorului, the geologist notices that the mountains (Obcina Voroneț and the south-east of the Obcina Mare, n. B.D.) were stratified in such a way that in the coloured clay layers that were alternating with sand there could be found spherical pieces of quartz and coarse jasper. Accidentally he found white-grey marl, marl mixed with black-grey flint, with cubical breach (silicolite n. B.D.) schists, limestone etc. (Hacquet 2002, 52-53). Re-entering the valley of Moldova (third chapter), Hacquet shows that “we can recognize, in part, the soils of which high mountains are made of”: amphiboles, limestone, quartz and rocks with twisted and laminated quartz, micaceous schists, red marble with white pigmentations, various clays etc. (Hacquet 2002, 74-75).

To the west, upstream Moldova, towards Câmpulung Moldovenesc [Kimpolung], Hacquet signals the limestones originating in the Giumalău Mountains, and from the “smaller mountains” (Obcina Feredeui and Obcina Mestecăniș, n. B.D.) red granite, limestone, schists, sands. At Pojorâta he remarks that the mountains are made of grey gritstone and limestone, and at the entrance on the Putna valley and road a gallery where red schists mixed with quartz could be found. Upstream it, he shows that a haematite exploitation opened in the gallery, that was processed in a smelting house that had been created a few years before (1789, n. B.D.), together with the minerals brought from Valea Fierului, near Vatra Dornei (Hacquet 2002, 78-81).

Really interesting is the detailed description made on the iron ore discovered in the south-eastern part of Obcina Mestecăniș, between Pojorâta and the Dornelor Depression, and the ways that these elements were processed at the factory in Iacobenii: “The ore are the following: 1. The Iron Ochre *Ochra ferri* of bright yellow colour, light and with conchoidal breach. This ochre can be found under water, it’s very soft and can be easily decomposed into dust. Secondly, the yellow ochre, hardened with quartz and mica, being mixed with more soil than the precedent, has a smaller consistence. Thirdly, a very brown ochre, spongy as if clotted, is nothing else than a low depth deposit (*Wasenlauffer*)\*. The reminded mining types are exploited at Dorna, on the plain, not far from Bistrița and other areas. This ore’s density is of twelve to twenty and even more pounds to quintal thus being unprofitable for smelting, but very useful as an addition to richer ores. Forthly, the ordinary haematite (*minera ferri vulgaris*), irregular, coarse, and it is mixed with pyrolusite (*Magnesia*). This ore sometimes seems as being half melted, is exploited in lodes (*gangwey*) and has a content of thirty to fifty pounds quintals to of one hundred pounds of iron. Fifthly, a haematite similar to ochre, exploited in an abyss in an overhang (*hangend*), not far from the factory at Iacobenii; it is mixed with schist with mica content and covered with crust of pyrolusite that can create beautiful dendrites if placed on solid frames. This ore is poorer than the previous one. Sixthly, a yellow iron ore, mixed compactly with pyrolusite and quartz that has an iron content of thirty-five and forty of pounds per quintal. The contact faces with the load were made of mica schists. The seventh ore is

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\* Some linguistic collocations were adjusted by us, in conformity with the mining and geological meanings implied by them, being somehow different from the current translation.

completely black, it divides into iron ore slices made of pyrolusite, which sometimes seems crystallized and is as rich as the precedent one. The mountain from which the ore is exploited is made of quartz and the lodes are made of the previously mentioned schist. The last four ores are exploited at Valea Fierului (south-east of Iacobeni n. B.D.), not too deep in the mountain. The eighth ore is coarse, as if completely coloured in black by the pyrolusite and goes on with ochre, is exploited from the same rocks, like the ones above, but has a content of only forty pounds per chital; it is exploited at Valea Putnei or Pojorâta, near Iacobeni. The ninth ore is a marsh iron ore, *minera ferri palustris*, hard and its shape is of lamella, but also of spheres which are empty on the inside; its content is of fifteen to twenty-five pounds and even more per quintal (Hacquet 2002, 78-83).

In the fourth chapter, *Fortsetzung des übrigen Theils der Bukowina an den Gränzen Marmatiens gelegen, von dem hohen Gebirge Luscina, der allda befindlichen Pferdezzucht, von der Provinz Pokuttia, deren Salzflöze, Salzsiedereyen, Karaemii oder Juden u.s.w.* [Sequel Regarding the Bucovina Part Bordering Maramureş; about the High Mountains of Lucina and about Horse Breeding in that Place; about Pokuttia Province, about its Salt Deposits, Salt Boiling Places, the Karaims or the Jews, etc.], Hacquet shows that towards north-west, towards Moldova's springs, "Sulița Mountains" (which are part of Obcina Feredeului, n. B.D.) are made of limestone, silica siliceous breccia and quartzites (Hacquet 2002, 92-93, 96-97).

Travelling towards north, he reached Cernohora Mountain, where Black Ceremuş originates, and where there could be found at that time another *triplex confinium*, among Hungary, Pokuttia and Galitsia. The mountains from that area (Aluniş, Pogonişte, Getshive, Marenişte), on the northern segment of Obcina Mestecănişului, (n. B.D.) are made up of: limestone, layers of red soil (maybe iron oxides, n. B.D.), red schists and gritstone (Hacquet 2002, 96-97). At the border between Bucovina and Pokuttia, the Ceremuş River crosses the mountains made of gravel, limestone, plaster, amphibole, altered basalt, clay (Hacquet 2002, 98-99). Schists, gritstone and clay can be also found in the other mountains crossed by Ceremuş, and in the surroundings of the small town Kutty he signalled: gritstone, quartz schists, limestone, breccia, amphibole (Hacquet 2002, 102-103).

Until the end of the chapter, Hacquet makes remarks on the composition of the different Pokuttian Carpathians subdivisions that don't differ from the one in Obcinile Bucovinei, the good quality Koszow flint, marl, schists, limestone, comean, discovered in many places and numerous salty springs, where boiling places were organised: Koszow, Pistin, Utorop,

Jablonoŭ, Nadworna (towards the Galitsian Bistritsa basin), Solotwino (towards the superior Tisa basin), Krasna (Krasna Ilski, n. B.D.), Kalush and the mining exploitation from Okna (Hacquet 1791, 180-206).

At the end of this short presentation, we show that Balthazar Hacquet created and transmitted the first accurate observations regarding the natural resources from the North-Eastern Carpathians zone (Bucovina, Pokuttia, Galitsia), offering us a general image over what this ecosystem before the preindustrial period consisted of. This information was verified and certified by subsequent geological researches (Borcoş *et alii* 1983, 1984; Bâgu, Mocanu 1984, 235-250; Mutihac 1990, 171-195; Grasu *et alii* 1998), proving once again the value of the information transmitted by the well-known geologist.

At the same time, we draw attention to the extremely valuable information discovered by B. Hacquet and to the economical, social, political-military realities at the beginning of the Austrian rule implementation and functioning in the North-Eastern Carpathian area (Bucovina, Pokuttia, Galitsia), and to the administrative and political-military situations in the neighbouring areas.

**IV. Archaeological corroboration of the data transmitted by Balthazar Hacquet.** Certainly, even though there is no direct proof of Carpathians and peri-Carpathians mineral resources exploitation in pre and proto-history (except salt), we specify that, indirectly, the volcanic, metamorphic and sedimentary rocks and from the last type the flint and jasper were used both from the primary occurrence areas (Carpathian deposits and outcrops, the ones from Moldo-Volhyno-Podolian Tableland) and from the secondary sources, from the minor river beds that eroded the mountains. Irrefutably, this fact can be noticed from the review of the raw lithic materials from which tools and weapons of the Palaeolithic and Epipalaeolithic / Mesolithic, Neolithic and Eneolithic communities were made, and of the ones from the Iron and Bronze Age: different varieties of gritstones (siliceous, limestone, micaceous, glauconitic, etc.) grauwacke / greywacke, silicolites, flint, jasper, schists (green clayish of Audia etc.), bituminous marls, siltites and argillites, basalt, granite, andesites, tuffs etc. The data provided by the Gravettian site from Pojorâta-Poalele Muncelului, situated in a mountain area, are very interesting, where about 60% of the pieces were made of glauconitic silica gritstone, about 22% of flint (blue and brown-grey translucent) and about 18% of black schist, mainly local rocks, situation that appears repeated in other proportions at the station in Suceava-Câmpul Ciorii and which differs from the site at Udeşti-Poiana

(72% flint, 17% menilite, 5% black schist and 5% glauconitic silica gritstone) or Dolhasca–Dealul Viei ( 80% Prut flint, 17% glauconitic silica gritstone, 2% menilite and 1% black schist); (Chirica, Tanasachi 1974-1976, 267-278; Chirica 1989, 76-80, Ciortescu-Bitiri 1981, 331-346; Ciortescu-Bitiri, Căpitanu, Cârciumar 1989, 7-52; Păunescu 1998, 80-98). This situation is similar to the one in other Palaeolithic sites from the mountain area: Bicaz–Ciungi and Bardos, settlements from Ceahlău, Bistricioara and so on (Păunescu 1998, 101-286), Neolithic and Eneolithic (Ursulescu 1972, 69-78; Ursulescu 1983, 21-41; Ursulescu 1991, 214; Ursulescu 2000, 269-271; Ignătescu 2000a, 64-74; Ignătescu 1999-2000-2001, 45-87; Ignătescu 2000b, 389-399; Marinescu-Bîlcu, Cârciumar, Muraru 1981, 16; Boghian 1995, 7-42; Boghian 1996, 4-36; Boghian 1996, 277-342; Boghian *et alii*, 2004, 135-160; Cotoi, Grasu 2000; Cotoi 2003, 101-118; Niculică, Andronic 1997-1998, 7-17; Batariuc 1979-1980, 34; Mareş 1990-1991-1992, 496) and from the Iron and Bronze Age (Niculică 2003, 67-80; Munteanu 2010, 12-14, 168-170; Березанская 1994; Мазур 2001).

A special attention must be made of the flint sources mentioned by Hacquet. He signalled some Carpathian sources (Obcini area), from the Middle Dniester and Galitsia area, not knowing—because of the direction he followed—about the Prut flint. The subsequent geological and archaeological researches brought to light both the presence of flint and of the Carpathian jasper (Păunescu, 1998, 48-55, with extensive references from the geological literature; Cârciumar, Anghelinu, Nițu, Cosac, Murătoreanu, 2007, 15-48), and the presence and the special quality of the flint varieties from Prut and Middle Dniester areas (Bibikov 1953, 79-80; Bibikov 1966, 3-6; Passek 1950, 40-56; Passek 1961; Černyš 1967, 60-67; Zbenovič 1989, 47; Videjko 2003, 48-51; Videjko 2004, 47-48; Petrun 2004, 199-218) and Podolia-Volhynia (Свешников 1969, 136; Свешников 1974, 97; Skakun 1990, 43-45; Skakun 1996, 223-235; Skakun 1999, 133-135; Petrun 2004, 199-218; Бурдо 2008, 3–8; Boghian 2008, 39-70).

The same thing can be said about the iron, manganese and copper compounds, that could be found both in the primary occurrence areas (Obcinele Bucovinei), and also re-sedimented in the deposits “aligned” mainly along the flood-plains of Moldova and Bistrița rivers, not excluding their appearance on the flow of some of their tributaries, and also on different sections of the Moldo-Volhyno-Podolian Tableland. Given these conditions, “the coloured soils”, the iron and manganese compounds could be easily found, both by the Palaeolithic and the Epipalaeolithic / Mesolithic communities, and also by the Cucuteni ones (Stos-Gale, Rook,

1981, 155–161; Niculescu, Coltos, Popovici, 1982, 205–206; Mantu, Vlad, Niculescu 2001, 191-210; Traşka *et alii* 2003, 179–194; Constantinescu *et alii*, 2007, 281-288; Buzgar *et alii* 2010, 5-14; Buzgar *et alii*, 2010, 95-108\*\*), for ceramics painting and more (body marks, dwellings and sacred buildings painting, etc.), and then by the communities from the Iron and Bronze Age, until The Middle Ages, in order to manufacture different metallic artefacts.

As far as cooper deposits are concerned, we show that they were identified in the North-Eastern Carpathian area, and in the Podolo-Volhynian Tableland, between Styr-Horyn, from Zhyrychi and Rafalovka-Berestovets (Emetz *et alii*, 2006, 297-314), in the Dniester area, the superior area and the first part of the middle one (Klochko, Manichev, Kvanitsa, Kozak, Demchenko, Sokhatskiy, 2000, 168-186), and in the Putila district, between the White Ceremuş and the Black Ceremuş were registered deposits of alluvial gold, copper, manganese and also poli-metallic compounds (Župans'kji 1993, 21-23; Liubov, 2008). Referring to the alluvial gold, “washed” in the Rodnei Mountains, Obcinile Mestecănişului and Feredeului and re-sedimented in the feroxidic alluvia, of cooper and manganese type, driven downstream Golden Bistriţa (in the superior part), as far as its middle flow, it must be stated that it was unsystematically exploited, according to some incipient techniques, as we remarked, until the XIX<sup>th</sup> century (Hacquet 2002, 86-91).

The circulation at the end of the Bronze Age and beginning of the Iron Age (Gáva-Holihradý) of some human communities from west to east, might have taken place during the political-military reorganizations of that time, and also during the disputes and the search for new resources, metals included.

Last but not least, the salt resources (salty sources, the exploitation of halite) had a major importance also in the North-Eastern Carpathians, as it was highlighted for other regions (Şandru 1952, 407-424; Ursulescu 1977, 307-317; Ursulescu 1996, 489-497; Andronic 1989, 171-177; Monah 1991, 387-

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\*\* We really appreciate the attempts to define as accurate as possible the pigments used by the Cucuteni communities for ceramics painting, made in the last work, even under the circumstances of the un-comradely omission of the researchers who offered the archeological evidence. However, we consider that the historical reconstruction was altered by preconceived ideas. In our opinion, it is impossible to maintain, at least now, the hypothesis of Carpathian salt exchange versus mineral pigments in Nikopol area (Ukraine) out of the following reasons: the inexistence of any Cucuteni-Trypillian habitation traces in the area, the poor representation of the painted ceramics in the east-Trypillian part, corroborated with its massive presence in the north-eastern Carpathian and in the peri-Carpathian area.



400; Dumitroaia 1994, 7-82; Cavruc, Chiricescu 2006; Monah *et alii* 2007; Alexianu, Weller, Curcă 2011), facilitating the habitation and making of the mountain region a humanity area, to which the neighbouring areas were bound.

**V. Some conclusions.** Naturally, the mountain archeology can contribute to the checking of this data transmitted by B. Hacquet, although many of the pre-historic and historic investigations were destroyed by the subsequent habitations and industrial activities from the modern and contemporary era. Although important improvements were made in this domain as well, it is the task further investigations to check this valuable knowledge, in order to clear out, even partially, this spectacular life aspect in the mountain areas on which the existence of the communities in the adjacent areas depended on.

Historically and methodologically speaking, we find adequate the classification of the origin areas of the natural resources used by the pre-historic and historic communities according to the geomorphologic, geological and geographical criteria (Turq, 2000, 106-107; Master, Racz, 2010, 30-31):

**1) primary sources – autochthonous:** in the mother rocks from the occurrence area, *in situ*;

**2) secondary sources – sub/quasi-autochthonous:** usually resulted from natural erosion (land slides, ravines, geomorphological processes, frost-defrost, deepening of water flows etc.), and re-sedimented / accumulated, mostly, in alluvial deposits, next to the primary sources;

**3) tertiary sources – allochthonous:** resulted from repeated erosion, transported away and re-sedimented accumulated as alluvial deposits on the middle flows and even on the inferior flows with mountain springs or which go over areas with resources.

Given this fact, the knowledge offered by Balthazar Hacquet are extremely useful in order to outline a clear image on the mountain resources from the North-Eastern Carpathians and from the adjacent areas, which had been used by different pre-historic, proto-historic and historic human communities, long before the intensive industrial exploitation of the modern and contemporary era. The existence and exploitation of these resources had favourable effects also on the human settlements density over different historical ages, both in the North-Eastern Carpathians and in the neighbouring areas.

## BIBLIOGRAPHY

- Alexianu M., Weller O., Curcă R.-G. (eds.) 2011.** *Archaeology and Anthropology of Salt. A Diachronic Approach. Proceedings of the International Colloquium 1-5 October 2008, Al. I. Cuza University, Iași, Romania, BAR International Series, 2198.*
- Andronic M. 1989.** Cacica – un nou punct neolitic de exploatare a sării. *SCIVA* 40, 2, 171-177.
- Antonacci-Sanpaolo E. (ed.) 1992.** *Archeometallurgia – ricerche e prospettive. Atti del colloquio internazionale di archeometallurgia. Bologna 18-21 ott. 1988.* Bologna.
- Bailly-Maître M.-Chr. 1993.** Les méthodes de l'archéologie minière, ed. R. Francovich. *Archeologica delle attività estrattive e metallurgiche.* Firenze, 237-264.
- Bailly-Maître M.-Chr., Ploquin A. 1993.** *Brandes en Oisans. Archéologie et paléometallurgie d'un village de mineurs au Moyen-Âge.* Paris.
- Batariuc P.-V. 1980.** Așezarea precucuteniană de la Bosanci (județul Suceava). *Suceava VI-VII, 1979-1980*, 33-43.
- Bâgu Gh., Mocanu Al. 1984.** *Geologia Moldovei. Stratigrafie și considerații economice.* București.
- Bibikov S. N. 1953.** Poselenje Luka-Vrublevckaja na Dnestre. *MIA* 38. Moskva-Leningrad.
- Bibikov S. N. 1966.** Drevnje kremnvye vyrabotki v srednem Podnestrove. *Sbornik Narodniho Muzea v Praze* 20, 1-2, 3-6.
- Boghian D. 1995.** Unele considerații asupra utilajului litic al complexului cultural Precucuteni-Cucuteni-Tripolie (I). *Codrul Cosminului* SN, 1 (11), 7-42.
- Boghian D. 1996.** Unele considerații asupra utilajului litic al complexului cultural Precucuteni-Cucuteni-Tripolie (II). *Codrul Cosminului* SN, 2 (12), 4-36.
- Boghian D. 1996 a.** Unele considerații asupra utilajului litic al comunităților Precucuteni-Cucuteni-Tripolie. Eds. Gh. Dumitroaia, D. Monah. *Cucuteni aujourd'hui.* Piatra Neamț, 277-342.
- Boghian D. 2008.** Di alcune fonti di materia prima per l'utensileria litica delle comunita del complesso culturale Precucuteni-Cucuteni. In: N. Ursulescu, R. Kogălniceanu, Cr. Crețu (eds.), *Cucuteni. Tesori di una civiltà preistorica dei Carpazi.* Atti del Convegno italo-romeno, Roma, 18 ottobre, 2007. Iași/Roma, 39-70.
- Boghian D., Ursulescu N., Catana C., Romanescu Gh., Ignat M., Mareș I., Cotiugă V., Niculică B. P., Ignătescu S. 2004.** Unele considerații privind identificarea și repertorierea resurselor utile din zona montană a județului Suceava, utilizate în preistorie și istorie. *Codrul Cosminului* SN, 8-9 (18-19), 2002-2003, 135-160.
- Borcoș M., Kräutner H. G., Udubașa G., Săndulescu M., Năstăsescu S., Bițoianu C. 1983-1984.,** *Harta substanțelor minerale utile*, Second Edition, the Ministry of Geology, Institute of Geology and Geophysics. București, vol. I-II.

- Buzgar N., Bodi G., Aștefanei D., Buzatu A. 2010.** The Raman study on white, red and black pigments used in Cucuteni neolithic painted ceramics. *Anal. Șt. Univ. Al. I. Cuza Iași, Geologie*, LVI/1, 5-14.
- Buzgar N., Bodi G., Buzatu A., Apopei I. A., Aștefanei D. 2010.** Raman and XRD studies on black pigment of Cucuteni ceramics. *Anal. Șt. Univ. "Al. I. Cuza" Iași, Geologie*, LVI/2, 95-108.
- Byczkiewicz A. 2007.** Die Neueste Deutschsprachige Reiseliteratur zu Galizien. Hrsg. Schmitz W., *Zwischeneuropa – Mitteleuropa. Sprache und Literatur in interkultureller Konstellation. Akten des Gründungskongresses des Mitteleuropäischen Germanistenverbandes. Veröffentlichungen des Mitteleuropäischen Germanistenverbandes. Dresden*, 419-429; [http://www.kakanien.ac.at/beitr/emerg/Abyczkiewicz\\_1.pdf](http://www.kakanien.ac.at/beitr/emerg/Abyczkiewicz_1.pdf), accessed 10 March 2013.
- Cavruc V., Chiricescu A. (eds.) 2006.** *Sarea, timpul, omul, Catalog de expoziție*. Sfântu Gheorghe; <http://www.cimec.ro/Arheologie/sarea/index.html>, accessed 15 March 2013.
- Călători străini 2001.** Holban M., Alexandrescu-Dersca Bulgaru M., Cernavodanu P. *Călători străini despre Țările Române*, vol. X/2. București, 2001.
- Ceaușu M. Șt. 1982.** Contribuții la istoricul exploatării sării la sfârșitul secolului al XVIII-lea și în prima jumătate a secolului al XIX-lea în Bucovina. *Suceava IX*, 377-392.
- Černýš E. K. 1967.** Tripol'skie masterskie po obrabotke kremnja. *KSIA III*, 60-67.
- Chirica V., Tanasachi M. 1974-1976.** Cercetări arheologice în așezarea de la Dolhasca (județul Suceava) și unele considerații privind gravetianul de pe teritoriul României. *MemAntiq VI-VIII*, 267-278.
- Chirica V. 1989.** *The Gravettian in the East of the Romanian Carpathians*. Iași.
- Ciortescu-Bitiri M. 1981.** Așezarea paleolitică de la Udești și specificul ei cultural. *SCIVA* 32, 3, 331-346.
- Ciortescu-Bitiri M., Căpitanu V., Cârциumaru M. 1989.** Paleoliticul din sectorul subcarpatic al Bistriței în lumina cercetărilor de la Lespezi – Bacău. *Carpica XX*, 7-52.
- Cârциumaru M., Anghelinu M., Nițu El. Cr., Cosac M., Murătoreanu Ge. 2007.** *Géo-Archéologie du Paléolithique Moyen, Paléolithique Supérieur, Epipaléolithique et Mésolithique en Roumanie*. Târgoviște.
- Constantinescu B., Bugoi R., Pantos E., Popovici N. Dr. 2007.** Phase and chemical composition analysis of pigments used in Cucuteni Neolithic painted ceramics. *Documenta Praehistorica XXXIV*, 281-288.
- Cotoi O., Grasu C. 2000.** *Uneltele din piatră șlefuită din eneoliticul Subcarpaților Moldovei*. Iași.
- Cotoi O. 2003.** Observations on the Chalcolithic polished stone tools in the Subcarpathian area of Moldavia. *SAA IX*, 101-118.
- Di Lernia S., Galiberti A. 1993.** *Archeologia mineraria della selce nella preistoria. Definizione, potenzialità e prospettive della ricerca*. Roma.
- Dumitroaia Gh. 1994.** Depunerile neo-eneolitice de la Lunca și Oglinzi, județul Neamț. *MemAntiq XIX*, 7-82.
- Emetz A., Piestrzyński A., Zagnitko V., Pryhodko L., Gaweł A. 2006.** Geology, mineralogy and origin of Zhyrychi native copper deposit (North-Western Ukraine). *Annales Societatis Geologorum Poloniae* 76, 297-314.

- Flügel H. W., Wach G. 2011.** Belsazar Hacquets und Ehrenbert von Molls „Reise in die Norischen Alpen“ 1785. 225 Jahre geologische Feldforschung in den Ostalpen. *Berichte der Geologischen Bundesanstalt*, No. 84, Wien, März, 1-50; the online variant: [http://www.landesmuseum.at/pdf\\_frei\\_remote/BerichteGeolBundesanstalt\\_84\\_0001-0050.pdf](http://www.landesmuseum.at/pdf_frei_remote/BerichteGeolBundesanstalt_84_0001-0050.pdf), accessed 12 February 2013.
- Grasu C., Catana C., Miclăuș Cr., Boboș I. 1998.** *Molasa Carpaților Orientali. Petrografie și sedimentogeneză*. București.
- Freise Fr. 1908.** *Geschichte der Bergbau- und Hüttentechnik*, Band1: *Das Altertum*. Berlin-Heidelberg-New York.
- Hacquet B. 1791.** *Neueste physikalisch-politische Reisen in den Jahren 1788 und 1789 Durch die Dacischen und Sarmatischen oder Nördlichen Karpathen*, Nürnberg; <http://www.literature.at/item?objid=1385>, accessed 12 March 2013.
- Hacquet B. 2002.** *Bucovina în prima descriere fizico-politică. Călătorie prin Carpații Dacici (1788-1789)*. Bilingual edition, introduction, afterwords, notes and comments Acad. Radu Grigorovici, Preface by D. Vatamaniuc. Rădăuți.
- Hacquet B. 1792.** *Physischen und sechniethen Beschreibung der Flintensteine, wie sie in der Erde vorkommen und deren Zurichtung zum oekonomischen Gebrauche*. Wien.
- Hacquet B. 1794.** *Neueste physikalisch-politische Reisen in den Jahren 1791, 92 und 93 durch die Dacischen und Sarmatischen oder Nördlichen Karpathen*. Nürnberg.
- Haupt Th. 1866.** *Bausteine zur Philosophie der Geschichte des Bergbaues, Lief.2: Die Archäologie und Chronik des Bergbaues*. Leipzig.
- Ignătescu S. 2000.** *Cultura ceramicii liniare în Podișul Sucevei*. Graduation paper. Suceava.
- Ignătescu S. 2000a.** O descoperire precucuteniană în apropierea orașului Suceava. *Codrul Cosminului* SN, 5 (15), 389-399.
- Ignătescu S. 1999-2000-201.** *Ceramica liniară de la Mihoveni – „Cahla Morii”*. Suceava XXVI-XXVII-XXVIII, 45-87.
- Iorga N. 1981.** *Istoria Românilor prin călători*. Edition, introductory study and notes by Adrian Anghelescu, vol. III, *De la 1800 până la epoca războiului Crimeii*. București, 1981.
- Ivanov L. 2007.** Oaza de necunoscut (Un breton pe meleaguri moldave). *Transilvania* 10, 54-58; [http://www.revistatransilvania.ro/nou/ro/anul-editorial-2007/cat\\_view/47-anul-editorial-2007.html](http://www.revistatransilvania.ro/nou/ro/anul-editorial-2007/cat_view/47-anul-editorial-2007.html).
- Jakob G. 1930.** Belsazar Hacquet, Leben und Werke. *Große Bergseiger*, V, München (includes *Hacquet's autobiography*, 223-237).
- Južnič St. 2004.** Hacquetova bibliografija. *Arhivi*, 27, št. 1, 167-187; <http://www.arhivsko-drustvo.si/sl/documents/18325/25927/juznic.pdf>, accessed 14 May 2013.
- Klemun M. 1988.** Belsazar Hacquet – Begründer einer vielfaltigen Durchforschung des Ostalpenraumes. *Carinthia II*, 178/98. Klagenfurt, 5-13.
- Klemun M. 2007.** Writing, „Inscription” and Fact: Eighteenth Century Mineralogical Books Based on Travels in the Habsburg Regions, the Carpathian Mountains. *Geological Society, London, Special Publications* 287, 49-61.
- Klochko I. V., Manichev I. V., Kvanitsa N. V., Kozak A. S., Demchenko V. L., Sokhatskiy P. M. 2000.** Issues Concerning Tripolye Metallurgy and the Virgin Copper of Volhynia. *Baltic-Pontic Studies* 9, 168-186.

- Kranjc A. 2006.** Baltazar Hacquet (1739/40-1815), the Pioneer of Karst Geomorphologists. *Acta Carsologica*. Ljubljana, 35, 2, 163-168.
- Kuna M., Dreslerová D. 2007.** Landscape Archaeology and "Community Areas" in the Archeology of Central Europe, eds. D. Hicks, L. McAtackney, G. Fairclough. *Envisioning landscape: situations and standpoints in archaeology and heritage*. One World Archaeology Series, 52, Left Coast Press Inc.
- Liubov A. F. 2008.** Litologija i zolotnosnist' četvertinnih aliuvialnih vidkladiv baseinu ričioek Čiornij i Bilij Čeremoš. *Avtoreferat na zdibittja naukova stupina kandidata geologičinih nauk, Akademija Nauk Ukraini, Institut Geologičinih Nauk*. Kijv, 2008; <http://referatu.com.ua/referats/7569/175491>, 15 May 2013 (in ukrainian).
- Lüning J. 1997.** Landschaftsarchäologie in Deutschland, ein Programm. *Archäologisches Nachrichtenblatt* 2, 3, 277-285.
- Mantu C.-M., Vlad A. M., Niculescu Gh. 2001.** Painting Pigments for Ceramic Decoration in the Cucuteni-Tripolye Cultural Complex. Fl. Draşoveanu (ed.). *Festschrift für Gheorghe Laza rovic i Zum 60. Geburstag*. Timişoara, 191-210.
- Mareş I. 1992.** Sondajul de la Sfântu Ilie – "Silişte" (1991). *Suceava XVII-XVIII-XIX, 1990-1991-1992*, 496-503.
- Marinescu-Bîlcu S., Cârciumaru M., Muraru A. 1981.** Contribution to the Ecology of Pre- and Protohistoric Habitations at Târpeşti. *Dacia* NS, XXV, 7-31.
- Mester Zs., Rácz B. 2010.** The spread of the Körös Culture and the raw material sources in the northeastern part of the Carpathian Basin: a research project, eds. J. K. Kozłowski, P. Raczky. *Neolithization of the Carpathian Basin: Northernmost distribution of the Starčevo/Körös culture*. Kraków-Budapest, 23-35.
- Monah D. 1991.** L'exploitation du sel dans les Carpathes Orientales et ses rapports avec la culture Cucuteni-Tripolye. V. Chirica, D. Monah (eds.), *Le Paléolithique et le Néolithique de la Roumanie en contexte européen*, BAI, IV. Iaşi, 387-400.
- Monah D., Dumitroaia Gh., Weller O., Chapman J. (eds.) 2007.** *L'exploitation du sel a travers de temps*. BMA, XVIII. Piatra Neamţ.
- Munteanu R. 2010.** Începuturile Bronzului mijlociu în depresiunile marginale ale Carpaţilor Orientali. BMA XXIV. Piatra Neamţ.
- Mutihac V. 1990.** *Structura geologică a teritoriului României*. Bucureşti.
- Niculescu Gh., Coltos C., Popovici Dr. 1982.** Analysis of pigments used for decorations of Cucuteni pottery. *Cercetări de Restaurare şi Conservare* 2, 205-206.
- Niculescu Gh., Şiclăman D. 1994.** Difrakţia de raze X – metodă de largă aplicabilitate în studiul obiectelor minerale; posibilităţi şi limite. *Mousaios*, Second part, 321-322.
- Niculică B. P. 2003.** Topoare de piatră aparţinând epocii bronzului descoperite pe teritoriul judeţului Suceava. *Codrul Cosminului* SN, no. 6-7 (16-17), 2000-2001, 67-80.
- Niculică B. P., Andronic M. 1997-1998.** O nouă aşezare precucuteniană în nordul Moldovei. *Suceava* XXIV-XXV, 7-17.
- Passek T. S. 1950.** Tripol'skie poselenija na Dnestre. *KSIMK* 32, 40-56. **Passek T. S. 1961.** *Rannezemledel'českie (tripol'skie) plemena Podnestrovija*. MIA 84. Moskva-Leningrad.

- Păunescu Al. 1998.** *Paleoliticul și epipaleoliticul de pe teritoriul Moldovei cuprins între Carpați și Siret*. vol. I/1. București.
- Petrun V. F. 2003.** Viktoristannja mineral'noj sirovini naselennjam tripil's'koj kul'turi. M. Ju. Videjko, N. B. Burdo (eds.), *Enciclopedia Tripil's'koj Civilizacij*, tom I, kniha perša. Kijv, 199-218.
- Reichardt H. W. 1879.** Hacquet, Balthasar. *Allgemeine Deutsche Biographie*, herausgegeben von der Historischen Kommission bei der Bayerischen Akademie der Wissenschaften, Band 10, 300-301.
- Scharr K. 2004.** *Die Karpaten. Balthasar Hacquet und das "vergessene" Gebirge in Europa*. Studien Verlag, Innsbruck, Wien, München, Bozen.
- Schwarz S. 1936.** Arqueologia Mineira. *Boletim de Minas*, Anno 1933. Lisboa, 35-38.
- Skakun N. 1990.** Vivčennja eneolitičnogo poselennja-majsterny bilja s. Bodaki. *Tezi dopovidej i povidomlen 1-oj Ternopil's'koj oblasnoj naukovoju istoriko-kraeznovčmoju konferenciji*, Či. 1. Ternopil, 43-45.
- Skakun N. 1996.** Le rôle et l'importance du silex dans le Chalcolithique du sud-est de l'Europe (sur la base du matériel provenant des fouilles du campement de Bodaki). M. Groenen (ed.), *La Préhistoire au Quotidien (Mélanges offerts à Pierre Bonenfant)*. Grenoble, 223-235.
- Skakun N. 1999.** Novye dannye o raskopkah tripol'skogo poselenja Bodaki. *Arkheologični doslidžennja v Ukraini v. 1998-1999 rr.* Kijv, 133-135.
- Steuer H., Zimmermann U. (eds.) 1993.** *Montanarchäologie in Europa. Berichte zum Internationalen Kolloquium "Frühe Erzgewinnung und Verhüttung in Europa" in Freiburg vom 4. bis 7. Oktober 1990*, Archäologie und Geschichte, Band 4, Sigmaringen.
- Stöllner Th. 2008.** Montan-Archaeology and Research on Old Mining: Just a Contribution to Economic History. Hrsg. Ü. Yalçın. *Anatolian Metal IV. Der Anschnitt*, Beiheft 21, Bochum, 149-178.
- Stos-Gale Z., Rook E. 1981.** Analysis of pigments used for decorations of Neolithic pottery from Bilcze Złote, Ukraine. *British Museum – Occasional paper* 19, 155–161.
- Sulzer F. J. 1781.** *Geschichte des transalpinischen Daciens, das ist, der Wallachey, Moldau und Bessarabiens*, 3 Bände. Wien.
- Șandru I. 1952.** Contribuții geografico-economice asupra exploatării slatinelor din Bucovina de Sud. *SCȘ-Iași* III, 407-424.
- Trąbska J., Trybalska B., Gawel A., Bytnar Kr. 2003.** Pigmenty i warstwy malarskie ceramiki neolitycznej kultury trypolskiej (Bilcze Złote); Zabytki kamienne z Bilcza Złotego. *Materiały Archeologiczne* 34, 179-194.
- Turq A. 2000.** Le Paléolithique inférieur et moyen entre Dordogne et Lot. *Paléo Supplément* 2, Les Eyzie; [http://www.persee.fr/web/revues/home/prescript/issue/pal\\_1145-3370\\_2000\\_sup\\_2\\_1](http://www.persee.fr/web/revues/home/prescript/issue/pal_1145-3370_2000_sup_2_1), accessed 17 May 2013.
- Ursulescu N. 1972.** Topoare perforate ale culturii Starcevo-Criș din România. *Carpica* V, 69-78.
- Ursulescu N. 1977.** Exploatarea sării din saramură în neoliticul timpuriu, în lumina descoperirilor de la Solca (jud. Suceava). *SCIVA* 28, 3, 307-317.



- Ursulescu N. 1983.** Tipologia și evoluția pieselor de piatră șlefuită cu tăiș ale culturii Starcevo-Criș din Moldova. *Buletin Științific. Istorie*. Institutul de Învățământ Superior. Suceava, 21-41.
- Ursulescu N. 1991.** La civilisation de la céramique rubanée dans les régions orientales de la Roumanie. Eds. V. Chirica, D. Monah, *Le Paléolithique et le Néolithique de la Roumanie en contexte européen*, BAI IV. Iași, 188-224.
- Ursulescu N. 1996.** L'utilisation des sources salées dans le Néolithique de la Moldavie. M. Otte (ed.). *Nature et culture*. Vol. I, ERAUL, 68. Liège, 489-497.
- Ursulescu N. 2000.** Contribuții privind neoliticul și eneoliticul din regiunile est-carpătice ale României. Vol. 1. Iași, 276-338.
- Videjko M. Ju. 2003.** *Tripil's'ka civilizacija*. Kijv.
- Videjko M. Ju. 2004.** Bila Gora. S. M. Ljaško, N. B. Burdo, M. Ju. Videjko (eds.) *Enciclopedia Tripil's'koj Civilizacij*, tom II. Kijv.
- Zbenovič V. G. 1989.** *Rannij etap tripol'skoj kul'tury na territorii Ukrainy*. Kiev.
- Zimmerman A. 2002.** Landschaftsarchäologie. I. Die Bandkeramik auf der Aldenhovener Platte. *Bericht der RGK* 83, 17-38.
- Zimmerman A., Richter J., Frank T., Wendt K. T. 2004.** Landschaftsarchäologie, II, Überlegungen zu Prinzipien einer Landschaftsarchäologie. *Bericht der RGK* 85, 37-97.
- Župans'kji I. Ja. (red.) 1993.** *Geografija Cernivec'koj oblasti*. Cerniv'ci.
- Weisgerber G. 1995.** Aufgaben der Montanarchäologie. *Archäologie Österreichs* 6, 23-29.
- Wilsdorf H. 1964.** Aspekte der Montanethnografie, zugleich Rückblick auf die Montanarchäologie. *Deutsche Jahrbuch für Volkskunde* 10, 54-71.
- Wollmann V. 1996.** *Mineritul metalifer, extragerea sării și carierele de piatră în Dacia romană*. Cluj-Napoca.
- Березанская С. С. 1994.** Камнедобывающее и камнеобрабатывающее производство. И.Т. Черняков (Отв.ред.), *Ремесло эпохи энеолита-бронзы на Украине*. Kiev, 8-54.
- Бурдо Н.Б. 2008.** Кременева індустрія пам'яток трипільської культури на середньому Дністрі (за матеріалами колекцій Наукових фондів із розвідок Середньодніс-ровської експедиції 1964–1970 р.). *Археологія* 4, 3-8.
- Мазур В. А. 2001.** Первичная классификация кремневых орудий труда ранней эпохи бронзы северо-западной Украины. *Восточноевропейский Археологический журнал*, 5 (12), on-line papers; <http://archaeology.kiev.ua/journal/050901/mazur.htm>.
- Ровенчак І. 2000.** Бальтазар Гакет як географ України, Історія української географії. *Всеукраїнський науково-теоретичний часопис*. Тернопіль: Підручники і посібники, Випуск 2, 56-62.
- Свешников И. К. 1969.** Кремневые копи у с. Городок Ровенской области. *КСИА*, Вып. 117, М., 1969, 114-121.
- Свешников И. К. 1974.** *Історія населення Передкарпаття, Поділля і Волині в кінці III-на початок II тисячоліття до нашої ери*. Kiev.

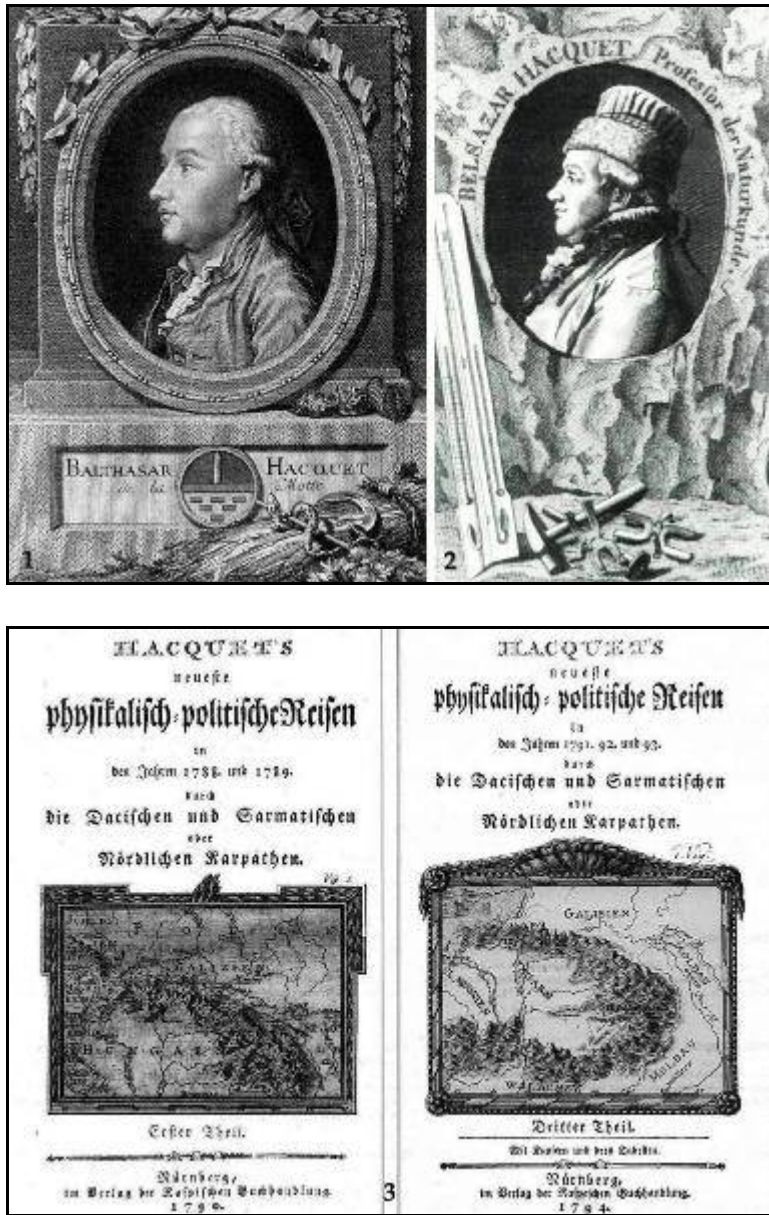


Fig. 1. Balthasar (Belsazar) Hacquet. 1. Portrait of 1777 (drawing Fr. Linde, gravure Kl. Kohl); 2. Gravure J.S.L. Halle after Th. Klemesch drawing (1793) Bildarchiv der Österreichischen Nationalbibliothek Wien; 3. Two of Hacquet's works (after Klemun, 1988 and Scharf 2004).

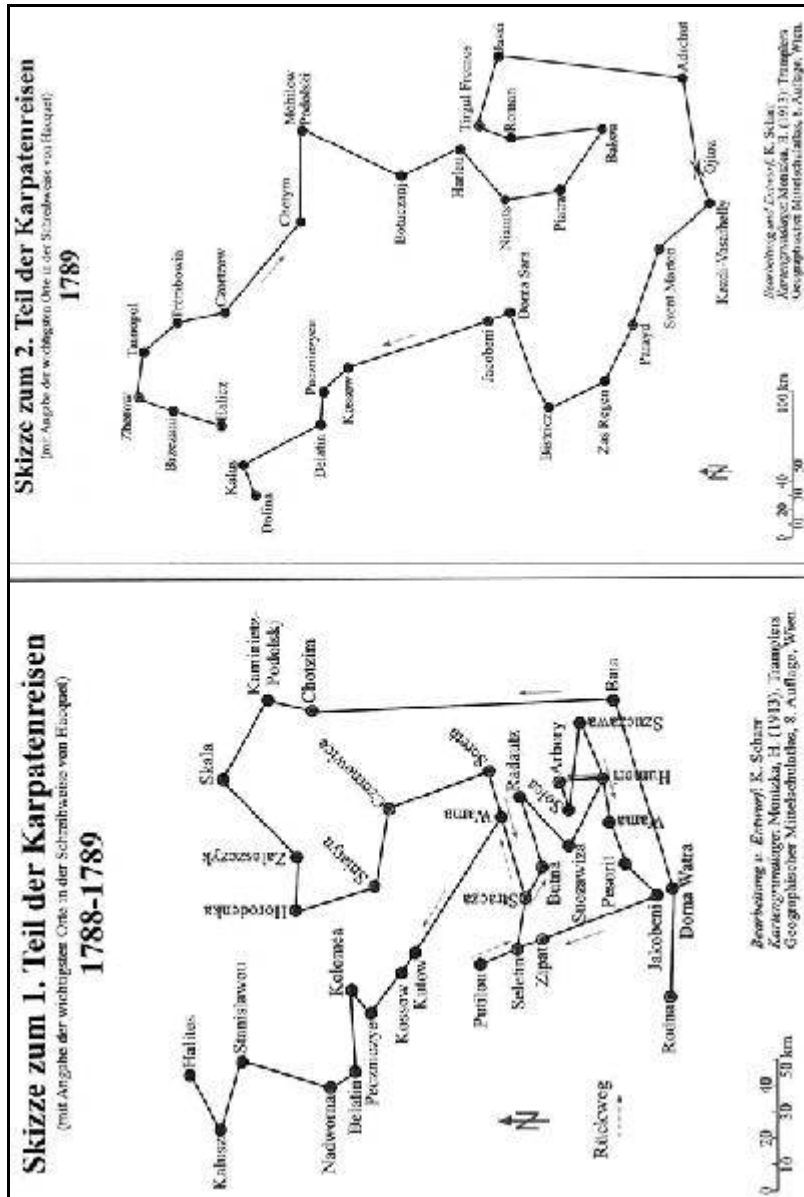


Fig. 2. The routes followed by Balthasar Hacquet in the years 1788-1789 (after Schar 2004).