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Review Paper
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Banatite metallogeny of North Poiana Ruscă Mts. revisited

Șerban Nicolae Vlad[1]

Abstract. The somehow ignored northern portion of the Banat-Timok Province/Banatitic Belt is reconsidered in metallogenetic terms after updated evaluation based on recent considerations and long ago recognized tectonic, magmatic and metallogenetic evidence. Banatitic occurrences in the investigated area are confined to the NE extent of the non productive alkali-calcic alignment up to the Mures Valley where it joins the sub-latitudinal Bega-Mures branching lineament. Banatitic edifices related to this junction depart from the alkali-calcic trend, drifting to the productive calc-alkaline porphyry environment, characteristic of Timok-South Banat metallogeny. The assemblage of Cretaceous volcanics/pyroclastics and sedimentary formation with subvolcanic and blind intrusions with associated alteration and mineralization creates a environment that reminds the well-known Timok setting. Despite the so far poor understood setting with underestimated economic attractivity, integrated geological-geophysical evidence underscore the potential of this peculiar Timok like volcano-plutonic structure associated with blind porphyry Cu-Au and distal base metal expression, fostering future investigations.

Key words:
Banatites, Timok, Poiana Ruscă, porphyry environment.

Апстракт. На неки начин занемарени северни део провинције Банат-Тимок/банатитски појас преиспитан је са металогенетског аспекта након ажуриране процене засноване на недавним разматрањима и давно признатим тектонским, магматским и металогенетским доказима. Појаве банатита у истраживаном подручју су ограничене на североисточну зону непродуктивног алкално-калцијског појаса до долине Mures где су у контакту са Bega-Mures разгранатим појасом. Банатитски продукти везани за овај контакт одступају од алкално-калцијског тренда, прелазећи у продуктивно калцијско-алкално порфирско окружење, карактеристично за тимочко-јужнобанатску металогенију. Асоцијација кредних вулканита/пирокластита и седиментних формација са плутонитима и скривеним интрузивима праћених алтерацијом и минерализацијом ствара окружење које подсећа на добро познату тимочку грађу. Упркос до сада слабо схваћеном окружењу са потцењеним економским значајем, интегрисани геолошко-геофизички докази подвлаче потенцијал ове својствене вулканско-плутонске структуре која наликује тимочкој, а у вези је са скривеним порфирским лежиштима Cu и Au са пратећим металима, подстичући будућа истраживања.

Кључне речи:
Банатити, Тимок, Poiana Ruscă, Порфирска лежишта.

[1] Babes-Bolyai University. Cluj-Napoca, Romania, E-mail: serban.nvlad@gmail.com

Introduction

The history of banatites extends from early sources such as von Cotta (1864) who introduced this term into the geological literature, till present times when this complex rock association of Late Cretaceous age is accepted as a subcontinental belt named Banatitic Magmatic Metallogenetic Belt /BMMB (*e.g.,* Berza et al., 1998) or Apuseni–Banat–Timok–Srednogorie Magmatic Metallogenetic Belt/ABTS (*e.g.,* Popov et al., 2000). Relaying on multi-secular time span contributions, various authors expressed their interest during the last decades in terms of general outlook, structural setting, petro-geochemistry, geochronology and metallogeny, (*e.g.,* Janković, 1997; Vlad, 1997; Berzaet al., 1998; Popovet al., 2000; Heinrich & Neubauer, 2002; Ciobanu et al., 2002; Dupont et al., 2002; Vlad & Berza, 2003; Berza, 2004; von Quadt et al., 2005; Zimmerman et al., 2008; Berza & Ilinca, 2014; Gallhofer et al., 2015; Vander et al., 2016). Such recent literature generated more or less accurate models based on credible age determinations, relations between magmatism and metallogeny and, last but not least, suggested tectonic setting. Plate tectonic setting is still controversial, featuring both compressional and extensional interpretations. If progress was made in terms of geochronology and petro-geochemistry, lack of systematic sampling procedure (*i.e.,* type location and selective samples from early stage and major trends - main stage of the banatite multistage entity) or even use of uncredited samples (such as molybdenite analyzed by Ciobanu et al., 2002) or otherwise speculative interpretations (Dupont et al., 2002) represent so far obstructions in recognizing the real Banatitic magmatic-metallogenetic signature.

Banatitic metallogeny in Banat-Poiana Ruscă Mts.

The present paper refers to the northern part of Banat-Poiana Ruscă Mts. (South Carpathians) segment of the Banatite Belt. This somehow ignored area was revisited recently and reconsidered in metallogenetic terms based on a set of three long ago recognized, and still valid evidences, with – so far – the most reliable regional geophysical support provided by Andrei et al. (1989):

Banatitic tectono-magmatic alignments, by Giuşcă et al. (1966);

Banatitic magmatism, both volcanic and intrusive, characterized by poly-stage emplacement; spatial distribution as coinciding magmatic and metallogenetic alignments by Cioflica & Vlad (1973);

Magmatic-metallogenetic zonation with spatially distributed porphyry *vs.* non-porphyry environments: the main intrusive event contains two calk-alkaline productive magmatic suites, resulting in Cu *vs.* base metal ore formation and adjacent non-economic alkali-calcic suite by Vlad (1979).

Banat–Poiana Ruscă Mts. (South Carpathians) banatites, including the area under present evaluation, belong to the Banat–Timok Province (BTP) of the BMMB (Fig. 1). Their main characteristics are recalled briefly below (*e.g.,* Berza et al., 1998; Vlad & Berza, 2003; Berza & Ilinca, 2014):

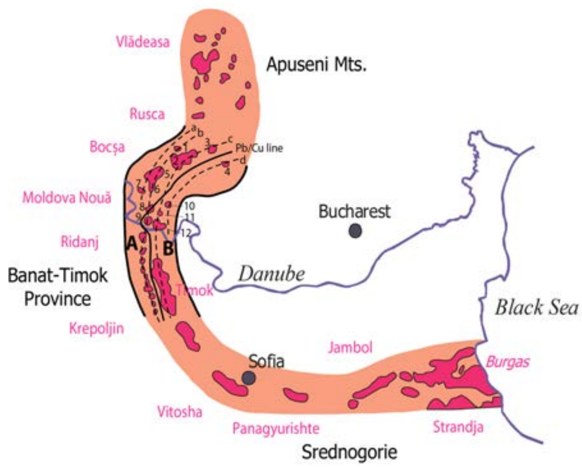

*Fig. 1. Volcano-plutonic alignments of BMMB. **A.** North Banat–Ridanj–Krepoljin zone / non-porphyry (Fe-Pb-Zn); **B.** South Banat-Timok zone / porphyry (Cu-Mo-Au). Banatite alignments: **a.** Alkali-calcic alignment; **b.** Calc-alkaline western major alignment; **c.** Calc-alkaline eastern major alignment; **d.** Calc-alkaline easternmost alignment. Banatitic massifs: **1.** Tincova pluton; **2.** Rusca Montană volcano-sedimentary basin / Ascuţita-Ruschiţa intrusions; **3.** Densuş volcano-sedimentary basin; **4.** Baru Mare intrusion; **5.** Bocşa composite pluton; **6.** Ocna de Fier-Dognecea pluton (extension of Bocşa east); **7.** Surduc pluton; **8.** Oraviţa-Ciclova plutons; **9.** Sasca and Moldova Nouăintrusions; **10.** Teregova-Lăpuşnicel intrusion; **11.** Lăpuşnicu Mare intrusion; **12.** Lilieci--Purcariu-Nasovăţ (Şopot) intrusions.*

Petrology

The Banatitic igneous evolution was markedly intrusive, but significant volcanism was described in Senonian Gosau type basins. Intrusive banatites are ascribed to calc-alkaline hydrated magmas and belong to I-type/magnetite series granitoids. The source is deep crustal or upper mantle and the specific evolution lines are a more primitive monzodiorite, diorite to granodiorite and a complementary more evolved granodiorite to granite trend (high-K calc-alkaline to calc-alkaline), both productive in terms of ore formation (**b**, **c**, and **d** alignments; Fig. 1). An additional alkaline trend (in fact high-K calc-alkaline to shoshonitic) of restricted extent lacks economic interest (so far) (**a** alignment; Fig. 1).

Precise isotopic data range between 84 and 70 Ma (Santonian–Campanian as Late Cretaceous subdivisions) (*e.g.,* Gallhofer, 2015).

The magmatism is poly-stage and consists of plutons and/or volcano-plutonic complexes and related dikes:

Early stage: gabbro, monzodiorite, quartz-monzonite, syenite plutons and apophyses and dikes

Volcanic stage: andesite, dacite, rhyolite lavas, subvolcanics and pyroclastics

Main stage: two evolution lines:

a) monzodiorite, diorite to granodiorite trend: monzodiorite, quartz-monzonite, diorite to quartz-diorite, granodiorite, (granite) plutons and apophyses and dikes

b) granodiorite to granite trend: granodiorite, (monzodiorite), granite, microgranite plutons and apophyses and dikes.

Late stage: differentiated dikes and final lamprophyre dikes

The intrusive activity generated contact aureoles with recrystallization and metasomatic products (hornfels and marble, respectively skarn, hydrothermal alteration and mineralization).

Structural setting

Banatitic intrusions and the volcano-plutonic assemblages cross from the South towards North the Getic-Supragetic Groups of Nappes in association with Late Cretaceous extensional basins of Gosau type (*e.g.,* Rusca, Șopot).

Metallogeny

The ore deposits and prospects are related mainly to skarn and porphyry types. The main commodities are Cu, Au, Mo, Pb, Zn, Fe, subordinately W, Bi, U, Ti, Co, Ni.

The **BTP** in Banat-Poiana Ruscă Mts. consists of two meridian zones of contrasting features, *i.e.,* a western zone and an eastern zone, separated by the Pb-Cu line (Fig. 1):

- The *western zone* extends from Poiana Ruscă Mts. in the north with a slight bend conform to the Carpathian curvature to the North Banat Mts. and further south of the Danube in Serbia (Ridanj-Krepoljin sector) along specific portions of alignments **b** and **c** (Fig. 1). The environment is non-porphyry with marked base-metal character. The magmatism belongs to the more evolved granodioritic to granitic trend. Related Fe-Cu-Pb-Zn-skarns in distal to proximal peri-plutonic setting is peculiar for the "classic" Ocna de Fier-Dognecea district (similar to Hannover-Fierro district in the Southern Cordillera) in Banat and to Ruschița, Ascuțita, Tincova in Poiana Ruscă.

The additional alignment **a** (Fig. 1) is atypical: the magmatism is alkali-calcic and so far it lacks metallogenetic appeal. The *reinterpretation of its extent and potential*, in fact the aim of this paper, is discussed subsequently.

- The *eastern zone* correlates Banat Mts. occurrences to the very prolific Timok Massif (eastern Serbia) along meridian lineation. This metallogenic unit exhibits a Cu character in typical porphyry environment. The magmatism is of more primitive trend, monzodioritic-dioritic to granodioritic, and the associated ores mainly of porphyry and/or skarn type. Two tectono-magmatic alignments (southern parts of **b** and **c**; Fig. 1) are recognized: the western line contains Oravița-Ciclova-Sasca-Moldova Nouă ore deposits with Cu (Mo, Au+-W, Co) skarn-(porphyry) in the north and Cu (Mo±Au) skarn-porphyry, Bingham-like style at Moldova Nouă, whereas the eastern one represents the very extension of the Timok volcano-plutonic complex north of the Danube, yielding much less productive Cu (Mo) porphyries at Șopot and Bozovici/Lăpușnicu Mare. Banat Mts. contain minor Au occurrences, such as Au remobilization at Văliug. Presumable Carlin type settings did not confirm any expectation so far.

The additional minor alignment Teregova-Lăpușnicel (d; Fig. 1) extends probably towards Poiana Ruscă, but its potential is not promising, so far.

The alkali-calcic alignment

In North Banat, the western major alignment of calc-alkaline character (b; Fig. 1) is bordered to the west by above mentioned “atypical” alkali-calcic alignment of restricted extent (a; Fig. 1). It runs SW–NE from Surduc intrusion to Bocșa West intrusion (part of Bocșa composite pluton). Compared with widespread calc-alkaline occurrences where the products of the main magmatic event prevail, the alkali-calcic plutons exhibit intrusions stemming mainly from the early magmatic stage, such as gabbro, monzodiorite to monzonite followed by monzogranite differentiates. Both plutons lack economic attractivity. They are non-productive or alternatively, the productive upper level has been eroded.

The alkali-calcic alignment extends to NE into the southern part of the Poiana Ruscă Mts., at Drinova and Hăuzești, with similar occurrences. The continuity of the NE trend is suggested by geophysics and field exposures such as Gladna-Rozalia intrusive and dikes with contact aureole and minor occurrences of polymetallic mineralization. Regional integrated gravimetric and magnetic survey suggest the further extension of this alignment to the northern Poiana Ruscă Mts., by the Mureș crustal fault that separates the Apuseni Mts. structures from the South Carpathians structures (Andrei et al., 1989) (Fig. 2). Accordingly, Bulza polymetallic mineralization located south of the Mureș Valley fits into this system. Bulza sector as northernmost extension of the alkali-calcic alignment is represented by minor ore occurrences related to apophyses of a shallow intrusion. The environment is a volcano-plutonic complex which was related to the Tertiary volcanism of the Apuseni Mts. (Peltz et al., 1968), and reinterpreted lately as Banatitic occurrence (Roșu et al., 1993).

A minor Carboniferous (Hercynian) parallel lineation located marginal and eastward to the Banatitic alignment is found between Gladna-Rozalia and Bulza ore occurrences and consist of Ba-Pb-Zn veins at Tomești (Fig. 2). Scaun Hill vein and adjacent minor veins striking NE-SW and subordinately NW-SE, especially along marble-schist contact, lack economic importance. Such couples of Banatitic-Hercynian ore alignments are found in eastern Serbia-South Banat region by the Danube with special regard to peripheral Hercynian Ba veins trailing major Banatitic porphyry clusters. Metallogenetic indicators of this kind suggest reactivation-remobilization processes through the South Carpathians that trigger re-evaluation of present standard concepts at regional and local scale.

A brief presentation of above mentioned occurrences in Poiana Ruscă, *i.e.,* northern extension of the alkali-calcic alignment, after field visit and library study is intended to comment why Hăuzești is nonproductive, Gladna-Rozalia disappointing and Bulza more promising, featuring a ”mini”-Timok like setting.

Hăuzești-Drinova Banatite field (Fig. 2) consists of Hăuzești main intrusion and Drinova andesite body. The basement is represented by quartz-albite schists, dolomite marbles and calc-schists of the Padiș Series (Lower Carboniferous). Hăuzești intrusion is similar to Bocșa west and Surduc plutons from the North Banat portion of the alkali-calcic alignment and represents their proximal NE extension. It is interpreted as the upper part of a composite stock that contains several magmatic pulses. The sequence and rock types are, like Bocșa west and Surduc plutons, associated by far with the early stage of the Banatitic magmatism. Surduc and Bocșa west model of the early stage, *i.e.,* gabbro, monzodiorite to monzonite followed by monzogranite differentiates is recognized at Hăuzești where the pyroxene-monzodiorite, pyroxene-diorite and olivine gabbro association is cut by monzodiorite and micromonzodiorite; andesite dikes occur beyond the intrusion as well as final lamprophyre dikes. The sequence is documented by K-Ar age de-

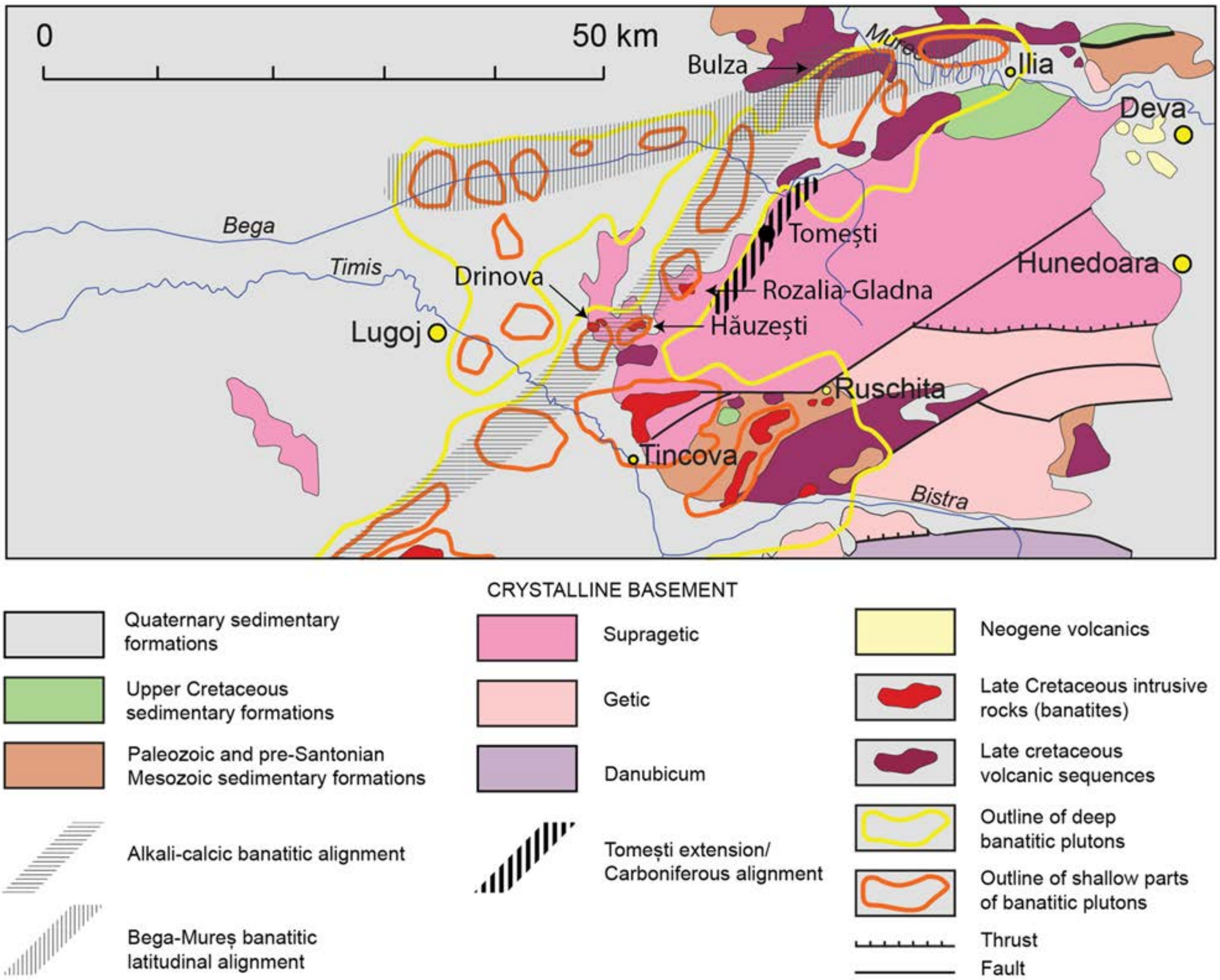

Fig. 2. *Alkali-calcic banatitic alignment in Poiana Ruscă (simplified geology and anomalies, after* Andrei *et al., 1989).*

terminations (Cioflica et al., 1994). The contact aureole of restricted extent consists of hornfelses and superposed hydrothermal alteration ("tourmalinization, propylitic alteration, silicification, sericitization, chloritization, argillic alteration, carbonatization" acc. to Cioflica et al., 1994).

Ore potential: Hăuzești intrusion is *non-productive*, similar to Surduc and Bocșa west plutons (North Banat) composed mainly of *Banatites Early Stage* that lacks economic significance**.**

Gladna-Rozalia field (Fig. 2) consists of minor banatitic occurrences situated mainly along Rozalia valley and tributaries. The geological setting is similar to above mentioned Hăuzești field, *i.e.,* epimetamorphic schists of the Padeș series penetrated by Banatites. Refined early data (Chivu & Serafimovici, 1965; Tudor, 1990, 1991, 2012; Cioflica et al., 1992) strongly suggest that the Banatitic sequence is more evolved compared to Surduc, Bocșa west and Hăuzești intrusions found southward along the same alignment. A monzodiorite intrusion and related micromonzodiorite porphyry apophyses linked to a late pulse of the early stage, is penetrated in core by a granodiorite stock and related microgranodiorite porphyry apophyses belonging to the main stage. The sequence is completed as usually by late dikes. The upper part of this edifice is eroded. The remnant subjacent assemblage is marked by a ring like (diameter ~1.5 to 2 km) alteration aureole with minor mineralization zones produced by the main stage granodiorite emplacement (Figs. 3, 4). The aureole consists of potassic and phyllic alterations in granodiorite

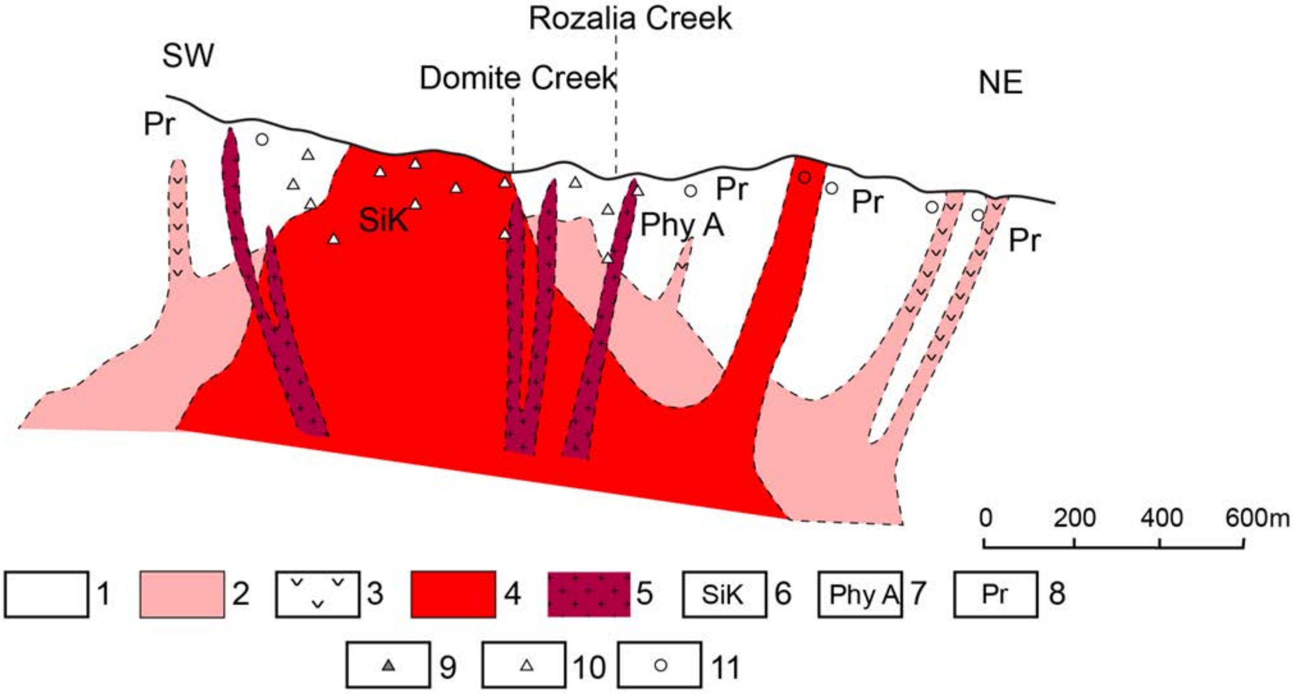

Fig. 3. *Geological cross section through the GladnaMontană intrusion (PoianaRuscă Mts.) (after* Cioflica *et al., 1992).* ***1.*** *Epimetamorphic schists partially converted into hornfels;* ***2.*** *Monzodiorite;* ***3.*** *Micromonzodiorite porphyry;* ***4.*** *Granodiorite;* ***5.*** *Microgranodiorite porphyry;* ***6.*** *Hydrothermal alterations: potassic (K) and silica (Si) zones;* ***7.*** *phyllic (Phy) and argillic (A) zones;* ***8.*** *Propylitic (Pr) zone;* ***9.*** *Cu+Mo mineralization;* ***10.*** *Cu+Py mineralization; 11. Pyrite.*

whereas silicification, argillic alteration and peripheral propylitisation extend in intruded rocks converted into hornfelses. The ore formation is of porphyry style: it consists of Cu-Mo stockworks centered on granodiorite apophyses and grade southwards in hornfelses along fissure networks. A mineralization zoning is mentioned as following:

$$cp+mo+py \rightarrow mg+cp+mo+pyr+marc \rightarrow$$
$$py+cp+mo+marc \rightarrow py \rightarrow sph+gn+Au$$

Minor veins of polymetallic character have been mentioned along tributaries of Rozalia valley, *i.e.,* Vingl, Banita and Talianu. They include Au-telluride species and Au. Re-evaluation of these data suggest the following:

In terms of large scale evaluation of the alkali-calcic Banatitic alignment, the more evolved Gladna-Rozalia intrusion contains the main stage of the poly-stage banatite evolution;

Since the main stage is productive throughout the BMMB, we expect a certain degree of ore formation at Gladna-Rozalia, too. This is confirmed by above mentioned evidence, i.e., porphyry-like system;

The reduced intensity of ore formation and the erosion level that removed a consistent amount of productive level are relevant factors in terms of economic evaluation resulting in restricted potential.

Northern extent of the alkali-calcic alignment (Bulza-Tisa-Fântoag field): the alkali-calcic alignment may be continued following the same NE trend up to the Mureș valley (Fig. 2). It is represented by blind structures deducted from regional geophysics (Andrei et al., 1989) that lack economic interest. Anyway, the northernmost portion is an exception, that is the association of andesite volcanics and Cretaceous sedimentary formation creates an environment that reminds the well-known Timok setting. The age of these volcanics has been contro-

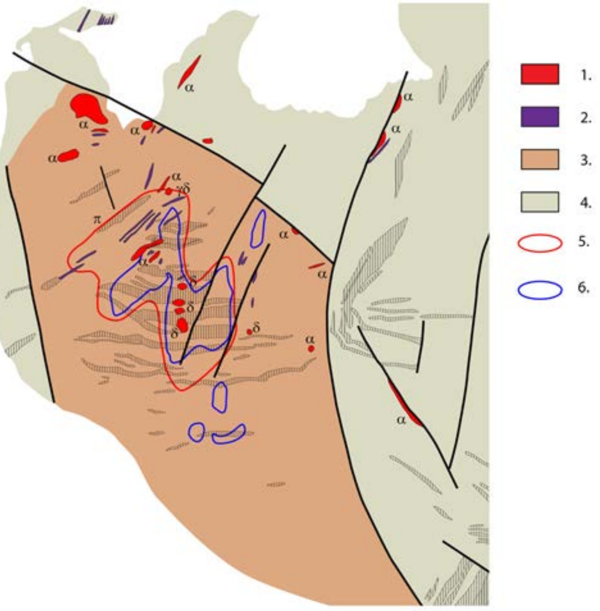

Fig. 4. *Rozalia geological map (after* C*HIVU* *&* S*ERAFIMOVICI*, *1965), hydrothermal and mineralization aureoles (*T*UDOR*, *1991). Legend:* ***1.*** *Upper Cretaceous igneous rocks: (a) andesites; (gd) granodiorites; (d) diorites;* ***2.*** *Pre-Banatitic igneous rocks: dolerites;* ***3.*** *Muscovite schists complex;* ***4.*** *Muscovite schists complex;* ***5.*** *Hydrothermal alteration area;* ***6.*** *Mineralized areas.*

versial. Early considered as Miocene linked to the classic Tertiary volcanism of the South Apuseni Mts. (PELTZ et al., 1968), this assemblage was reconsidered as Banatitic in the last decades (*e.g.*, ANDREI et al., 1989; ROȘU et al., 1993). Anyway the area is poorly understood, and the economic potential ignored. So far, among a few minor ore occurrences, Bulza occurrence may be more attractive. Its location in the very NW corner of Poiana Ruscă Mts. seems to be controlled by an intersection of two alignments (Fig. 2):

NE termination of the alkali-calcic alignment which lost its character largely expressed at Surduc, Bocșa West, Hăuzești, and partly at Gladna-Rozalia;

Bega-Mureș alignment consisting of shallow intrusions in the west and volcanic sequences to the east, by Mureș valley. This lineament interferes somehow with the Vardar-like structure of the so-called Mureș corridor.

Such orthogonal-like tectonic setting, that is meridian major lineation crossed by latitudinal lineation is similar to a peculiar magmatic-metallogenetic BMMB situation in mid-Banat (VLAD, 1979; ANDREI et al., 1989):

main eastern alignment at Oravița-Ciclova and main eastern alignment at Bozovici/Lăpușnicu Mare are linked by a meridian alignment of shallow intrusions;

both Oravița-Ciclova and Bozovici/Lăpușnicu Mare tectonic intersections are selective hot centers of ore formation, whereas the adjacent southern and northern portions of the main western and eastern alignments as well as the meridian lineation are barren.

Bulza mineralization (Fig. 5) occurs at the edge of Poiana Ruscă and South Apuseni structures. Thus the basement is metamorphic (Supragetic) stemming from Poiana Ruscă Mts. and ophiolite and sedimentary Transylvanides affiliated to the Apuseni Mts. The area of interest occurs in a volcanic pile, *i.e.,* andesitic lavas, late rhyolites (in places ignimbrite facies) and pyroclastics. Magmatism of the early stage is represented by monzonitic subvolcanic bodies surrounded by hornfels zones.

A later magmatic event produced mainly porphyritic micro-granodiorite intrusions. The granodiorite emplacement is responsible for intrusive breccia formation and significant hydrothermal alteration (tourmalinization, propylitization, sericitization and argillization), accompanied in two sectors, Ioneasca valley and Bulza valley, by mineralization of porphyry –like type and minor base metal veins (ROȘU et al., 1993). The late magmatic event is marked by basaltic andesite rocks.

Such evolution shows evident departure from early described occurrences of the alkali-calcic Poiana Ruscă and North Banat. It is much closer to the monzodiorite-granodiorite trend of Cu character. Furthermore, thinking of challenging comparison with Timok, it may represent an area of economic incitement. In fact ROȘU et al. (1993) conducted a petrochemical study on 20 analyses and concluded that “most tested magmatic rocks plot into the calc-alkaline field and only few of them in the alkaline field, which differentiates them from the banatitic rocks in the Poiana Ruscă which show a more pronounced alkaline tendency”. In addition, ROȘU et al. (1993) stated that “mineralization from

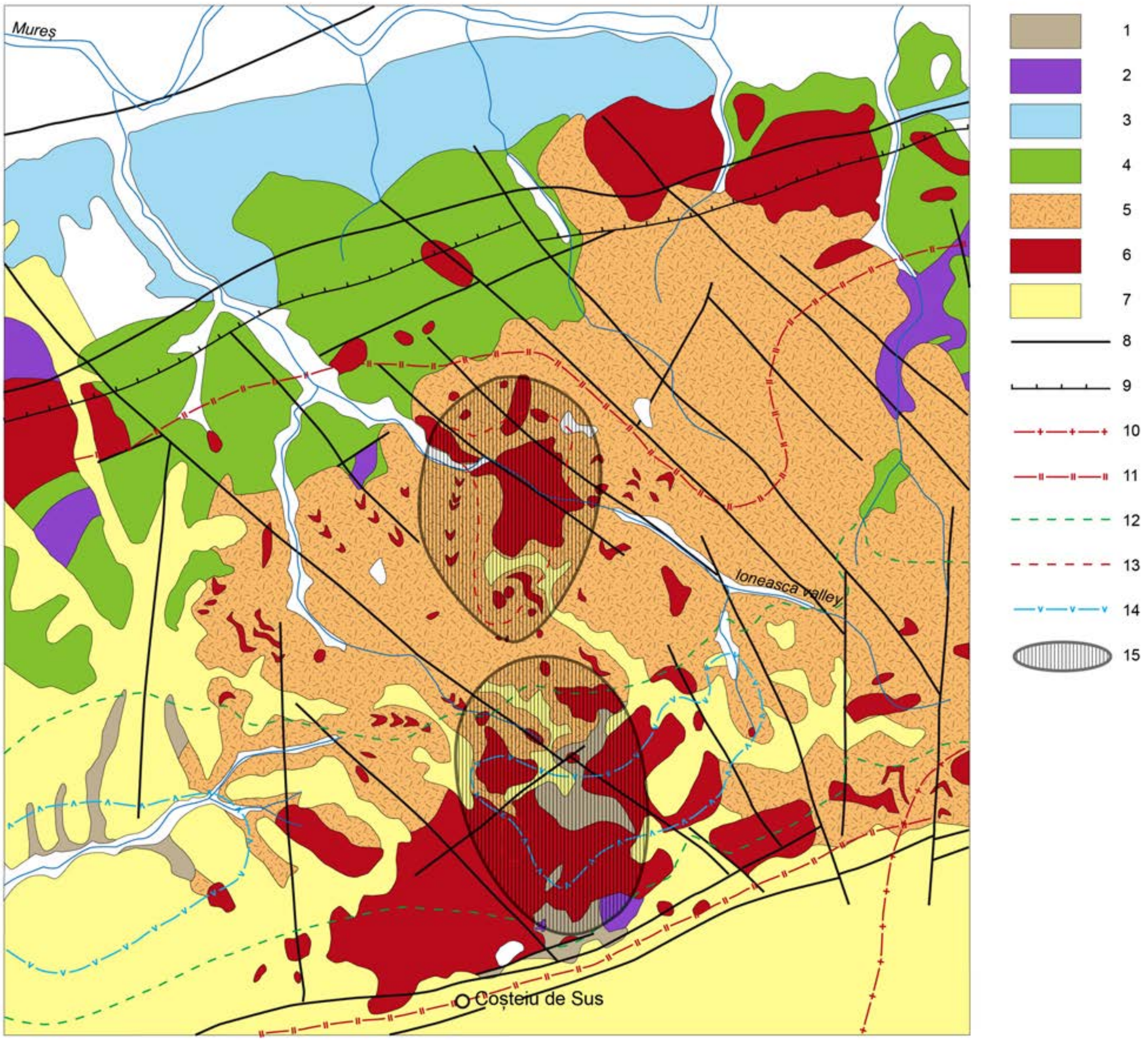

Fig. 5. *Areas of economic significance at Bulza.* ***1.*** *Lower Carboniferous sedimentary;* ***2.*** *Jurassic ophiolites;* ***3.*** *Upper Jurassic limestones;* ***4.*** *Cretaceous sedimentary;* ***5.*** *Upper Cretaceous volcanoclastics;* ***6.*** *Upper Cretaceous igneous rocks;* ***7.*** *Neogene sedimentary;* ***8.*** *Faults;* ***9.*** *Deep-seated outline of the "Ophiolitic trench" of Metaliferi Mts. inferred from aero-magnetometric data;* ***10.*** *Deep-seated outline of banatitic plutons inferred from gravimetric and/or aero-magnetometric data;* ***11.*** *Deep-seated limit of "Mureș Cordillera" inferred from gravimetric data;* ***12.*** *Deep-seated outline of the southern summit of "Mureș Cordillera" inferred from gravimetric data;* ***13.*** *Deep-seated outline of Neogene igneous bodies (necks and sub-volcanoes) inferred from gravimetric and magnetometric data;* ***14.*** *Sub-outcropping outline of the metabasite core summits of "Mureș Cordillera" inferred from gravimetric data;* ***15.*** *Areas of economic interest. (Simplified geology after Lupu et al.,1991; geophysical data after Borcoș et al., 1998).*

the west side of the Ioneasca and Bulza valleys display a well expressed spatial zoning which could be traced as follows (towards the subvolcanic granodiorite body): SbàPb, Zn, CuàCu, Mo±Au".

Consequently, Bulza-Tisa-Fântoag field turned into a compelling area of interest based on several indicators for further investigations, such as:

- occurrence of subvolcanic bodies, as target for blind porphyry systems;
- local NW-SE fractures as main tectonic control;
- widespread hydrothermal aureoles bearing base metal and Au-Ag mineralization;
- significant geopysical and geochemical anomalies.

Brief final reflections

During the last decades the northern and especially the north-western termination of Banat-Timok Banatite entity has been underestimated in terms of metallogenetic significance. Under present circumstances a new thinking approach leads to the following valuation of the regional potential:

The non-productive alkali-calcic alignment of North Banat (**a**; Fig. 1) that runs SW-NE from Surduc to Bocșa West plutons extends north-westward to Hăuzești–Drinova field, further on to Gladna-Rozalia and on towards Mureș Valley (Fig. 2). The same magmatic pattern is conserved, that is early magmatic stage association prevail. In addition, the alkali-calcic style still preserved at Hăuzești graded to a calc-alkaline trend at Gladna-Rozalia, i.e.occurrence of the main magmatic stage – monzodiorite, diorite à granodiorite suite, related commonly to Cu-ore formation. It looks promising but, in fact, the porphyry systems found at Gladna-Rozalia are deceiving due to their low volume and grade. The modest development of the productive magmatic stage is responsible for the reduced economic value of Gladna-Rozalia metallogenetic field.

Mureș Valley area (intersection of northern termination of the alkali-calcic alignment with Bega–Mureș alignment) (Fig. 2). Based on well-established geological-geophysical evidence, emerging messages underscore the potential of this peculiar setting:

Timok like volcano-plutonic edifices associated with blind porphyry Cu-Au and distal base metal expression, fostering future investigations throughout the Bulza–Tisa–Fântoag metallogenetic field.

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Резиме

Преглед металогеније банатита северних Poiana Ruscă планина

У раду је дат приказ металогеније северног дела планина Banat-Poiana Ruscă (Јужни Карпати) који представља сегмент банатитског појаса. Банатитски магматизам је углавном био интрузивног типа, а значајни вулкански продукти су заступљени у сенонским басенима. Интрузивни банатити воде порекло од калк-алкалних хидратисаних магми и припадају I-типу/магнетитске серије гранитоида. Извори магми воде порекло из горњег омотача и

дубљих делова коре. Прецизни изотопски подаци указују на сантонско-кампанску старост (84–70 Ма). Магматизам је имао полифазни карактер и састоји се од плутона и вулканско-плутонских комплекса и пратећих дајкова:

Рани стадијум: габрови, монцодиорити, кварцмонцонити, сијенити;

Вулкански стадијум: андезити, дацити, риолити, пирокластити;

Главни стадијум: две еволутивне фазе:

а) монцодиоритски, диоритски до гранодиоритски тренд: монцодиорити, кварцмонцонити, диорити и кварцдиорити, гранодиорити са плутонима, апофизама и дајковима

б) гранодиоритски до гранитски тренд: гранодиорити, монцодиорити, граніти са плутонима, апофизама и дајковима.

Рудна лежишта су углавном скарновског и порфирског типа. Главне металичне сировине су представљене рудама Cu, Au, Mo, Pb, Zn, Fe, док се подређено јављају сировине W, Bi, U, Ti, Co, Ni.

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