ION POPESCU-VOITEȘTI. WORKS ON PALEOGEOGRAPHY

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Abstract : In addition to tectonics, stratigraphy, paleontology, economic geology, hydrogeology and other geological fields, Ion Popescu-Voitești also addressed paleogeography problems. In 1936, he published a fascinating book, unique in the country at the time, regarding the geological-paleogeographical evolution of the Romania territory from the Silurian to the Quaternary. From his works in this field, we chose two themes, one related to the formation of the Olt transversal valley (1918, 1936) and one related to the formation of the transversal valley of the Danube and to its paleo-course in the Romanian Plain (1936, 1940).

Keywords: paleogeography, transversal valleys.

INTRODUCTION

In addition to tectonics, stratigraphy, paleontology, economic geology, hydrogeology and other geological fields, Ion Popescu-Voitești also addressed paleogeography problems as early as 1918, when he separated the Bucegi Conglomerate Nappe in the Olt Valley. In 1936, he published a fascinating book, unique in the country at the time, regarding the geological-paleogeographical evolution of the Romania territory from the Silurian to the Quaternary. From his works in this field, we chose two themes, one related to the formation of the Olt transversal valley and one related to the capture of the Danube and its paleo-course in the Romanian Plain.

THE TRANSVERSAL VALLEY OF THE OLT (1918, 1936)

Based on geomorphological and hydrographic criteria, Em. de Martonne (1907, in Voitești, 1918, p. 52-55) concluded that until the beginning of the Quaternary, the waters of the current Olt River were divided into two streams, one flowing to the north and the other to the south. The Pliocene Gornovița erosion platform slopes to the north in the Titești Basin and to the south in the Brezoi Basin. Consequently, the direction of the water courses in the two sedimentary basins is different. The waters of the Titești Basin (Băiașu, Titești and Boișoara rivers) flow in SE-NW direction, towards the northern Olt, while the waters of the

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Brezoi Basin (Lotrul and Călinești rivers) flow in NW-SE direction, towards the southern Olt. In the author's opinion, the main cause of the northern Olt capture by the southern Olt consists in the uplift of the Carpathian region and the Transylvanian Basin during the post-Pliocene orogenic movements (Wallachian orogeny) simultaneously with the subsidence of the Romanian Plain. The activation of erosion in the South Carpathians area led to the rapid erosion of the sedimentary formations in the Brezoi-Titești sector and to the capture of the Băiașu River by the Lotru River.

In the paper regarding the Bucegi Conglomerate Nappe in the Olt Valley, Popescu-Voitești (1918, p. 36-49) also refers to the course of the Olt and to the morphology of the region, with references to Em. de Martonne. The last chapter of the paper (Voitești, 1918, p. 52-55)is dedicated to the relationship between the formation of the transversal valley of the Olt and to the tectonics of the region, Voitești emphasizing the role of tectonics in the capture of the northern Olt, somewhat to the detriment of vertical movements. On the tectonic sketch of the Brezoi Basin and the neighboring regions (Fig. 1a), the author places the crest line that closed the Olt Valley at the end of the Pliocene between the Călinești and Băiașu valleys, on the crystalline islands within the Bucegi Conglomerate Nappe. Implicitly, the author considers that these crystalline islands are vestiges of the crest that separated the northern Olt from the southern one.

In favor of the intense erosion in this sector of the Olt Valley, Popescu-Voitești invokes the geological structure, in this case the tectonic breccias on the thrust plane of the Bucegi Conglomerates Nappe. On the sketch of the hydrographic network before the capture, the dividing waters line between the northern and southern course of the Olt crosses the mouth of the Lotrișor River (L), which Voitești considers a former tributary of the Băiașu River (B) before the capture (Fig. 1b), the argument being precisely its direction of flow to the northwest.

In his work, Popescu-Voitești also refers to the Olt Gorge from Turnu Roșu. In his otherwise correct opinion, the tectonic planes in the Călinești-Racovița sector continue to the north, on the Transylvanian slope of the Făgăraș Mountains. The author considers that in the Mio-Pliocene the crest of Făgăraș did not exceed the crest of Cozia in height. The relatively low height of Făgăraș favored the formation of the gorge on the northern course of the Olt just as the tectonic breccias in the Călinești-Racovița sector favored the capture of the northern Olt by the southern Olt (Lotru River).

In his book on the geological-paleogeographical evolution of the Romanian land, Popescu-Voitești (1936, p. 165-168) reconsiders the role of eustatic movements, noting the fact that many rivers on the external slope of the Carpathian arch have their sources beyond the crest line (e.g. Jiul, Oltul, Buzăul). The author admits that the higher erosion power of these rivers is given by their much lower base level (10-50 m) than that of the rivers in the Transylvanian Basin (300-350 m). Under these conditions, the bar of brecciated crystalline on the line separating

the two Olts was easily eroded by a tributary of the Călinești River, capturing first the lower course of the Lotrișor and then the course of the Băiașu (Fig. 1b).

THE DANUBE PALEO-COURSE (1936, 1940)

In the work from 1936, Popescu-Voitești also refers to the paleo-course of the Danube. Through regressive erosion and successive captures, the sources of the Danube reach the Black Forest Mountains since the Lower Pleistocene. Voitești is a follower of the formation of the Danube Gorge through capture, a theory developed by Vâlsan (1919, p, 48-50), with geomorphological and hydrographic arguments. The subsidence of the Romanian Plain led to the withdrawal of the Pliocene Lake and the rivers began to carve the territory of Oltenia, reaching their sources in the mountains. Now is also being outlined the future course of the Danube, a river that collects the waters of the Topolnița, Cerna and Porecka rivers. The Danube does not have an antecedent valley because the terraces downstream of the gorge do not correlate with the terraces upstream. In addition, most of the hydrographic network in western Oltenia is tributary to the Jiu River and not to the Danube, which is an "intruder" in the Romanian Plain (Vâlsan 1919, p. 49). On the paleogeographic sketch of Romania in the Quaternary, from 1936, Voitești also marks the capture points of the Carpathian rivers, including the Danube (Fig. 2).

Popescu-Voitești (1940, p, 338) also brings petrographic arguments in favor of the the Danube capture theory. On the occasion of a trip to Oltenia, the author identifies numerous pebbles of quartz-porphyries in the gravels that cover the hills to the right of Jiu, in the area corresponding to the Piedmont of Bălăcița. The presence of quartz-porphyries pebbles in the western Getic Piedmont is surprising in the context in which such rocks do not outcrop on the southeastern slope of the South Carpathians, which constitute the border of the piedmont, but these outcrop on the western slope, representing the border of the Pannonian Depression. It is also interesting in terms of the considerations that Voitești makes regarding the trail of the pebbles.

The closest source areas where quartz-porphyries (i.e. Permian rhyolites) outcrop are in the Cerna Valley, at Mehadia, and in the Danube Gorge, at Drencova. In the case of the provenance from the Mehadia area, Voitești considers that the clastic material brought by the Cerna River could not reach the alignment of the Jiu Valley unless the region was exonded by the withdrawal of the Pliocene Lake waters to the south, at the end of the Pliocene (Fig. 2). In the case of the provenance from the Drencova area, upstream of Cazane where took place the capture of the Porecka River by a tributary of the Cerna River, the author concludes that the Danube sector between the Pannonian Lake and the retreating Romanian Plain Lake was already formed at the end of the Pliocene.

CONCLUSIONS

Popescu-Voitești constantly analyzed the arguments on which the conclusions of his works were based and had the power to admit post-factum if he made subjective assessments, returning with other works on the same subject. Regarding the Olt Valley, Voitești finally recognized the determining role of eustatic movements in the formation of the transverse river valleys outside the Carpathians.

Regarding the Danube Valley, the petrographic observations of Voitești were as unusual as they were fertile. These observations were the basis of paleogeographic reconstructions regarding the course of the Danube in the Romanian Plain. Thus, Coteț (1957, p. 195) made a reconstruction of the paleo-delta of the river that flowed into the Pliocene Lake (Cerna-Danube), extended exactly to the alignment of quartz-porphyries pebbles to the right of Jiu (Fig. 3a). Liteanu and Ghenea (1966, p. 48) extend the paleo-delta up to the Argeș River. In the continuation of the paleo-delta to the east, the two authors reconstruct a hypothetical course of the Danube in the Lower Pleistocene time following the route of the gravel deposits (Cândești Gravels) in the south of the Subcarpathians and the south of the Moldavian Plateau (Fig. 3b).

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BIBLIOGRAPHY

Coteț 1957, Coteț P., ***Câmpia Olteniei, studiu geomorfologic***. Editura Științifică, București, 272 p.

Liteanu, Ghenea 1966, Liteanu E., Ghenea C., *Cuaternarul din România*. *Studii Tehnice și Economice*, seria H, nr. 1. Institutul Geologic al României, p. 3-103.

Martonne 1907, Martonne E. de, ***Recherches sur l'evolution morphologique des Alpes de Transylvanie (Karpates Méridionales)***, tome 1, traducere în limba română. Editura Academiei RSR, București, 271 p.

Popescu-Voitești 1918, Popescu-Voitești I., *La nappe du Conglomérat des Bucegi dans la vallée de l'Oltu avec de nouvelles données sur la structure de cette vallée dans la région des Carpates méridionales (avec 14 coupes, deux esquisses hydrographiques, 11 planches photographiques et une esquisse géologique). Anuarul Institutului Geologic al României*, vol. VIII/1914, p. 56-117.

Popescu-Voitești 1936, Popescu-Voitești I. *Evoluția geologico-paleogeografică a pământului românesc*, *Rev. Muz. Geol.-Min. Univ. Cluj*, vol. V, nr. 2. Editura Ardealul, Cluj, 211 p.

Popescu-Voitești 1940, Popescu-Voitești I. *Sur la présence des galets des roches porphyriques à quartz dans les graviers continentaux du Levantin supérior-Quaternaire inférieur de l'Olténie occidentale. Compte-rendue de l'Institut des Sciences de Roumanie*. Academia Română de Științe, IV/3-4, p. 337-339.

Vâlsan 1919, Vâlsan G. *Asupra trecerii Dunării prin Porțile de Fier. Buletinul Soietății Regale Române de Geografie*, XXXVII, p. 333-353. Reprinted in ***G. Vâlsan-Opere alese***, 1971. Editura Științifică, Bucureşti, 693 p.

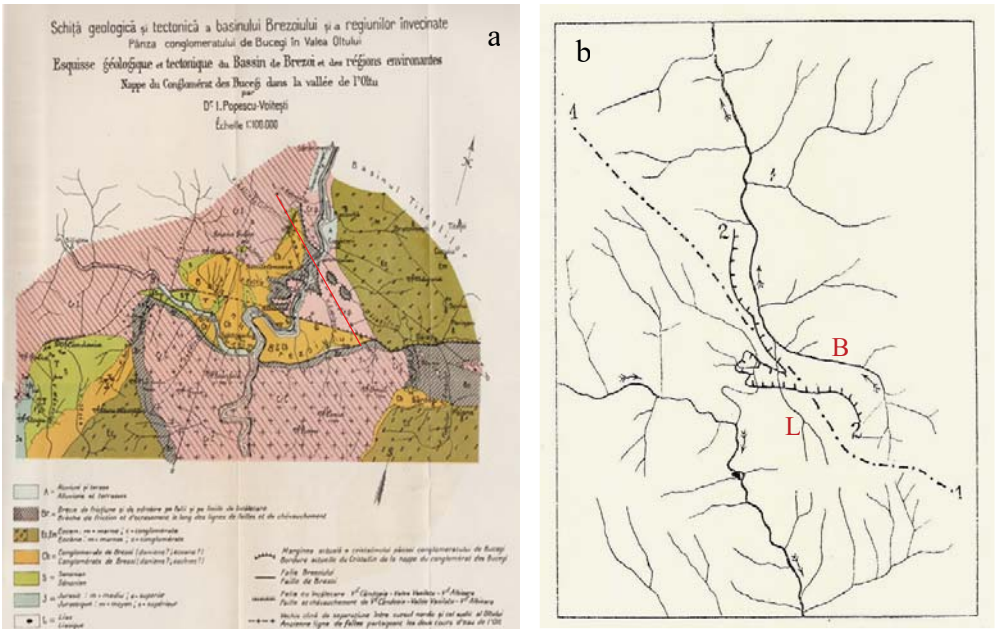

Fig. 1. a) Geological sketch of the Brezoi Basin and the neighboring regions at scale of 1:100,000, with the dividing waters line of the southern Olt from the northern Olt (red line); b) hydrographic sketch prior to the capture, with the old dividing waters line (Voitești, 1918). Details in text.

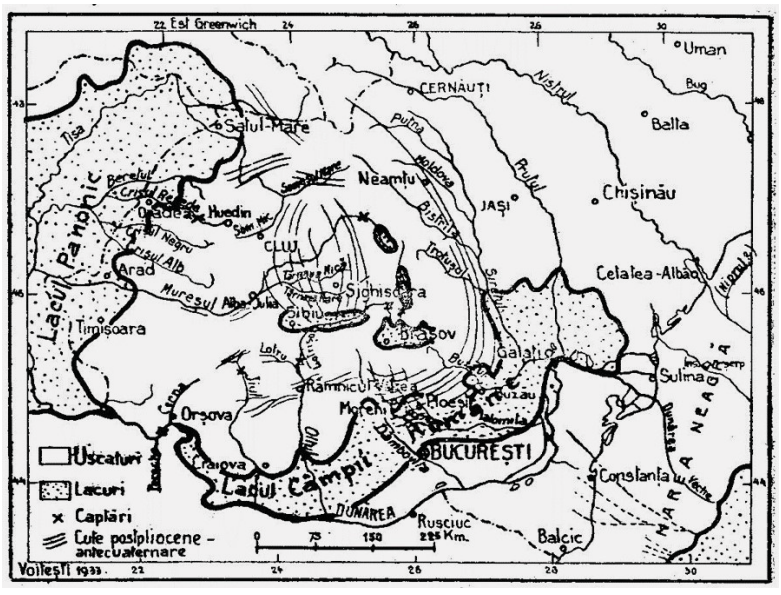

Fig. 2. Paleogeographic situation of the Romania territory in the Quaternary (Popescu-Voitești, 1936).

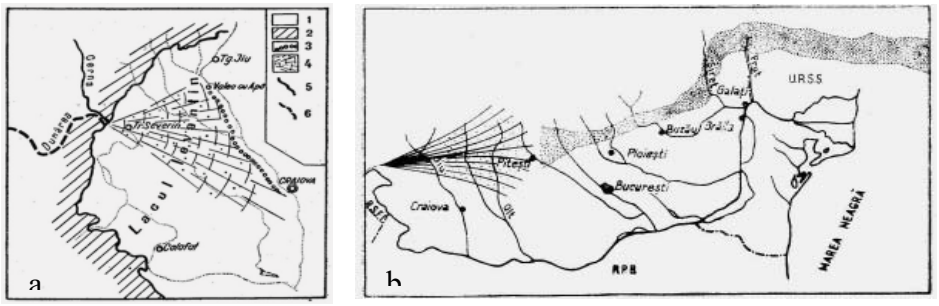

Fig. 3. a) The Danube paleo-delta in the Pliocene (Coteț, 1957, p. 195); b) Paleo-delta and the paleocourse of the Danube in the Lower Pleistocene (Liteanu, Ghenea, 1966, p. 48). Details in text.