GEOLOGY, PETROLOGY AND CHROMITE MINERALIZATION OF THE BULQIZA ULTRAMAFIC MASSIF

H. BESHKU[1], A. DOBI[1], V. GJONI[1] and A. PIRDENI[2]

[1]Geological Survey of Albania, Rr. "Kavajes", Nr. 153, Tirana, Albania
[2]Institute of Geological Research, Blloku "Vasil Shanto", Tirana, Albania

Abstract. The Bulqiza ultramafic massif belongs to the eastern belt of the ultramafic massifs of the eastern ophiolites of Albania. This paper provides the data on the geological position and structure of the Bulqiza ultramafic massif, petrology and its chrome-bearing potential. The particular morpho-structural features of this massif are given in this paper.
The chromite mineralization mainly of the metallurgic type occur, while the refractory type occur in the southwestern part.

Key words: Geology, petrology, structural features, chromite mineralization, Bulqiza region, Albania.

Geology. The ultramafic massif of Bulqiza is a component part of the eastern belt ultramafic rocks of the eastern ophiolites of Albania. It occupies about 352 km^2 surface, with tectonic relationships with the Triassic-Jurassic carbonate rocks in the northeastern and southwestern parts and with the Upper Tithonian-Lower Cretaceous marly-sandy flysch in southeast, covering by the Neogene molasses in northwest (fig. 1).
The carbonate periphery of the ultramafic massif of Bulqiza consists of the carbonate rocks of the Upper Triassic-Lower Jurassic age, on which by the hard grounds, the pelagic limestones of the Upper Liassic, Dogger-Malm and radiolaritic cherts of Malm are followed. In parts, as in Stavec, Peshk, Ballenje, Kacni and Qaf Helmi, they are normally covered by the ophiolitic melange and/or marly-sandy flysch of the Upper Tithonian-Neocomian age (fig. 2, a, b).
Petrology. The generalized sequence of the ultramafic rocks of the Bulqiza massif, from bottom to top, is as follows:

a. mantle serie (m),
   - ultramafic tectonites, mainly fresh harzburgites (m_1),
   - intercalation of harzburgite tectonites with the thin dunite tectonite bands, composing about 15-20 % of the sequence (m_2),

- intercalation of harzburgites with frequent dunite one, about 25-50 % of the sequence (m_3).

b. Cumulate serie (k), transitory zone,
   - cumulate dunites (k_1),
   - Cumulates of the plagioclase and clinopyroxene dunites, lherzolite-wehrlites and pyroxenites (k_2),
   - olivine gabbros, troctolites and gabbros, separating the mantle section from the cumulate one (k_3).

The characteristic of the rocks of the ultramafic massif of Bulqiza are the facial changes, being more evident at the upper levels of the mantle sequence and ultramafic cumulates. The veiny-dyke rocks as enstatites and gabbro pegmatites, while the microgabbros, diabase porphyries, leucocrate micro-plagiogranites up to granites occur in the uppermost part of the mantle and cumulate sequence.

The tectonite harzburgites has banded to gneissy texture showing the foliation elements derived from the plastic deformation, with the typical cataclastic and porphyro-clastic texture with neoblasts. They consist of magnesial olivine Fo = 90-94 and enstatite with ex-solutional needles of pyroxene with the chrome spinel disseminations.

Structural features. The Bulqiza massif represents a big asymmetric anticline complicated by the foldings of different ranks and Vajkali flexure showing by the plunging of the ore stratification of Bulqiza with 70-80º dipping angle (fig. 4). In the northern margin the stucture of the massif is complicated by the transversal inclination, having in its nucleus the gabbro rocks, interrupting the north continuation of the massif.

Chromitite mineralization. The metallogeny of the Bulqiza ultramafic massif is characterized by the wide spreading of the chromitite mineralization, represented by the unical deposits regarding the dimensions, morpho-structural features and the highest chrome bearing potential in the eastern belt of Albanides.

The chromitite mineralization is mainly of the metallurgic type. The refractory type mineralization occur in the southwestern part, localized within the mantle sequence and the transitory zone.

Chromitite mineralization of the mantle section. It is localized throughout the ultramafic tectonite sequence, within which, some morpho-structural types are distinguished: folded concordant pseudo tabular ore bodies and/or subconcordant ones as in Lugu Gjate, Qafe Buall, Ternove and other deposits and discordant pipe type ores as in Shkalla deposit.

Because of the wide occurrence of the chrome-bearing sequences (m_2, m_3) within this massif, the further peropective of prospection is open.

Chromitite mineralization of the transitory zone. This mineralization consists of the lensy-stratified, banded and disseminated bodies, concordant to subconcordant and more seldom, lensy-massive ores.

The banded chromitite mineralization is associated with the pentlandite disseminations and the PGE mineralizations.

Based on the petrological, geochemical and metallogenic features, the Bulqiza massif belongs totally to the eastern ophiolites (of the harzburgitic type) of the second type ophiolites with the ortho and pyroxene sequence, formed in the close relationships with the formation of the ophiolites of the eastern type, during the Middle-Upper Jurassic, with the Kimmeridgian-Tithonian uppermost levels.

Conclusions:

- The Bulqiza ultramafic massif, as a component part of the Mediterranean-Alpine belt is distinguished by an unical geological, petrological and metallogenic features, characterized by the high chrome bearing potential.
- This massif and some of its deposits (Bulqiza, Batra etc.) are characterized by the intensive foldings both, in longitudinal and transversal plane.
- The chrome-bearing perspective of this massif is open, mainly within the middle-upper part of the mantle sequence.
-

References

Alliu I., Beccaluva L., Cina A., Coltorti M., Dobi A., Gjata K., Gjoni V., et al. (1994) – The Skanderberg and Bulqiza mafic-ultramafic ophiolitic complexes and their relationships with chromititic ore deposits (Working Group Meeting of IGCP Project nr. 256)

Dobi A. (1983) – Petrology of the Bulqiza ultramafic massif. Bull. Shk. Gjeol., nr. 2, Tirana, Albania.

Beshku H. & Goskolli E. (2000) – Study on the unification on the Albania classification of reserves with the International one. Bul. Shk. Gjeol., nr. 2, Tirana, Albania.

Beshku H. & Gjoni V. (2002) – Chrome-bearing perspective of Mali Lopes-10 Korriku-Theken-Ternove region (Bulqiza ultramafic massif) (in press).

Dobi A., Premti I., et al. (1998) – Petrological and geochemical features of the Bulqiza ultramafic massif and related chromite mineralization. Workshop on Albanian ophiolites and related mineralization. IUGS/UNESCO MODELING PROGRAMME, 10-17 Octobre 1995, p. 66. BRGM Edition, France.

Gjata K., Kodra A., Pirdeni A. (1980) – Geology of some peripheral parts of the Mirdita ophiolitic zone. Permbl. Stud., nr. 3, Tirana, Albania.

Gjoni V. (1991) – Mali i Lopes-10 Korriku-Theken-Ternove chromite deposits and their potential, 9th International Congress, Athens, Greece.

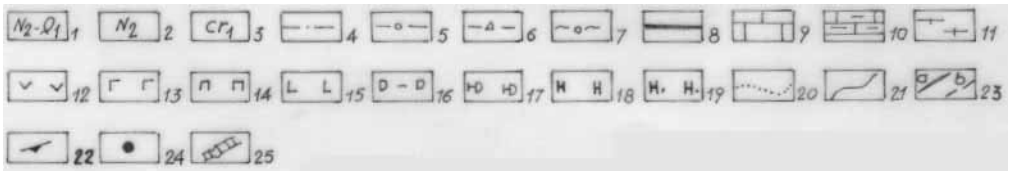
Gjoni V. (1995) – Petrology and chromite deposit of the Bulqiza ultramafic massif. Ph. D., Thesis, 231p, Tirana, Albania.

Kodra A., Gjata K., Pirdeni A. & Jahja B. (1977) – Doger-Malm levels in Martanesh region, western flank of the Bulqiza ultramafic massif. Permbl. Stud., nr. 4, Tirana, Albania.

Premti I., Brace A. & Gjoni V. (1996) – Petrological modeling of Bulqiza and Shebenik ultramafic with metallogenic implications. Convegno Italo-Albanese, Tirana, Albania.

Fig. 1. Geological Map of the Bulqiza ultramafic massif. 1:50 000 scale

(According to Shallo M., Dobi A. et. al)



1.Pliocene-Quaternary: conglomerates, sandstones and clays (N_2-Q_1); 2. Neogene molasses (N_2); 3. Lower Cretaceous terrigene formations (Cr_1); 4. Maastrichtian-Paleogene flysch (Cr_2^m – Pg_{1-2}); 5. Upper Tithonian-Lower Cretaceous marly-sandy flysch deposits (J_3-Cr_1); 6. Ophiolite conglobreccias (J_3-Cr_1); 7. Ophiolitic mélange (J_3^t – Cr_1); 8. Carbonate-cherty formations (J2-3); 9. Shallow water limestones (T_3-J_1); 10. Carbonate-cherty limestones (T2-J); 11. Metamorphic rocks: amphibolites, amphibolite and quartz-micaceous-garnet schists; 12. Basic volcanics (B_{J2-3}); 13. Gabbros; 14. Pyroxenites; 15. Cumulate peridotites (lherzolites, wehrlites etc.); 16. Cumulate dunites; 17. Upper level of the mantle dunite-harzburgite sequence; 18. Middle level of the mantle harzburgite-dunite sequence; 19. Lower level of the mantle harzburgite sequence; 20. Normal geological boundary within the ophiolites; 21. Normal geological boundary; 22. Faults: a. verified, b. supposed; 24. Chromite ore deposits; 25. Horizontal section of Bulqiza-Batra deposit.

Fig. 2.a. The tectonic contact of the transitory zone pyroxene dunites of the Bulqiza massif with the thick bedded neritic Triassic-Jurassic limestones in Prroi i Lenes (Martanesh).

Fig. 2.b. The western contact of the Bulqiza ultramafic massif in Gjonaj (Martanesh). 1. Gabbro-troctolites; 2. Pyroxenites; 3. Plagioclase dunites; 4. Conglomeratic-sandy ophiolitic deposits (J_3-Cr_1); 5. Shallow water limestones (T_3-J_1).

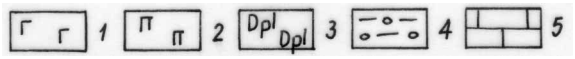
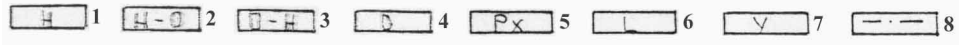
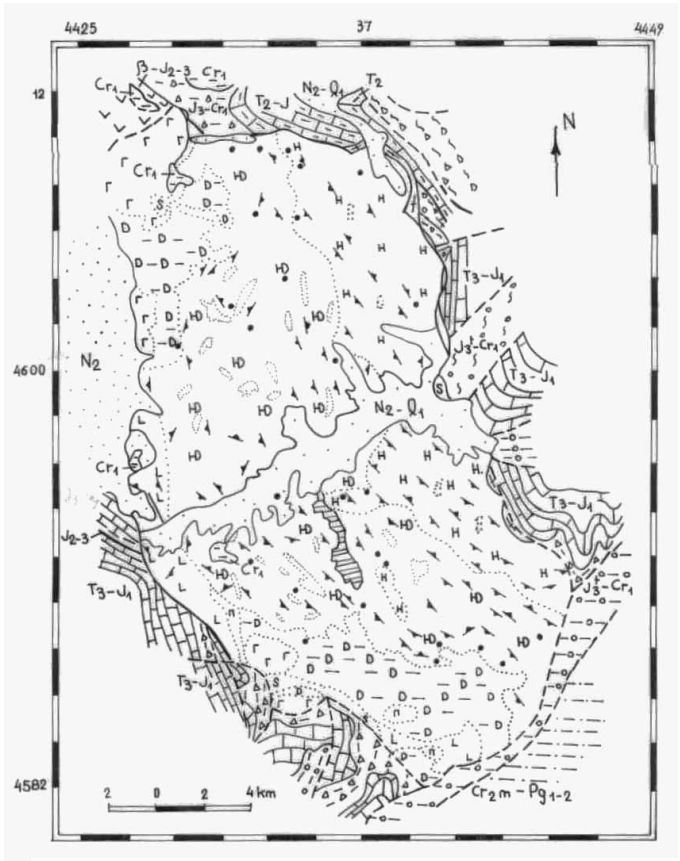


Fig. 3.a. Generalized schematical column of the Bulqiza ultramafic massif.

Fig. 3.b. Correlation of different sequences of the Bulqiza Ultramafic massif.

Fig. 4. Ultramafic massif of Bulqiza. A. Transversal section. B. Longitudinal section.
1.Harzburgite; 2. Harzburgite-dunite; 3. Dunite-harzburgite; 4. Dunites;
5. Pyroxenites; 6. Lherzolites; 7. Wehrlites; 8. Mineralization levels.





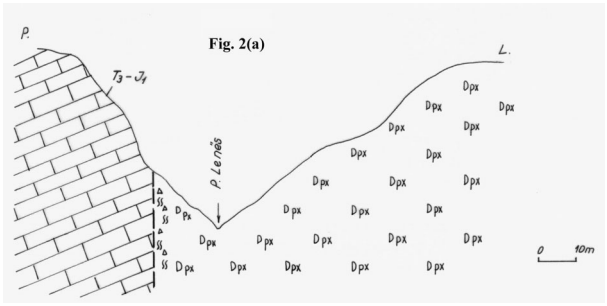


Fig. 2(a)

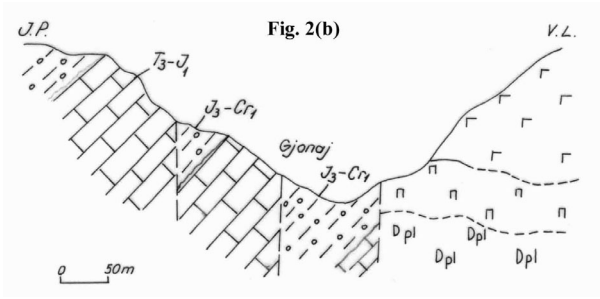


Fig. 2(b)

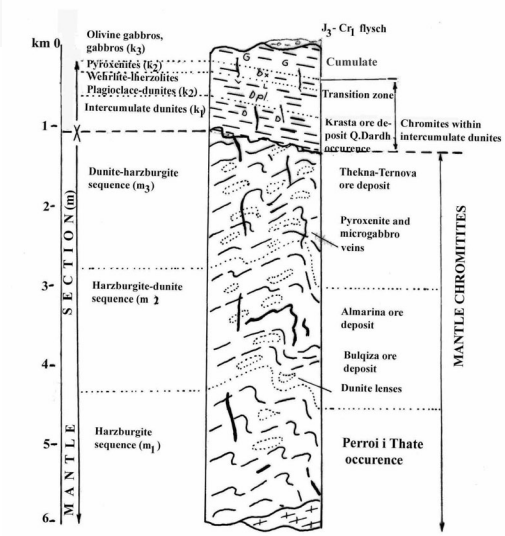


Fig. 3a

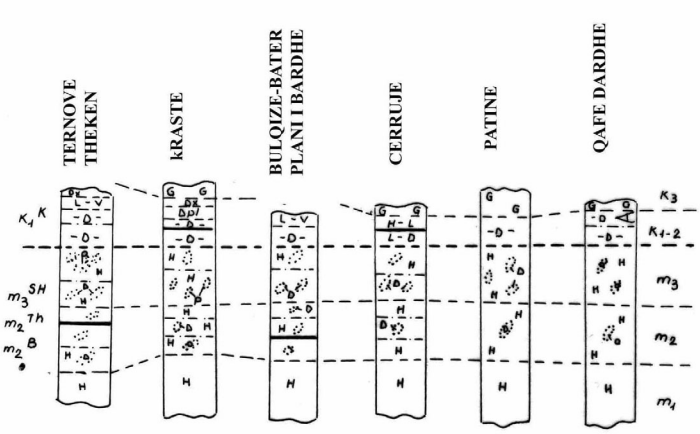


Fig. 3b

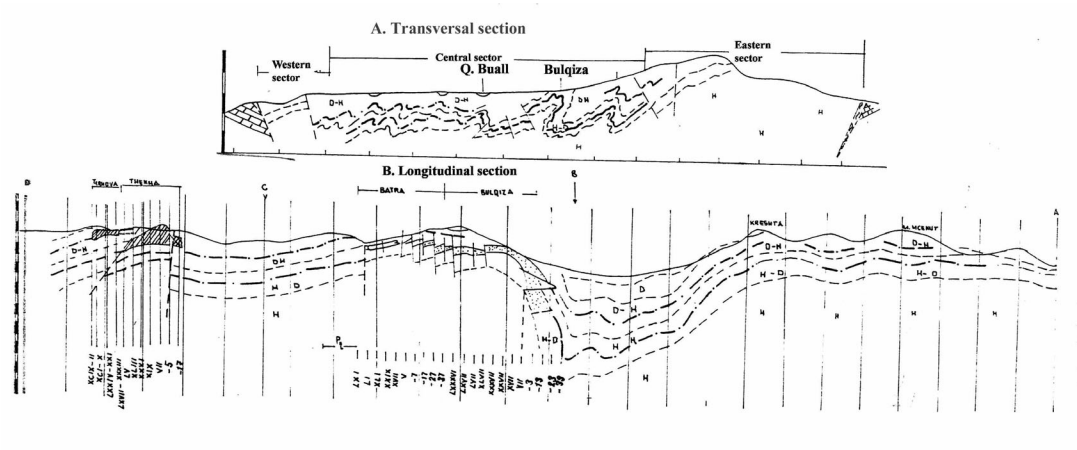


Fig. 4