

**THE YUBDO-DALETI AND TULU DIMTU ULTRAMAFIC ROCKS:  
A POTENTIAL SOURCE OF ECONOMIC DEPOSITS OF PLATINUM GROUP MINERALS**

by

**A. Mogessie<sup>1</sup>, K. Belete<sup>1</sup>, G. Hoinkes<sup>1</sup> & J. Bowles<sup>2</sup>**

<sup>1</sup>Institut für Mineralogie und Petrologie  
Universität Graz, Universitätsplatz 2, A-8010 Graz

<sup>2</sup>John F. W. Bowles Mineral Science Ltd.  
109 Asheridge Road, Chesham, Buckinghamshire, England HP5 2PZ

The 9 km long and 45 km wide ultramafic intrusion of Yubdo lies on the southern tip of a NNE–SSW striking lineament which includes the Daleti and Tulu Dimtu ultramafic intrusions covering a distance of 100 kms in western Ethiopia. Although the presence of platinum group minerals in both the Daleti and Tulu Dimtu ultramafic intrusions has yet to be proved, the platinum group element (PGE)/chondrite normalized plots show that all three intrusions display an Alaskan type layered intrusion trend as opposed to the ophiolitic origin that has been proposed by previous researchers in the region.

These ultramafic rocks are underlain by precambrian basement consisting mainly of gneisses, mica schists, quartzites and chlorite schists. Acidic intrusive rocks include syn-tectonic granodiorites, hybrid granites, quartz diorite and diorite porphyries which intrude the ultramafics.

There is an estimated 12.060 kg of platinum reserves in the weathered lateritic deposit of Yubdo with an average platinum content of 0.336 g/t of ore. Placer platinum and gold workings are common in the Yubdo area along the Alfe and Birbir rivers in addition to the known elluvial-alluvial lateritic placer deposits on the top of the birbirite and dunitic rocks belonging to the ultramafic intrusion.

The platinum group minerals are found in the form of Pt-Fe nuggets. They contain a wide variety of inclusions ranging from hollingworthite, irarsite, erlichmanite, laurite, genkinite, stibio-palladinite, and osmium laths with iron oxide coatings (MOGESSIE et al., 1999; BOWLES, 1986) suggested that a chemical agent must have been responsible for their sculpting and the extreme polishing observed on some alluvial platinum nuggets from Yubdo. The embayed and sculpted surfaces of the platinum-iron nuggets and their intimate association with fine grained iron oxides in the cavities of the nuggets documented from Yubdo are also features of gold grains considered to have grown in a lateritic environment. The similarities between gold and the platinum-group elements (PGM) indicate that the processes of formation of gold in laterites are likely to be paralleled by comparable development of PGM.

Based on the investigation made one can conclude that 1) the occurrence of droplets of PGM in chromites from bore hole ultramafic samples at depth suggests a magmatic origin; and 2) a remobilization and transport of the Pt-Fe alloys have taken place from a possible dunitic source and concentrated them in the laterites. Since the remobilization of the PGE is related to a hydrothermal fluid and structurally controlled, there is a possibility of finding an enriched platinum deposit as an offshoot mineralization in the basement intruded by the ultramafic rocks.

This work was financed by FWF project PI 3643-GEO.

### **References**

- [1] BOWLES, J. F. W. (1986): The development of Platinum-Group Minerals in Laterites. - *Econ. Geol.* 81: 1278-1285.
- [2] MOGESSIE, A., BELETE, K., HOINKES, G., & ETTINGER, K. (1999): Platinum mineralisation in the Yubdo ultramafic rocks, western Ethiopia. - In *Mineral Deposits: Processes to Processing*, STANLEY et al. (eds), Balkema, Rotterdam. 751-754.