

## Rare and new mineralogical phases in the Ni-Cu-Sb-As system from the Gomati ophiolite, Northern Greece

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The Gomati ultramafic body (Chalkidiki peninsula, Northern Greece) is located in the Serbo-Macedonian Massif, one of the geotectonic terranes composing the Hellenides orogenic belt. Ophiolite occurrences in this domain have an unclear origin, and consist of altered peridotites hosting scattered chromitite bodies with massive, schlieren and disseminated textures. These ultramafic bodies are enclosed in the Vertiskos unit, an alternation of Silurian gneisses and schists, and are sometimes in contact with late Cenozoic granites. The present work focuses on several accessory minerals in the Ni-Cu-Sb-As system, found in a chloritized clinopyroxenite in contact with chromitite. The composition of these accessory minerals was determined through electron microprobe analyses. Well known mineralogical phases are represented by orcelite (Ni<sub>5</sub>As<sub>2</sub>) and breithauptite (NiSb), while other detected phases have been either not well described or never reported.

The chemistry of the Gomati minerals clusters around the following ideal stoichiometries: (Ni,Cu)<sub>7</sub>(Sb,As)<sub>3</sub>, (Ni,Cu)<sub>2</sub>(Sb,As), (Ni,Cu)<sub>11</sub>(Sb,As)<sub>8</sub>, Ni<sub>3</sub>As, Ni<sub>5</sub>(As,Sb)<sub>2</sub> and Ni<sub>7</sub>(As,Sb)<sub>3</sub>. As orcelite (Ni<sub>5</sub>As<sub>2</sub>) is a non-stoichiometric mineral, (Ni,Cu)<sub>7</sub>(Sb,As)<sub>3</sub>, Ni<sub>5</sub>(As,Sb)<sub>2</sub> and Ni<sub>7</sub>(As,Sb)<sub>3</sub> may correspond to Cu and/or Sb-rich terms of this phase. A mineral phase corresponding to the (Ni,Cu)<sub>2</sub>(Sb,As) stoichiometry was first described in the Alaskan-type Tulameen complex of Canada as unknown phase by Nixon and Cabri (1990). A phase with stoichiometry Ni<sub>3</sub>As is reported by Tredoux et al. (2016), from Bon Accord oxide body (South Africa), and corresponds to the mineral dienerite, known only from one loose crystal found in Austria in 1921 and recently discredited by IMA. (Ni,Cu)<sub>11</sub>(Sb,As)<sub>8</sub> probably represents a Cu-rich Sb analogue of the mineral maucherite (Ni<sub>11</sub>As<sub>8</sub>).

Such an anomalous mineral assemblage in the Gomati ophiolite is puzzling. While ultramafic rocks contain Ni and As of magmatic origin, the presence of Sb and Cu could be indicative of a metasomatic enrichment, probably linked to the presence of fluids emanating from the granite body in contact with the Gomati ophiolite.

Nixon G.T., Cabri L.J. & Laflamme J.G. (1990) - "Platinum-group-element mineralization in lode and placer deposits associated with the Tulameen Alaskan-type complex, British Columbia." *The Canadian Mineralogist*, 28(3), 503-535.  
Tredoux M., Zaccarini F., Garuti G. & Miller D.E. (2016) - Phases in the Ni-Sb-As system which occur in the Bon Accord oxide body, Barberton greenstone belt, South Africa. *Mineralogical Magazine*, 80, 187-198.