

TYPOMORPHISM OF DIAMONDS FROM KIMBERLITE BODIES AND PLACERS OF THE YAKUTIAN DIAMONDIFEROUS PROVINCE

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Diamond is a mineral with variety of crystallomorphological, physics-chemical and other features indicating to thermodynamical and geochemical conditions of its generation. These features can serve as typomorphic signs. For many years of investigations over the territory of Siberian platform the detailed physiographical and instrumental study of indication peculiarities provided data on diamond morphology, structure of crystals, impurity composition and entrance, mineralogical and chemical composition of solid inclusions, carbon isotope composition, types of alteration, etc.

Typomorphic features of diamonds were studied in accordance with mineralogical classification suggested by Orlov Yu.L. (1973, 1984) and justified by physical data (Bokiy, 1986). This classification distinguishes 11 genetical varieties of diamonds and divides the crystals by habit, morphology and physical properties. Diamonds were studied following geological data correlated to mineralogical-petrological peculiarities and in correspondance to secondary collectors considering age and genetical type of the latter. We have studied hundred of thousands of crystals over 259 objects (kimberlite bodies, ancient secondary collectors, modern placers) of the Yakutian diamondiferous province. The goal was to distinguish indicator features of diamonds in definite kimberlite bodies, ore columns in kimberlite bodies with a complex geological structure, and in bushes of kimberlite pipes, to determine their relation with composition and diamond content in kimberlites and to map the host and placer diamond distribution over the Yakutian diamondiferous province.

Typomorphic features of diamonds indicate to absence of zonality in fields of kimberlite magmatism of the province and absence of vertical zonality inside the ore columns of multiphase kimberlite bodies. This fact is in contradiction with opinion of Milashev V.A. and Kovalsky V.A. who suggested the model of zonal structure of kimberlite provinces.

Correlation of some typomorphic features in diamonds with kimberlite composition (mineralogy, petrography) and their diamond content points to the complex relations due to xenogenic nature of diamonds in kimberlite rocks and their different epigenetic history in various pipes and ore columns providing processes of plastic deformation, dissolution, corrosion and some other at crystals.

Negative factor for diamond content in kimberlites is the increased (more than 18-20 %) content of typical rounded diamonds of the "ural" ("brazil") type and the fact that dodekahedrons with stripes of plastic deformation are common not only for kimberlite veins (Afanasiev et al., 1974) but also for kimberlite pipes with poor diamond content referring to independent phase of kimberlite magmatism which in majority of cases preceded the intrusion of kimberlite magma.

Complex study of mineralogy and physical properties of diamonds from placers allows to distinguish 4 types of their primary sources: I - diamonds of kimberlite genesis characteristic for rich deposits of Phanerozoic age; II - diamonds of kimberlite genesis characteristic for kimberlite bodies with

poor diamond content and kimberlite veins; III - diamonds of unclear, supposedly eclogite, genesis untypical for kimberlite bodies; IV - diamonds with circular structures of "impact" genesis.

These data gave a possibility to outline the area of Kyutyungdin graben and the associated area of Molodo-Daldyno-Toluop interfluvium in the placers where diamonds of II and III types prevail. This region is perspective for discovery of rich kimberlite bodies of pre-Carbon age bearing diamonds of the so-called "kyutyungdin" type with classical pyropes of diamond association which have high contents of khorringite component comparable to diamond content of Malo-Botuobyn diamondiferous region.

Comparative study of mineralogy and physical properties of diamonds from secondary collectors of different age allowed to characterize their general typomorphic peculiarities and to distinguish among them types of primary sources of "mirny", "kyutyungdin" and "Nizhnyaya Lena" ("ebelyakh") types.

We have shown similarity in typomorphic features of diamonds from collectors of different age from Ebelyakh diamondiferous field and Upper Triassic deposits of Nizhne-Lensky region. The latter nowadays are the most ancient known diamond collectors typomorphic for the majority of placers at the north-east of Siberian platform whose primary sources have not been distinguished yet. At placers of the central part of Yakutian diamondiferous province (Malo-Botuobin, Daldyno-Alakit, Viluy, Ygyatin, Morkokin, Dyukunakh and Sredne-Markhin diamondiferous regions) diamonds of type I prevail in modern as well as in more ancient Carbon, Perm and Jurassic deposits.

In the north-east of Siberian platform (Anabar, Sredne-Olenek, Nizhne-Olenek, Muno-Tiung and Prilensky diamondiferous regions coinciding with areas of Anabar anteklise) diamond associations of "ebelyakh" (Nizhne-Lensky) type take place commonly. Their most ancient known secondary collectors are the Upper Triassic deposits of Predverkhoyan trough. For diamonds of this region such features as size, degree of unweariness and mechanical wearing increase from rim parts of Anabar anteklise towards Anabar massif. It is in accordance with major direction of transgression at generation of the given structure during geological evolution of Siberian platform. The most high degree of mechanical wearing is typical for diamonds of II, V and VII varieties according to Orlov Yu.L. (IIIrd type of primary source). It suggests their more complex exogenic history in comparison to other types of primary sources of diamonds in this region.

Polycrystals of diamond with impurity of lonsdeilite of XI variety ("yakutite") in north-eastern placers of Siberian platform analogical to those from rocks of the Popigay structure type are widely spread. The most ancient secondary collector are ferrous coarse gravels of Neogene-Lower Quaternary age.

Obtained data on the study of typomorphic features of diamonds supports the necessity of their application as of criteria for regional and local prognosis and for solution of other problems in searching of diamonds.