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ONYXES: TERMS, NOTIONS AND CLASSIFICATION

The analysis of the term 'onyx' is given. It is suggested that some terms associated with the notion 'onyx' are no more used and the list of these ornamental stones is supplemented with new varieties such as 'onyx-perelivt', 'malachite onyx', 'rhodochrosite onyx', 'fluorite onyx' and others. Onyx classification based on its mineralogical and genetic features is provided.

Надається аналіз змісту терміна "онікс". Передбачається, що деякі терміни, які пов'язані з поняттям "онікс", вже не використовуються, але з'явилися нові, такі як онікс-перелівт, малахітовий онікс, родохрозитовий онікс, флюоритовий онікс та інші. Також подається класифікація оніксу, яка базується на його мінералогічних та генетичних особливостях.

The term 'onyx' is known to a wide range of stone experts and fans. Its interpretation can be found in many encyclopedias and dictionaries such as the Great Soviet Encyclopedia, the Mining Encyclopedia, the Biblical Encyclopedia, the Geological Dictionary, the Great Encyclopedic Dictionary, the Natural Science Dictionary, the Fine Arts Dictionary and others. It is used in various literature sources, from popular to scientific, and also in advertising literature, and is known as jewelry, jewelry-ornamental stone and can represent an expensive facing material. However, despite its wide development, the term 'onyx' has different and not always correct interpretation.

The name of the stone is ancient Greek and is translated as 'nail'. The Geological Dictionary (1973) describes it as agate composed of alternating black and white strips, or black chalcedony. The Mining Encyclopedia (1987) and also the works of other researchers (Kiyevlenko, Senkevich, 1983; Putolova, 1991) also refer banded carbonate rocks called marble onyx to it. Some foreign sources call the marble onyx calcite alabaster, just alabaster or alabastrite. The Gemological Dictionary of V.V. Bukanov (2001) describes some other types of onyxes – chalcedony-onyx, carnelian-onyx, obsidian onyx and opal-onyx.

The objective of this work is to investigate this problem. There is an opinion that the term 'onyx' is ancient, non-scientific, with no genetic meaning and can be used in popular literature and at the stone market only. However, its wide use, in scientific literature as well, does not allow for its rejection. For example, it is very convenient to use the term 'cave onyx' for different types of aggregates - stalactites, stalagmites, buds, dripstones, crests etc. We think that the use of the term 'onyx' needs some ordering. The terms and notions used shall be examined and their correctness from the scientific standpoint shall be decided upon. Moreover, geological mineralogical and gemological classification indicators shall be identified and an onyx classification developed.

Following the traditions, onyx means banded (rhythmic-zonal) chalcedony – agate. It can be concentrically or straight-banded and coloured differently. Some authors (Kornilov, Solodova, 1986; Golovikov et al., 1987) think that agates and onyxes shall be differentiated. In agates strips of different colour form concentrically-zonal pattern and onyxes are banded agates (agates of the Uruguayan type) with straight-banded pattern. We think that such limitations on the basis of the pattern type are excessive because the type of banding is frequently defined by the direction of cutting (section) and the size of the item cut. Moreover, amygdales of some aggregates frequently contain zonal-concentric chalcedony from outside and straight-banded (parallel-banded) chalcedony inside, therefore, we need to call different parts of a single formation differently (Figure 1).

Figure 1. Agate amygdale combining concentrically zonal and straight-banded onyxes. Photo from the website www.catalogmineralov.ru

In jewelry the description of ornamentals frequently contains such names of inserts as black agates or onyxes. But in most cases they are not because they do not have any onyx banding. They are usually presented by black chalcedony but can be also obsidians, artificial phianites, iron-yttrium garnets, glasses etc.

Another large group of onyxes has carbonate composition. We think that the name of banded carbonate rock - 'marble onyx' - widely used in the literature and agreeing with earlier statements of other researchers (Putolova, 1991) is incorrect from the scientific standpoint. Such rock has nothing to do with marble, neither in terms of genesis, nor structural or textural features, or sometimes composition (aragonite onyx). Carbonate onyx is a more applicable term for such rock. Carbonate onyxes can have calcite, aragonite and, as suggested below, malachite and rhodochrosite compositions. As for the term 'marble onyx', it can be used as a commercial term based on its wide use. Moreover, it is incorrect to call carbonate onyx alabaster because the latter is a fine-grained gypsum variety.

We think that not all banded ornamental stones can be called onyxes. For example, they shall not include obsidian varieties with banding preconditioned by fluidal structure (Figure 2) and also metamorphic rock with banded structure such as migmatite skarns, for example wollastonite-hedenbergite from the Dalnegorskoye deposit (the Far East) (Figure 3).

According to the ideas formed, onyxes are multicolored banded mono-mineral, sometimes bimineral aggregative formations. Their origin is hydrogenic, preconditioned by sedimentation of the mineral matter from thermal and cold solutions. Body shapes include vein, tabular onyxes formed in fractures and cavities, and dripstones – in the form of covers, stalactites, stalagmites in carst caves and other cavities (Putolova, 1991; Malakhov, 2004). We think it necessary to allocate secretion (agates) and concretion types of onyxes.

We can significantly extend the list of onyxes on the basis of structural, mineralogical and genetic indicators described above. In addition to the above-given agate (chalcedony), calcite and aragonite onyxes, we can also identify other types - onyx-perelivt, malachite, rhodochrosite, opal and fluorite onyxes.

Figure 2. Banded obsidian. Photo from the website: http://obsidians.my1.ru

Figure 3. Metasomatic rhythmicity of wollastonite-hedenbergite skarn. From the collection of D.I. Savrasov's Kimberlitic Museum of the Diamond Company ALROS

Figure 4. Onyx-perelivt, Shaitanskoye deposit (the Urals). Photo from the website www.catalogmineralov.ru

Figure 5. Concentrically zonal malachite onyx. From the collection of the Fersman's Mineralogica

Shaitan perelivt – a beautiful ornamental stone – unquestionably has all onyx qualities (Kornilov, Solodova, 1986) (Figure 4). It was found in the form of vein bodies at the eastern slope of the Northern Urals near the Shaitanka village. Perelivt is a small-crystalline dickite-quartz aggregate of hydrothermal origin with banded structure. Exteriorly onyx-perelivt is very similar to onyx-agate, but the latter is a chalcedony variety – a cryptocrystalline finely-fibred quartz variety. Perelivt can be considered onyx both in terms of structural and genetic features.

Malachite, sometimes together with azurite or chrysocolla, is another carbonate onyx variety. Its typical aggregates in the form of dripstone crusts, buds, stalactites have clear banded (strip-like, striate, concentric etc.) pattern in cuts and chips (Figure 5). Such malachite forms are generated in carst cavities and cavities in ore-bearing limestone, where waters with copper bicarbonate are filtered (Kornilov, Solodova, 1986).

The largest malachite deposits are located in Africa. There they are concentrated in the 'Copper Belt' stretched from Congo to Zambia. Stalactites with clear onyx pattern 0.5 by 0.2m in size can be found there.

Rhodochrosite onyxes are uniquely beautiful (Figure 6). This is excellent ornamental and collection material. The known deposits of such rhodochrosite are located in Argentina. Stalactite and stalagmite rhodochrosite onyxes are found there in the Katamar province in former silver mines left by the Incas in the 13th century, such as the Kapilitas. Some of these formations are huge in size, up to 3 m high and up to 50 cm in diameter.

Some noble opals have onyx banding. Their origin is low-temperature-hydrothermal. They fill fractures or cavities of other origin layer-by-layer. Some aggregates have cluster and bud shapes. Such pattern is typical for boulder-opals mined in Australia.

Banded fluorite is another type of onyx. It is presented by vein thermal product characterized by clearly expressed colour banding. Fluorite onyx of vein type of the Kalanguyskoye deposit (the Chita

Region) is the example (Figure 8). Such onyxes are found in other places of Eastern Transbaikalia, for example, at the Usugli deposit, in Primorye at the Nikolayevskoye mine, in Mongolia etc.

We also identify another type of vein carbonate onyx – a concretion one. It was discovered at the Torgashino limestone deposit near Krasnoyarsk (Ananyev et al., 2010). Vein bodies filled with concretions are found in the limestone stratum in addition to typical calcite onyx veins. Idiomorphic calcite crystal fragments (1-3 cm) are located in the centre of concretions and are grown over by concentrically zonal ferruginized much argillite-altered calcite onyx looking like 'rounded pebble' (2-4 cm) from outside. This in turn is grown over by concentrically banded large radial-columnar calcite crystals (Figure 9). Vein cavities are filled with closely packed concretions-spherolites usually 5-12 cm in diameter. In some cases, when such veins are destructed, they are easily dissected into separate aggregative formations. Concentrations are a good collection material.

The photographs of similar chalcedony-amethyst onyx-spherolite formations can be found in the Internet (Figure 10).

At the Torgashino deposit a single gigantic concretion was found with the diameter exceeding 1 m. There was a fragment of light-grey calcitic limestone inside it up to 20 cm across. It was grown over by an aggregate of compact

Figure 6. Cut of dripstone rhodochrosite onyx.
From the collection of the Museum of Natural History, Vienna (Austria)

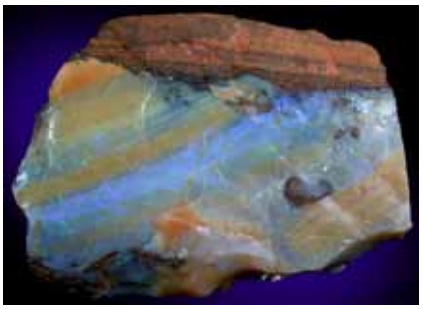

Figure 7. Onyx banding of boulder opal (Australia).
Photo from the website: http://ru.deposit-photos.com

Figure 8. Fluorite onyx of the Kalanguyskoye deposit.
From the collection of the Mineralogical Museum of the Siberian Federal University

Figure 9. Calcite onyx concretion-spherolite 9x8x7.5cm in size. From the collection of the Mineralogical Museum of the Siberian Federal University

Figure 10. Chalcedony-amethyst onyx-spherolite. Photo from the website www.catalogmineralov.ru.

concentrically zonal light greenish-white calcitic onyx up to 40 cm wide. The concretion represented a flattened roundish shape, and the surface of its chip about 50 cm thick showed its internal structure. The size of this concretion testifies to the uniqueness of some of such formations at the Torgashino deposit.

Therefore, it can be assumed that onyxes are banded aggregative formations of water origin. The most typical of them are presented by carbonates, oxides, hydroxides and halogenides. They compose carst formations, vein and tabular bodies as well as secretions and concretions which is reflected in the classification below (Table).

Onyx Classification

Table

Onyx Types					
Mineral			Morphologic		
			Examples of Countries, Territories, Deposits		
1	2	3	4	5	6
Class	Mineral, Aggregate	Cave (Dripstone)	Vein (Fracture, Tabular	Secretion	Concretion
	Calcite	Russia, Khakasia, Borodindskoye. Turkmeniya, Karlyukskoye	Russia, Krasnoyarsk Territory, Torgashino		Russia, Krasnoyarsk Territory, Torgashino
	Aragonite		Pakistan, Beljistan Province		
	Rhodochrosite	Argentina, Kapillitas			
	Malachite	Russia, the Urals, Mednorudnyanskoye. Africa, Congo, Katanga Province (Shaba)			
1	2	3	4	5	6
Oxides	Chalcedony quartz			Russia, Brasil Uruguay	
	Quartz-perelivt		Russia, the Urals, Shaitanskoye		
Hydroxides	Opal		Australia, Koober Pedy, Andamooka		
Halogenides	Fluorite		Russia, Chita Region, Kalanguyskoye		

This work represents a solution for ordering the use of the term 'onyx'. It shall be noted that onyx is primarily an ornamental and sometimes jewelry stone drawing attention by its high decorative features, good polishing capacity, frequently together with translucence

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