MINERALS OF THE LIMESTONE AND DOLOMITE DEPOSITS IN THE SOUTHERN DONETSK BASIN

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Schematic location map of limestone and dolomite deposits in the southern Donets Basin.

A group of limestone and dolomite deposits in the Volnovakhskiy and Starobeshevskiy districts of Donetsk oblast are geologically restricted to the so-called junction zone of the Donets Basin and Azov Crystalline Massif. The Early Carboniferous and Late Devonian sedimentary rocks rest on Archean–Proterozoic gneisses, migmatites, and granites. In this area, opencast mines and dumps of the Komsomolskiy Mine and Dokuchaevskiy Dolomite Flux Plant (DDFP) are situated. The dolomite and limestone are mined in quarries and utilized mostly as flux agents for the metallurgical industry.

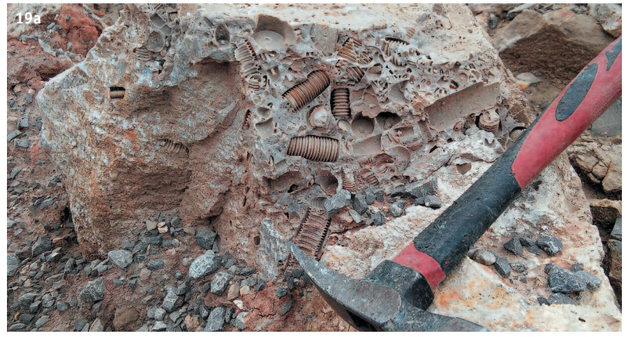
The deposits are hosted practically exclusively in Visean and Tournaisian (Early Carboniferous) carbonate rocks. The zone of carbonate rocks extends sublatitudinally for approximately 80 km at a width of 10–15 km[1]. The limestone abounds in fossils, while the dolomite and dolomitized limestone are practically barren of them. Beautiful specimens of calcite, pyrite, marcasite, amethyst, rock crystal, gypsum, fluorite and some other minerals currently embellish private and museum mineralogical collections. Regretfully, most of the collection-quality mineral specimens are dumped and destroyed during blasting operations and are only occasionally saved by enthusiasts.

The junction zone of the Donets Basin and Azov Crystalline Massif begins in an area west of the village of Novotroitskoe, which houses the Novotroitskiy Mine Administration. The economic production of the limestone was launched in 1933. Before that time, the limestone was produced by small diggers for the needs of metallurgical plants in the Donets Basin. The annual production of the flux limestone and dolomite currently amounts to 4 million tonnes (MT). The now flooded Western Dolomite Quarry and the operating Limestone and Eastern quarries were dug in the left-hand side of the Sukhaya Volnovakha River, which circles this village (*Fig.* 1).

Specimens and photos:
Mikhail M. Bitman
if other is not specified.

1. Western limestone quarry of the Novotroitskiy Mine, 2014. Photo: Mikhail V. Kulishov.

[1] *Lazarenko, E.K., Panov, B.S., and Gruba, V.I.* Mineralogy of the Donets Basin, 2 volumes, Kiev: Naukova Dumka, **1975**. vol. 1, 256 pp., vol. 2, 504 pp.



17. Cluster of **quartz** crystals. 5 x 4 cm. Northern Quarry of the Komsomolskiy Mine. Specimen and photo: Mikhail M. Bitman.

18. Smoky **quartz** crystals and a pseudomorph after crinoid ("mold") in silicified limestone. 4 x 4.5 cm. Northern Quarry of the Komsomolskiy Mine. Specimen: Victor M. Mikushev; photo: Mikhail M. Bitman.

19. (a) Block of silicified limestone with crinoid "molds". (b) Crinoid "molds" in silicified limestone (up to 6.5 cm high). (a, b) Northern Quarry of the Komsomolskiy Mine. (a) Photo: Mikhail M. Bitman, (b) Specimen and photo: Mikhail M. Moiseev.

20. Cluster of **quartz** (amethyst) crystals. Northern Quarry of the Komsomolskiy Mine. Specimen and photo: Fedor V. Lysenko.

21. **Quartz** (amethyst) crystals from cavities in granite. The largest crystal is 3 cm tall. Vicinities of the villages of Bogdanovka and Novognatovka, Starobeshevskiy district. Specimen and photo: Mikhail M. Bitman.

37. Zoned honey-colored **calcite** crystal:
(a) the specimen when found. 8 cm.
Western Quarry, Novotroitskiy Mine.
Specimen and photo: Mikhail M. Bitman.

38. **Calcite**. 3 cm tall.
Western Quarry, Novotroitskiy Mine.
Specimen and photo: Mikhail M. Bitman.

39. Cluster of equant **calcite** crystals. 7 x 7 cm.
Western Quarry, Novotroitskiy Mine.
Specimen: Victor M. Mikushev;
photo: Mikhail M. Bitman.

40. Cluster of **calcite** crystals of two generations.
5 x 5 cm. Eastern Quarry.
Dokuchaevskiy Dolomite Flux Plant.
Specimen and photo: Mikhail M. Bitman.

42. Amber-colored **calcite**. 9 cm.
Eastern Quarry.
Dokuchaevskiy Dolomite Flux Plant.
Specimen and photo: Anatoliy V. Cherkaev.

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41. Aggregate of rhombohedral–prismatic **calcite** crystals crowned with obtuse rhombohedral crystals. 12 cm.
The crystals are transparent, amber-colored, and their faces are dull only on one side of the crystals (pictured). Eastern Quarry.
Dokuchaevskiy Dolomite Flux Plant.
Specimen and photo: Mikhail M. Bitman.

43. Stepped-block **calcite** crystal.
12 cm tall. Eastern Quarry.
Dokuchaevskiy Dolomite Flux Plant. The specimen was found by Anatoliy V. Cherkaev.
Specimen and photo: Mikhail M. Bitman.

large (> 10 cm) crystals, of which any mineralogical collection could be proud. One of such splendid crystal was found in the spring of 2014 in clay from a karst cavity, which was brought to the dumps of the Western limestone quarry (*Figs*. 37a, 37b). This *"pocket"* also hosted other interesting crystals (*Fig*. 38).

The third remarkable type of Novotroitskiy calcite crystals is locally referred to as *footballs* by local mineral lovers and collectors. These are white and yellowish crystals with complicated faceting (*Fig*. 39). The crystals can be subdivided into two generations: relatively large (up to 3–4 cm) crystals resembling footballs overgrown clusters of scalenohedral crystals. Some of the crystals possess dark gray edges, which contrastingly differ from the pale faces. Rare specimens of this type show evidence of later crystal growth with a change in the crystal habits. In this situation, the younger crystals host dark edges of phantoms of another habit. This locality also provided a variety of other interesting specimens.

Calcite from the quarries of the Dokuchaevskiy Dolomite Flux Plant

Although the Dokuchaevskiy quarries are situated within a direct vision distance from the Novotroitskiy quarries, calcite specimens from these two deposits are notably different. Most specimens from Dokuchaevskiy originate from karst cavities found in the Eastern dolomite quarry. It seems to be reasonable to describe in more detail individuals typical for this deposit. Their type 1 comprises large bright-amber semitransparent crystals shaped with prism and obtuse-rhombohedron faces. These crystals are sometimes found as beautiful clusters up to dozens of kilograms. The crystals commonly show growth steps on their faces and resemble ancient Indian pyramids (*Figs*. 42, 43). The crystals of this type usually possess mat faces on one of their sizes (*Fig*. 41).

Type 2 comprises crystals found in the same cavities and faceted by combinations of scalenohedron and rhombohedron faces, and their diverse twins. The color of these crystals is also close to amber or pale brown, and they are often transparent (*Figs*. 46, 44). Some crystals of the two types are as large as more than 20 cm and weigh up to a few kilograms. It is interesting that, unlike the Novotroitskiy calcite specimens, the mineral from the Dokuchaevskiy quarries does not luminesce in UV radiation. This locality also provides perfectly faceted transparent doubly-topped twins of delicate yellow color (up to 2–5 cm), which look like gems, and can be referred to as type 3 of the crystals (*Fig*. 45).