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Fall site: vicinity of the village of Ozerki, Stanovlyanskii district, Lipetsk oblast, Russia.

Coordinates: 52°48.084'N, 38°10.268'E.

Fall time: 4 : 15 a.m. June 21, 2018.

Total mass of found fragments:
20+ kg (meteorite shower).

Total number of found fragments:
approximately 100.
chondrite L6.

Found by: G.A. Yakovlev (59.8 g) and others.

Housed at: Eltsin Ural Federal University, Yekaterinburg (1 176 g, 5 fragments), Vernadsky Institute of Geochemistry and Analytical Chemistry, Russian Academy of Sciences, Moscow (603 g, 3 fragments).

In the early morning (4:15 a.m. Moscow time) of July 21, 2018, dozens of locals in the Lipetsk and Tula oblasts in southern central Russia were awakened by a thundering explosion associated with a bright flare, which was visible even against the rising sun.

The bolide was also seen in the Moscow, Voronezh, Orel, and Tambov oblasts, and reports on it were received even from the Kharkov oblast in Ukraine and the town of Mogilev in Belorussia. The residents of the Central Black-Soil Region of Russia witnessed a rare astronomic phenomenon: the flight and fall of a meteorite. The cosmic body entered the Earth's atmosphere in azimuth of 57° at a velocity of 14 km/s (more than 50 000 km/h) and exploded at a height of 27.2 km. According to data from a network of a dozen of infrasonic detectors located in Germany, Tunisia, Portugal, the United States, and Greenland, the explosion was 3200 tonnes in TNT equivalent yield. These evaluations correspond to a cosmic body as large as 4 m across and 100–200 tonnes.

The meteorite passed through the upper atmosphere as a bright body, whose flight was associated with repeated flares and left a long smoky trail. Because of its steep entry angle (79° to the horizontal), this body flew only for 6–7 s and thereby covered a distance of 60–70 km in the atmosphere to the explosion (and destruction) site. This predetermined that the meteorite fragments were strewn over a relatively compact area of 3–4 km².



3. Individual fragment of the Ozerki meteorite.
Weight 45 g.
Find and photo: Timur V. Kryachko.



4. Smoky trail of the Ozerki meteorite.

The next day after the meteorite fall, the fall site was examined by researchers of the Meteorite Committee, Russian Academy of Sciences, and of the Eltsin Ural Federal University, as well as a team of volunteers and enthusiasts from Moscow.

Search teams intensely worked at the suggested fall site of the meteorite in the Elets and Stanovlyanskii municipal districts: witnesses of the fall were questioned, and the forests, woodlots, fields, and country roads were thoroughly searched. On June 25, G.A. Yakovlev (search team of the Eltsin University) found the very first fragment 3 cm across (approximately 60 g). The stony meteorite was then visually identified as, most probably, ordinary chondrite. Shortly afterward, the search groups found more fragments, including one as large as 550 g.

The meteorites are polyhedral, rounded, elongate, with clearly seen regmaglypts and pits, or with a smooth surface topography, all coated with black fusion crusts. The chondrite is pale gray, massive, and is cut by a discernible dense network of thin veinlets. Some of the samples host impact melt, and their rock is then brecciated.

"As seen in polished sections, the meteorite contains very rare chondrules, which are evenly distributed in the coarse-grained recrystallized matrix. Most of the chondrules are poorly discernible and vary from 0.2 to 1 mm across. The large chondrules (no larger than 4 mm) are better preserved. The most abundant chondrules consist of olivine, plagioclase, pyroxene, chromite, troilite, and Fe–Ni metal. The dominant matrix minerals are olivine, clinopyroxene, plagioclase, Fe–Ni metal, and troilite" (V.V. Sharygin, Laboratory for Studying Mineral-Hosted Inclusions, Sobolev Institute of Geology and Mineralogy, Siberian Branch, Russian Academy of Sciences, Novosibirsk).

The Ozerki meteorite is the 145th meteorite found in the territory of Russia.

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1. Inner structure of the Ozerki meteorite: chondritic breccia cemented by impact melt. Find and photo: Timur V. Kryachko.

2. Individual fragment of the Ozerki meteorite. Weight 169 g. Find and photo: Timur V. Kryachko.

