

# Meteorites in the Snow

## Antarctic ice points to the origin of the building blocks of life

**Organic material was formed directly in the cold regions of our still-young solar system, as proved by so-called micrometeorites from Antarctica that have been investigated by a French research team. Typically, organic compounds come from the interstellar dust clouds where new stars and planetary systems are created. The microscopically small fragments from the permanent ice in fact contain very large quantities of organic material, such as carbon and an extraordinary amount of deuterium, but they also consist of crystalline minerals. And this clearly indicates that the micrometeorites originate in our solar system, report Jean Duprat of the Université Paris-Sud and his colleagues.**

For the most part, our knowledge of the early history of our planetary system comes from laboratory studies of extraterrestrial material. This includes meteorites from the asteroid belt between the orbits of Mars and Jupiter, icy bodies from the outer solar system, or minute particles of interplanetary dust. Samples were returned to Earth by space probes, or collected by aircraft in the stratosphere at an altitude between ten and fifty kilometers. The composition of the analyzed material provides information about chemical processes that occurred in the early days of our solar system.

Jean Duprat and his colleagues, on the other hand, implemented another method of obtaining samples in the snow of Antarctica. The researchers filtered two so-called micrometeorites from the 40- to 55-year-old snow near the French-Italian polar station Concordia, and examined the composition of the fragments, which measured only a few hundred micrometers. The two meteorites named Particles 19 and 119 contained great quantities of carbon as well as deuterium, an isotope of hydrogen. Among the particles' organic compounds, they discovered crystalline phases of silicate, a characteristic mineral that was formed during the creation of terrestrial planets like Earth.

These discoveries contradict the prevailing assumption that organic material with a high deuterium content is created only in molecular clouds in interstellar space. These gas clouds consist mainly of hydrogen, and occasionally collapse because of their own mass, which can lead to the birth of a new star. Meteorites and other objects that fly through these clouds are enriched with organic materials. In this case, though, unstructured silicates are the prevailing mineral. The scientists with Duprat conclude that Antarctic micrometeorites provide further information about the early, still-forming solar system. In the future, researchers may draw further cosmic clues about how the first organic compounds appeared on Earth.

Jean Duprat (Université Paris-Sud) et al.:  
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