

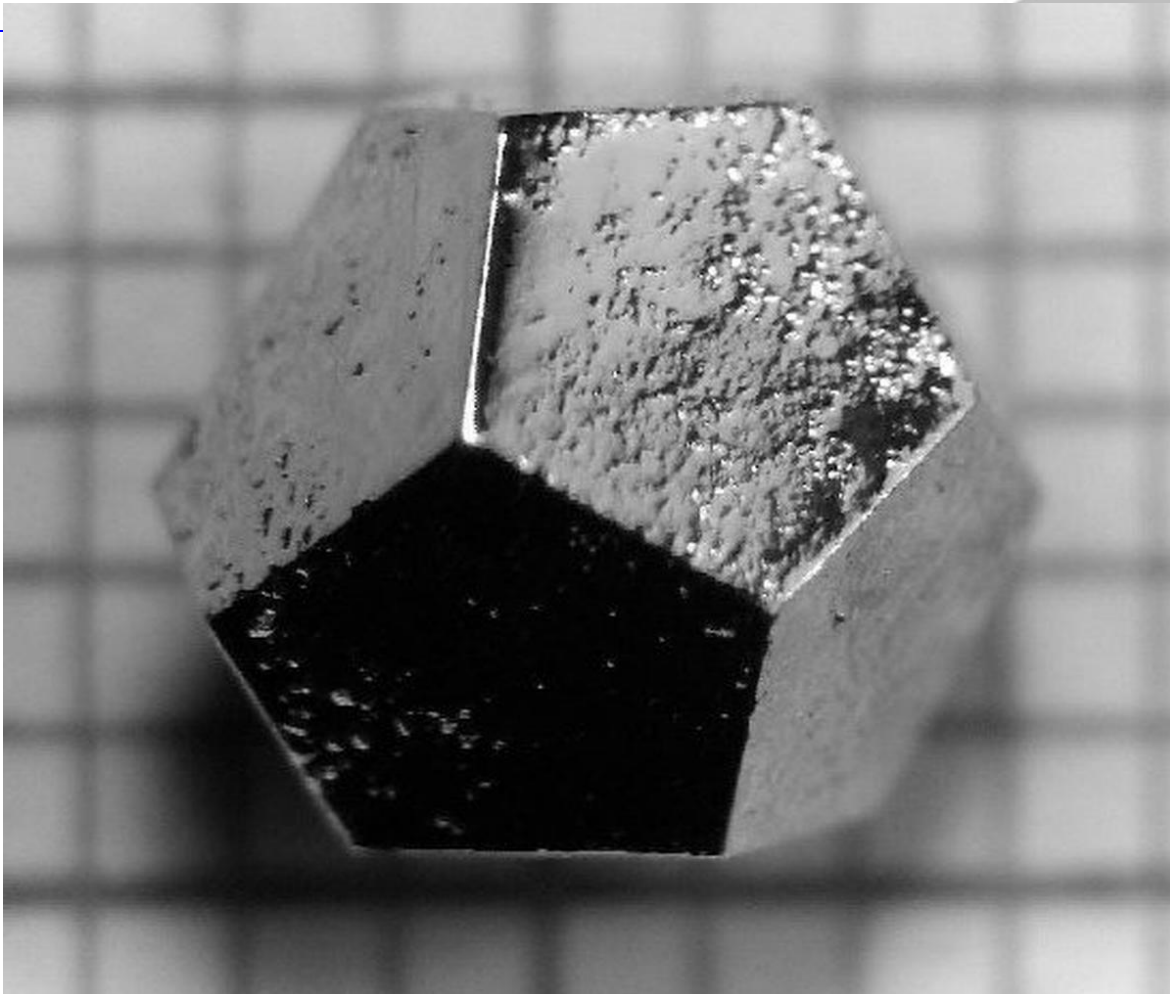


Quasicrystals

Why in News?

Scientists have discovered a **third natural source of quasicrystals in the Sand Hills of north central Nebraska, USA.**

//



What are Quasicrystals?

- **About:**
 - **Quasicrystals** are fascinating materials that possess a unique combination of properties. They are a **testament to the beauty and power of irregularity** in the natural world.
- **Difference from Traditional Crystal:**
 - Unlike **traditional crystals**, the atoms in quasicrystals are arranged in a pattern that repeats itself at irregular intervals, rather than in a fixed, repetitive pattern.
 - This deviation from the normal arrangement of atoms in solids makes quasicrystals

a **symbol of the power of irregularity.**

- **Common salt crystals**, like those of [Sodium chloride \(NaCl\)](#), adopt a cubic pattern due to their chemical and physical properties.
 - The cubic pattern allows the sodium and chloride ions to **optimise for factors like density and thermal stability.**
- Quasicrystals, on the other hand, **form in a pattern that deviates from the cubic structure** and is less optimal.
 - The structure of their atomic lattice still contains the imprints of some stressful event.
- **Application:**
 - They are used in manufacturing **non-stick frying pans**, needles for acupuncture and surgery, dental instruments and razor blades.

How Quasicrystals were Discovered?

- The discovery of quasicrystals was made by **American-Israeli scientist Dan Shechtman** in **1982** in the lab.
 - **Dan Shechtman received the 2011 Nobel Prize in Chemistry** for discovering quasicrystals.
- The **first natural quasicrystal was discovered in the Khatyrka meteorite** in Russia in 2009.
 - The Khatyrka meteorite is believed to have gone through **several collisions in space over millions of years**, which would have subjected it to intense pressure and heat.
 - Inspired by these conditions, physicists **conducted experiments to create new quasicrystals in the lab using "shock synthesis."**
- In 2021, scientists discovered **a quasicrystal in the remains of the first-ever detonated atomic weapon**, the **Trinity test of the Manhattan Project**.
- These findings suggest that intense, fiery conditions like those experienced by the **Khatyrka meteorite and the Trinity test are the birthplace of natural quasicrystals.**

[Source: TH](#)

PDF Refernece URL: <https://www.drishtias.com/printpdf/quasicrystals>