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And His Discovery of Quasicrystals
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What are Quasicrystals?

First we must look at what a crystal is. Traditionally a crystal was defined as “a regularly ordered, repeating three-dimensional pattern.” Because of this repetition, crystals by definition had to follow two, three, four, or six-fold rotational symmetries. However, this only encompasses periodic crystals.

A quasicrystal is just like a periodic crystal in that it has sharp diffraction peaks, but different in that it does not have a continuous repeating lattice structure and does not have translational symmetry. Quasicrystals are therefore not bound to the symmetries listed above, but can possess 5-fold symmetries instead, like Shechtman discovered.

Visualization of Quasicrystals:

One way to think of Quasicrystals is of a tiling pattern that never repeats. The simplest example is the Penrose tiling, discovered by Roger Penrose. One can notice the five-fold symmetry of the blue tiles create together. The “tiles” in real crystals are the atoms packed together in them.

Visually we can see that the crystals with 2-fold, 3-fold, four-fold, and 5-fold symmetry have what is called translational symmetry. The crystal can be slid over to line up with its own edge without creating any gaps. The crystal with five-fold symmetry cannot do this.

Works Cited & Consulted