

Frédéric Mansuy

*Fibonacci words and the construction of a “Quasicrystalline” Fivefold Structure,*

Fibonacci Quart. **55** (2017), no. 5, 115–134.

**Abstract**

Since their discovery in 1982 by Dan Shechtman, quasicrystals are still somewhat mysterious. The atoms they are made of arrange themselves on long distances in a fivefold symmetry that is forbidden by the rules of crystallography. The Penrose tilings are one of the rare examples presenting such a symmetry. It is therefore natural to assume that atoms in quasicrystals should be organized in a similar way. However, the rules of placement of the basic bricks composing these tilings are not sufficient to solve the mystery since after a certain extension, they offer several placement possibilities of these bricks thus provoking a decoherence of the system. As a consequence, there is a need for a global, fundamental, geometric logic to explain the formation of quasicrystals; this is precisely what this article proposes through a method of construction in several steps based on the intrinsic particularities of the infinite Fibonacci word.