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The squiral tiling from Grünbaum and Shephard's monograph is equivalent to a binary bijective lattice substitution in the plane. In fact, it is a genuinely two-dimensional analogue of the classic Thue-Morse substitution. It is shown how the constructive approach due to Mahler and Wiener, as well as Kakutani, can be extended to prove that this system has purely singular continuous diffraction. The methods extend to higher dimensions and provide an alternative approach to results previously discussed by Natalie Frank. (Received January 23, 2014)