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Grünbaum, Branko; **Miller, J. C. P.**; **Shephard, G. C.**

Uniform tilings with hollow tiles.

The geometric vein, pp. 17–64, *Springer, New York-Berlin*, 1981.

From the introduction: "Tilings of the plane in which each tile is a closed topological disk, or some other simple kind of set, have been extensively studied from many points of view [see Grünbaum and Shephard, *Tilings and patterns*, Freeman, San Francisco, 1982]. Of special interest are tilings whose tiles are regular polygons; there are many such tilings and they occur frequently in practical applications. In particular, the three regular tilings have been known since ancient times and the uniform (or Archimedean) tilings have been known since Kepler's pioneering work in the seventeenth century.

"The purpose of this paper is to present a generalization of these ideas that leads to a great variety of new and visually attractive tilings. The generalization is based on the concept of a 'hollow tile', which can also be traced back to Kepler.

"Our difficulty in the treatment of tilings by hollow tiles is that many of the traditional definitions have to be recast. Even the usual definition of a tiling—a family of sets (tiles) that cover the plane without gaps or overlaps—is clearly inapplicable here. We must therefore begin by reformulating the definitions of many terms we shall use. For the most part we shall be concerned with uniform tilings (vertex-transitive tilings by regular polygons) and we shall give diagrams of all those whose existence is known. These represent a true generalization of the 'traditional' uniform tilings in that the latter are included when suitably interpreted in terms of our new definitions. We must point out, however, that we can only conjecture that our enumeration is complete. We are essentially sure that this is so when no infinite polygons occur, though we cannot produce a full proof even in this case.

"In the final section of the paper we give a short history of the subject as well as indicating generalizations, related problems, and areas for further investigation."

{For the entire collection see MR0661767 (83e:51003)}