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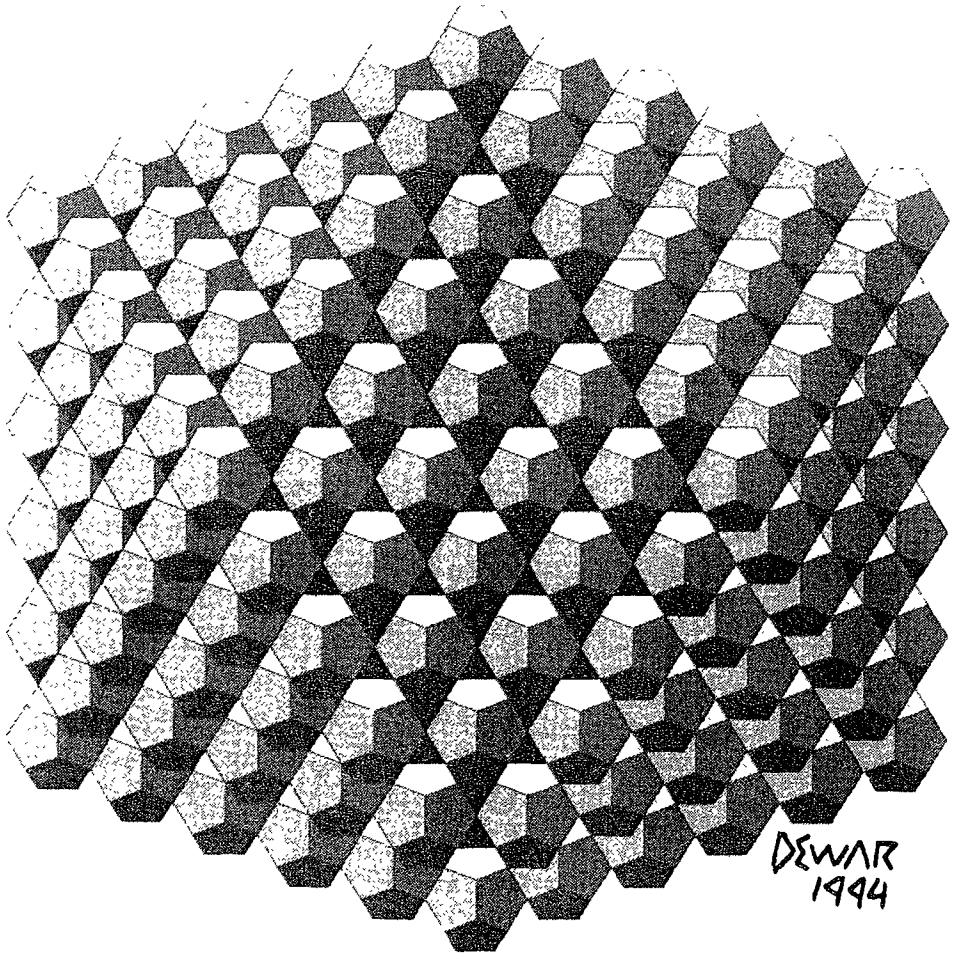

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THE DUTCH GRAPHIC ARTIST M. C. ESCHER

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Mathematicians, engineers, chemists, physicists were among the first admirers of Escher's graphic art. Escher felt closer to people in the physical sciences than he did to artists because many of his prints were done more like an engineering project using ruler and compass than in a free spirit mode. His work still appeals to mathematicians because many of his prints contain good examples of plane symmetry groups. Mathematicians continue to use his periodic patterns of animal figures as clever illustrations of translation, reflection, rotation, and glide-reflection symmetry. Escher said "although I am absolutely without training or knowledge in exact sciences, I often seem to have more in common with mathematicians than my fellow artists."

It is well documented in written correspondence of Escher that there were many sources of influence for his graphic work. For example, some of his drawings of impossible objects was influenced by a drawing of an "impossible triangle" by two British professors. This paper will focus on Escher's works of symmetry and periodic patterns.

Escher visited the Alhambra and Cordoba in Spain and made pencil sketches of some of the tilings. He later put animal figures in these patterns. M. C. Escher was a master at producing tessellations. A tessellation of a plane is the filling of the plane with repetitions of a figure in such a way that no figures overlap and there are no holes. Escher said this about his 1936 visit to the Alhambra: "the Moors were masters in the art of filling a plane with similar interlocking figures, boarding each other without gaps. What a pity that their religion forbade them to make images."

Two mathematicians, George Polya and H. S. M. Coxeter, influenced Escher's work. For instance, Polya published an article in a crystallographic journal that pictured examples of the 17 different symmetries of the plane. The figures in Polya's article contained different combinations of translations, line reflections, rotations, and glide-reflections that map into themselves when one of these motions is performed. These symmetries are sometimes called "wallpaper patterns" because they resemble the periodic patterns found in wallpaper. Escher studied these figures, which helped him produce animal shapes that fit into tile like patterns that cover the plane in a regular interlocking manner.

Much of Escher's work was reproduced with wood blocks. Often the method used in doing the printing produced translation and/or rotational symmetry. For example, in his woodcut "Square Limit" Escher described the printing procedure: "I needed a minimum of three colours. Using the white paper as one colour, I executed two woodblocks, each of which has the form of a right-angled isosceles triangle; four of them fill the entire square. Turning around the center, the white interspaces of every triangle remain always at their places, but the blue and the red alternate continually; one same woodblock is alternately used for printing blue and red. A complete copy needs 8 printings."

Those wanting to do some historical research on Escher can find a rich source in the Roosevelt collection at the National Gallery of Art Library in Washington, D. C. This collection contains some of Escher's original letters dating from 1957 to 1972.

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