

Readers' comments offering substantial theoretical and practical contributions to issues that have been raised in texts published in Leonardo are welcomed. The Editors reserve the right to edit and shorten letters. Letters should be written in English and sent to the Main Editorial Office.

COMMENT ON "ON THE AESTHETICS OF SIERPINSKI GASKETS FORMED FROM LARGE PASCAL'S TRIANGLES"

Almost anyone can study the (Pascal's) triangle and discover more properties, but it is unlikely that they will be new.

—Martin Gardner

Pascal's triangle is almost universally famous, although it should more properly be called Khayyam's triangle after the Persian mathematician-philosopher-poet who, in all probability, was its true discoverer. But such are the vagaries of history that even the Encyclopaedia Britannica does not mention it in the biographies of either Blaise Pascal or Omar Khayyam; I will, with no disrespect to Pascal, call it Khayyam's triangle here.

Contrary to Gardner's assertion, new results keep on being discovered; indeed, a multitude of papers in the *Fibonacci Quarterly* attest to the richness of the morphology of this triangle. This is also amply borne out in Pickover's paper (*Leonardo* 23, No. 4, 411–417, 1990). Attention in this connection is drawn to a recently published monograph by Bondarenko [1]. This work is as yet available only in the Russian language; it is devoutly wished that arrangements will be made for the publication of an English translation by some appropriate learned society in the near future.

As Pickover has mentioned, computer graphics tools are very well suited for discovering the esthetics of Khayyam's triangle. In particular, he has shown the symmetries of the triangle modulo N , where $N > 1$ is a positive integer. In this respect, it must be mentioned that Khayyam's triangle modulo P , where $P > 1$ is prime, is a deterministic fractal with a well-defined similarity dimension [2]; a paper by Long is highly recommended [3]. Even more interesting are the generalizations [4,5] of Khay-

yam's triangle, which yield intricate patterns when computed modulo N [6]. As a result of Pickover's paper, it is expected that readers will find exploration of Khayyam's triangle and its generalizations rewarding.

I conclude with the following thought: While Khayyam's triangle modulo 1 contains only zeroes, the triangle modulo ∞ contains all numbers except zeroes!

Akhlesh Lakhtakia

Department of Engineering Science and Mechanics
Pennsylvania State University
227 Hammond Building
University Park, PA 16802
U.S.A.

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COMMENT ON "HOW I CAME TO PAINT THE CRAB NEBULA: THE DEVELOPMENT OF COSMIC THEMES IN MY OIL PAINTINGS"

The underlying theme of Berta Golahny's *Crab Nebula* painting (*Leonardo* 23, No. 4, 363–365, 1990), and two later paintings on the same subject, is creation—specifically, a modern, twentieth-century understanding of the inception and continuing life of the universe from a scientific point of view. It is particu-

larly appropriate that Golahny's painting of the Crab Nebula grew out of her Genesis series based on the biblical seven days of Creation. In seeking to make the *Fourth Day of Creation*, the creation of the sun, moon and stars, more convincing, the artist consulted photographs of the cosmos and the latest discoveries in space exploration. This led directly to a new, scientific interpretation of creation in the phenomenon of a pulsing, exfoliating nebula, tinged with astral, saturated colors and curling, twisting forms that press against the outer limits of the canvas. The coloring effects of magenta, orange, red, green, blue, purple and black have been made more vivid by the juxtaposition of complementary colors and the skillful manipulation of brush strokes to suggest twisting, turning, often translucent shapes and the flux and energy of endless evolution.

This vision of creation invites comparison with earlier views, such as the anthropocentric interpretations of Michelangelo's Sistine ceiling (1508–1512) or Blake's engraving "And the Morning Stars Sang Together" (c. 1821). Here primal energy is personified in God or the Ancient of Days, complete with flowing white beard, or, as Robert Frost so wittily put it, "It's God," said Eve. "I'd know him from Blake's painting anywhere." Even a modern version of space, Robert Rauschenberg's *Stoned Moon* series, presents photographs of the astronauts exploring the moon; a cosmic vision shaped by the image of humanity.

Golahny's *Crab Nebula*, although primarily abstract in form, does suggest in some of its embryonic shapes future terrestrial life, but its main thrust is to capture the process of creation, a process that takes place both in the creation of the nebula and in the gestation of the painting it-

Section Editor: Elizabeth Crumley