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BOOK REVIEW

A Grain of Sand: Nature's Secret Wonders, Gary Greenberg, Voyageur Press, 2008, 112 pages.

"Art will lead the way in conveying science to the consciousness of twenty-first century culture" – Gary Greenberg.

A *Grain of Sand: Nature's Secret Wonders* (Voyageur Press, 2008, 112 pages) by Gary Greenberg is a spectacular atlas of sand grains as seen through the lenses of a microscope. The author – an artist, scientist, and inventor – has photographed and written the text for this delightful book that in 10 brief chapters, takes the reader on an amazing visual journey into the microscopic realm of sand grains and beach deposits from around the world. The primary aim of the author is to enlighten the world to the existence of this unique world of "sand art."

It all begins in Hawaii and its fabulous multicolored beaches that contain myriad minerals eroded from volcanic rocks – from pure olivine crystal beaches to black basaltic beaches and everything in between. Chapter 2 provides the author's background as well as some technical details regarding the various ways he has used the microscope to photograph sand grains. The montage of Maui sand grains made of twenty-seven individual photographs (p. 33) sums up the author's primary objective to "create art through the microscope". In Chapter 3, the geology, mineralogy and oceanography of sand grains and beaches are highlighted. The creation of sand by erosion, beach mineralogy and formation, coral reefs and beach ecology, are all discussed and beautifully illustrated with micrographs and photos. Chapter 4 presents the

spectacular range of natural colors of minerals that make up beach sands – from the ubiquitous quartz grains to the heavy minerals of garnet, epidote, magnetite to shell fragments, corals, sea urchin spines, foraminifera and other unique biogenic materials. Chapter 5 exhibits the incredibly wide variety of shapes that individual mineral grains can take, including a magnificent three-pronged sponge spicule next to a purple sea urchin spine (p. 76). The shapes and colors of minerals and biogenic sands are lavishly presented by many fabulous close-up micro-photos. Chapter 6 brings the book to a close with colorful illustrations of patterns and designs of spirals, dots, honeycombs, stripes, radical symmetries, rings, and worm trails found among biogenic sand grains. A brief two page index concludes the book.

I strongly recommend this book to all my geosciences colleagues. It can be used in classes and labs to illustrate the composition, shape, and mineralogy of beach sand from around the world. At the end of the Afterword, the author recalls a comment by the great Nobel Laureate physicist Richard Feynman, made during a dinner conversation which really captures the essence of his book and message: "he didn't think our society was truly in a scientific age because we hadn't yet embraced science in our art".

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