

# NICOLAUS STENO

[by John H. Lienhard](#)

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Today, we solve a riddle about a stone within a stone. The University of Houston's College of Engineering presents this series about the machines that make our civilization run, and the people whose ingenuity created them.

Nicolaus Steno was born in Denmark in 1638. He studied medicine and did fine anatomical work while he was young. At 27 he became physician to the Grand Duke of Florence. There, he converted to Catholicism. Twelve years later he became bishop to the Catholics in the Protestant North.

Just after he came to Florence, he wrote a book on geology. The title was *Introduction to a Dissertation on a Solid Body Contained Within a Solid*. Then his attention turned to the church. He never wrote the full dissertation.

Steno left scholars confused. We credit him with pointing out that angles between crystal faces don't change with size and shape. But that was just an offhand remark in a figure caption. His book dealt with other things entirely.

Steno was fascinated by stony inclusions -- one rock inside another. He observed their form with an artist's eye. Suddenly he saw two entirely different kinds of inclusion. In one, a hard inner substance has filled a cavity in the outer rock. In the other, the outer rock has shaped itself around an inner one.

Crystal inclusions and veins of metal fill rocks in. But sediment forms itself around fossils. The trouble is, fossils were unknown in Steno's day. One inclusion looked like a sea shell. Another, a vein of quartz, might be shaped like the letter Z. God had just as mystically left one there as He had the other.

Steno changed all that by seeing that the two things must have been put there by different means. He saw that the image of a sea shell wasn't an image at all. It was the vestige of a real shell -- that sedimentary rock had formed around it.

And so the world we knew began to change. Steno's Earth couldn't have been formed in one sidereal day. It was made by long sequences of events. He put us on the road to creating a history for Earth.

Stephen Jay Gould laments the way we read Steno today. The book looks primitively simple. Twentieth-century readers miss his question: "Of the two rocks -- inner and outer -- which formed itself to the other?" We grasp for direct insights like the one about

crystal angles. What Steno really gave us was a whole new way of looking at geological formation.

Now the Catholic Church has begun the process of declaring Bishop Steno a saint. Not too many scientists can claim that distinction. But maybe the community of scientists should lay its own mantle of sainthood on this remarkable man who saw so clearly -- wherever he turned his eyes.

I'm John Lienhard, at the University of Houston, where we're interested in the way inventive minds work.

(Theme music)

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Gould, S.J., *Hen's Teeth and Horse's Toes*. New York: W.W. Norton and Company, 1983, Chapter 5, The Titular Bishop of Titiopolis.

By the way, Steno's actual title was *De Solido intra Solidum naturaliter Contento Dissertationis Prodromus*. I've translated the word "Prodromus" as "Introduction" for simplicity's sake. It is a more technical term that means something like "Introductory Discourse." Steno's book was meant to set the stage for a really heavy work.



Sugar Crystals

