

NICHOLAS STENO'S *CHAOS* AND OLE WORM'S WUNDERKAMMER

APPENDIX TO

NICHOLAS STENO'S *CHAOS*
AND
THE SHAPING OF EVOLUTIONARY THOUGHT
IN
THE SCIENTIFIC REVOLUTION

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As stated in the text of this brief report, Nicholas Steno named his notebook, *Chaos* in reference to its diverse contents as well as to religious ideas concerning origin of the cosmos (Ziggelaar, 1997). Despite the title, it is not likely that Steno would have regarded the contents as dissimilar or unrelated to the same extent that we would today. The modern classification of nature was then in its formative stages, and it is clear that “the underlying unity” of the entire cosmos was something Steno sought in *Chaos*, in concert with other leading naturalists of the times. It was his devotion to geometry, which pervades *Chaos*, and which took Steno beyond the lingering metaphysical view of nature.

In retrospect, it is difficult to understand how the seventeenth century mind conceptualized this unity of nature, but seventeenth century wunderkammer, rooms or cabinets of curiosities, were held to embody it and they can help us visualize it. Ole Worm's collection is a most appropriate one to consider. Ole Worm (1588-1654) was a contemporary of Steno's, and a Dane who had one of the most famous wunderkammer in Europe. Frederick III, King of Denmark, acquired it after Worm's death. Steno wrote in *Chaos* (p. 179) that “[He] saw that famous room which is decorated with manifold conches and the shells of various animals...” (Fig. 1). It contained many more objects than shells, including minerals and rocks, hunting equipment, tools, jewels, a kayak, chairs and other furniture, and musical instruments. Steno is

known to have visited wunderkammer elsewhere in Europe, notably in Holland and in Italy, and these undoubtedly reinforced Steno's development as a polymath.

Two objects depicted in Ole Worm's collection especially exemplify the natural philosophy of the times. The item that looks like a geode (Figs. 2A,B) is now known to be *Paramudra*, a trace fossil from the Cretaceous of Denmark. This would not have been understood by any seventeenth century collector, and it was not common in other European wunderkammer, which was the point of including it. Its rarity signified that the curiosity cabinet was a comprehensive sampling of the greater macrocosm. The organism that created the fossil is still unknown and none of the specimens in the Geology Museum, University of Copenhagen have been conclusively identified as the one figured (David Harper, personal communication).

The second object of interest is the root of an oak root grown around the jaw of a horse or deer (Figs. 2A, C). Today we can think of it as an amusing oddity but in the seventeenth century such flukes of nature were viewed as transitional objects in the Aristotelian sense and hence evidence of the "unity in diverse things." Red twiggy coral from the coast of Genoa, Italy, had similar significance and was common in wunderkammer throughout Europe, both as a semi precious gem and as a transitional object, an animal that looks like a land plant but which lives in the sea. (A specimen can be seen in Fig. 1, on the shelf at right, center.)

The oak root and horse jaw is one of the few items in the Danish collections today whose provenance in Ole Worm's collection has been confirmed (Wolff, 1999). Like most wunderkammer throughout Europe, Ole Worm's collection was eventually broken up, redistributed, or mingled with other, later collections without proper cataloging and recording of provenance. However, because Worm's original collection was one of the best documented wunderkammer (Wolff, 1999; Schepelern, 1971; Worm, 1655) other objects still in the Royal Danish collection are undoubtedly similar to, if not the actual specimens in Ole Worm's collection, and they further illustrate the complex rationale of the contents of *Chaos*. One is a

carved ivory skull (Fig. 3), bisected to show both the flesh and underlying bones. On the one hand, this was a lesson in anatomy, showing the 3-dimensional relationships between living flesh and inert bone. For Steno, Europe's consummate anatomist, discoverer of the parotid salivary duct, and demonstrator in anatomical theaters across Europe of the structure of the head of various animals, the ivory skull would have attested to the power of geometry to reveal the structure of the body. It is also a *memento mori*, an object that signifies the brevity of life, and the moral imperative to do good works before one's short time on earth is up. In other words, the little ivory skull expresses the ultimate concern of the human condition, our mortality underlying our flesh and bones.

The spatial arrangement of objects in wunderkammer (as well as in modern museums) constitutes a language whose meaning is idiomatic of the culture wherein and when it was assembled (Foucault, 1970). Mordhorst (2003), who studied Worm's notebooks, found that the objects in Worm's collection (Fig. 1) are grouped according to their properties such as weight, hardness, and texture and to their material substance. The categories are animal (left), vegetable (wood, center rear, including the root grown around the horse jaw as an object transitional between animal and plant), and mineral (right, crystals and the hardened carapaces). The arrangement showed that similar materials were used for similar purposes in nature and furthermore, that they could be put to related purposes for human benefit. For example, objects such as cups crafted from horn hang together with antlers to exemplify the common properties of all horn as well as their value (e.g. horn carved and used as a drinking vessel and horn that was powdered and drunk as an elixir).

Alternatively, the organization of Ole Worm's display is also consistent with Aristotelian categories. Water is represented by turtle carapaces, crabs, twiggy coral, and the aquatic penguin on the right. To the left, skins, horns, and antlers of terrestrial animals, and the mysterious *Paramudra* which was dug out of the ground signify earth. In the center at top are objects that

symbolize air (birds, arrows which fly through the air, and fish with prominent wing-like fins that help them “fly” through the water and which thus may be seen as animals transitional between fish and birds).

This interpretation compares favorably with Giuseppe Arcimboldo's (1527-1593) famous *trompe l'oeil* portraits that art historians have long accepted as renditions of the four Aristotelian elements. Figure 4 shows two examples. Earth (left) is represented by terrestrial animals, and water (right) by marine life and pearls.

Steno's rejection of this Aristotelian classification of nature as his very first task in *Chaos* clearly indicates that its influence during the seventeenth century was still pervasive, and that the modern taxonomy and geometric structure of nature remained to be established. Steno's empirical approach to revealing this structure, which he so clearly asserts in *Chaos*, positions him at the center of the tensions of the times between the new empiricists and the scholastic, Aristotelians. This debate is explicitly represented by the bladder stone framed in silver that was considered in Figure 1 in the text of this report. Such embellishment of a natural object was meant to show that the creative power of the artisan who produced it improves upon the works of nature. More generally, it was meant to assert that art works designed in response to experiencing (visualizing, touching, recreating, and attempting to surpass) nature embodied nature better than Aristotelian speculations about it (Smith, 2004). It is, in other words, an assertion that observation and experimentation could produce more truthful representations of nature than could scholastic speculations.

In retrospect, it is clear who won this debate: a man who earned his fame dissecting cadavers and who studied the structure of all of nature. Not only does the bladder stone framed in silver symbolize Steno's ultimate fate, but it also prefigures the formal establishment of evolutionary science based on a rational structure of the entire cosmos.

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Fig. 1 Ole Worm's Wunderkammer, 1655. Nationalmuseet Denmark.

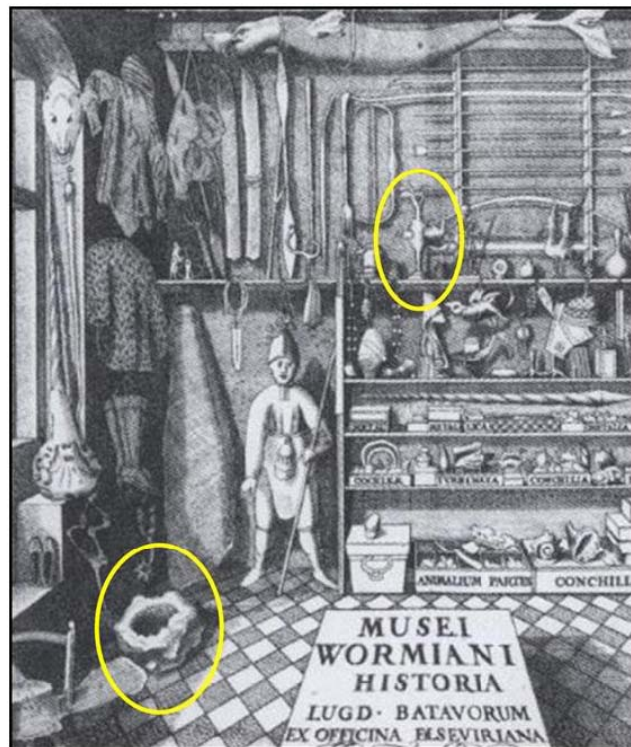


Fig. 2A. Ole Worm's Wunderkammer (detail) showing the trace fossil, *Paramudra*, (circled, lower left) and an oak root grown around lower jaw of horse (circled, upper right).



Fig. 2B. The trace fossil *Paramudra* (Cretaceous of Denmark, courtesy David Harper, Geological Museum, Natural History Museum of Denmark, University of Copenhagen)



Fig. 2C Oak root and lower jaw of horse (courtesy Geert Brovad, The Zoological Museum, University of Copenhagen). Height of oak root is approximately 62 cm.

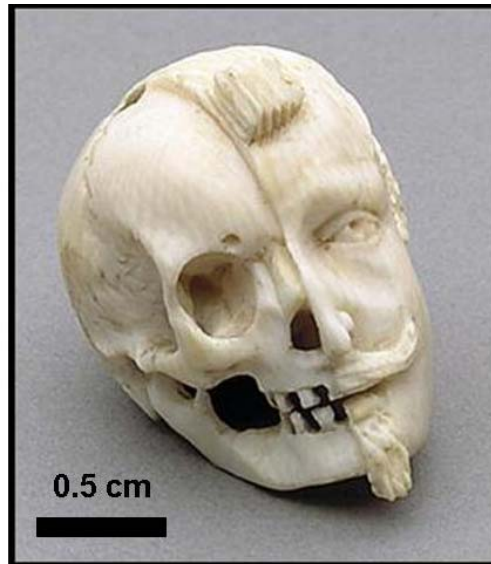


Fig. 3. Carved ivory skull, Royal Danish Wunderkammer (before 1674). Nationalmuseet Denmark.



Fig. 4. Giuseppe Arcimboldo, *Earth* (L., ca 1570, priv. coll., Germany), and *Water* (R., 1566, Kunsthistorisches Museum, Vienna, painted for Emperor Maximilian II). Photos Erich Lessing, Art Resource, NY.