

The Adventures of Captain John Smith, Pocahontas, and a Sundial

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Let me tell you a tale of intrigue and ingenuity, savagery and foreign shores, sex and scientific instruments. No, it is not “Desperate Housewives,” or “CSI,” but the “Adventures of Captain John Smith, Pocahontas, and a Sundial.”¹ As our story opens in 1607, we find Captain John Smith paddling upstream through the Virginia wilderness, when he is ambushed by Indians, held prisoner, and repeatedly threatened with death. His life is spared first by the intervention of his magnetic compass, whose spinning needle fascinates his captors, and then by Pocahontas, the chief’s sexy daughter. At least that is how recent movies and popular writing tell the story.² But in fact the most famous compass in American history was more than a compass – it was a pocket sundial – and the Indian princess was no seductress, but a mere child of nine or ten years, playing her part in a shaming ritual. So let us look again at the legend, as told by John Smith himself, in order to understand what his instrument meant to him.

Who was John Smith?³ When Smith (1580-1631) arrived on American shores at the age of twenty-seven, he was a seasoned adventurer who had served Lord Willoughby in Europe, had sailed the Mediterranean in a merchant vessel, and had fought for the Dutch against Spain and the Austrians against the Turks. In Transylvania, he had been captured and sold as a slave to a Turk. The Turk had sent Smith as a gift to his girlfriend in Istanbul, but Smith escaped and fled through Russia and Poland. In the midst of these adventures, Smith was shipwrecked, enriched by piracy, and thrown into the sea as a human sacrifice to a storm. After further escapades – real or embellished – in Europe and North Africa, he returned to England around 1604.

In London, Smith signed up with the Virginia Company to plant a settlement on the Chesapeake. He set sail in late December 1606. After the forgoing ordeals, the prospect of four hard months at sea might have seemed a piece of cake to Captain Smith, but he took part in a mutiny and arrived at Jamestown in chains. He was held prisoner until the letter of instruction of the Virginia Company – sealed until the colonists had landed – announced him to be one of the colony’s governing counselors. So it was that in June 1607, Smith began his embattled leadership of the colony.

Jamestown was fraught with problems, including a shortage of food, water, and supplies and an abundance of dissent, laziness, and efforts to desert. Smith was reviled and revered. In the midst of the chaos, he left Jamestown to explore the Chesapeake Bay area not only in search of food and water, but also in search of navigable passages to the Pacific and marketable commodities. This brings us to the episode at the heart of this paper. Our primary sources are Smith’s own accounts published in 1608 and 1624.⁴ Here is what he claimed.

While exploring the Chickahominy River by canoe in December 1607, Captain John Smith was ambushed by 200 Powhatan Indians and chased into the swamp. Wounded by arrows and mired in the cold mud, Smith surrendered and was led to their chieftain, Opechancanough. Smith played for time. “I presented him with a compasse diall,” Smith wrote in his *True Relation*, “describing by my best meanes the use thereof, whereat he so amazedly admired, as he suffered me to proceed in a discourse of the roundnes of the earth, the course of the sunne, moone, starres and plannets.”⁵ Smith added that the Indians also “marvailed at the playing of the Fly and Needle, which they could see so plainely, and yet not touch it, because of the glasse that covered them.”⁶ Notwithstanding the fascinating show, his captors had him tied to a tree an hour later and were preparing to shoot when Opechancanough held the instrument aloft and spared his life. For the next month, Smith was alternately fêted and condemned while being paraded around various Indian villages. At last, he was brought before Opechancanough’s father-in-law, the supreme chief, Powhatan. Powhatan questioned Smith about the colonists’ intentions and held a trial of his prisoner. After debate among the Indians, Smith was forced to lie down on a large stone slab. Just before a warrior was to bash in his head, the chief’s young daughter, Pocahontas, threw

herself across Smith and asked that his life be spared. [Figure 1] Smith was then released on the condition that he pledge loyalty to Powhatan as a subservient chieftain. Although Pocahontas appears to have played a choreographed role in a shaming ritual (what better way to humiliate a brash soldier than to have him saved by a female child?), Smith was convinced that he owed his life to her.⁷



Figure 1. Pocahontas ‘saves’ the life of Captain John Smith, from Smith’s *The Generall Historie of Virginia* (1624). Courtesy of Houghton Library, Harvard College Library (STC 22790).

like matters.”⁸ Although recent movies have misrepresented Smith’s device as a pocket compass, it was a type of pocket sundial made in Europe and contained in a hollow ivory sphere.⁹ [Figure 2] When opened, one hemisphere contained a magnetic compass whose wire needle was glued to the underside of a card painted with a wind rose. The card – or fly – spun on a pivot and indicated north. The fly was protected by glass held down by a brass sundial that stretched across the opening. Inside the other hemisphere, there typically was a brass volvelle that showed the phases of the moon and could be used to determine the times of tides or to convert the sundial into a moon dial. The exterior of the ivory sphere was often ornamented with delicate patterns, or, as in Smith’s example, could be inscribed with the great celestial circles – i.e., the ecliptic, the equator, the Tropics of Cancer and Capricorn, Arctic and Antarctic circles, and the colures – demarcating the path of the sun and planets in the heavens.

Smith’s sundial was a powerful token, a model of the universe he could hold in the palm of his hand. In shape and inscribed detail, it mirrored the cosmic sphere of Aristotle and Ptolemy. According to this view, the earth was located at the center of a finite universe and encircled by the moon, sun, planets, and fixed stars (each generally thought to be carried in its own sphere). Although some astronomers advocated the new theory proposed by Copernicus of a sun-centered system of the world, they were the minority in 1607, and there was no concrete evidence at this time to prove that it was better. In any case, a navigator like Smith need not choose between one cosmology or the other in order to find his way

This legendary event reveals more than Smith’s ingenuity and ability to embellish a good story. The compass dial represents the clash of two cosmologies – that of the Indians and European settlers. It embodies the belief that the smallest things mirrored the large, that number was the key to God’s creation, and that by means of mathematical instruments, men could dominate that world (or at least extricate themselves from tight spots!).

Smith’s Cosmology

Captain John Smith described his instrument as a “round Ivory double compass Dyall...[a] Globe-like Jewell, [that demonstrated] the roundness of the earth, and skies, the speare of the Sunne, Moone, and Starres, and how the Sunne did chase the night round about the world continually; the greatnesse of the Land and Sea, the diversitie of Nations, varietie of complexions, and how we were to them Antipodes, and many other such

across the seas. All his instruments worked on the premise that the earth was fixed and the celestial bodies revolved around it.



Figure 2. Ivory globe compass sundial, French, 17th century, similar to the sundial mentioned by Smith. Courtesy of the Trustees of the British Museum (inv. 1926,10-16.3).

Just as the heavenly sphere was represented in miniature on the ivory globe, the magnetic virtues of the earth were mirrored in the tiny compass needle. Smith might have subscribed to William Gilbert's view that magnetism was a mysterious, animistic power flowing through the world, which caused the earth to rotate, held the moon in its orbit, and controlled the tides.¹⁰ He likely endorsed the common view that stars and planets exerted heavenly influences on the earth.¹¹

This interconnectedness was typical of the Renaissance belief in the unity of nature, the great chain of being, and the correspondences between macrocosm and microcosm. All parts of the sublunary world, including the political sphere or human body, were mirrors of the celestial world and heavenly order. A disturbance in one sphere could cause a disturbance in a corresponding sphere. To the Renaissance mind, such disparate things like stars, weather, illness, and civil disorder went together.¹² This is why John Smith could use his pocket sundial as inspiration for his lecture to the Powhatans on astronomy (heavens), geography (earth), nations (politics) and ethnography (man). He saw in his ivory, compass sundial a microcosm of the universe.

Number as the Key to Knowledge

Smith's sundial embodied mathematical projections of the sun's path through the sky and motions of shadows on a horizontal surface, and as such was as much a mathematical instrument as an astronomical one. For those Renaissance scholars influenced by Neo-Platonic and Pythagorean writings, mathematics was the key to unlock Nature's secrets.¹³ John Dee and others maintained that God "created all things in *Number, Waight, and Measure*," and that the act of creation had been a mathematical process.¹⁴ At this time, mathematics also took a more practical or Vitruvian turn in the work of architects, surveyors, navigators, gunners, cartographers, and time finders.¹⁵ Dee bridged the worlds of the Neo-Platonists and Vitruvius, and took it upon himself to train practitioners (particularly navigators) in the use of new methods and mathematical instruments. Smith was schooled in the Vitruvian works of like-minded reformers, including Thomas Digges, William Bourne, Robert Norton, Thomas Smith, Edward Wright, John Tapp, Martin Cortés, John Davis, Lucas Janssen Wagenaer, Edmund Gunter, John Aspley, Robert Norman, William Borough, and Robert Hues.¹⁶ William Barlow spoke for many when he said in *The Navigators Supply*:

*A great helpe also would it be for the furtherance of skill, if those that are practisers in that Arte [of navigation], and such as are Students of the Mathematikes, might often conferre together. For except there be a uniting of knowledge with practise, there can be nothing excellent: Idle knowledge without practise, & ignorant practise without knowledge, serve unto small purpose.*¹⁷



Figure 3. 'Experience' and 'Art' share information on the frontispiece of John Seller's *Practical Navigation* (1669). Courtesy of Adler Planetarium & Astronomy Museum, Chicago, Illinois.

aimed at would-be colonists. Smith said that he did not write them "as an instruction to Marriners nor Sailors...But as an intraduction for such as wants experience, and are desirous to learne what belongs to a Sea-man."²⁰ Smith believed that hands-on practitioners and scholars should share knowledge for the benefit of English commerce and the glory of the commonwealth. He was very practical, remarking that lots of books will show one the theory, but to be good, one must learn it by practice. [Figure 3]

Captain John Smith understood well how bold action and new mathematical tools and technologies could be joined to explore, subdue, and shape the world. Smith included a portrait of himself [Figure 4] on his important map of New England, published in 1616 in his *Description of New England* and 1624 in his *Generall Historie*. In the corners we see troops, a globe and dividers, soldier on horseback, and a ship—symbols of Smith as a man of action. Below the portrait, poet John Davies of Hereford praised Smith:

These are the Lines that shew thy Face; but those
That shew thy Grace and Glory, brighter bee:
Thy Faire-Discoveries and Fowle-Overthrowes
Of Salvages, much Civilliz'd by thee
Best shew thy Spirit; and to it Glory Wynn;
So thou are Brasse without, but Golde within.
If so; in Brasse, (too soft smiths Acts to beare)
I fix thy Fame, to make Brasse Steele out weare.²¹

Smith left Jamestown for England in 1609, but was soon after dispatched by London merchants to explore and chart the waters of New England in 1614 and 1615. It was in the spirit of the English mathematical reformers, that Smith published accounts of his Virginia and New England expeditions that were notable in cartography and scientific detail.¹⁸ He also published in 1626 the first English manual for seamen, *An Accidence or The Path-way to Experience. Necessary for all Young Sea-men, or those that are desirous to goe to Sea*. The book offered practical advice on various duties aboard ship and explained terms related to rigging, types of vessels, and ordnance. It also explained the navigational instruments and skills required of a seaman. An enlarged version appeared a year later with a new title, *A Sea Grammar*, and it was followed in 1631 by *Advertisements for the unexperienced planters of New England or anywhere*.¹⁹ These were



Figure 4. Smith as Admiral of New England, from his map of the same in his *Generall Historie* (1624). Courtesy of Houghton Library, Harvard College Library (STC 22790).

Davies compared Smith to a finely engraved brass instrument magically tempered to be stronger than steel, and indeed, the swashbuckling and intrepid Smith was a robust mathematical practitioner. He felt invincible. But the English cosmology represented by Smith's sundial was on a collision course with the world of the Native Americans. Thomas Harriot, the scientist-explorer, who tutored Raleigh's sea captains on navigation and spent nine months at Roanoke Island in 1585,²² wrote that the Indians did not know what to make of "Most things they sawe with us."

Mathematicall instruments, sea compasses, the vertue of the loadstone in drawing yron, a perspective glasse [mirror] whereby was shewed manie strange sightes, burning glasses, wildefire woorkes, gunnes, bookes, writing and reading, spring clocks that seeme to goe of themselves, and manie other things that wee had, were so straunge unto them...that they thought they were rather the works of gods then of men.²³

Harriot observed what Smith would note twenty years later: that knowledge of mathematics and its worldly applications – in navigation, surveying, optics, chemistry, fortification, gunnery, time keeping, and more – gave the European settlers powers that seemed magical to the Indians. For better or for ill, the explorers would use these powers to dominate the New World landscape.

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¹ A version of this article first appeared as "The Adventures of Captain John Smith, Pocahontas, and a Sundial," in *East and West: The Common European Heritage*, Proceedings of the XXV Scientific Instrument Symposium (Krakow: Jagiellonian University Museum, 2006). To see the sundial story set in a broader, more comprehensive context, consult Sara Schechner, "New Worlds, New Scientific Instruments: Cosmology, Mathematics, and Power at the Time of Jamestown," in *The World of 1607* (forthcoming 2007).

² *Pocahontas*, written by Carl Binder, directed by Mike Gabriel and Eric Goldberg, Walt Disney Pictures, 1995; and *The New World*, written and directed by Terrence Malick, New Line Cinema, 2005.

³ P. L. Barbour, *The Three Worlds of Captain John Smith* (Boston: Houghton Mifflin, 1964).

⁴ John Smith, *A True Relation of such occurrences and accidents of noate as hath hapned in Virginia* (London: 1608); John Smith, *The Generall Historie of Virginia, New-England, and the Summer Isles* (London: 1624).

⁵ Smith, *True Relation*, sig. B4r.

⁶ Smith, *Generall Historie*, 47.

⁷ I. N. Hume, *The Virginia Adventure: Roanoke to James Towne* (New York: Alfred A. Knopf, 1994), 171-181.

⁸ Smith, *Generall Historie*, 47.

⁹ Cf. French spherical, ivory compass sundials, 1624 and circa 1675-1685, British Museum, inv. 1894,1211.9 and 1926,1016.3; German ivory compass dials, circa 1600-1650, Adler Planetarium and Astronomy Museum, Chicago, inv. W-26, M-254; and an ivory globe sundial, Seville, 1626, Collection of Historical Scientific Instruments, Harvard University, inv. HO81Z-17. Smith's dial was different from the fragments of German sundials recovered in archaeological sites in Virginia. See N. Lucchetti and B. Straube, *1998 Interim Report on the APVA Excavations at Jamestown, Virginia* (Richmond: The Association for the Preservation of Virginia Antiquities, 1999), 23-25; A. Outlaw, *Governor's Land* (Charlottesville: University Press of Virginia, 1990), item 219.

¹⁰ William Gilbert, *De magnete...physiologia nova* (London: 1600).

¹¹ E. Garin, *Astrology in the Renaissance* (London: Routledge and Kegan Paul, 1983); F. R. Johnson, *Astronomical Thought in Renaissance England* (New York: Octagon Books, 1968); and W. Shumaker, *The Occult Sciences in the Renaissance* (Berkeley: University of California Press, 1972).

¹² E. M. W. Tillyard, *The Elizabethan World Picture* (New York: Vintage Books, 1960).

¹³ John Dee, *The Mathematicall Praeface to the Elements of Geometrie of Euclid of Megara (1570)*, ed. Allen G. Debus (New York: Science History Publications, 1975); Nicholas of Cusa, *On Learned Ignorance*, ed. and trans. Jasper Hopkins (Minneapolis: Arthur J. Banning Press, 1981), book 2, chap. 13.

¹⁴ Dee, *Mathematicall Praeface*, sig. biiiiv, *.i.

¹⁵ Leonard Digges, *A Booke named Tectonicon* (London: 1556); E. G. R. Taylor, *The Mathematical Practitioners of Tudor and Stuart England* (Cambridge: Cambridge University Press, 1968); J. A. Bennett, *The Mathematical Science of Christopher Wren* (Cambridge: Cambridge University Press, 1982); G. L'E. Turner, *Elizabethan Instrument Makers* (Oxford: Oxford University Press, 2000).

¹⁶ John Smith, *An Accidence or The Path-way to Experience* (London: 1626), 33, 36; John Smith, *A Sea Grammar* (London: 1627), 69, 83.

¹⁷ William Barlow, *The Navigators Supply* (London: 1597), sig. Lv.

¹⁸ John Smith, *A Map of Virginia. With a Description of the Countrey, the Commodities, People, Government and Religion* (Oxford: 1612); John Smith, *A Description of New England: or The Observations, and discoveries, of Captain John Smith* (London: 1616); Smith, *Generall Historie*.

¹⁹ John Smith, *Advertisements for the unexperienced planters of New-England, or any where* (London: 1631).

²⁰ Smith, *An Accidence*, sig. A2.

²¹ Smith, *Generall Historie*, foldout map between 202-203.

²² H. H. Miller, *Passage to America: Raleigh's Colonists Take Ship for Roanoke* (Raleigh: North Carolina Department of Cultural Resources, 1983).

²³ Thomas Harriot, *A briefe and true report of the new found land of Virginia* (Frankfurt: 1590; reprinted, New York: Dover Publications, 1972), p. 27.