

## Seventeenth Century Science in Old Virginia

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When the first permanent English settlers came to Jamestown in 1607 they found a new raw land so different from what they were accustomed to in old England that they had the greatest difficulty in adjusting to the new life. The immediate problem was survival. Science could only be of an exploratory type, directed toward the discovery of commodities "for victuall and sustenance of mans life." Native animals and plants, the soil, rocks and minerals, the possible occurrence of gold, the geography of the area, the climate, the character and ways of the Indians — all must have been of intense interest and of great importance to the settlers.

Rosy prospects of immediate wealth were held out to the gentlemen adventurers and others from England. The experience of Spanish conquistadors and explorers in Central and South America must have inflamed the imagination and excited the cupidity of Europeans in the early seventeenth century, especially because of the writings of Oviedo.

Our settlers might have learned something about Virginia from the first report to go back to England. This was "*A briefe and true report on the new found land of Virginia*" by Thomas Hariot, the mathematician. Hariot went as historian, surveyor, and explorer with the expedition sent out by Sir Walter Raleigh in 1585. The commander was Sir Richard Grenville. A temporary settlement was made on Roanoke Island, now in North Carolina.

Hariot was a real scientist whose report covered the natural history of that time. He had little use for travellers' tales, but made an accurate survey of plant and animal life as well as geological conditions in the New World. After returning to England he published his report in London in 1588. This is the first account in English of any section of the United States.

The book is divided into three parts. The first treats of "Marchantable commodities" in which Hariot mentioned various minerals and the occurrence of iron and copper. His report is confirmed by Governor Ralph Lane and by the mineralogist or "mineral man," (Captain Vaughan) who took part in the expedition.

The second part is entitled "suche commodities as Virginia is known to yeelede for victuall and sustenance of mans life." Here we have the

first description of the plant and animal life of old Virginia. One need not expect a systematic report from one who lived a century and a half before Linnaeus, but keeping in mind the day and the state of science, the fulness and accuracy of Hariot's narrative is notable. He names twenty-eight species of mammals, twelve of which he saw himself. He was the first to distinguish the American and European species of deer:

"Deere, in some places there are great store: neere unto the sea coast they are of the ordinarie bignes as ours in England, & some lesse; but further up into the cuntry where there is better feed they are greater; they differ from ours onely in this, their tails are longer and the snags of their hornes looke backward."

This brief account was not replaced by a better one for nearly two centuries. Of birds, he wrote:

"*Turkie cockes* and *Turkie henness*: *Stock doves*: *Partridges*: *Cranes*: *Hernes*: & in winter great store of *Swannes* & *Geese*. Of al sortes of foule I have the names in the cuntry language of four score and sixe of which number besides those that be named, we have taken, eaten, and have the pictures as they were there drawne with the names of the inhabitaunts of severall strange sortes of water foule eight, and seventeene kinds more of land foul, although wee have seen and eaten of many more, which for want of leasure these for the purpose could not be pictured: and after we are better furnished and stored upon further discovery, with their strange beastes, fishe, trees, plants, and herebes, they shall be also published.

There are also *Parats*, *Faulcons*, & *Marlin Hawkes*, which although with us they be not used for meate, yet for other causes I thought good to mention."

Sixteen different varieties of fish were listed.

Hariot also described the planting, sowing, and cultivation of maize, beans, pease, melons, pumpkins, and gourdes, and then gives this interesting account of tobacco:

"There is an herbe which is sowed apart by its selfe & is called by the inhabitants uppowoc. In the West Indies it hath divers names, according to the severall places and countries where it groweth and is used: the Spaniardes generally call it Tobacco. The leaves thereof being dried and brought into powder; they use to take the fume or smoke thereof by sucking it through pipes made of claie into their stomacke and heade; from whence it purgeth superfluous fleame & other grosse humors, openeth all the pores & passages of the body: by which meanes the use thereof, not only preserveth the body from obstructions; but also if any be, so that they have not beene of too long continuance

in short time breaketh them: whereby their bodies are notably preserved in health, & know not many greivous diseases where withall we in England are oftentimes afflicted."

In the final section of the book are observations on the geology of the area which are remarkably good considering the short time, less than a year, at the author's disposal and the obstacles to travel from the coastal island of Roanoke. Hariot distinguishes the coastal plain, the Piedmont, and the fall line. He notes varied crystalline rocks of the Piedmont and the good and abundant clay of the coastal plain for brick making. He speaks of the occurrence of iron ore in the Piedmont and of copper at some point beyond the limit of exploration. This information probably came from the Indians who used copper ornaments.

Hariot's Virginia is the first scientific effort by an Englishman in our colonial history. Enough has been said of the work to indicate its quaint flavor; the flavor of the man himself is largely lost. We can guess that he was a modest man by the very fact that in spite of his stature as a scientist he is little known. His best biographer is Henry Stevens of Vermont, who asserts that Hariot, after his return, worked on the same problems as Galileo. Although it is difficult to say which one actually invented the telescope, it seems that each independently made the invention.

Hariot was the constant companion of Sir Walter Raleigh and Henry Percy, ninth Earl of Northumberland during their years in the Tower of London. He collaborated with Raleigh in his *Historie of the World*.

Hariot was one of England's great scientists of his day. He died in 1621 and was buried in the churchyard of St. Christophers on the site of the Bank of England on Threadneedle Street. In any account of the earliest Virginia science the name of Thomas Hariot must occupy a prominent place.

Captain John Smith, along with his remarkable talent for leadership, has the distinction of being the first scientist of the Jamestown Colony. A *Map of Virginia, with a description of the Countrey*, published in Oxford in 1612, contains many scientific observations. Smith's Map is on the whole accurate and detailed. Like Hariot, Smith distinguishes coastal plain, Piedmont, and the fall line. His observations on soil types are the first made in the new land. He notes the relation between vegetation and soil: "The vesture of the earth in most places doeth manifestly prove the nature of the soile to be lusty and very rich." He was not deceived by: "These waters [from the mountains] wash from the rocks such glistening tinctures that the ground in some places seemeth as gilded, where both the rocks and the earth are so splendent to behold, *that better judgement than ours might have been perswaded, they contained more than probabilities.*"

The inference is plain. John Smith's own judgment is not persuaded that glistening tinctures and moskered shining stone in the stream beds are gold. Speculators in England learned to their sorrow that a shipload of such material had no more value then so much ballast.

Captain Smith in the brief compass of the first chapter of his book gives a great deal of new information about his "Ould Virginia." He was the first to describe the muskrat, raccoon, and flying squirrel. He notes the opossum's pouch. He catalogues twenty-five kinds of fish and shellfish. Among birds he includes blackbirds with red shoulders.

He mentions the common types of trees such as oak, ash, walnut, elm, mulberry, and various fruits and vines. He describes the "chechin-quamens" and "putchamins" (chinquapins and persimmons). It seems strange to find so little mention of pine, which must have been abundant. Another omission among cultivated plants is tobacco, though he devotes considerable space to Indian methods of cultivation and utilization of maize. Though untrained in scientific writing Smith shows himself a keen observer, whether of natural history or of the manners, religion, and government of the Indians.

Three years after publication of Smith's Map Ralph Hamor the younger extended the list of native animals in his *True Discourse on the Present Estate of Virginia*.

A considerable figure in seventeenth century science in Virginia was the Reverend John Clayton, thought to be a cousin of the later and greater botanist of the same name. This Clayton was a man of scientific culture. He published in the Philosophical Transactions of the Royal Society, 1693, '94, a creditably full annotated catalogue of mammals, birds, and reptiles. He was especially interested in fossils. His description of a fossil whale is well known. He also described shark's teeth and many fossil shellfish. His attitude toward the latter was similar to that of his scientific contemporaries in England, where there was uncertainty as to their being the remains of animals or just figured stones.

These and other seventeenth century Englishmen contributed something to American science, but of them all, perhaps only Hariot can be called great. The period was not favorable to the development of science in America. Persistently beset by danger on all sides and the struggle to exist, the colonials had little opportunity to develop an American science before the eighteenth century. At a time when England and the Continent of Europe were experiencing the age of enlightenment, one man stands out on the American scene, John Banister.

We have seen that the earlier scientific writers were historians rather than scientists. John Banister, however, was an exact observer; and though

remembered chiefly as a botanist, was the first to investigate and report intelligently on the mollusks and insects of North America. In a paper transmitted to the Royal Society in 1693 he refers to drawings of ten or twelve kinds of land snails and six of freshwater mussels, probably the first zoological paper of scientific importance to go from the American Colonies. While scientific thought and investigation begin with Thomas Hariot, accurate scientific knowledge of plant and animal life finds its first real pioneer in John Banister.

This eminent naturalist is supposed to have been a native of England and a graduate of Magdalen College, Oxford. He was living in Charles City County, Virginia, as early as 1678 and for at least fourteen years carried on serious scientific studies of the plant and animal life of Virginia. The belief that Banister was really a native Virginian has some support in two documents on record in the court house of Charles City County. On January 12, 1658, a certain John Burton demised to "Lieutenant John Banister one plantation at Bonaccord which I hold by lease for thirteen years or upward to come." A John Banister is listed as having served on a jury in the County record books, 1655-1666, p. 219, dated July 2, 1659. This Banister is thought to have been the father of John the naturalist. Whether young John Banister was a native of Virginia or England American natural history actually begins with him. He marks the real beginning of a native science. He was a tireless investigator of the plant and animal life of Virginia.

Very little is known of Banister's personal life. He was a clergyman of the Church of England and patented land on the Appomattox River. There is evidence that he married a "young widow" in 1688. He was a friend of the first William Byrd and was highly regarded by those who knew him. He is known to have spent much time in scientific pursuits. William Byrd mentioned Banister in several of his letters as a neighbor and friend. In a letter to Jacob Bobert, keeper of the botanical gardens and Sherardian Professor of Botany at Oxford University, Byrd says:

"Virginia, May 20th, 1684.

To Jacob Bobert, Per Wynne.

Sir, — Yours of the 9th of January and the 28th of Sept'r both came safe to my Hands, with your acceptable present of roots and seeds. The Iris, Crocus, Tulips, and anemones flowered this year. The Seeds (I fear) were heated in the hould of the Ship, but very few of them coming up.

If you send anything to Mr. Banister, you had best send it up to Messrs. Perry & Lane, merchants in London to bee sent to mee, who will send anything from the middle of July to the

last of Oct'b'r when there is allways a ready passage. If you send roots and seeds you had best write on the box to bee put in the Hould.

I wish it lay in my power to doe you and Mr. Banister any acceptable service. I'll assure you none should bee more ready than your obliged friend and servant.

W(illiam) B(yrd)"

In another letter to Bobert he gives this interesting side-view of Banister:

"I gave your Token to Mr. Banister who is married to a Young Widow. I did expect him at my home last weeke, but hear since that he was not very well. . ."

The first William Byrd was a capable amateur botanist. His interest in trees and plants was doubtless heightened by his friendship with Banister.

Proof of Banister's ability as a naturalist is found in the testimony of his contemporaries and in his correspondence with many eminent naturalists of the seventeenth century, notably John Ray, Bishop Compton, Sir Hans Sloane, and Martin Lister. He sent many specimens and drawings of New World plants to these men. In 1680 he sent Petiver a collection of fifty-two species of insects, which with his observations and notes by Petiver, were later communicated to the Royal Society. Among these insects many forms are recognizable, notably the mudwasp, seventeen year locust, Cimex, cockroach, firefly, Elater, and tobacco moth. He seems also to have drawn and described several phases of the life history of the ichneumon fly.

Banister had in his possession in 1686, and exhibited to an English traveller, large bones and teeth of fossil mammals from the interior of Virginia. These are among the first fossils of which there seems to be any record in North America. George Brown Goode has suggested that these were the bones of *Megalonyx Jeffersonii*, the giant sloth subsequently discovered by Thomas Jefferson.

In 1687 Banister sent his list of Virginia plants to the English botanist John Ray, who spoke of him as "eruditissimus vir et consummatissimus botanicus." Lister termed him "a very learned and sagacious naturalist." The historian John Lawson of North Carolina remarked that "had not the ingenious Mr. Banister (the greatest virtuoso we have ever had on this continent) been unfortunately taken out of this world, he would have given the best account of the plants of America of any that have yet made such an attempt in these parts."

Banister's zoological and botanical papers were published in the Philosophical Transactions of the Royal Society. His lengthy catalogue of Virginia plants, the first systematic paper upon natural history to emanate from America, was published in Ray's *Historia Plantarum*. His descriptions in this paper are generally accurate, and some have been called elegant.

The Banister River, flowing through Pittsylvania and Halifax Counties and meeting the Roanoke by way of the Dan, and the small Virginia village of Banister, were named for John Banister. John was nominated an original trustee of the College of William and Mary. He was considered by that institution to be one of the forty-two most distinguished men of Virginia before the American Revolution and his name is engraved as such on the mace of the College. Linnaeus named the genus *Banisteria* of the tropical Malpighia family for him. His early death prevented the completion of a proposed *Natural History of Virginia*, for which work Ray says he was in every way qualified. After Banister's death his papers were transmitted to Bishop Compton, and his herbarium to Sir Hans Sloane, with whose collection it became a part of the nucleus of the British Museum.

The accounts of Banister's death vary with each reporter. One says that he was accidentally shot; one that he fell from a cliff in pursuit of his objective; and a descendant that he was struck by a falling tree. We have no way of knowing which version is correct. We do know that he died about 1692 somewhere on the Roanoke River while on a botanical expedition. He sleeps somewhere in the sweet Virginia soil, possibly in the soft sands of the tidewater where he made his home, or in the blue hills of the Piedmont, or on a winding bank of the Roanoke as it glides through Southside Virginia. No one knows. Nothing he owned or wrote is left, but the first naturalist of America, the first martyr to science in the New World, has no need of memorials.