Robert Plot’s investigation of nature

Introduction and Background

Robert Plot was born in Sutton Barne, Kent, in 1640. He remained in that locality until, aged 18, he entered Magdalen Hall in Oxford. His tutor, Josiah Pullen, was an antiquarian who shared the geographical bias of many fellows at Magdalen at that time. Plot graduated BA in 1661 and MA in 1664 - during which time he formed the rather ambitious plan of writing a descriptive survey of England. While teaching and preparing for postgraduate degrees through the following seven years Plot found time to learn some of the skills which he thought necessary for such an endeavor: he followed a course in chemistry and learnt various techniques for surveying land.

In 1671, after proceeding bachelor and doctor of civil law, he spent two years soliciting patronage- he sent manuscripts of his plans to local figures such as the Bishop of Oxford and the vice-chancellor of the university. Thanks to their aid he was able to begin travelling through Oxfordshire in June 1674. Two years later he published The Natural History of Oxfordshire: Being an Essay Toward the Natural History of England, the success of which can be clearly illustrated from three avenues. There was a suggestion that a chair of philosophical natural history be created for Plot at Oxford. Secondly, fellow antiquarian naturalists such as John Aubrey sent Plot their own manuscript research, hoping (vainly) that he would find time to edit it for publication. Thirdly, he was made curator of the objects in the natural and antiquarian sciences


2 Bodleian Library MS Aubrey 4, f. 235; also referred to in a letter requesting the return of the manuscript to Aubrey in British Library, Eg. 2231, f. 39, John Aubrey to Anthony Wood, 3 Aug 1691
centre at Oxford- and director of experiments when the centre was included within the new Ashmolean museum.

This paper will, after situating my debate, discuss Plot’s investigation of nature through a series of examples. Throughout two issues will form a particular focus. Firstly, how important was gentry status to Plot? Did he accept testimony given by a gentleman over and above that by a tradesman, or even his own eyes? Secondly, how did Plot’s understanding of nature influence his observations and experiments? Was he able to cast aside his preconceptions and accept the evidence of several people that crop circles were caused by fairies, or did his prior knowledge cause him to seek a different causation?

The genre which Plot founded, the county natural history, was short-lived and uniquely English. The six books and various manuscripts in various stages of completion all shared a remarkably wide topical outlook. The chapter titles from Plot’s of Oxfordshire illustrate this better than modern disciplinary labels: of the heavens, waters, earths, stones, formed stones, plants, brutes, men and women, arts and antiquities. This was nature most widely conceived- of the topics listed only antiquities were considered to be outside the discipline of ‘natural history’: so for instance the final book, published by John Morton in 1712, was The Natural History of Northamptonshire, with some account of the Antiquities. In this work, Morton also makes explicit the reason arts,

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3 Alix Cooper, Inventing the Indigenous: Local Knowledge and Natural History in Early Modern Europe (Cambridge, 2007), p. 128.

4 Perhaps the most advanced was John Bridges’ work on Northamptonshire, 48 notebooks of which is now held in the Bodleian Library, Top Northants c1-39, e1-8, f1-14.
‘being nothing else but Nature restrained, forced, or fashioned, in her Matter or Motions’, are unusually included as natural history.\(^5\)

While these works were styled and marketed as natural histories, another major influence upon them was the tradition of English local history. From the fifteenth century there had been several distinct genres of local history which were popular in England, the most salient among which for county natural historians were genealogy and topography.\(^6\) The importance, to Plot and the other county natural historians, of the patronage networks which had been built up around these genres, cannot be overstated - but is largely a matter for elsewhere.\(^7\) In addition to financial assistance and lodging more mundane forms of assistance were vital to the project. For instance Plot was guided through the parish of Tresle in Staffordshire by William Barnesley, a ‘good old Gentleman, whose assistance in riding about and showing [Plot] the County (notwithstanding his age) must by no means be forgotten’ - Barnsley also furnished Plot with a detailed report of a solar iris (a circular light which often appears after a rainbow).\(^8\)


\(^7\) Nathaniel Johnston, for example, contributed to both genealogy and topography in his efforts to solicit patronage: British Library, Manuscript Collections, Harl MS 6158, with associated collections in Add MS 18446; most of his topographical work is contained within the Bodleian Library Special Collections and Western Manuscripts collection, e.g.: top Oxon c378, top Yorks c 13-45, d 9-11.

More important for my purposes today was the intellectual legacy of topography in particular.\(^9\) Plot’s close friend John Aubrey embodies the link between topography and county natural history. His work on Surrey which culminated in *The Natural History of Surrey* which he later boasted was begun before Plot’s on Oxfordshire,\(^10\) was undertaken on commission from John Ogilby, Royal Cosmographer and Geographer, as a topographical survey very much in the mould of earlier works.\(^11\) Likewise Plot’s initial plans for Oxfordshire, though putting more focus on natural phenomena than earlier topographers, fit into that tradition comfortably. The element of locality which was so central to the work of Robert Plot had a long heritage, and was a marketable element in the patronage networks of the time. By confining his ‘enquiry to one of the smallest parts’ of the country, rather than ‘the universe’ as ancient natural historians did, Plot felt that his ‘attempt seems more justly to belong to your majesty, than any of their histories to their respective patrons.’\(^12\) Evidently the Bishop of Oxford, vice-chancellor of the University of Oxford, and Henry Howard, seventh duke of Norfolk, felt likewise.

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\(^10\) Bodleian Library, MS Aubrey 1, f. 6.


\(^12\) Robert Plot, *The Natural History of Oxford-Shire: Being an Essay Toward the Natural History of England* (London, 1677), preface. In addition to John Fell (Bishop of Oxford) and Ralph Bathurst (vice-chancellor at Oxford University) Plot’s main patron was Henry Howard, seventh duke of Norfolk.
Historiography and the Scientific Revolution

Collection and description, without this local focus, was a common concern among intellectuals throughout Europe in the seventeenth and early eighteenth century— as the recent work on Historia demonstrates. The problem of such universal collection has been demonstrated clearly by Ann Blair’s work, both on reading strategies and note-taking\(^\text{13}\) and on Theodor Zwinger. His *Theatrum humanae vitae* was first published in 1565 in a relatively manageable 1,400 pages. By 1631 this had expanded to 7,468 pages and a 600 page index: this size did not detract from its popularity and five further essentially unchanged editions ensued through to 1707.\(^\text{14}\) Blair argues that this apparent problem became an opportunity, with new techniques of note-taking, indexing, and cataloguing becoming commonplace. This encouraged natural philosophers to think more about how to class natural objects and phenomena, and provided the facts on which their scientific advances were based.

Mary Poovey’s *A History of the Modern Fact* (1998) advances the contention that for seventeenth century natural historians and natural philosophers nuggets of information only become ‘facts’ when they were used as evidence to prove a general theory about the natural world. This conception is supported by most work on the Royal Society, and indeed both Yeo and Blair’s work on the encyclopaedic disciplines in Europe as a whole.


Most widely I will be arguing about the place of Plot’s work in the narrative of the “scientific revolution”. Historians have largely discarded the idea of a singular scientific revolution in which the conception of nature changed suddenly. In its place has come the discussion of how nature was investigated at discrete points in time or within discrete scientific cultures: epitomised by the papers at this conference. But while the narrative has broken down, shifts in the understanding of nature—for instance between the pre-modern and modern fact—remain central to our understanding. As Pickstone noted recently, the most fruitful areas of inquiry are on the borders between the ‘older’ and ‘newer’ modes of thinking about nature, with a particular focus upon how the sustained older modes were altered or adapted during the periods of interaction. County natural histories provide an ideal example of one of these borderlands.

**Gentility and Evidence-giving**

The idea that a gentleman’s evidence would be believed above that of a commoner is not new. Obviously here I’m referring particularly to the work spurred by Shapin and Schaffer’s Leviathan; but more recently there has been some interesting work on the relationship between legal and scientific ‘testimony’—for instance by Shapiro. This work has found that while gentry status was respected it cannot be directly related to giving

16 Perhaps the best example of this is Lorraine Daston and Peter Galison, *Objectivity* (New York, 2007).
correct and useable testimony. While Plot’s work does not support Shapiro’s conclusion that the legal method of assessing facts was utilised in natural history, it does support her more nuanced, layered concept of testimony.

Examples abound in Plot’s work of testimony from gentry as well as other men: both specialists in their field and unknown others. In a few cases apparent precedence is given to evidence from gentry, for instance in the case of a Mock Sun- a reasonably regular occurrence in which a second (and sometimes third) ‘sun’ appears to be present in the sky. To quote one instance where a mock sun was seen by:

the Worshipful Francis Wolferstan of Statfold Esquire, who riding between his own house and Clifton Campvill... about twelve at noon, his Man first espied somewhat unusual in the Heavens

This ‘somewhat unusual’ was verified by Wolferstan as a mock sun around two hours of azimuth behind the real sun. Interestingly it is made clear by Plot that it was this verification was what made the event worth recording- the only response of the ‘man’ was ‘amazement’. Wolferstan also told Plot about the oval rainbow which this phenomenon caused upon rainfall- a much rarer phenomenon which is then supported by authorial sources of similar events elsewhere in Europe.

When it comes to what might be termed specialist knowledge perhaps the most interesting case is that of the Potters. Amongst other things we are told how the clay,
after being wrought, is ‘set abroad to dry in fair weather, but by the fire in foul, turning
them as they see occasion, which they call weaving... After the vessels are painted, they
lead them, with that sort of Lead-Ore they call Smithum, which is the smallest ore of
all... which gives them the gloss, but not the color... After this is done, they are carried to
the Oven... where they are placed one upon another from the bottom to the top.’

Initially this sounds like a history of a trade, of the type Bacon advocated and other
Royal Society members regularly produced. However, this was placed by Plot in his ‘of
stones’ chapter, and seen as testimony regarding the clay itself. Similarly, miners are
used as the authoritative source regarding the properties of pyrites.

At Leek (in the Staffordshire moorlands) some un-named inhabitants told Plot of
a place in the Church-yard at which, on each day in the year at midday, the sun sets in a
noticeably different position- this was noticeable thanks to the local landscape and hills.
This, as Plot tells us, went against the astronomical theory of the day that ‘the Sun whilst
it occupies that Cardinal point [at the solstice], appears stationary for some time... they
can plainly perceive by the help of this Hill, that no two days are equal’. He cites the
Temple of Tentiris in Egypt where the sun’s beams go through a different window as
support, but also feels the need to make six days of his own observations to verify the
accuracy of this particular report. He ends the section with a request to the ‘Curious
that for the most part reside thereabout [to] make annual and more strict observations
for the future by suitable Instruments’

23 Plot, Oxfordshire, p. 60.
25 Ibid., p. 3.
Plot’s acceptance of the evidence of potters and un-named others, seemingly on a par with that form gentlemen gives an interesting counter-argument to the idea that gentlemanly conduct was necessary to give testimony when it came to the natural world. In all cases- for instance when verifying what a local man told him regarding rainbows in moonlight- he was happy to cite learned and observing support: by which he generally means, from the citations, Royal Society fellows or at least contributors to the society journal, *Philosophical Transactions*. He would also back-up claims made with reference to literary sources- both contemporary and ancient.

In more general terms what I have found is that the evidence which Plot accepted depended upon the phenomena in question- the three examples I’ve given being representative in this regard: observations of singular events were generally taken from gentry, evidence of the general properties of a material from a related tradesman, and repeatable events and phenomena from anybody but often verified by Plot himself.

**The Influence of Preconceptions- observation, experimentation, and theorems**

Throughout his county natural histories Plot focused upon the reporting of matters of fact: explanations of theory were given solely as comparators. Even when using well-known philosophical theories, he did not claim anything resembling an absolute truth:

> In the Philosophical part, I have chiefly embraced the Principles of Dr. Willis, as the most universally known and received, and therefore most likely (in this inquisitive Age) to be the truest\(^\text{26}\)

\(^{26}\) plot, *Oxfordshire*, preface.
To give one example of a case in which none of the theories of the time were reconcilable with Plot’s observations, indeed a case that remains open to debate today, I will briefly turn to crop circles. Are they caused by lightning, witches, elves, fairys, moldwarps’ or moles’ mating rituals, or hay falling when it is wet? Plot suggests that fairies, witches and elves, to which crop circles were normally attributed, could cause certain crop circles; but only those ‘that are bare at many places like a path-way’—though his ‘faith be but weak in this matter’ and the suggested alternative of a never-observed mole mating ritual remains open. Other, more complex circles were probably created by lightning, which was the only explanation Plot could conceive of for the altered state of the soil beneath the circles. Plot finds it necessary to state that whether ‘this is the true Philosophical account of them, I will not be so confident as firmly to pronounce.’

On the other hand, when it came to echoes Plot was increasingly certain, and indeed innovative. With most other phenomena his work described physical observations, then listed reports of others’ observations. But with echoes Plot makes a short sojourn into general theory, and conducts a series of experiments at several sites through Oxfordshire to support and nuance this theory.

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27 Plot, Staffordshire, p. 9-19.
The top figure shows Plot’s general theorem: he used a ‘new analytical method’ to describe the relationship between an object, the source of the sound, and the position of the listener. The best position to listen for a sound is ‘at right angles with the object.. not too near, or too far off.’ Of course in reality the most interesting echoes were not from simple walls, for instance at Lord Rochester’s lodge in the central figure there was an echo which could only be found by standing in a certain location between the two hills- Plot was unable to identify the object with any certainty.

However, even on echoes the primary focus of his work was the cataloguing of natural phenomenon. In particular he was interested in finding those echoes which would return the longest spoken phrase:
the Echo near the Church at the parish of Tatenhill, which will return four of five syllables at least, though spoken almost with as low a voice as we ordinarily use in our common discourse... the best of the kind in the County, is that at Norbury, North-easterly from the Manor near a little bank under the wood side about 80. poles or 440. yards distant, which in a still say will repeat 10. or a 11. syllables distinctly, or 12 or 13. if spoken quick. 28

Another property of the ‘air’, to Plot’s mind, was the health which it gave to its inhabitants. I am yet to study Plot’s extensive medical work in any detail- but from a cursory survey he appears to have been fairly ‘traditional’ in his beliefs, and deeply interested in the environmental effects on health.29 This comes out clearly in his discussion of the relationship between the quality of local airs and health. As ever, his empirical research was reliant upon what locals told him- and willing to, if substantiated, value this evidence above the theories to which he subscribed. So:

the Moorland County notwithstanding its Boggs [and their associated bad airs], is really as healthy perhaps as the best part of the County... The Worshipful Mr. Biddulph of Biddulph (as I was informed by diverse) having not long since had twelve Tenants all living at a time within the two parishes of Biddulph and Horton, whose Ages put together made up a thousand years.30

28 Ibid., pp. 28-9.
29 British Library, Sloane MSS 3646.
30 Plot, Staffordshire, p. 45.
However when it came to making the distinction between healthy and healthiest the absence of bad air was vital- though again this was backed up by the fact that there were three Christenings to one Burial in ‘Swynerton, the Village of Beech and all the Hill Country betwixt that and Trentham’.31 This research allows Plot to come to various conclusions as to the properties which, in the particular climate of Staffordshire, would lead to the healthiest situation. To quote:

the most healthy paces are both on the tops and descents of hills facing the north, the winds from thence blowing cool and dry, whereas those from the South are hot and moist...whatever the ancients have written in commendation of the lofty, dry, and open situations (which perhaps may be best in hotter Climes) ours in England ought neither to be without trees for shade, which may be Oak, Ash or Elm planted pretty thick and close to the building to the West and North, that they may serve too for shelter against the injuries of those Quarters... Nor ought the English situation to be altogether dry, but water’d if possible with a quick and clear stream32

Fortunately Staffordshire was anything but dry, Plot identifies 24 named rivers despite Staffordshire being a ‘Mediterranean County’, and suggests that ‘very few countries of the like extent can be found to surpass, if any’ can equal that total.33 He discusses the problems that excessive water can bring, such as around the moors, and again shows the primacy of personal observation over theory and hearsay:

31 Ibid., p. 38.
32 Ibid., p. 41.
33 Ibid., p. 43.
black-meer of Morridge... though it be confidently reported that no Cattle will drink of it, no bird light on it, or fly over it; all which are as false as that it is bottomless; it being found upon measure scarce four yards in the deepest place, my Horse also drinking while I was there as freely of it as I ever saw Him at any other place.\(^\text{34}\)

**Conclusions**

I’ve tried to give a sense of the range of topics covered by Plot in his county natural history. The temporary unification of local study with a widely-conceived natural history had several ramifications. Firstly, by 1720 the more modern division of local study began to emerge, with natural history in the form of gentlemen’s societies and local history continuing with the publication of a new 4,500 page edition of *Magna Britannia*. Local scientific societies remain popular today, and the ever-revised Victoria county histories represent a continuation of the other trend.

Secondly Plot’s work represented the widest form of the encyclopaedic tradition, in terms of topics covered. Yeo’s study of eighteenth century encyclopaedia argues that the place of natural history was to provide the descriptions from which useful facts could be selected: it was to be used as an empirical source of information.\(^\text{35}\)

Here, though, we have another use for natural history - the examination of locality for its own sake. Despite his interest in more general theorems (such as that regarding echoes), and his involvement as director of experiments at the Ashmolean, Plot carefully separated the general from the particular. The county natural history was almost

\(^{34}\) Ibid., p. 44.

exclusively concerned with the latter: these were works describing and examining the microcosm, not providing evidence for a macrocosm.

To sum up, Plot adopted a pragmatic attitude to both testimony and theory. Gentry status was important- all gentlemen who gave evidence to Plot were named, while many others were not- but not a determining factor. Plot took evidence from a wide range of sources, with no apparent order of priority except as regarded individual issues: his own observations were paramount, but he was quick to realise their limitations. When he did occasionally move from observation to conjecture, or theory, he made this clear to the reader. Above all he saw his county natural histories as a catalogue- an essentially antiquarian endeavour which he undertook, in his own words, ‘at first for my own pleasure, the subject of it being so pleasant, and of so great variety’.36

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36 Plot, Oxfordshire, to the reader.
Manuscript Sources

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-- Top Northants c1-39, e1-8, f1-14
-- Top Oxon c378
-- Top Yorks c 13-45, d 9-11

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