

Thomas Harriot's *A briefe and true report*: Knowledge-making and the Roanoke Voyage

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In late 16th-century England the drive towards the extension of maritime trading operations and the establishment of colonial planting and settlement enterprises to rival those of Spain produced a significant volume of print publications, culminating in Richard Hakluyt's monumental *Principall Navigations, Voiages, and Discoveries of the English Nation* (1589). In this paper I will suggest that the entrepreneurial desires of Elizabethan traders and investors laid the foundations not only for a trading empire, but also for a 'knowledge economy' that was to grow exponentially over the next two hundred years, in which the production of knowledge was closely tied to the production of capital. The Grenville–Lane voyage to Roanoke in 1585–6 and Thomas Harriot's representation of it in *A briefe and true report of the new found land of Virginia* (published in 1588) offer us as an illuminating case-study of such a 'knowledge economy'.

In his two-volume collection of sources *The Roanoke Voyages 1584–1590*, David Beers Quinn drew attention to what he saw as the limitations of Harriot's first-hand account of the Roanoke voyage. 'Thomas Harriot's *Briefe and true report* has two aspects', Quinn suggested: 'It is the propagandist tract to discourage adverse rumours about Raleigh's Virginia and to set out the facts which would encourage settlers to go there. This governs its form and limits its contents.'¹

Despite his identification of the 'propagandist' limitations of Harriot's work, Quinn's characterization of the contributions of Thomas Harriot and John White to the voyage has a very different emphasis. 'It is the remarkable naturalism of White's drawings', Quinn says, 'combined with the sympathetic detachment of Harriot's observations which make the collaboration of the two men so noteworthy.' The achievement of Harriot and White lies in the ethnographical light which they shed on 'native society', their 'contribution to natural history' and 'cartographic work which was incomparably the best yet done on any part of North America by any Europeans'.² The contribution of Harriot and White is thus a 'contribution to knowledge' the 'opening up [...] of a remarkable continent to inquiring European eyes'.³ This last phrase is perhaps the most helpful, for Harriot and White were indeed involved in 'opening up' the newly discovered continent, but whether the 'eyes' of Europeans were 'inquiring' or merely acquisitive, is the question of this paper.

For Quinn, then, the Harriot–White enterprise is one which can broadly be categorized as 'scientific', dividing up neatly into natural history, ethnography and cartography, all of which seem to be construed as the ideologically indifferent acquisition of knowledge. Quinn's emphasis on the 'high degree of objectivity and the painstaking accuracy' of the two men reflects a certain mid-20th-century understanding of scientific detachment which is seen as readily applicable to the late 16th century. This accuracy and objectivity Quinn says,

makes Harriot and White's work in Virginia a 'landmark in the history of English cartography and the natural sciences'.⁴

As the 'trained mind' of the expedition to White's 'practised eye',⁵ Harriot's duties were as much scientific as practical – thus, according to Quinn, 'Harriot's task when he sailed with Grenville in April 1585 was to take astronomical observations at sea, and act as a consultant on navigation'.⁶ Here already we can see signs of a tension within Quinn's characterization of Harriot's 'detachment'. Even the astronomical observations have a practical orientation in relation to the voyage, and Harriot's contribution is more invested in the enterprise than some of Quinn's remarks may lead us to think. Quinn, of course, was too good a historian not to see the extent of these involvements. While he notes Harriot's sympathetic insights into Native American culture – in which Harriot himself states that he was 'specially imploied' by Raleigh⁷ – Quinn recognizes that Harriot's acquisition of skill in the Algonquian language (aided by his development of a highly sophisticated phonetic symbolic alphabet) had a largely utilitarian function. Harriot had almost certainly spent time with the Algonquians who had been brought back to England in 1584, Manteo and Wanchese, so that he might learn 'as much as he could of the local language from them, and interrogat[ed] them about the resources, economic and other, of their homeland'. Once he had arrived at Roanoke Harriot's role was 'supervising the mapping of the new territories [...] and above all making a survey [...] of the economic resources of the region'.⁸

Far from being detached and objective, then, Harriot and White were fully implicated in the economic nature of the enterprise, and while their work may have generated knowledge which to 20th-century eyes at least has an objective value of its own, their work was fundamentally driven by the financial aims of the expedition. Quinn does recognise this arguing that,

The positions which Harriot and White were to occupy in the 1585 expedition were those of which well-informed opinion by that time considered necessary to the effective conduct of any reconaissance in the newly-explored territories, whether the objective was trade, mines or settlement.⁹

This 'well-informed opinion' is typified, according to Quinn, by the figure of the 'geographical consultant': men like Richard Eden and the two Richard Hakluyts who 'disposed of their information to merchants, speculators, explorers and would-be colonists'.¹⁰

Richard Hakluyt and the 'traffique' of knowledge

Richard Hakluyt was without doubt one of the most outspoken promoters of this new 'knowledge economy' arguing the necessity for the 'breeding vp of skilfull Sea-men and Mariners in this Realme'.¹¹ He sought to promote the establishment of a lecture on navigation in London, modelled on those which had

been established in Spain by Charles V, arguing that English mariners ‘by lectures and such like instructions ... ought to haue a better education, then hitherto they haue had’. In addition to lectures Hakluyt also saw the publishing of ‘sundry exact and worthy treatises concerning Marine causes’ as a desideratum.¹² Hakluyt points to the precedent of Sir Thomas Gresham, who ‘being but a Merchant hath founded so many chargeable Lectures, and some of them also which are Mathematicall, tending to the advancement of Marine causes’.¹³ The cultivation of skilled and knowledgeable mariners, Hakluyt suggests, would:

turne to the infinite wealth and honour of our Countrey, to the prosperous and speedy discouery of many rich lands and territories of heathens and gentiles as yet vnknown, to the honest employment of many thousands of our idle people.¹⁴

Hakluyt compares English voyages of discovery with those of Spain and Portugal, arguing that England’s exploration of the northern seas in Europe, Scandinavia and Russia while they had not met with the same ‘golden successe [...] and] deductions of Colonies [...]and] attaining of conquests’ as those of their Spanish and Portuguese rivals were nonetheless every bit as courageous and honourable.¹⁵ Now, Hakluyt says, is the moment to emulate the ‘golden successe’ of their enemies by competing with them for territory in the new world:

But nowe it is high time for vs to weigh our ancre, to hoise vp our sailes, to get cleare of those boistrous, frosty and misty seas, and with all speede to direct our course for the milde, lightsome, temperate, and warme *Atlantick* Ocean, ouer which the *Spaniards* and *Portugales* haue made so many pleasant prosperous and golden voyages.¹⁶

Hakluyt promotes this vision of an Atlantic colonising enterprise, and his own ‘sweet studie of the historie of Cosmographie’ as being ‘for the common-wealths sake’,¹⁷ and yet his appeal to Howard as ‘the father and fauourer of English nauigation’ and his praise of Howard’s father as one of the ‘first fauorers and furtherers, with his purse and countenance, of the strange and wonderfull Discouerie of Russia’ (as a backer of the Muscovy company) makes it clear that Hakluyt is seeking to appeal to private investors in these ventures. In Hakluyt’s vision the individual ‘fauourer’ with his private ‘purse’ would in some ill-defined way contribute towards the greatness of the nation (as well as his own wealth). One can certainly see signs of Hakluyt’s heady blend of Protestant evangelism, profiteering and national pride in the Bill brought before the House of Commons in December 1584 to confirm the Royal Charter given to Raleigh for the settling of Virginia. Not only would Raleigh’s patent ensure that the ‘trewe religion’ would be ‘propagatyd amongst foreign Nacions’, but also:

The people of this her heighnes Realme mainteyned and encreased And traficke to the most benefitte and Comodytie of her louinge subiectes as otherwise shulde spende there tyme in Idellnes to the greate preiudice of the Common Welthe be trayned in vertuous and Commodityous Labor [...].¹⁸

In his *Discourse of Western Planting*, presented by Richard Hakluyt to Queen Elizabeth three months earlier, Hakluyt gave a detailed account of how to prepare for such a voyage, which included ‘provisions tendinge to force’, such as the inclusion of ‘men experte in the arte of fortification’ and various trades associated with the making of weapons, but also identified the need for an intellectual skill-base ‘incident to the first traficque

and trade of marchandize’. These included ‘cosmographers [and] hidrographers’, ‘Diers to seeke [...] rich Cochiniilio and other things for that trade’, ‘mynerall men’, a ‘phisition [...] and] a surgeon to lett bloude’ and an apothecary ‘to serue the phisition [...] and to sende into the Realme by seede and roote herbes and plantes of rare excellencie’.¹⁹ We can see evidence of Hakluyt’s recommendation of skilled and knowledgeable personnel in the team that Raleigh put together for the 1585 voyage.

Apothecaries and mineral men

In an anonymous set of notes written for the guidance of Richard Cavendish and Walter Raleigh before the 1585 voyage (headed ‘For Master Rauley’s Viage’), we can see an even more detailed prescription of intellectual skills. Although the primary emphasis was on the military aspects of the expedition – the construction of a fortification, the government of soldiers, etc. – the notes also identify other essential occupations:

I would haue a phisition as well for the healthe of the souldier as to discover the simpels of earbs plantes trees roothes and stons, [a] good geographer to make a discription of the landes discoverd, and with hym an exilent paynter, potticaris and Surgiantes for low sycniss and woundes. An alcamist is not Impertinent, to try the mettaylls that maybe discoverd and an perfett lapidary not to be forgotten. Masons, Carpenters, makers of mudwals, su[m] of y^e myners of Cornwell [and] Sume exelent husband men, with all thinges appertayninge to husbandry.²⁰

Raleigh seems to have adhered fairly closely to these suggestions. John White was certainly ‘an exilent paynter’, and Harriot’s cartographical and navigational skills clearly mark him out as the ‘good geographer’. In a letter to Francis Walsingham, Ralph Lane refers to ‘our Appotycaries’,²¹ while Harriot in his *A briefe and true report* refers to ‘our Phisitions and Chirurgeons’ (who had assessed the quality of the *terra sigillata* – or *Wapeih* – found at Roanoke), as well as ‘men of skill’ who had given their ‘iudgement’ on the Virginian flax and hemp (whether as merchants or ‘husbande men’ Harriot does not say).²² The role of ‘myner’, ‘lapidary’ and ‘alcamist’ was filled by the Czech metallurgist Joachim Gans – to whom Harriot refers as ‘a minerall man’ who located iron ore and ‘founde by triall’ that the Virginian copper contained traces of silver.²³ Quinn speculates that Gans may also have been accompanied by Daniel Höchstetter the younger, who was later concerned with copper mining in Keswick.²⁴ It is clear from the remaining documents (and especially Harriot’s report) that the Grenville–Lane voyage had been well supplied by Raleigh with intellectual know-how, but they can best be seen not as ‘investigators’ concerned with the natural sciences or the natural history of the new world, but rather as ‘men of skill’ who were ‘incident to the ... traficque and trade of marchandize’.²⁵

The aptness of this characterization of Harriot, White, Gans and the others can be seen clearly in Harriot’s *A briefe and true report* and in Lane’s letters from Virginia to investors in the voyage. While Harriot refers at a number of points to other kinds of discourse that he had written and might publish at some later date – a ‘Chronicle’ of the voyage,²⁶ a ‘large discourse’ concerning the ‘naturall inhabitants, their nature and maners’,²⁷ or a detailed account of ‘strange beastes, fishe, trees, plants, and hearbes’ which ‘for want of leasure there for the purpose could not bee pictured’²⁸ – the fact remains that

the *Report* itself (as Quinn has noted) has a very limited brief: 'to discourage adverse rumours about Raleigh's Virginia and to set out the facts which would encourage settlers to go there.'²⁹ Harriot was later extensively involved in lawsuits against his patron,³⁰ so it is fitting that he should treat the *Report* as a kind of forensic legal brief. The first six pages of the *Report* deals with the 'many enuious, malicious, and slaunderous reports and deuises' which had been spread abroad about the Virginia colony and its prospects by individuals who had been involved in the voyage. These reports Harriot says, had

not done a litle wrong to many that otherwise would have also fauoured & aduentured in the action, to the honour and benefite of our nation, besides the particular profite and credite which would redound to them selues the dealers therein.³¹

Therefore, it had dissuaded potential investors who might have profited from the colony. The first six pages, then, are a rebuttal of these reports, so that investors might 'renewe' their 'good liking' of the venture.³² Harriot treats this as a legal 'cause', which, he says he will 'open [...] in a few wordes' so that the 'Adventurers, favorers and well-willers of the enterprise' to whom the *Report* is addressed can place 'fauorable constructions' on the verity of Harriot's account. Harriot in fact omits dealing with the 'particularities' of the claims of the slanderers but (in good legal forensic style) confines himself to undermining the character of these false witnesses. These individuals says Harriot, were those who were 'neuer out of the Iland where wee were seated' (and so were ignorant of the commodities of the Virginian main-land). Once gold and silver were 'not so soone found, as it was by them looked for' these malingers lost interest in discovery and sought nothing but 'to pamper their bellies'. They were, in short, city-slickers unfitted for the rigors of colonial life:

Some also were of a nice bringing vp, only in cities or townes, or such as neuer (as I may say) had seene the world before. Because there were not to bee found any English cities, norsuch faire houses, nor at their owne wish any of their olde accustomed daintie food, nor any soft beds of downe or fethers: the country was to them miserable, & their reports thereof according.³³

Brushing aside their testimonies in this way, Harriot moves quickly to the second part of his 'cause' – the reporting of the commodities that make Virginia an attractive investment. This objective can be seen in the three broad headings that structure *A briefe and true report* that are economic, i.e., first, 'marchantable commodities' where 'an ouerplus sufficiently to bee yeelded' would allow planters not merely to subsist but 'by way of trafficke and exchange' to 'enrich' themselves and their investors; second, commodities of 'victuall and sustenance', which would sustain the planters in the new settlement and third, 'Other thinges as is behoofull for those which shall plant and inhabit to know of', which deals largely with an outline of available building materials and a description of the Algonquians as a docile and governable people.

The first section, on merchantable commodities, begins not with precious metals (as one might have expected) but with 'grasse Silke', a specimen of which, on their return to England, was used to make 'a peece of silke Grogan' that was 'excellent good'. This is followed by silk worms which, by planting mulberry trees Harriot hoped would lead to 'as great profite in time to the Virginians, as there doth now to the Persians,

Turkes, Italians and Spaniards.' This theme of supplanting costly imports to increase English merchant profits was clearly one that Harriot had picked up from Hakluyt who makes a particular point about the customs paid on 'forren commoditie' in his *Discourse of Western Planting*.³⁴ The theme of commodities derived from plants continues with flax, hemp, pitch, tar, rosin and turpentine. Harriot places particular emphasis on a relatively new commodity to European markets, sassafras, which he says, has 'most rare vertues in phisick for the cure of many dieases' which is 'found by experience to bee far better and of more uses then the wood which is called *Guaiacum*, or *Lignum vitae*'. Harriot's assessment of these two very new commodities is an interesting example of what I am calling a 'knowledge economy'.

For more information on sassafras Harriot refers his readers to 'the booke of *Monardus*, translated and entitled in English, *The ioyfull newes from the West Indies*'.³⁵ This is a reference to the translation of a treatise on New World plants and their medicinal uses by Nicholas Monardes of Seville published by the Bristol merchant John Frampton.³⁶ Frampton's work was clearly used by Harriot as a field guide while he was in Virginia and he also cites Frampton's translation in relation to cassia bark, and would also presumably have read Monardes' descriptions of guaiacum and the tobacco plant.³⁷ Hakluyt too had read Monardes in Frampton's translation – as can be seen from his reference to Monardes on sassafras in the *Discourse of Western Planting*.³⁸ The idea of potential profits from New World apothecary drugs was clearly a high priority for the Grenville–Lane voyage. This can be seen from Lane's first letter from Virginia to Sir Francis Walsingham who is identified as one of the 'honorable aduenturers' who had invested in the voyage. In this letter Lane boasts of their discovery of the 'singular commodityes' that they had discovered, which had been approved 'by y^e vnyuersalle opynyone of our Appotycaryes and all our merchantes here'. Clearly medicinal commodities were high on the lists of his priorities (and that of his investors), as at this stage they had not yet 'serched' into 'y^e bowelles of y^e Earthe'.³⁹ That apothecary drugs continued to be a particular objective for the Virginian colonizers can be seen from Harriot's account of 'Sweete Gummes' in *A briefe and true report*, where he says that they have discovered 'many other Apothecary drugges of which we shall make speciall mention when wee shall receiue it from such men of skill in that kynd'.⁴⁰ Dyes were also prominent in Harriot's report, not only cochinele, which Harriot knew about from the Spanish Indies, which he hoped might be derived from *Metaquesúnnauk*, a local fruit-bearing shrub,⁴¹ but also Sumach and the bark and roots of other local trees and bushes.⁴²

The fact that both Harriot and Hakluyt cite Monardes – and that Lane should prioritize apothecary commodities in his letter to Walsingham – is significant. The Bristol trader and merchant Frampton, as Donald Beecher has recently shown, was a significant contributor to the new knowledge economy that was growing up around (and shaping) nascent colonial enterprise.⁴³ The promotion of apothecary drugs as a new commodity in which England should compete with Spanish trade from the Indies was central to Frampton's book. In a dedicatory epistle addressed to Edward Dyer, Frampton says that he translated Monardes' book so:

that in deede it might bryng in tyme rare profite, to my Countrie folkes of Englande, by wonderfull cures of sundrie greate diseases, that otherwise then by these remedies, thei were incurable.⁴⁴

The profits that Frampton envisaged were not just metaphorical ones, however, and later in his preface he notes that:

the afore saied Medicines mentioned in the same worke of Doctour Monardes are now by Marchauntes and others, brought out of the West Indias into Spaine, and from Spain hether into Englande, by suche as dooeth dailey trafficke thether.⁴⁵

While Frampton is attuned to the medicinal import of Monardes' New World medicines (which has caused the 'olde orde and manner of Phisicke' to be 'forsaken') it is clear that it is the mercantile prospects of such medicines and their very real 'profite' to the English which he has uppermost in mind.⁴⁶ The import of Frampton's work was not lost on Raleigh, Harriot and Lane.

Raleigh had been told that an 'alcamist' and a 'lapidiary' would not be 'Impertinent' to his voyage, and, as is to be expected, the mineral resources of Virginia also loom large in Harriot's account. The first mineral commodity mentioned concerns a coastal 'veine of earth' which was rich in rock alum, copperas and nitre which had presumably been identified as such by Gans and Höchstetter, but had also been approved by 'chymists' who 'made triall' in England.⁴⁷ The reference to testing the iron ore deposits and assaying copper for traces of silver were confirmed in the 1990s by the archaeological work of Ivor Hume who supervised new excavations in Roanoke Island's Fort Raleigh National Historical Site under the auspices of the Virginia Company Foundation, which give us a vivid picture of the chemical work done by Harriot and Gans at Roanoke.

Hume discovered the remains of an 'old, buried laboratory once used for metallurgical research', the 'first archaeological evidence [...] for a laboratory in America'. Remains found at the site included fragments of glass, a piece of metallic antimony, slag, clinkers from a forge and traces of molten materials.⁴⁸ A brass apothecary's weight was found in a ditch and also shards of glassware consistent with the kinds of vessel used by assayers in the late 16th century. Although a visitor to the site in 1849 was reputed to have found 'glass globes containing quicksilver, and hermetically sealed',⁴⁹ the fragments of glassware found by Hume and his colleagues was rather less well preserved, but still identifiable as chemical vessels of the period.⁵⁰ Harriot and Gans also appear to have used Native American bowls in their work as badly burned fragments of local clay pots were found at the site.⁵¹ The traces of materials found at the site are consistent with Harriot's description of their activities, including fragments of smelted copper, and antimony (which was used in the separation of silver and copper), and seeds and nuts from leaf pine and shagbark hickory which Hume believes may have been among the plants which Harriot was testing for their medicinal properties. There may also have been a 'perfect lapidary' amongst the discoverers (or at least a merchant with extremely particular knowledge) as Harriot notes that one of the party, who had gathered 'about five thousande pearls' from the local people was 'a man of skill in such matters'.⁵²

It can be seen from this brief summary that Harriot's

interest in the 'natural history' of the region has an explicit economic focus – the attraction of investment and settlement in Virginia – and he pointedly omits descriptions of flora and fauna which have no commodity value. He mentions in the section on trees, for example, that they had found 'many other strange trees whose names I knowe not but in the *Virginian* language', but he declines to 'trouble' his readers with a 'particular relation' of them, as they have no 'necessary uses'.⁵³

Harriot's putative contributions to ethnography also share this narrow colonial objective. While it is true that Harriot's *A briefe and true report* gives us intriguing insights into the daily lives of the local people, including their religious beliefs, Harriot's narrative is clearly aimed at addressing the potential concerns of investors and settlers. Harriot by his own testimony was 'specially imploied' in 'dealing with the naturall inhabitantes', but as his detailed lexicon of the local commodities, and his conversations with the local inhabitants concerning the sources of their copper ornaments show, Harriot's dealings were of a strictly utilitarian nature.⁵⁴ While Harriot promises a 'large discourse' on the local inhabitants at a later date, he restricts himself, in the present context, to those aspects of immediate concern to potential settlers, that is to say, 'onely so farre forth, as that you may know, how that they in respect of troubling our inhabiting and planting, are not to be feared [...]'.⁵⁵ His detailed descriptions of local husbandry are also not disinterested observations, but bear direct relevance to the 'victuall and sustenance' of settlers (and appear in the section of the report dedicated to that purpose),⁵⁶ with crop yields carefully compared to the yields of the average English acre.⁵⁷

Harriot spends a disproportionate amount of time in *A briefe and true report* outlining the religious beliefs of the Algonquians and their putative deference to the religion of the colonizers (especially after the famous 'invisible bullets' episode).⁵⁸ But even here Harriot is not engaging in disinterested anthropological or ethnographical speculation, or exhibiting a desire to understand the Algonquians as a different culture, but focuses instead on depicting the Algonquians as heathens who are ripe for conversion to a Protestant Christianity, and whose respect for the God of the colonizers will dispose them to be docile and governable by settlers:

These their opinions I haue set downe at large that it may appeare vnto you that there is good hope they may be brought through discreet dealing and gouernement to the imbracing of the truth, and consequently to honour, obey, feare and loue vs.⁵⁹

Harriot reassures his readers about the vastly inferior military organization of the Algonquians in comparison with the English, with their 'discipline [...] strange weapons and deuises',⁶⁰ and while he is at pains to emphasise their 'gentlenesse' towards the local people,⁶¹ he acknowledges that some of his party had 'shewed themselues too fierce' towards the end of their stay.⁶² Even at the beginning of their stay Lane had complained to Sir Philip Sidney that he was 'emungst sauages [with] y^e chardege of wylde menn of myne owene nacione',⁶³ and although Harriot claims that the violence meted out to the Algonquians was 'on their part iustly deserued',⁶⁴ the description of English colonists burning a village and spoiling crops after the failure of a local chieftain to return a silver cup suggests otherwise.

In his conclusion Harriot emphasises that all the commodities mentioned in *A briefe and true report* had been 'discovered & experiemented' not far from Roanoke Island ('not far from the sea coast where was our abode'). Their occasional journeys 'farther into the maine and countrey' revealed more and better commodities than those described, holding out the possibility of emulating Spanish colonial successes:

Why may wee not then looke for in good hope from the inner parts of more and greater plentie, as well of other things, as of those which wee haue already discovered? Vnto the Spaniardes happened the like in discovering the maine of the West Indies.⁶⁵

The interior, which extends 'many hundreds of leagues', and 'where yet no Christian Prince hath any possession or dealing', was sure to provide 'many kinds of excellent commodities, which we in our discoverie haue not yet seene'. The climate of Virginia is compared favorably to that of Japan, China, Persia, Cyprus, Greece, Italy and Spain, and the clear implication is that it is capable of yielding the same commodities as England presently obtained at a premium from these other nations.⁶⁶ Added to this the Atlantic voyage is such that it could 'bee performed thrise a yeere with ease and at any season'.⁶⁷ *A briefe and true report* closes with a brief advertisement for the land grants that Raleigh was offering to settlers on the basis of his 1584 patent ('fiue hundred acres to a man onely for the aduventure of his person').⁶⁸

Science, colonization and the knowledge economy

From this brief analysis of *A briefe and true report*, we can see then what Harriot meant when he said that he was 'imploied in discovering'. Discovering in effect meant the identification of new commodities and their 'necessary uses'.⁶⁹ This is a far cry from the scientific detachment imagined by Quinn, and yet this scramble to recover from what Hakluyt called the 'decayed trades' of 16th-century England,⁷⁰ produced knowledge – and not by accident, but by design. Harriot found the Algonquians 'a people poore, and for want of skill and iudgement in the knowledge and vse of our things', and particularly in their lack of 'craftes, sciences and artes'. By acknowledging this technological superiority Harriot believed that they could be 'brought to ciuilitie'.⁷¹ Science and technology, as Harriot points out, had led to an increased 'speed' in 'doing or execution' in Europe, and this increased speed and the reciprocal exchange between knowledge and use is what created the necessary conditions not just for the colonial enterprise but also for the advent of modern science.

Quinn noted the close connections between England's colonial enterprise and science in his account of the work of Harriot and White: '[M]ajor figures in natural history in the sixteenth century', he said, 'had contacts with the pioneers of English overseas enterprise'.⁷² While the concerns of these pioneers were 'almost wholly utilitarian', Quinn argued,

The growing exactness of the questions asked and answered by the naturalists, particularly the botanists, impelled them towards more scientific ways of acquiring and assembling their information.⁷³

In his Oxford Harriot lecture, 'Thomas Harriot and the problem of America', given in 1990, Quinn returned to this distinction between the 'utilitarian' and the 'scientific' in what was probably his final assessment of Harriot's career (Quinn

died in 2002). 'That his [i.e., Harriot's] work helped to give rise to the imperialist ventures of the following century is not in question', Quinn argued,

Although in this area it exerted only a marginal influence. His powers of investigation, however, made their mark on other spheres, mainly mathematical and astronomical, and we can only regret that because of political circumstances his later life was passed with little publicity. In this period, the habit of quiet experiment for its own sake became engrained in him, contributing to the obscurity in which much of his achievement has remained for so long.⁷⁴

Harriot's colonial role is minimized in Quinn's account, making way for Harriot the 'problem solver' and 'investigator' who valued 'experiment for its own sake'.⁷⁵ In the most recent Harriot lecture, Stephen Johnston asked whether there wasn't some connection between Harriot's thought and the life he'd lived. In Johnston's view Harriot's work would not have taken its later shape unless he had been on the Roanoke voyage, if he hadn't accompanied Grenville on his 'Tilt boate' to discover the towns of Pomeiooc, Aquascogoc and Secotan.⁷⁶ What Quinn seems to assume is the existence of a realm of theoretical scientific thought which is uncontaminated by the utilitarian, the practical and the profitable – a realm where experiment, or astronomy, or mathematics or botany could be pursued 'for its own sake'. While it is quite clear that even by the late 16th century there was a highly developed notion of the theoretical and practical realms (in relation to the classification of the arts and sciences), what I would propose is that a conception of a 16th-century 'science' that is not embedded in a practical world of economic considerations is a chimera. Consider, for example, the botanists or 'naturalists' who Quinn sees as encouraging colonial pioneers in 'scientific ways of acquiring and assembling their information'.

Is it possible to conceive of a 16th-century botanist whose pursuit of knowledge is not shaped by the *materia medica* and the livelihood of the practising physician, or the apothecary trade? Would mathematics and astronomy have made the advances they made in the 16th and 17th centuries, without the economic impetus of maritime navigation, warfare, engineering and other practical employments? It is interesting to note, for example, that one of Harriot's most explicit acknowledgements of Copernicus as a 'notable mathematician' comes not in his manuscripts concerning observational astronomy, but in a manuscript entitled 'The Sonnes Regiment', where the interest in finding the 'declination of the sonne' is strictly navigational, and sets him in the immediate context of Spanish and Portuguese maritime endeavours.⁷⁷

I would like to end this paper on an image that I think captures the spirit of Harriot's activities in the 1580s (and beyond). In an abbreviated 1595 version of his *Arcticon* – a manual for the seamen involved in the Roanoke voyage – Harriot talks about the difficulty of making astronomical observations on board ship. The astrolabe is unreliable 'when the sea is rough [...] because of his agitation & unquiet hanging'.⁷⁸ The cross-staff is to be preferred, he says, but one should take care to adjust 'the orderly mouing of your body & hand' so that they are 'answerable to the surge of the sea, & then bring him downe by litle & litle till you se only the edge of the sonne'.⁷⁹ Without his experience on the Roanoke voyage, Harriot's scientific knowledge would have been very different. This is what I mean by Harriot's place in a 'knowledge

economy': that scientific knowledge and economic needs in the 16th century existed in a reciprocal relationship. If Harriot had not been involved (for better or for worse) in the energetic mercantile culture of 'traffique, settlement and discovery' he would not be the 'Elizabethan man of science' we remember today.

Notes

- 1 D.B. Quinn, *The Roanoke Voyages 1584–1590: documents to illustrate the English voyages to North America under the patent granted to Walter Raleigh in 1584*, 2 vols, London, 1955, I, 314. For an account of the voyages based on these materials see Quinn, *Set fair for Roanoke: Voyages and Colonies, 1584–1606*, London and Chapel Hill, NC, 1985.
- 2 Quinn, *Roanoke Voyages*, I, 316–317.
- 3 *Ibid.*, 317.
- 4 *Ibid.*, 35.
- 5 *Ibid.*, 47.
- 6 *Ibid.*, 37.
- 7 T. Harriot, *A briefe and true report of the new found land of Virginia*, Frankfurt, 1590, 5.
- 8 *Supra* n. 2, 37.
- 9 *Ibid.*, 50–51.
- 10 *Ibid.*, 49.
- 11 R. Hakluyt, *The principal nauigations, voyages, traffiques and discoveries of the English nation made by sea or ouer-land, to the remote and farthest distant quarters of the earth, at any time within the compasse of these 1600. yeres: deuided into three seuerall volumes, according to the positions of the regions, whereunto they were directed. The first volume containeth the worthy discoveries, &c. of the English ... The second volume comprehendeth the principall nauigations ... to the south and south-east parts of the world ... By Richard Hakluyt preacher, and sometime student of Christ-Church in Oxford*, 3 vols, London, 1599–1600, I, dedicatory epistle 'To the right honorable my singular good Lord, the Lord Charles Howard, Erle of Nottingham [... etc]', sig. *3 recto.
- 12 *Ibid.*
- 13 *Ibid.*, sig. *3 verso.
- 14 *Ibid.*
- 15 *Ibid.*, sig. *4 recto.
- 16 *Ibid.*, sig. *4 verso–*5 recto.
- 17 *Ibid.*, sig. **2 verso and sig. *2 recto.
- 18 *Supra* n. 2, 127.
- 19 R. Hakluyt, *A particuler discourse concerninge the greate necessitie and manifolde commodityes that are like to growe to this Realme of Englande by the Westerne discoveries lately attempted*, D.B. Quinn and A.M. Quinn, eds, London, 1993, xxiv, 124, 127.
- 20 Essex County Record Office, County Hall, Chelmsford, MS D/DRh, MI, reprinted in Quinn, *supra* n. 2, 130–139. For more on the preparations for the Roanoke voyage see J.L. Humber, *Backgrounds and preparations for the Roanoke voyages, 1584–1590*, Raleigh, 1986.
- 21 Ralph Lane to Sir Francis Walsingham, 12 August 1585, *supra* n. 2, 199.
- 22 *Supra* n. 7, 8.
- 23 *Ibid.*, 10. On Gans see G.C. Grassl, 'German Mineral Specialists in Elizabethan England and Early English America', *Yearbook of German-American Studies*, 31, 1996, 45–61 and 'Joachim Gans of Prague: The First Jew in English America', *American Jewish History*, 86, 1998, 195–217 and I. Abrahams, 'Joachim Gaunse: a mining incident in the reign of Queen Elizabeth', *Transactions of the Jewish Historical Society*, 4, 1903, 83–103. On the 'Harriot-Gans workshop' in Roanoke and its archaeological discovery in the 1990s see I.N. Hume, *The Virginia adventure: Roanoke to James Towne: an archaeological and historical odyssey*, Charlottesville, VA, and London, 1997, 73–89. Evidence of Gans' explicitly alchemical interests can be seen in British Library MS Sloane 3748, an alchemical notebook owned by Clement Draper of London, which includes a piece on Beginning on f. 26v is 'The Greatt Redd Worke taught in ye prisson of King's Bench' (ff. 26v–30v) the end of the treatise is endorsed 'per Jo. Gantz'. I would like to thank Deborah Harkness for drawing my attention to this manuscript.
- 24 *Supra* n. 2, 195, fn. 2.
- 25 The characterization of Harriot as an 'investigator' or 'problem solver' comes from Quinn's 1990 Oxford Harriot lecture 'Thomas Harriot and the Problem of America', in *Thomas Harriot: An Elizabethan Man of Science*, R. Fox, ed., Aldershot, 2000, 9–27 (see pp. 9 and 27).
- 26 *Supra* n. 7, 32–3.
- 27 *Ibid.*, 24.
- 28 *Ibid.*, 20.
- 29 See fn. 1 above.
- 30 See J.W. Shirley, *Thomas Harriot: a Biography*, Oxford, 1983, 218–223 and idem, 'Sir Walter Raleigh's Guiana Finances', *Huntington Library Quarterly*, 13(1), 1949, 55–59.
- 31 *Supra* n. 7, 5.
- 32 *Ibid.*
- 33 *Ibid.*, 6.
- 34 Hakluyt, *supra* n. 19, 116.
- 35 *Supra* n. 7, 9.
- 36 J. Frampton, *Ioyfull newes out of the newe founde worlde wherein is declared the rare and singuler vertues of diuerse and sundrie hearbes, trees, oyles, plantes, and stones, with their aplications, aswell for phisicke as chirurgerie, the saied beyng well applied bryngeth suche present remedie for all deseases, as maie seme altogether incredible: notwithstanding by practize founde out, to bee true: also the portrature of the saied hearbes, very aptly discribed: Englished by Ihon Frampton marchaunt*, London, 1577. This is a translation of N. Monardes, *Primera y segunda y tercera partes de la historia medicinal de las cosas que se traen de nuestras Indias occidentales qui sirven en medicinal*, Seville, 1574.
- 37 On cassia lignea see *supra* n. 7, 23. For tobacco and guaiacum see *ibid.*, 10v, 34 recto–45 recto.
- 38 Hakluyt, *supra* n. 19, 18–19: 'Doctor Monardus bestoweth xj leaves in describinge the ... excellent properties thereof.' Cf. *supra* n. 36, 46 recto–56 verso. On Harriot, Frampton and Monardes see G. Mirlees, *Sassafras: a cure-all of Harriot's time*, Durham Thomas Harriot Seminar Occasional Papers, 12, Durham, 1993.
- 39 Ralph Lane to Sir Francis Walsingham, 12 August 1585, *supra* n. 2, 199–200. One possible reason for the emphasis on commodities other than precious metals was the recent embarrassing failure of the Frobisher voyages of 1576–8. See D.D. Hogarth, P.W. Boreham, and J.G. Mitchell, *Mines, Minerals and Metallurgy: Martin Frobisher's voyages of 1576, 1577 and 1578*, Mercury Series, 7, Ottawa, 1994, 73–99.
- 40 *Supra* n. 7, 11.
- 41 *Ibid.*, 18: 'Some that haue bin in the Indies, where they haue seen that kind of red die of great price which is called Cochinile to grow, doe describe his plant right like vnto this of Metaquesunnauk but whether it be the true Cochinile or a bastard or wilde kind, it cannot yet be certified; seeing that also as I heard, Cochinile is not of the fruite but founde on the leaues of the plant; which leaues for such matter we haue not so specially obserued.'
- 42 *Ibid.*, 'Dyes of diuers kindes', 11. For tentative identifications of these plants see *supra* n. 2, 334–5.
- 43 D. Beecher, 'The legacy of John Frampton: Elizabethan Trader and Translator', *Renaissance Studies*, 20(3), 2006, 320–339.
- 44 *Supra* n. 36, sig. *ij recto–verso.
- 45 *Ibid.*, sig.
- 46 On the 'ideological and mercantile intent' behind Frampton's translations and the stimulation of pharmacological trade see *supra* n. 43, 324–6.
- 47 *Supra*, n. 7, 8.
- 48 *Chicago Sun Times*, Wednesday, 25 December 1991, 26. I would like to thank Dr Gerrylynn Roberts of the Open University for drawing my attention to this reference.
- 49 I.N. Hume, 'Roanoke Island': America's First Science Center', Pamphlet reprinted with permission from the Spring 1994 Issue of *Colonial Williamsburg: the Journal of the Colonial Williamsburg Foundation*, 4.
- 50 Private correspondence from I.N. Hume, 1 February 1995: 'The fragments of glass [...] were very small indeed and only two pieces came from recognizable vessels, both of them from wide-necked retorts and one of them a characteristic string rim.'
- 51 *Supra* n. 49, 10.
- 52 *Supra* n. 7, 11.
- 53 *Ibid.*, 23.
- 54 For a critical view of the role of the Algonquians as 'informants' see B.R. Smith, 'Mouthpieces: Native American Voices in Thomas Harriot's *True and Brief Report of ... Virginia*', Gaspar Pérez de

- Villagrà's *Historia de la Nuevo México*, and J. Smith's *General History of Virginia*, *New Literary History*, 32(3), 2001, 501–517.
- 55 *Supra* n. 7, 'Of the nature and the manners of the people', 24.
- 56 See *ibid.*, 13–16.
- 57 *Ibid.*, 15.
- 58 This section of Harriot's narrative has achieved a certain notoriety in literary studies thanks to S. Greenblatt's essay 'Invisible bullets: Renaissance Authority and its Subversion, Henry IV and Henry V', *Glyph: Textual Studies*, 8, 1981, 40–60. See the response of B.J. Sokol, *Invisible Evidence: The Unfounded Attack on Thomas Harriot's Reputation*, Durham Thomas Harriot Seminar Occasional Papers, 17, Durham, 1995.
- 59 *Supra* n. 7, 29.
- 60 *Ibid.*, 25.
- 61 *Ibid.*, 28.
- 62 *Ibid.*, 30.
- 63 Ralph Lane to Sir Philip Sidney, 12 August 1585, *supra* n. 2, 204.
- 64 *Supra* n. 7, 30.
- 65 *Ibid.*, 31.
- 66 *Ibid.*
- 67 *Ibid.*, 32.
- 68 *Ibid.*
- 69 See *ibid.*, 12: 'Many other commodities by planting may there also bee raised, which I leaue to your discret and gentle considerations: and many also may bee there which yet we haue not discovered.'
- 70 *Supra* n. 19, 16. On the colonising impulse and England's trading difficulties see p. xxiii.
- 71 *Supra* n. 7, 25.
- 72 *Supra* n. 2, 48.
- 73 *Ibid.*, 49.
- 74 Quinn, *supra* n. 25, 27.
- 75 Cf. also D.B. Quinn, 'Thomas Harriot and the New World' in *Thomas Harriot Renaissance Scientist*, J.W. Shirley, ed., Oxford, 1974, 36–53, 42: '[W]hile the primary purpose of the survey was to inform Raleigh and his associates of the major features of Virginia as a basis for colonial development there, from an early stage in the process of their survey, Harriot and White had in mind the preparation from their collections of a systematic illustrated survey, covering both natural resources and ethnography.'
- 76 S. Johnston, Thomas Harriot Lecture 2007, 'Thomas Harriot and the English Experience of Navigation', delivered at Oriel College Oxford, 17 May 2007. On Grenville's 'Tilt boate' see Quinn, *supra* n. 25, 190.
- 77 Thomas Harriot, 'How to find the declination of the sonne for any time of the yeare & any place; by a speciall table called the Sonnes Regiment newly made according to late obseruations', British Library, Add. MS 6788, f. 468 et seq. For his praise of Copernicus see f. 468 *recto*: 'There are in the hands of seamen both written & printed 2 sortes of regiments. The one sorte I ~~count~~ <call> those which are the auncientist calculated [...] they were calculated & made of the Tables of Alfonsus sometime King of Spayne [...]. And although since about 70 yeres ~~since~~ past those tables were found faulty by the diligent obseruation of certayne notable mathematitians & especially of one Nicholaus Copernicus of Cracow in poland; whose labor in obseruations & in making of tables according, was since of all men preferred; but only of the spaniards & portingalls, who [...] thorough self-loue of the doinges of there owne king litle regarded what others had don; [and] followed stil there owne tables [...].' Harriot also refers to the 'exquisitenes' of Copernicus' tables (*ibid.*). For more on the Regiment see J.J. Roche, 'Harriot's "Regiment of the Sun" and its background in sixteenth-century navigation', *British Journal of the History of Science*, 14(48), 1981, 245–261.
- 78 British Library, Add. MS 6788, f. 485, cit. J.V. Pepper, 'Harriot's Earlier Work on Mathematical Navigation: Theory and Practice' in *supra* n. 75, 54–90 (p. 59).
- 79 *Ibid.*, 63.