Short title: Physical Arguments and Moral Inducements

Title: Physical Arguments and Moral Inducements. John Wallis on Questions of Antiquarianism and Natural Philosophy[1]

Author: Philip Beeley

Address: History Faculty, University of Oxford, George Street, Oxford OX1 2RL, UK

Email: philip.beeley@history.ox.ac.uk

Summary: In his posthumously-published work *Chartham News* (1669), the antiquary William Somner tentatively sought to link the discovery of fossilized remains near Canterbury to the prehistoric existence of an isthmus connecting Britain and France, before calling on natural philosophers to pursue his explanation further. This call was eventually heeded by the Oxford mathematician John Wallis, but only after more than thirty years had elapsed. The arrival in England of a catalogue of questions concerning the geology of the Channel led to the republication of *Chartham News* in the *Philosophical Transactions*, prompting Wallis to develop a physical explanation based on his intimate knowledge of the Kent coastline. Unbeknown to Wallis at the time, that catalogue had been sent by G. W. Leibniz, who had in turn received it from G. D. Schmidt, the former Resident of Brunswick-Lüneburg in Sweden. Wallis's explanation, based on the principle of establishing physical causes both for the rupturing of the isthmus and the origin of fossils, placed him in a camp opposed by Newtonian authors such as John Harris at a time when the priority dispute over the discovery of the calculus led to the severing of his ties with the German mathematician and philosopher Leibniz.

Keywords: Wallis, Leibniz, Somner, isthmus, fossils, antiquarianism

1. Introduction

Despite being one of the most perambulated and investigated counties in early modern England, Kent's path towards an up-to-date account of its antiquities encountered considerable difficulties along the way. The most highly respected figure to undertake this endeavour was William Somner (1598-1669), a scholar of Anglo-Saxon who held the Cambridge lectureship in this discipline from 1657. A friend of James Ussher (1581-1656) and Meric Casaubon (1599-1671), both of whom supported him in his scholarly endeavours, Somner devoted a large part of his antiquarian studies to the history of his home town of Canterbury with the intention that they would eventually feed into his planned work on the antiquities of the county itself. This plan, delayed through the many years he spent preparing his Anglo-Saxon dictionary,[2] was however thwarted by his death in 1669. Some years later, the challenge was taken up again by the theologian and scientific author John Harris (c.1666-1719), an active member of the Royal Society and a principal contributor to the debate over the Flood provoked by the writings of Thomas Burnet (c.1635-1715).[3] He succeeded in securing an impressive list of subscribers for his *History of Kent*, while systematically collecting and compiling information for use in the project.[4] Indeed, Harris seems to have been overwhelmed by the sheer quantity of material he was able to assemble. Of the two

volumes he planned, only the first, which was going through the press at the time of his death in 1719, ever appeared in print. Moreover, its reception by the learned public was less than enthusiastic.[5]

Shortly before he died, Somner came across a local discovery of fossilized animal remains that required him to explore historical questions without recourse to the tools he and his antiquarian friends usually employed, such as man-made artefacts or literary sources. Compelled to go beyond any evidence that written records could provide, he relied instead on his own observations and his knowledge of the local topography.[6] Somner's posthumously published short tract on the topic of his discovery, which appeared under the title *Chartham News*, had little resonance among the learned public at the time it came out, but its republication over thirty years later was a crucial contribution to an English debate over the pre-historic existence of an isthmus or neck of land connecting ancient Britain with the Continent. The Oxford mathematician and theologian John Wallis (1616-1703) played an important role in this debate, although he was not instrumental in bringing it about. Rather, it was initiated by a set of geological questions sent to Hans Sloane (1660-1753), the secretary of the Royal Society, in the summer of 1701 by the German mathematician and philosopher Gottfried Wilhelm Leibniz (1646-1716). Prompted by these questions, the Royal Society republished Somner's tract in the *Philosophical Transactions*, leading Wallis to develop a scientific explanation for the precise location of the fossilized remains. This explanation, based on the natural history of the Kent coast, supervened on the existence and subsequent rupture of such an isthmus. His explanation fell squarely within the core interests of the Royal Society, but Wallis also cited further kinds of evidence for their having been an earlier land connection, derived from linguistic tradition and historical texts. Such evidence, he suggested, while not having conclusive force could at least provide moral inducement, further corroborating grounds to adopt a certain physical hypothesis. In general, the debate had the effect of encouraging scholars working on questions of natural philosophy to consider employing methods more readily associated with antiquarianism, while conversely historians and antiquarians alike found they were required to draw on the observational techniques of natural philosophers.

2. Camden, the Flood, and the Isthmus

Against the backdrop of the failures of Somner and Harris, William Camden's (1551-1623) *Britannia*, a work originally published in Latin 1586, remained in many ways the most authoritative source on Kent's antiquities into the eighteenth century. In part its enduring value was due to the foresight of Camden himself in allowing Philémon Holland (1552-1637), the translator responsible for the first English edition of 1610, to use the fruits of their correspondence on antiquarian topics to embellish the text. But more significant was the decision, primarily by Edmund Gibson (1669-1748), a prominent member of a group of Anglo-Saxon scholars centred on the Queen's College, Oxford, to produce a revised edition of *Britannia* based on a new translation.[7] While remaining faithful to Camden's original text, his new edition incorporated the substantial additions to antiquarian knowledge that had been accumulated since 1637, when Holland's translation was last printed. Conceived sometime in 1692, Gibson's edition came out to much critical acclaim in 1695.[8] In commissioning the 'Additions and Corrections' to individual county chapters, Gibson was able to draw on the

knowledge of an extraordinarily strong body of contemporary scholars, including John Evelyn (1620-1706), Edward Lhuyd (1659/60-1709), and Arthur Charlett (1655-1722). At the end of each chapter there was also a catalogue of the county's indigenous plants provided by John Ray (1627-1705), while Samuel Pepys (1633-1703) delivered accounts of the arsenals of the Royal Navy in Kent and elsewhere.[9] Other aspects of the work were delegated, too. The task of revising Camden's chapter on Kent fell to Robert Plot (1640-96), who took John Leland (c.1503-52) as his model for his researches, closely allying natural history with antiquarianism. Indeed, he suggested that Camden himself had produced *Britannia* as a superstructure on the foundation Leland had created.[10] In this spirit, endeavouring to procure information at first hand, Plot undertook an excursion through Kent in August and September 1693, accompanied by Thomas Browne (1673-1710), son of the eminent physician Edward Browne (1644-1708).[11] Reflecting Plot's scientific interests, the journey began in Greenwich and a short report on the Royal Observatory duly found its way into the new edition of Camden's work.[12]

Among many additions that Camden himself made to the chapter on Kent in the first English edition of *Britannia* was a series of deliberations concerning the narrow sea passage or fretum separating Britain and France between the modern-day ports of Dover and Calais. To be more precise, he considered the historical and natural philosophical evidence that the island was formerly attached to the continent by an isthmus or neck of land that had subsequently been breached and destroyed through the effects of waves or tidal movements over the course of time:

> Heere might arise a question beseeming a learned man that hath wit and time at will, whether, where this narrow sea runneth between France and Britaine now, there was a narrow banke or necke of land that in times past conjoined these regions, and afterwards being broken either by the generall deluge, or by rushing in of the waves, or else by occasion of some earthquak, did let in the waters to make a through passage. Verily, as no man makes doubt that the face of the whole earth hath beene altered, partly by the said deluge, and partly by long continuance of time and other causes: as also that Ilands by earthquakes, or the shrinking backe of waters were layd and joined unto firme lands: so, most certainly it appeereth by authors of best credite, that Ilands by reason of earthquake and the breaking in of waters were severed, disjoined, and rent from the Continent.[13]

Camden proceeds to cite evidence for this kind of geographical change having been observed or recorded in the ancient world, drawing on such authors as Ovid (b. 43 BCE), Pliny the Elder (23-79), Seneca (4 BCE-65), and Virgil (70-19 BCE). However, he concedes the limitations of such historical evidence. Examples of the separation of land masses noted by these writers are, he suggests, unable to provide us with 'assured ground upon certaine authority'.[14]

The insufficiency of literary sources alone meant that for Camden other kinds of possible evidence need to be weighed and considered. A geographical approach, he suggests, might involve a series of comparisons: of the nature of the soils on both sides of the Channel; of the breadth and depth of the channel itself, and of the nature of the seabed on the two opposing coastlines. Geological similarities, he argues, would provide strong support for the earlier existence of an isthmus, as would shallowness of water at the point of greatest

proximity of land. Other possible considerations lead directly or indirectly to questions of scholarship. Thus, Camden floats the idea that an investigation of names on either side of the Channel separating Britain and France might provide grounds for supposing them to have been formerly bound by a neck of land, but confesses that he himself is unable to find such evidence.

Finally, Camden turns to an argument which in subsequent discussion delivers some of the strongest support for the hypothesis that an isthmus had existed: the whereabouts of fauna, or remains thereof, following the Flood: 'They that would have Britain to have been the very continent of Gaule after that uniuersall deluge, argue from the wolves, whereof there were many among us in old time, like as at this day in Scotland and Ireland.'[15]

3. Somner and the Chartham discovery

The early modern discussion of a pre-historic isthmus between Britain and France might have simply ended with Camden's inconclusive deliberations, had the antiquary William Somner not written a short tract, around the beginning of 1669, about a remarkable discovery made in the village of Chartham, Kent, the previous year. Of the eponymous parish his patron Archbishop Laud (1573-1645) had appointed him rector some quarter of a century earlier.[16] In the tract, Somner describes how 'a parcel of strange and monstrous Bones, some whole, some broken, together with four Teeth, perfect and sound, but in a manner petrified, and turned into Stone' was unearthed by his brother, John Somner, when sinking a well at his new house.[17] The circumstances are crucially important for the subsequent discussion. Somner claims that the discovery was made at a depth of around seventeen feet and some sixty-five yards away from the River Stour, which flows through the village.

The tract, which bears the title *Chartham News*, was completed shortly before the author's death at the end of March 1669 (Figure 1).[18] His brother evidently prepared it for publication.[19] Somner expressly does not enter into speculation on the nature of the creature itself, noting only the opinion of some that they were the bones of a hippopotamus. In this way largely steering clear of questions of natural philosophy, he suggests that it is up to others to 'employ their skill in guessing and judging of the Creature'.[20]

Somner's chief concern in the tract is to consider possible explanations for how the remains came to be where they were discovered, 'at so remote a distance from the Sea', in view of the absence of any recorded evidence that the sea 'did ever actually insinuate it self so far to this place and when'.[21] The limitations of historical documentation necessitate for him the employment of other forms of evidence unless one wants to resign oneself to ignorance:

> we have none [sc. Records] that I know of, before the Romans time: no written credible evidences to help us in this scrutiny. We must therefore either sit us down, and rest contented to throw off all further inquiry, or else cast about for information as we can.[22]

Somner's approach begins with linguistic considerations of the kind found in his more overtly antiquarian studies such as *A Treatise of Gavelkind* (London 1659).[23] The origin of the name of the River Stour, in whose valley besides Chartham also Canterbury, Ashford, and

Godmersham lie, and which discharges into the sea at Sandwich, provides the first clues, for earlier written and spoken denominations such as Æsture or Esture are in his view clearly derived from the Latin term Æstuarium.[24] Assuming therefore that the lower parts of the Stour valley or level was formerly a tidal mouth, Somner conjectures a cause of the sea's receding which at the same time provides further support for the supposed isthmus. Since he has no need to rehearse Camden's arguments, he simply notes that others before the author of *Britannia*, including Richard Verstegan (1548/50-1640)[25] and the schoolmaster and antiquary John Twyne (c.1505-81)[26] had also argued strongly and rationally for the former existence of a land connection between Britain and France.[27]

From here, without the support of literary sources, Somner was obliged to develop his ideas based only on his own observations and knowledge of the local area.[28] The argument he puts forward is one that Camden and others had omitted and derives from a further received tradition, namely that Romney Marsh was formerly covered by sea water, a phenomenon known locally at the time as 'the Sea's gift'.[29] The presence of an isthmus, as Somner points out, lends itself to explaining this phenomenon, since the pressure of water from the west would find its easiest outlet on the Marsh. Supposing that the sea had broken through and in time wasted away 'that isthmus between Us and France', he suggests figuratively that with 'more play and elbow-room' the sea itself would drain off the levels, ultimately leaving them in the sanded-up state in which they were found in his day. A similar process on the other side of the Channel might, he thinks, have led to the recovery of land now forming part of the territory of the Low Countries.

There is no evidence that *Chartham News* had any impact whatsoever on scholarly discussion at the time of its publication. It was not reviewed in Henry Oldenburg's (c.1619-77) *Philosophical Transactions*, nor does it appear to have been mentioned at any of the contemporary meetings of the Royal Society. And when the revised English edition of Camden's *Britannia* appeared a quarter of a century later, the chapter on Kent cited a number of works by Somner, but noticeably not the account of what was discovered at his brother's house. Things did not change until after the turn of the century, when the tract was reprinted in the *Philosophical Transactions* for July 1701,[30] the journal now being under the editorship of Hans Sloane. Shortly afterwards it was reprinted for a second time in the new, enlarged edition of Somner's *Antiquities of Canterbury*, which was published by the antiquary and churchman Nicholas Batteley (1648-1704) in 1703.[31]

Sometime during the spring of 1701, Sloane forwarded to John Wallis a set of enquiries described as 'concerning the Coast of Kent, opposite to that of France'.[32] He did so on specific instruction, but the Savilian professor would in any case have been the obvious person to ask. Not only had he been born in Ashford and spent a good part of his youth there,[33] but also he had returned to Kent on many occasions since taking up his post at Oxford, sometimes visiting family, sometimes inspecting the Savilian lands in that county on the Isle of Oxney and Shirley Moor, from which part of the income of the geometry and astronomy professors derived.[34] Moreover, Wallis had earlier written a number of tracts on the nature of tides and tidal motion, in which he had made extensive use of his intimate knowledge of the Kentish coastline.[35] Now, unbeknown to him, Wallis was to help resolve a difference of opinion between two German scholars, one of whom, Gottfried Wilhelm Leibniz, had already been for a considerable time been his correspondent.[36]

4. Leibniz and Schmidt's Catalogue of Questions

Independently of the English discussion, the Resident of Brunswick-Lüneburg in Stockholm, Gustav Daniel Schmidt (1646-1720) had, around 1695, devised a hypothesis that ancient Britain and France had earlier been connected by a neck of land and that their subsequent separation had come about through the effects of the sea. At Leibniz's request, Schmidt sent him a copy of his fully worked out hypothesis early in 1697.[37] Not convinced of its validity, Leibniz asked that Schmidt formulate a series of questions that would enable it to be tested by scholars in France and England.[38] He eventually received a catalogue of seven geological questions in late 1700.[39] The following year, having extended the seventh question and added an eighth, Leibniz sent copies to Sloane[40] in England and to Jean-Paul Bignon[41] (1662-1743) in France, the two addressees effectively serving as entry points to the Royal Society and the Académie des Sciences respectively. His letter to Sloane containing the questions on a separate sheet of paper also enclosed a short letter to Wallis[42] which he asked to be forwarded to its addressee in Oxford.

Schmidt introduced his questions with the words 'It would be good if one could be informed on the following points', and then continued:

1) If the English cliffs in the vicinity of the Channel are in the same direction as those on the French coast opposite, and if their soil and the stones it contains are of the same nature.
2) Whether or not from the coast where these cliffs look out over the Channel one can see similar precipices on the banks of a rapidly flowing river.
3) Whether or not between these cliffs and the Channel one can see here and there pieces of rock completed denuded and sometimes heaped on top of one another, without one being able to suspect that human effort had arranged them in that way.
4) Whether or not when one excavates wells or ditches one finds different layers of pebbles, of sand, and of mud arranged horizontally one above the other.
5) Whether or not the hills which one sees on the two sides of the Channel have the direction northeast to southwest.
6) Whether or not when one excavates the earth at the base of the said hills one finds more sand, and perhaps even pebbles, where they are orientated to the northwest and the southeast than where they are orientated towards the southwest and northeast.
7) Whether or not the English rivers that empty into the Channel are curved towards the southwest, just as those of the Low Countries are curved towards the northeast, and which direction one notices even with respect to streams also on the French coast.
8) One would also like to know the circumstance of the soil and the direction of the hills, streams, and river courses on the islands and sandbanks of the Channel itself.[43]

By this time, Leibniz's relations to English scholars in general and to the Savilian professor in particular were becoming strained due to the developing controversy over the discovery of the calculus, to which Wallis's own publications had decisively contributed. In fact, Leibniz's letter to Wallis was to mark the end of their epistolary exchanges. No doubt with these already existing tensions in mind, Leibniz chose to conceal as far as possible the role he had played in Schmidt having prepared the catalogue. In his letter to Sloane, the German mathematician spoke simply of a friend who had developed ideas on changes to the

earth's surface, leaving it to the secretary of the Royal Society to decide whom to task with writing a response.[44] However, Sloane appears to have been at a loss whom to choose and for convenience simply sent it to Wallis. The catalogue together with Leibniz's letter to Wallis duly made their way to Oxford as an enclosure to a letter of his own. Although Sloane's letter has not survived, the reply indicates that he asked for advice from the Savilian professor on how to deal with the questions raised.

The arrival of Schmidt's geological questions in London coincided with more practically-motivated discussions relating to the same part of the country's coastline. In government quarters concerns had been raised at the time that insufficient understanding of the tides in the Channel between Britain and France was presenting considerable problems for navigation. The astronomer Edmond Halley (1656-1742), who would go on to succeed Wallis in his Oxford chair, had already been in dispute with John Flamsteed (1646-1719) over his tidal predictions.[45] Having recently returned from his second Atlantic cruise, Halley was developing plans for a detailed survey of the Channel coasts in the final months of 1700, which led to a commission by the Admiralty to carry out such a survey the following spring.[46] However, despite being at least in part related to topics taken up by Schmidt, these plans are not mentioned in any of the ensuing correspondence.

Wallis was at the time more inclined to favour the Astronomer Royal intellectually. In his reply to Sloane, dated 9 June 1701, the Savilian professor first mentions some solar tables he had been lent and was now returning, pointedly noting that his former pupil, the Oxford astronomer John Caswell (1655-1712) considered 'Mr Flamsteed to be the most competent judge', after Halley had earlier deemed the tables 'not to be a new thing'.[47] Having thus set the scene, Wallis turns to the question of a prehistoric neck of land between Britain and France:

> The Inquiries, concerning the Coast of Kent, opposite to that of France; will best be satisfied by some Ingenious & Inquisitive person near Dover, (or who is well acquainted with those parts.) I am very inclinable to think, that Dover & Calis, were anciently united by an Isthmus; which, many ages since, was gradually worn away by the two Seas beating upon it on both sides. But, so long agoe, that we have now no history of it. But I remember to have read (divers years agoe) in Rudbecks book (of which I have forgot the Title) wherein he discourses of Ulisses travails (after the Siege of Troy) Northward as far as the utmost parts of Sweden, & returning by the Brittish Islands homeward to Greece: he cites a very Ancient Author which mentions a great Island swallowed up by the Sea; with such circumstances as make me think it to have been, the breaking through of this Isthmus, & making the Fretum between Dover & Calis. I have now but a very imperfect remembrance of it; & have not the book at hand to consult. I suppose, the person who now makes this inquiry, hath some such thing in his eye: and may be directed to consult that Book. I know not if it be not called Atlas Suecicus or by some such name.[48]

From Wallis's remarks, it is apparent that there had been no indication on Sloane's part that he had was intending to reprint *Chartham News* in a forthcoming issue of the *Philosophical Transactions*. On the contrary, it is possible that Wallis's suggestion about consulting someone with good local knowledge prompted the decision to reprint. Possibly, too, John Harris, who is known to have read Wallis's contributions on the topic after their

arrival at the Royal Society, was also involved in some way. But what is even more noteworthy about the Savilian professor's reply to Sloane is his poor recollection of the magnum opus of Olaus Rudbeck (1630-1702). For although it was certainly many years earlier that he had read the first part of the Swedish scholar's *Atlantica* (1679-1702)[49], Wallis fails to mention that he had discussed the work in connection with the isthmus question much more recently, namely in late summer 1699. Moreover, he had conducted that discussion in the course of his epistolary exchanges with Leibniz.

The correspondence between Leibniz and Wallis allows us to witness the emergence of the isthmus question from another perspective. Writing to the Savilian professor on 6 August 1699, Leibniz not only brings up the topic of an earlier neck of land connecting Britain and France, but also he gives a first indication of the role played by Gustav Daniel Schmidt in generating his interest. Thus, he speaks of a friend having developed some 'not inelegant ideas' relating to the rupture of an isthmus while surveying the coasts of the German and Baltic seas. Such scholarly surveys were not uncommon at the time in Sweden on account of Rudbeck's work. Leibniz then goes on to say that this friend, whose name is never mentioned, wanted to ascertain if his ideas could be confirmed by observing the British and Gallic coasts. Leibniz even goes so far as to say that he had encouraged him to formulate some questions to send to England.[50]

While Leibniz describes *Atlantica* as 'an ingenious, but at times rather indulgent work',[51] Wallis in his reply seeks unsuccessfully to reconstruct from memory Rudbeck's argument based on classical sources that the Scandinavian peninsula was the Atlantis of the ancients. Nonetheless, he suggests that the topographical correspondence of the cliffs at Dover and Calais, as well as the correspondence of their composition, tends to confirm in his own view that sometime in the past 'before human memory' the land there had been continuous, a view with which Leibniz subsequently largely concurs.[52] Two years later, remarkably, Wallis seemed oblivious to this earlier exchange. In particular, he evidently failed to recognize the origin of the catalogue of questions Sloane sent him.

5. Wallis's remarks on *Chartham News*

Although Sloane did not open Leibniz's letter to Wallis of 6 August 1701, he was prompted by the geological questions that accompanied it to reprint Somner's *Chartham News* in the July issue of the *Philosophical Transactions*. The inconsistency in the dates is explained by the delayed appearance of what was now the Royal Society's journal. Those questions, to which Wallis had written an initial response in his letter to Sloane of 9 June 1701, evidently kindled the Savilian professor's interest in the isthmus, too, for he now proceeded to write a much longer letter to Sloane, expanding further on the arguments Somner had set out in his 1669 tract. Wallis's letter was duly published in the October issue of the *Philosophical Transactions* as a further contribution to the topic.

Seeing no need to challenge or correct Camden's original arguments, or indeed those of other antiquarians such as Verstegan and Twyne, which in his view constitute 'a convincing Evidence' for the earlier existence of an isthmus joining Britain with France,[53] Wallis's main task in the letter is to test the validity of the specific hypothesis Somner developed in the light of the discovery made in Chartham. His approach thereby is to produce a considerably more elaborate explanatory model, drawing on his extensive knowledge of

tides and more generally of the natural history of the Kent coast. His strategy in so doing is, as he writes, to enforce Somner's argument 'by considering, what must have been if this Hypothesis be true; and how it agrees with what we see'. [54] It is a strategy we find expressed contemporaneously in a letter to Halley in this way: 'For a true Natural History of matters of fact, is certainly the surest foundation on which to ground a Physical Hypothesis, to explain the causes'.[55]

While much of the argument set out in *Chartham News* is speculative, Wallis articulates concrete physical causes based in part on his own experience. Thus, he considers the effect of the western tide 'coming in fiercely between us and France, fretting on the Coast of both sides' when hindered by the presence of the postulated earlier isthmus. The earth, sand or mud being carried by the tide would not, 'as might be thought', be deposited on the side of the isthmus, thereby strengthening it. Rather, this material would have 'found the opportunity of discharging itself on the spacious Level of Romney Marsh' and in the process of so doing eroded the isthmus itself. In this way, not only would the rupturing of the neck of land between Britain and France be explained, but also the geological characteristics of nearby Romney Marsh:

> Which gives us a fair account, both how the Isthmus might be washed away; and how that Level might be raised to that height it now is. For no man can doubt (who doth well know the Situation of the Place, and the Nature of the Soil) but that all that Level had heretofore been Sea. And, even at this day, it lies so much lower than the Surface of the Sea at High-Water, that it would (much of it) be overflowed every Tyde, if not defended (at a vast charge) by Dim-church Wall, for many miles together.[56]

Although Wallis had no personal experience of the Low Countries, he was well acquainted with contemporary accounts of the natural history of the Dutch coastline. On the basis of this knowledge, he argues that the tidal current on the Northern Sea on the eastern side of the Isthmus would in part discharge itself on the coast of Holland, in similar fashion to Romney Marsh on the western side, 'Whence it is that Holland and Zealand, which (by the consent of all) is judged to have been once Sea, is now raised, thirty or forty foot higher than it had once been'. But there is an important geographical difference here. The large inlet on the Dutch coast would, Wallis suggests, lead the Northern Sea to 'insinuate itself' on the English coast, too, 'where-ever it might find low grounds'. He thus provides a concrete explanation for how sedimentation came to fill the estuary on Canterbury Level, leaving the Stour valley much less deep than it had formerly been. Not least with a view to the depth at which the Chartham discovery was made, Wallis is able to claim almost triumphantly of the insinuation described 'nothing appears why we should think it had not so done'.[57] Conversely, the absence of tides at Corinth explains why the isthmus there had not been ruptured, despite its being beaten upon by two seas.

Beyond citing physical arguments building on those proposed by Camden and Somner before him, Wallis also draws additional evidence from his own scholarly endeavours, including his work on language theory.[58] Thus, he is able to adduce the linguistic commonalities of the people of ancient Gaul and Britain as being a clear sign of their having interacted, which, he suggests, 'is not likely to have been, if there had not been an easie Communication between the one and the other'.[59] Employing a term widely used in contemporary theological discourse to signify probable grounds for credibility, Wallis

describes this fact as providing ‘a good Moral Inducement’, further confirming the physical arguments. In similar fashion, by now having had the opportunity to consult once more Rudbeck’s *Atlantica*, he rejects the allegorical interpretation of the destruction of Atlantis in Plato’s (c. 427-347 BCE) late dialogue *Critias* given by the Swedish scholar.[60] In the absence of any ‘particular histories’ before those left by the Romans, Wallis understands the account given by Plato of the earthquake and the ensuing flood in a literal sense, as reflecting ‘a true matter of fact’, a historical narrative that had been handed down over generations. Furthermore, this understanding of the story of Atlantis provides Wallis with additional evidence for his own conclusions, since it shows that the effects of changes such as those wrought on that island can be seen long after they originally took place:

> It serves however to the present purpose, if at least so much of the Story be true, That long before Plato’s time, there had been some such Dissolution or Rupture of an Isle or Isthmus, somewhere in the Atlantick Ocean, (that is, in the Northern Sea) of which there were some symptons yet remaining in Plato’s time. For, this being admitted, it is as applicable to the present case (as any we know) of which there are so many Symptons yet remaining to this day.[61]

6. Luffkin and Wallis

Wallis expended considerable effort in writing his remarks on *Chartham News* and by the time they appeared in the *Philosophical Transactions* the debate had taken another turn. The Colchester apothecary John Luffkin (fl. 1686-1714), having read Somner’s tract in the July issue of the journal, wrote to its editor to inform him of a comparable discovery of ‘diverse bones of extraordinary bigness’at a similar depth of around sixteen feet in a gravel pit near the coastal town of Harwich in Essex.[62] According to Luffkin’s report, the gravel pit was situated in the village of Wrabness on the estuary of another River Stour, namely that in Essex. Clearly, the same etymological argument applied here as in the case of the River Stour in Kent, but Luffkin’s concern was primarily in the origin of the bones themselves. Noting that Camden in his *Britannia* had referred to the discovery of large teeth and bones in Essex during the reign of Elizabeth I (1533-1603)[63], Luffkin dismisses the popular opinion that those were ‘the Bones of Giants’ and finds a more plausible explanation in the work of the Kent-born antiquary and astrologer Joshua Childrey (1625-70). In his *Britannia Baconica* (1660), Childrey, an earlier correspondent of Wallis, argues that the teeth and bones derive from elephants, for, as Camden also reports, these animals were brought over in large numbers, specifically into the area covered by Essex, during the Roman conquest of Britain under Emperor Claudius (10 BCE-54).[64] Moreover, this use of elephants is documented in the account written by the Roman historian Cassius Dio (c.155-235) shortly afterwards. Luffkin also points to strong material evidence for the origin of the bones, having noted their resemblance to those reported in the anatomical account of an elephant published nearly twenty years earlier by the Dublin surgeon Allen Mullin (1653/4-90)[65]. Since Luffkin had been sent ‘the largest and most remarkable’ of the bones by Robert Riche (d. 1728), rector of Wrabness, he was able to compare them with Mullin’s description, leading him to the conclusion that they perfectly agree ‘not only to outward appearance or form, but to measure

also',[66] and therefore that they were 'the Bones, &c. of some Elephant, rather than of any other Animal'.[67]

For Luffkin, the Chartham discovery could also be adequately explained through Roman expeditions against the early Britons, therefore rendering the hippopotamus thesis redundant. In his published letter, he notes that both Julius Caesar (100-44 BCE) and Claudius had landed in Kent.[68] In his view there was likewise an easier explanation than that supplied by Somner for the depth at which the fossilized discoveries were made. Citing Robert Plot's (1640-96) *Natural History of Stafford-Shire* (1686), he suggests that the rising of the valleys can be understood as resulting from soil erosion of adjacent hills brought about by rain and snow.[69]

Wallis did not get to see the September issue of the *Philosophical Transactions* until the second half of December 1701. He had evidently not kept a copy of his extensive remarks on *Chartham News*, for he tells Sloane that he needs to wait until he sees the October issue of the journal – the issue containing the article – in order that he should 'better be able to judge, whether it will be necessary to adde ought to what I have sayd allready'. But already seeking to play down the significance of Luffkin's argument, he suggests that 'it matters not much' whether the bones are of an elephant rather than a hippopotamus or some 'other Marine Animal', since any of these proposals 'will prove, that valley to hath been much Deeper than now it is'.[70]

True to his argumentative character, Wallis found sufficient reason to write a second set of comments, which were subsequently published in the issue of the *Philosophical Transactions* for November and December. For the scientific public he repeats his earlier expressed opinion on Luffkin, but Wallis's supposed disinterest in the origin of the bones is somewhat contradicted by his desire that Sloane obtain for him drawings of the Chartham bones either from Canterbury, where such images had been made, or from the Royal Society's repository at Gresham College, where the objects themselves had been deposited (Figure 2).[71] Apart from this, he concerns himself in the second letter mainly with discussing the conditions under which petrification occurs, and with providing further evidence, based on his own experience, for river estuaries such as those of the Stour in Essex and the Stour in Kent becoming silted up. As a means to promoting useful knowledge, the Savilian professor also conveys details of some measures undertaken earlier in Kent in order to reduce the flooding of farmland.

Wallis evidently felt that neither his argument, nor that of Somner which he sought to embellish, was in any way called into question by Luffkin. But this was not a view shared by the antiquary Nicholas Batteley (1648-1704). In 'Reflections upon Chartham News', which he appended to his third edition of Somner's work, Batteley rejects Luffkin's argument that Caesar's route to the Thames would have taken him through Chartham, thereby undermining his explanation for the presence of elephant fossils there. Through William Sancroft (1617-93), Batteley had been collated to the vicarage of Bekesbourne near Canterbury. With the additional local knowledge this preferment afforded him, he was able to point out that Rutupiae, where Caesar is said to have landed, was 'beyond dispute' the ancient settlement of Richborough, and that the ancient passage from there to London did not pass through Chartham.[72] Batteley's elder brother, John (1646-1708), had almost certainly by this time composed his own *Antiquitates Rutupinae*, published posthumously in 1711, in which he discussed antiquarian finds he had made in the 1680s. Seemingly, therefore, Somner's argument and by implication Wallis's, too, remained intact.

Wallis had heard through Sloane's letter of 18 December 1701 that according to John Harris his remarks on *Chartham News* contained certain errors. Although the Savilian professor subsequently requested that Harris make these errors known to him, there is no evidence that he did so. However, at the beginning of the posthumously published first volume of his *History of Kent*, Harris criticizes both Somner and Wallis for the significance they attached to the discovery made at Chartham. Following a line of argument adopted contemporaneously by the antiquarian and geologist John Woodward (1665-1728), whom Harris supported in his controversy with Thomas Burnet (c.1635-1715),[73] he suggests that the physical reasons cited by Wallis and Somner for the presence of those fossilized remains were not compelling. Explaining his position, Harris points to the many instances where the remains of marine animals have been found in places 'where the Sea could never come'.[74] For Harris, as for Woodward, fossils buried beneath the earth's surface originated from once living animals that had been dispersed among the various strata by the Flood.[75] As a result, on their view physical arguments such as those put forward by Somner or Wallis were simply not compelling. In similar vein, Harris sought to weaken Wallis's argument for the prehistoric isthmus by suggesting that other perfectly good reasons for the building up of sediment in the Stour estuary could be presented. Unfortunately, he remained wanting on the detail of his criticism. The 'more particular account' that he promised to deliver in the section of his *History of Kent* devoted to natural history never appeared.[76]

7. Conclusion

Wallis saw his response to *Chartham News* as the attempt to put that archaeological discovery on a sound natural philosophical footing. Admittedly, Somner himself, a scholar steeped in the antiquarian tradition of Ussher, John Selden (1584-1654), and Casaubon, had already undertaken a few tentative steps towards developing an explanatory account based on observations of the natural world.[77] But recognizing his own limitations, Somner had called on his scientific contemporaries 'to take the matter, where the Historian hath left it'.[78] Heeding that call, the Savilian professor devised a causal explanation that would account for the location of the fossilized remains found buried at Chartham, while also supporting the argument for the prehistoric existence of an isthmus joining Britain and France. In setting out this physical hypothesis, Wallis makes use of his observational knowledge of the Kent coast and of the tidal studies he had conducted in earlier years, his results thereby embodying the natural philosophical principles of the Royal Society of which he was a founder member.

However, Wallis was also careful to pay an intellectual tribute to the methods and argumentative strategies employed by contemporary antiquarians and historians, men such as Robert Plot, Elias Ashmole (1617-92), and John Aubrey (1626-97), who had been esteemed members of that institution. Thus, while pursuing an enquiry rooted in natural philosophy, he happily also draws on questions of linguistic tradition as well. Likewise, he embellishes his physical explanation with references to literary sources in order to provide further corroborating evidence or 'moral inducement' for the prehistoric existence of an isthmus. Plato's dialogue *Critias*, to his mind falsely interpreted by Rudbeck, serves to provide precisely that kind of evidence, just as do the historical writings of Cassius Dio. While it remains true, as he writes in his remarks on *Chartham News*, that there is 'no History extant which takes notice of such an isthmus',[79] such literary sources contribute to building up a

body of support, rather like the accumulated evidence set out in presenting a legal case. Indeed, the approach Wallis takes in the debate on the Chartham discovery bears more than a passing resemblance to the approach he adopts in the legal arguments he conducted on behalf of the University of Oxford in his capacity as that institution's Custos archivorum.[80]

But there is another final twist to the story. At a time when Wallis's intellectual relations with Leibniz were about to break down irretrievably as a result of increasingly loud voices suggesting he had pilfered decisive parts of Newton's mathematical work in order to develop his infinitesimal calculus, the two men found themselves unwittingly on the same side. Moreover, they were in agreement on questions of profound importance to Newtonians, namely those of prehistory in general and of the interpretation of fossils in particular. Wallis did not live to see the criticism vented on him by Harris, who like Woodward was a Fellow of the Royal Society. But it is doubtful they would have able to convince the Savilian professor that his task was any other than to produce a coherent natural philosophical explanation for the presence of fossils based on observable physical causes.

---

[1] All dates are given Old Style, that is to say, according to the Julian calendar unless otherwise noted. Translations of French and Latin texts are by the author. The author would like to thank Stephen Snobelen and Adam Richter along with two anonymous reviewers for their helpful suggestions towards improving this article.

[2] William Somner, *Dictionarium Saxonico-Latino-Anglicum*, Oxford: William Hall 1659. See White Kennett, 'The Life of Mr. Somner', prefixed to William Somner, *A Treatise of the Roman Ports and Forts in Kent*, ed. James Brome, Oxford: at the Theatre 1693, 34. See also Graham Parry, *The Trophies of Time. English antiquarians of the seventeenth century*, Oxford: Oxford University Press 1995, 181, 186-7; David Douglas, *English Scholars 1660-1730*, 2nd. Edition, London: Eyre & Spottiswoode 1951, 54-8. Casaubon himself wrote a tract on the Saxon language as part of his *De quatuor linguis commentationis pars prior*, London: Richard Mynne 1650.

[3] See John Harris, *Remarks on some late papers, relating to the Universal Deluge: and to the natural history of the earth*, London: for R. Wilkin 1697. See also Dmitri Levitin, *Ancient Wisdom in the Age of the New Science. Histories of Philosophy in England, c. 1640-1700*, Cambridge: Cambridge University Press 2015, 192-204, and Martin J. S. Rudwick, *The Meaning of Fossils: Episodes in the History of Palaeontology*, Chicago and London: University of Chicago Press 1976, 77-82..

[4] Among the members of the Royal Society listed, we find Isaac Newton, Frederic Slare, Hans Sloane, John Somers, and John Woodward. Harris himself served as Secretary of the Royal Society 1709-10.

[5] See for example Thomas Hearne, *Remarks and Collections*, vol. VII, ed. C. E. Noble, Oxford: Clarendon Press 1906, 46: 'Last Week dyed Dr. John Harris (commonly call'd technical Harris), which is no great Loss, he being a most rank Whigg, & a sad, vile, loose Wretch.'

[6] See Jan Broadway, 'Ocular exploration, and subterraneous enquiry: developing archaeological fieldwork in the mid-seventeenth century', *The Antiquaries Journal* 92 (2012), 353-69, 356, 366.

[7] See Parry, *Trophies of Time*, 331-4.

[8] See for example Humfrey Wanley to Thomas Tanner, 25 March 1695, Bodleian Library, MS Tanner 24, f. 12r-12v, f. 12v: 'His industry amazes me. For tho' I long since knew of the designed new Edition of Camden, yet I never had the least thought of his being the Editor'; *The Letters of Humfrey Wanley. Palaeographer, Anglo-Saxonist, Librarian, 1672-1726*, ed. P. L. Heyworth, Oxford: Clarendon Press 1989, 11.

[9] See Parry, *Trophies of Time*, 333, 342.

[10] See Robert Plot to John Fell, c. 1673, Bodleian Library, MS Jones 17, f. 270r-278v; Parry, *Trophies of Time*, 340-1.

[11] See Plot's account of antiquities in the county of Kent in his letter to Edward Browne, dated 5 September 1693, Bodleian Library, MS Rawl. D. 390, f. 95r-95v.

[12] Plot reports on the progress of his journey in his letters to Arthur Charlett, dated 18 August 1693 and 2 September 1693, Bodleian Library, MS Ballard 14, f. 56r-56v, f. 57r-57v. In his additions to Camden's, *Britannia*,

Plot makes use of Richard Kilburne's *A topographie, or survey of the county of Kent*, London: Thomas Mabb for Henry Atkinson 1659, and John Philipot's *Villare Cantianum: or, Kent surveyed and illustrated*, London: William Godbid 1659.

[13] William Camden, *Britain, or, A Chorographicall Description of the most flourishing Kingdomes, England, Scotland, and Ireland, and the Ilands adioyning, out of the depth of antiquitie*, translated by Philémon Holland, London: George Bishop and John Norton, 1610, 346. Cf. William Camden, *Britannia*, edited and translated by Edmund Gibson, London: F. Collins for A. Swalle and A. & J. Churchil, 1695, 206. Holland's additions to the 1610 edition appear in the 1695 edition as footnotes. See Parry, *Trophies of Time*, 332.

[14] Camden, *Britain*, 347. Cf. Camden, *Britannia*, 207.

[15] Camden, *Britain*, 347. Cf. Camden, *Britannia*, 207.

[16] See Kennett, 'Life of Mr. Somner', 1-118; 15; Parry, *Trophies of Time*, 182.

[17] William Somner, *Chartham News: Or, A Brief Relation of some Strange Bones, there digged up*, London: for T. Garthwait 1669, 2. Wallis also gives an account in his postscript to his letter to Sloane relating to the isthmus: *Philosophical Transactions* No. 275 (October 1701), 967-79, 978-9. See further Renaud Morieux, *The Channel. England, France and the Construction of a Maritime Border in the Eighteenth Century*, Cambridge: Cambridge University Press 2016, 40.

[18] Kennett, 'Life of Somner', 101-2.

[19] See John Somner's preface to Somner's *Chartham News*, sig. A2r. It should be noted that Kennett makes no mention of *Chartham News* in his biographical work on the Kent antiquary.

[20] Somner*, Chartham News*, 3; Morieux, *The Channel*, 40-1.

[21] Somner, *Chartham News*, 5.

[22] Somner, *Chartham News*, 7.

[23] See also other tracts by Somner: *The Antiquities of Canterbury*, London: John Legat for Richard Thrale 1640; *The Most Accurate History of the Ancient City, and Famous Cathedral of Canterbury*, London: William Godbid for Richard Thrale 1661; *A Treatise of the Roman Ports and Forts in Kent*, ed. J. Brome, Oxford: at the Theatre 1693; *Julii Caesaris Portus Iccius illustratus*, ed. and transl. E. Gibson, Oxford: at the Theatre 1694. See also Parry, *Trophies of Time*, 188-9.

[24] Somner, *Chartham News*, 6. This etymological approach had been promoted already by Camden, who also noted the proximity of British beliefs, customs, and ways of fighting to those of the Gauls. See Parry, *Trophies of Time*, 29-31.

[25] See R. Verstegan, *A Restitution of Decayed Intelligence in Antiquities*, Antwerp: Robert Bruney 1605, 108. See William Poole, *The Worldmakers. Scientists of the Restoration and the search for the origins of the Earth*, Oxford: Peter Lang 2017, 76-8, 86-7; Parry, *Trophies of Time*, 51-2, 60-2; Morieux, *The Channel*, 41.

[26] See J. Twyne, *De rebus Albionicis, Britannicis atque Anglicis*, London: for Richard Watkins 1590, 9, 22-4; Parry*, Trophies of Time*, 184, 309-10; Morieux, *The Channel*, 41.

[27] Somner, *Chartham News*, 8.

[28] Broadway, 'Ocular Exploration', 366.

[29] Somner, *Chartham News*, 8

[30] *Philosophical Transactions* No. 272 (July 1701), 882-93.

[31] William Somner, *The Antiquities of Canterbury. In two parts*, ed. N. Batteley, London: R. Knaplock 1703, I, 186-90.

[32] See John Wallis to Hans Sloane, 9 June 1701, British Library, MS Sloane 4025, f. 330-330v, f. 330r.

[33] See Christoph J. Scriba, 'The Autobiography of John Wallis, F.R.S.', *Notes and Records of the Royal Society* 25 (1970), 17-46, 22-3.

[34] See for example Henry Wallis to John Wallis, 14 July 1651, and Samuel Shorte to John Wallis, 9 May 1653, *The Correspondence of John Wallis (1616-1703)*, ed. P. Beeley and C. J. Scriba, 4 vols, Oxford: Oxford University Press 2003-14, I, 36-8, 117-8.

[35] See for example John Wallis to Robert Boyle, 25 April 1666, *Correspondence of John Wallis*, II, 200-22, John Wallis to Henry Oldenburg, 19 March 1669/70, *The Correspondence of John Wallis*, III, 327-34.

[36] Direct correspondence between Leibniz and Wallis began at the end of 1696. Their scholarly relations were much older. See Philip Beeley, 'Un de mes amis: On Leibniz's relation to the English mathematician and theologian John Wallis', in: *Leibniz and the English-Speaking World*, ed. P. Phemister and S. Brown, Dordrecht: Springer 2007, 63-81.

[37] See G. D. Schmidt, 'Über den ursprünglichen Zusammenhang England mit dem Festland und die Senkung der Nordsee', G. W. Leibniz*, Sämtliche Schriften und Briefe*, ed. Preussische Akademie der Wissenschaften (and

successors), series I-VIII, Darmstadt, Leipzig, and Berlin: 1923ff. (cited by 'A', series, volume, and page), A I, 13, 596-601. Schmidt enclosed his hypothesis with his letter to Leibniz dated 20 February 1697, A I , 13, 594-5.
[38] See G. W. Leibniz to G. D. Schmidt, 22 November 1697 (new style), A I, 14, 715—23. On Leibniz's interest in the Earth's origins and history, and his writings on these topics, see the editors' introduction to Gottfried Wilhelm Leibniz, *Protogaea*, ed. and transl. C. Cohen and Andre Wakefield, Chicago and London: University of Chicago Press 2008. See also Rudwick, *Meaning of Fossils*, 91-4.
[39] See Schmidt to Leibniz, 7 October 1700 (new style), A I, 19, 176-8.
[40] G. W. Leibniz to H. Sloane, 15 May 1701 (new style), A III, 8, 677-9.
[41] G. W. Leibniz to J.-P.Bignon, 14 May 1701 (new style), A I, 19, 685-6, 686. Leibniz pointed out to Bignon that the same questions had been posed to the English.
[42] G. W. Leibniz to J. Wallis, 15 May 1701 (new style), A III, 8, 680-1.
[43] The original catalogue, to which Leibniz appended the latter part of question 7 and the whole of question 8, is contained in the manuscript collection of the Gottfried Wilhelm Leibniz Bibliothek, Hanover: LBr 817, Bl. 47; A I, 16, 463-4.
[44] G. W. Leibniz to H. Sloane, 15 May 1701 (new style), A III, 8, 679: 'Amicus quidam meus qui de mutationibus superficiei nostri globi cogitationes habet a me petit ut in articulos sequentes inquiram. Itaque et me obstringes si ad eos nobis responsiones procurabis'.
[45] See David Edward Cartwright, *Tides: A scientific history*, Cambridge: Cambridge University Press 1999, 56-7; Allan Cook, *Edmond Halley: Charting the heavens and the seas*, Oxford: Oxford University Press 1998, 175.
[46] See Eugene Fairfield MacPike, *Correspondence and Papers of Edmond Halley*, Oxford: Clarendon Press 1932, 9, 118-20; Cook, *Halley*, 284-5.
[47] J. Wallis to H. Sloane, 9 June 1701, British Library, MS Sloane 4025, f. 330r. Caswell went on to succeed David Gregory as Savilian professor of astronomy in 1709 and held this post until his death three years later.
[48] J. Wallis to H. Sloane, 9 June 1701, British Library, MS Sloane 4025, f. 330r.
[49] Olaus Rudbeck, *Atland eller Manheim/Atlantica, sive Manheim vera Japheti posterorum sedes ac patria*, Upsala: Henricus Curio 1675. The remaining three parts were published in 1689 (part II), 1698 (part III), and 1702 (part IV).
[50] G. W. Leibniz to J. Wallis, 6 August 1699, A III, 8, 191-5, 193: 'Amicus, qui bonam partem litorum Germanici et Baltici maris lustravit, non inelegantes habet observationes, quae et ipsae ad Isthmi rupturam ex parte referuntur, quas velim ex vestro et Aremorico litore confirmari, hortaborque ut quaestiones formet ad vos mittendas.'
[51] G. W. Leibniz to J. Wallis, 6 August 1699, A III, 8, 193: 'Rudbeckii *Atlanticam* legi, doctam et ingeniosam; sed, ut verum fatear, interdum indulgentiorem.'
[52] J. Wallis to G. W. Leibniz, 29 August 1699, A III, 8, 219-21, 221: 'Praeruptos clivos atque praealtos (congeneris materiae, et simili situ, quasi ad perpendiculum,) ad Dubrim et Caletum contrapositos (ubi est brevissimus trajectus ab Anglia in Galliam,) magnam prae se ferre speciem, quasi fuerint olim aliquando (ante hominum memoriam) continuati.' See also Leibniz's reply to Wallis, dated 24 November 1699, A III, 8, 258-60, 260.
[53] J. Wallis, 'A Letter […] Relating to that Isthmus, or Neck of Land, which is supposed to have joyned England and France in former times, where now is the passage between Dover and Calais', *Philosophical Transactions* No. 275 (October 1701), 967-79, 968. The original letter is John Wallis to Hans Sloane, 20 September 1701, British Library, MS Sloane 4025, f. 307r-309v.
[54] Wallis, 'Letter Relating to that Isthmus', 970.
[55] John Wallis to Edmond Halley, 23 May 1702, Royal Society, Early Letters W2, No. 67, 1: 'For a true natural History of matters of fact, is certainly the surest Foundation on which to ground a physical Hypothesis, to explain the Causes.'
[56] Wallis, 'Letter Relating to that Isthmus', 970-1.
[57] Wallis, 'Letter Relating to that Isthmus', 971.
[58] See John Wallis, *Grammatica linguae Anglicanae. Cui praefigitur De loquela sive sonorum formatione, tractatus grammatico-physicus*. Oxford: Leonard Lichfield 1652. For an overview of Wallis's work on grammar and language see J. A. Kemp, *John Wallis's Grammar of the English Language*, London: Longman 1972.
[59] Wallis, 'Letter Relating to that Isthmus', 968.
[60] See O. Rudbeck, *Atland*/*Atlantica*, 290-5.
[61] Wallis, 'Letter Relating to that Isthmus', 975; Morieux, *The Channel*, 42.
[62] J. Luffkin, 'Part of a Letter […] to the Publisher, concerning some large Bones lately found in a Gravel-pit near Colchester, *Philosophical Transactions* No. 274 (September 1701), 924-6. The original letter is J. Luffkin to H.

Sloane, 15 September 1701, British Library, MS Sloane 4025, f. 157r-157v. See Henry Richards French, 'Ingenious & learned gentlemen. Social perceptions and self-fashioning among parish elites in Essex, 1680-1740', *Social History* 25 (2000), 44-66, 60.

[63] Camden *Britain*, 451; *Britannia*, 351.

[64] Joshua Childrey, *Britannia Baconica: or, The Natural Rarities of England, Scotland, & Wales*, London: printed for the author 1660, 100; Camden, *Britain*, 451; *Britannia*, 347.

[65] Allen Mullin, *An Anatomical Account of the Elephant accidentally burnt in Dublin, June 17. In the year 1681*, London: for Samuel Smith 1682. See K. Theodore Hoppen, *The Common Scientist in the Seventeenth Century. A Study of the Dublin Philosophical Society 1683-1708*, London: Routledge & Kegan Paul 1970, 20-1, 37-8.

[66] Luffkin, 'Part of a Letter', 925.

[67] Luffkin, 'Part of a Letter', 925. Luffkin also wrote to Sloane the following March, speculating whether the bones were those of an elephant or a hippopotamus. See Luffkin to Sloane, 31 March 1702, British Library, MS Sloane 4025, f. 129r-129v. Some contemporaries, including John Ray, were unsure whether the hippopotamus actually existed. See Keith Thomas, *Man and the Natural World: Changing attitudes in England 1500-1800*, London: Pantheon 1983, 79-80; French, 'Ingenious & Learned Gentlemen', 60.

[68] See Parry, *Trophies of Time*, 33. In one of the tracts intended for his history of antiquities in Kent, Somner had written about Iccius Portus, from where Julius Caesar embarked for Britain. See William Somner, *Julii Caesaris Portus Iccius illustratus*, ed E. Gibson, Oxford: at the Theatre 1694. Luffkin does not cite this tract. See also Edmond Halley, 'A discourse tending to prove at what time and place, Julius Cesar made his first descent upon Britain', *Philosophical Transactions* No. 193 (April , Mary, June 1691), 495-501.

[69] Robert Plot, *The Natural History of Stafford-Shire*, Oxford: at the Theatre 1686, 46-8, 220.

[70] J. Wallis to H. Sloane, 24 December 1701, British Library, MS Sloane 4025, f. 305r-305v, f. 305r.

[71] Wallis to Sloane, 30 December 1701, British Library, MS Sloane 4025, f. 326r-328v; 'A Second Letter of Dr Wallis to the Publisher, *Philosophical Transactions* No. 276 (November & December 1701), 1022-38, 1022. The teeth are now part of the collections of the Natural History Museum in London.

[72] Somner, *Antiquities of Canterbury*, ed. N. Batterley, 191-2, 191.

[73] See Marjorie Hope Nicolson, *Mountain Gloom and Mountain Glory: The development of the aesthetics of the infinite*, Ithaca: Cornell University Press 1959, 245-7. Already much earlier, Harris had written a work on the deluge in direct defence of Woodward. See John Harris, *Remarks on some late Papers, relating to the Universal Deluge*, London: R. Wilkin 1697.

[74] John Harris, *The History of Kent*. 2 vols (one published), London: D. Midwinter 1719, I, 4 (Col. B).

[75] See Poole, *Worldmakers*, 64-7.

[76] Harris, *History of Kent*, I, 4 (Col. B).

[77] See Broadway, 'Ocular Exploration', 367.

[78] Somner, *Chartham News*, 10.

[79] Wallis, 'Letter Relating to that Isthmus', 973.

[80] See for example Wallis's responses to government measures seen as undermining the ancient privileges of the University of Oxford in respect of the taxation of colleges and the licensing of taverns in *The Correspondence of John Wallis*, volume IV, passim.

FIGURES:

Figure 1: William Somner's *Chartham News*, first published in 1669, titlepage. With the permission of the Provost and Fellows of The Queen's College, Oxford.

Figure 2: Contemporary drawing of the fossilized remains discovered at Chartham and printed in *Chartham News*. With the permission of the Provost and Fellows of The Queen's College, Oxford.