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Communicating "Natural knowledge" for the "*common* benefit" of England: Science, Trade and Colonial Expansion in *Philosophical Transactions* 1665-1700

Abstract I: Questo saggio si incentra sulla Royal Society e sulla sua capacità di promuovere la conoscenza della Natura nei primi anni dalla fondazione. Centrale l'apporto della prestigiosa rivista *Philosophical Transactions*, fondata da Henry Oldenburg nel 1665. Ricca di descrizioni di paesaggi unici, in particolare di studi innovativi in materia di geologia, botanica e agricoltura, questa ha contribuito non solo al progresso tecnico-scientifico, ma anche all'apertura dell'Inghilterra verso l'Europa e le più lontane terre d'oltremare. Ancora oggi trascurati dalla critica, e idealmente divisi in due macro aree tematiche, gli articoli apparsi nel periodo 1665-1700 rappresentano insieme la base testuale e strutturale di questo saggio: l'intento è quello di dimostrare come, partendo proprio dallo studio di quei campi del sapere, i Fellows siano riusciti a modificare l'idea stessa di viaggio, rafforzando soprattutto il rapporto tra scienza, mercantilismo e imperialismo.

Abstract II: This paper concentrates on the early Royal Society, on its idea of Nature, and on the impact that it had on the advancement and circulation of agricultural knowledge. Rich in descriptions of beautiful landscapes, in "Enquiries" on "curious" geologico-botanical phenomena and innovative plantation systems, *Philosophical Transactions*, the prestigious journal founded by Henry Oldenburg in 1665, effectively contributed to Britain's techno-scientific progress as well as its openness to Europe and far-off lands. Still neglected by academic criticism, and ideally divided into two macro thematic areas, the articles which appeared in the years 1665-1700 will represent this paper's textual and structural basis: our aim is to show that the Fellows and their correspondents also changed the idea of learned travel as they linked natural knowledge, trade and imperialism.

Natural resources represented the basis of economy in Stuart times (Coward 2014). Crops may be significantly hit by unfavourable geological conditions or disruptive climate events, yet it is undeniable that at the outbreak of the Civil War, England was almost self-sufficient in food production (Muldrew 2011), and that it was ready for a profound agricultural revolution. The gradual substitution of continuous cultivation, the application of new fertilizers, as well as the practice of convertible husbandry would be essential in the development of the industrial sector in the Enlightenment (Overton 1996).

Rooted in the most advanced theories and practices of the time, this innovative trend would be enhanced by the early Royal Society (Hunter 1989; Purver 2013). Hard science and the main branches of medicine were at the heart of the Fellows' research interests, but the way the land could best be studied and exploited was considered to be crucial: the country's progress was still too vulnerable to short-term natural disasters, so it was necessary to acquire a deeper knowledge of the living world, and to provide effective solutions to problems.

Most of them could be found in *Philosophical Transactions*, the Society's prestigious journal, and an icon of New Science. Founded by Henry Oldenburg (1618-1677) in 1665, it was initially made of his personal correspondence with distinguished intellectuals, but when it grew – printing over 1,000 copies of each issue, and distributing them throughout Europe – it became a powerful vehicle of scientific communication. Its main topics were the latest discoveries in most fields, which also offered examples of successful farming in distant countries (McDougall-Waters *et al*. 2015: 7-8).

In fact, the years 1660-1700 were those of Britain's development and proto-imperialist expansion. The Society was awarded the Royal Charter in 1662, which means that, especially in Restoration times, it would always support the Stuarts' policy of international prestige (Coward and Gaunt 2017: 511): both its commitment to enhance the tools of long-distance travel and its wide network of far-flung correspondents greatly helped to promote scientific and commercial interests abroad (D'Amore 2017a).

The Fellows' study of Nature would thus soon include the remotest parts of the globe, which reinforced the link between knowledge and progress. Published on 1 January 1665, however, the anonymous "Enquiries concerning *Agriculture*" showed that the main focus was Britain, and that creating a national network of "skilful" specialists would be highly beneficial for its regions:

> Whereas the *Royal Society*, in prosecuting the *Improvements of Natural knowledg*, have it in design, to collect *Histories of Nature and Arts*, and for that purpose have already, according to the several Inclinations and Studies of their Members, divided themselves into divers *Committees*, to execute the said design: Those Gentlemen, which do constitute the *Committee* for considering of *Agriculture*, and the *History* and *Improvement* thereof, have begun their work with drawing up certain Heads of *Enquiries*, to be distributed to persons Experienced in Husbandry all over *England*, *Scotland*, and *Ireland*, for procuring a *faithful* and *solid* information of the *knowledg* and practice already obtained and used in these Kingdoms. […] Now to the End, that those *Enquiries* may be universally known, and those who are skilful in Husbandry, publickly invited to impart their knowledg herein, for the *common* benefit of their Countrey (*Phil. Trans*., 1, 1665: 91-92).

A form of scientific manifesto, whose contents are divided into two sections – "For *Arable*" and "For *Meadows*" – this article reveals the Fellows' principles and work systems: the twenty-five technical questions that they raised on the preparation and use of the different types of "Soyls" in England, Scotland and Ireland were clearly related to the Galilean method, what is more important, they initiated a lively scholarly debate, which would contribute to the development of domestic economy.

It may be for this reason that in the following years, the Society's journal was literally swamped with similar writings. Apart from the anonymous "Queries concerning Vegetation" (*Phil. Trans*., 1668, 3: 797-801), which perfectly overlaps with the above-mentioned "Enquiries", other articles carefully illustrate geomorphological features and land use both in England and overseas countries. The ideal boundaries of these two macro- thematic areas of investigation are decisive in discerning the Fellows' plans of development in the closing decades of the seventeenth century: this paper will show that they were related to all aspects of Nature, including the most advanced instrumentation and technical devices.

Cultural agency, though, was not a question of scientific excellence only. Research results had to be communicated effectively (MacLeod *et al*. 2016), so Henry Oldenburg as the Editor of *Philosophical Transactions* aimed at stylistic precision and clarity, and created a link between words and images. Interestingly, the corpus of articles, that he and his successors agreed to publish from 1665 to 1700, parallels the countless pictures and geological samples which were housed at the Royal Society's repositories at the time, and which can still be found at its Centre of the History of Science: a sign of man's need to systemize learning and promote change, it was one of the most distinctive features of the early history of this scientific journal.

From Geology to Botany: the Fellows' Observations in Europe and in the Indies

Therefore, issues 1-22 were the product of the Fellows' geological and botanical studies. There was room for the spectacular beauties of Italy and of most regions of Central Europe[1], which were described in full, and were rich in data and technical explanations. "Extract of a Letter concerning the Icy and Chrystallin Mountains of *Helvetia*, call'd *Gletscher*", for instance, listed the colours of the "Crystals" in that part of Switzerland – "darkish and troubled" and "transparent, very pure and as clear as *Venice*-glass" – even though it dedicated a long paragraph to the "Thunder-like" noise that the local population could hear when the ice cracked in Summer (*Phil. Trans*., 1669, 4: 982-983). The author, the Swiss physician Johan von Muralt (1645-1733), could have written more about the fear and terror that this phenomenon caused, but at this stage, he seemed to be more interested in science, and determined to ignore its cross-cultural implications.

Appearing in the fourth volume of the *Transactions*, this article was continued a few years later, when Muralt completed his second contribution with a beautiful picture of "a very high Mountain", a "pretty deep and extremely cold […] rivulet" and a few "Hutts" (*Phil. Trans*., 1673, 8: 6192). Showing learned Britons the unique features of one of the most remote areas in Switzerland, this further combination of words and visuals certainly aroused curiosity for the Continent. It was still early for the eighteenth-century mode of the Grand Tour, yet the new conception of learned travel already appealed to Restoration men of letters and natural philosophers[2].

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[1] In those years, the Fellows could also read about a "remarkable Spring about *Paderborn* near *Germany*", about "the *Aponensian* Baths near *Padua*" and "the wonderful lake of *Zirknitz*". See, respectively, *Phil. Trans*., 1, 1665: 133-144; 7, 1672: 81-91; and 16, 1686: 411-426.

[2] Academic research has showed that the emergence of New Science, especially the cultural exchanges within the European Republic of Letters, contributed to shape a new idea of learned travel in Restoration times. From this point of view, diffusing information about the treasures on the Old Continent, *Philosophical Transac-*

The early *Transactions*, however, were not only rich in purely descriptive articles: the anonymous "Some *Hortulan* Communications about the curious engrafting of *Oranges*, *Lemons*, or *Citrons*" clearly suggests that in that period Nature had curious mysteries to unveil. As an "*Intelligence* from *Florence*" reported, in fact, some special orange trees could "bear" both citrons and oranges, which showed that, even though they could be found in the poorest and most dangerous regions in Italy, Mediterranean flora deserved English specialists' attention (D'Amore 2015):

> 1. We have here *Orange-trees*, (saith the *Intelligence* from *Florence*) that bear a fruit which is *Citron* on one side, and *Orange* on the other. They have not been brought hither out of other countries, and they are now much propagated by Engrafting.
> 2. This was lately confirmed to us by a very ingenious *English* Gentleman, who asserted, that himself not only had seen, but bought of them *An*. 1660. in *Paris*, whither they had been sent by *Genoa* Merchants; and on some Trees he had found an *Orange* on one branch; and a *Lemon* on another branch (*Phil. Trans*., 2, 1666: 553-554).

The author of *Aphorisms Concerning Cider* (1662) and a Fellow of the Royal Society, who utilized grafting to expand orchard cultivation in England (Roos 2015: 538), Dr. John Beale (bapt. 1608-ca. 1683) also attempted to promote England's products of excellence abroad. His new "agrestic" observations were centred on mulberry cider: it was made in Devonshire, and, although it seemed to be in the "highest esteem in *Italy*", it had not "spread into other Countries". For him, it was imperative to call for an effective solution to this problem (*Phil. Trans*., 12, 1677: 818).

Reinforcing the concept of Nature as an economic resource, which New Science could help to empower, John Beale's articles testify to the Fellows' commitment to Britain's domestic growth and openness to other countries. Europe was a major reference point in a period when the Royal Society was an active member of the Republic of Letters (Van Dixhoorn and Speakman Sutch 2008), but the immense, unknown territories on the other side of the Atlantic equally represented an irresistible point of attraction (D'Amore 2017a).

An English colony since 1655, Jamaica was certainly one of the most popular islands among the Royal Society's Fellows. It grew sugar and other tropical staples, so most of the articles in the early *Transactions* were centred on its watermelons, prickly pears and cacao trees. One of the latter in particular was described as "an old tree", "not at all beautiful". Still, it was painted from life by an anonymous correspondent, who had just sent his picture to the Society for further investigation:

> I send you on this Ship a box, that hath in it a Cacao tree painted to the life. 'Tis certain, nothing was ever more like; and this Picture contains the whole history of the Cacao. It's of an old Tree; the body of which (as they commonly are,) [*sic*] is about 4 inches in diameter, 5 foot in height, and above 12, from the ground to the top of the Tree. These

tions aroused his readers' curiosity for its richest regions, thus paving the way for the Grand Tour. See D'Amore (2017b).

> Trees are exceedingly different among themselves; [… t]hey are not at all beautiful, nor so agreeable to the Eye, as the Fruit is to the Palate of them that love Chocolatto. The number of Codds the Tree produces is uncertain: But we reckon, a bearing Tree yields from 2 to 8 pounds of nuts a year; and each Codd contains from 20 to 30 nuts (*Phil. Trans*., 8, 1673: 6007-6008).

Three more articles about Jamaica appeared in *Philosophical Transactions* between 1673 and 1695. One of them was written by Hans Sloane (1660-1753), the future President of the Royal Society from 1727 to 1741. It was the product of his expedition to the Caribbean Islands in 1687, and it provided precise information about the main botanical features of "the *Pimienta*, or *Jamaica* Pepper-Tree", also about the season when it flowered. Its references to the "*Negro's*", who were in charge of "curing and preserving" its "Fruits for use" (*Phil. Trans*., 16, 1686-1692: 463), clearly show that Henry Oldenburg was utilizing the new colonial experiences on the island as exceptional opportunities to carry out scientific observation and experimental research. First, on its natural products, and then, in the following decades, on meteorology and astronomy[3].

Newfoundland and its nearby countries were not the Fellows' only foci of attention. Thirty-eight anonymous "Enquiries" on Surat in India appeared in the second volume of the *Transactions* in 1666, which also detailed the exotic "*Lignum Aloes*", the botanical features of its "best *Tea*" and the "poisonous *Mangas bravas*" (*Phil. Trans*., 2, 1666: 417). As for the years 1698-1700, readers could learn about Richard Waller's observations of the Indies (*Phil. Trans*., 20, 1698: 273-277), together with Samuel Brown's and James Petiver's description of a collection of "Curious Plants and Drugs" (*Phil. Trans*., 22, 1700: 579-594). Written in a dry and lucid style (Preston 2015: 186-188), these articles testify to Britons' determination not only to list and illustrate these regions' "*Seeds*", but also to "raise" them in the most "*Curious Gardens* in *England*" (*Phil. Trans*., 22, 1700: 580). Their priority was still to expand orchard cultivation, thus spreading special plants' "*Use*":

> Some years ago, I think, ever since the year 1672, a *Root* was made great *Use* of with some Success in *Epilecktic*, *Convulsive* or Head Diseases; 'twas call'd by Dr *Peachy*, a Physician since dead, *Cassumuniar*, and a sheet of Paper was printed of its *Vertues*. […] When I saw this *Collection* at the *East-India-house*, I found among other things this *Root* by the name of *Bengalle*, and an account that it was much used by the Natives in the *Indies*. I told some *Drugsters* of this discovery, they sent for it, and have receiv'd it from the *Indies* by that name, and now it is better understood, as will appear by these papers, and to be had in greater plenty, so that even the *poorer* sort of *People* may receive the benefit by it at a moderate price (580-581).

Centred on the above-mentioned collection, which had just been donated by the East India Company to the Royal Society, the long article written by the botanists Samuel Browne

[3] In the eighteenth century, Jamaica continued to be at the heart of the Fellows' interests. The early *Transactions* show, however, that it was also considered a basis for the study of moon eclipses and of the climate. See among others *Phil. Trans*., 32, 1722: 370-380; 46, 1749: 235-236; and 78, 1788: 53-55.

(d. 1698) and James Petiver (1663-1718) discusses how herbs and roots could best be employed. Medicine, as has been argued, represented one of the Fellows' principal areas of study, and its development was considered highly beneficial for man, yet even stronger emphasis was given to the exchanges between Britain and the Indies. In fact, this was the period when it was necessary to go beyond the appropriation of land and natural goods, and to acquire further agricultural and commercial skills. From this point of view, the Fellows knew that they could not ignore the riches and know-how on the other side of the Ocean.

The *Transactions* were immediately flooded with articles about these new – or unknown – farming methods and tools. They were definitely more numerous than the purely descriptive ones, even though these latter represented the most significant contribution to the empowerment of scientific knowledge. Providing detailed information about the geomorphological and botanical features of the most hidden regions in Europe and in the Indies, they showed that natural resources could bring about change. Both in research perspectives and economic strategies.

A new vision of the living world was thus being shaped. It would not only mark the perception of larger and larger geographical areas on the globe, but it would also satisfy modern man's growing needs and ambitions. Britain's plans of cultural, political and ecological control were soon transferred elsewhere: early America and the Far East represented the first immense lands to start from (Grove 1990: 21-22).

Letters from Distant Lands: The Fruits of the Earth as "Merchantable Commodities"

Learned travel and the emerging imperialistic trends were thus closely related to the country's growth. Cristina Malcolmson in her recent *Studies of Skin Colour in the Early Royal Society* (2016) confirms that there was a direct link between the Stuarts' foreign policy and the Royal Society's systematic support of Britain's progress in agriculture, husbandry, and trading: expanding and diffusing knowledge of Nature on a global scale could be highly beneficial to the domestic economy, so it was essential to enhance scholarly research, and divulge its best products effectively.

From this point of view, the first issues of the *Philosophical Transactions* provide evidence of the Fellows' wide interests and network of relations. These could be associated with any special fruit of Mother Earth, as well as with any learned correspondent who could write about new plantation and work systems. Located in Europe or in far-off countries, they actively participated in the ambitious national programme of development.

"Of the way, used in the *Mogol*'s Dominions, to make *Saltpetre*" was published in the first volume of the journal, and centred on a chemical compound which was typical of India, "chiefly [of] *Agra*", the then capital of the empire (*Phil. Trans*. 1, 1665-1666: 103-104). The anonymous author explains that it was drawn "out of three sorts of Earth: black, yellow, and white", and that the indigenous population followed a series of complex procedures to work it (103). Clearer references to saltpetre as an economic product, though, could be found at the end of the article, where it was reported that the "Country People" sold the English "a *Maon* of 6 pounds for two *Rupias* and a half, which [they, the English] had formerly for half of that price" (104).

It was only the beginning of a new process. From this moment on, and for almost three centuries, Britain would be commercially and politically tied to India as one of the richest lands in the Far East. Indigo and saltpetre in particular were among the most important bulk goods: the first one ceased to be imported regularly after 1712, whereas saltpetre, "a non-perishable chemical, and impervious to rough handling", continued to be in demand throughout the period (Chaudhuri 2006: 328-330; Cressy 2013). Apart from gum resins, aloes, myrrh, lac and frankincense, which, thanks to commercial exchanges, were becoming more and more popular on the Continent, other regular imports from the region included precious stones and textiles. The East India Company greatly contributed to balance the lack of silk-production centres in Britain (Chaudhuri 2006: 343), even though skilled voyagers like Jean-Baptiste Tavernier (1605-1689) systemized knowledge about that part of the world, also mapping its wide range of "Merchantable Commodities". He may not be English, but a detailed report of his discoveries could be found in the anonymous "More Observations of Monsieur *Taverniers*' Voyages", which appeared in the *Transactions* in 1676. Divided into fifteen thematic sections, it drew the readers' attention to the immense riches in the Empire of the Great Moghul, as well as in the Kingdoms of Golkonda and Visapour in Southern and Western India:

> 6. That the Author affirms to have given us an exact List of Merchantable Commodities, furnish'd by the Empire of the *G. Mogol*, and the two kingdoms of *Golconda* and *Visapour*, and other neighbouring States; and all what Nature and Art afford there: *viz. Silks*; various *Cloths*, white and painted, *Cottons*, spun and unspun; *Indigo*, *Saltpeter*, Spices (*Cardamum*, *Ginger* and *Pepper*), *Diamonds*, *Rubies*, *Pearls*, *Bezoar*, *Musk*, *Sugar*; besides some Drugs, that indeed are found at *Suratte*, but are brought thither for sale from other Countries, as *Sal Armoniack*, *Borax*, *Gum-lac*, *Saffron*, *Cumin*, *Mirrhe*, *Frankincense*, *Opium*, *Lignum*, *Aloës*, *Licorish*, *Cassia*, *Coffe*. To all which he hath annexed an account of the Cheats used in divers of these Commodities, especially in *Silks*, *Cloths*, *Cottons*, *Indigo* (*Phil. Trans*., 11, 1676: 753).

The author's concrete and specific language may be defined as a distinctive feature of this new type of scientific prose. Devoid of any references to the Classics[4], it was meant to list and illustrate special natural resources, as well as to stimulate both readers' and prospective voyagers' interest. It was, in fact, during the initial phases of discovery of these far-off countries that the relation between science and commerce was even given greater emphasis: Charles Howard's 1677 "Account of the Culture or Planting and Ordering Saffron", for instance, confirms that its best quality derived from South-West Asia, and that in those years, it was never sold "at so low a rate as 30 shillings per pound, frequently at three pounds per pound and upward" (*Phil. Trans*., 12, 1677: 947). It was clear that learned correspondents from the Far East insisted on the monetary value of these products as they were still virtually

[4] From a stylistic point of view, these articles did not include any references to the Classics. The Fellows and their correspondents felt the emerging Neoclassical mode in the closinggg decade of the century, when the *Transactions* diffused the news about the latest archaeological finds in England and in Italy. See D'Amore 2015: 147-151.

unknown to the English, and they would soon change their habits and food culture. It may be of interest to know that in 1727, James Douglas (1675-1742), the then Secretary of the Royal Society, could already report on the "culture and management" of such an important spice – saffron – in England (*Phil., Trans.*, 35, 1727: 566-574).

Still, the Fellows' correspondents provided little or no information about agriculture and husbandry in those regions. This was the period when the East India Company was expanding its area of influence, so Britain's main concern was to create an efficient trading system, where imports and exports could be as balanced as possible (Judd 2005: 21-24). These complex phases were closely followed by the Royal Society, whose intellectual circles, however, derived knowledge about plantation techniques from other parts of the globe.

Newfoundland, with its vast territories and indigenous populations, was one of them. A letter "concerning an *unusual* way of propagating *Mulberry trees*, for the better improvement of the *Silk-Work*" appeared in the *Transactions*' opening volume, which showed that there was also room for those learned Britons who were experimenting with new agricultural systems on the other side of the Ocean.

In this case, it was Sir Robert Moray (1608-1673), the first President of the Royal Society, who exhorted "his friend to prosecute what he had begun" (Birch 1756: 75). His correspondent's name always remained unknown, but the colony of Virginia was proposed as the ideal setting for a story of commercial success:

> I have planted here already ten thousand *Mulberry trees*; and hope, within two or three years, to reap good silk of them. I have planted them in an unusual way, which advances them two or three years growth, in respect of their being sown in seed. […] I intend likewise to plant them all, as if they were *Currant's* or *Goos-berries*, so thick as hedges; whereby one man may gather as many of them, as otherwise, when they are planted in trees at distance, four persons may do. Expedient is the benefit of this Trade Having discoursed of this new way to all here; they are generally inclinable to it; considering that the Planting their Trees, as before, at distance, and letting them grow high, has been the main obstruction of that work hitherto, and the loss of their time and gain: but being in hedges, they will be always young and tender plants; and consequently will be easily cut in great quantities with a pair of Garden Sizzers (*Phil. Trans.*, 1, 1665-1666: 201-202).

Thomas Purvis in *Colonial America to 1763* confirms that at the time the Natives lived on hunting and fishing, and that they periodically moved to other regions as "fields lost fertility" (Purvis 2014: 21). Although they were not skilled enough to develop any special agricultural practices, in 1676 Thomas Glover's account of his discovery of Virginia dedicated an entire paragraph to the "manner of planting and ordering Tobacco". This would soon become a boom crop there (Duke & Jordan 2015: 26), and he, an "an ingenious Chirurgion", was eager to share the results of his observations with his readers:

> In the Twelve daies they begin to sow their seed in beds of fine Mould, and when the Plants be grown to the breadth of a shilling, they are fit to replant into the Hills; […]

> These Hills being prepared against the plants be grown to the forementioned bigness (which is about the beginning of *May*,) they then in moist weather draw the plants out of the plants out of their beds, and replant them in the hills, which afterwards they keep with diligent weedings. When the plant hath put out so many Leaves as the ground will nourish to a substance and largeness that will render them Merchantable, then they take off the plant (*Phil. Trans*., 11, 1676: 634-635).

Glover's detailed report was preceded by a long section on American Indians, who were depicted as "well-shaped" but intellectually inferior creatures (631-634), and who could thus be easily subjugated by more advanced civilizations: the colonial experience had begun early in the century, so the Royal Society also utilized the latest race theories to justify Britain's plans of land appropriation in that part of the world. Eminent scientist Robert Boyle (1627-1691), for instance, was firmly convinced that one of the goals of natural philosophy was to restore Adam's original dominion over nature, and that English colonists participated in this restoration by making the earth fruitful and providing information on its products. His views were very influential, and the Fellows largely supported them (Irving 2008: 190).

There were other articles similar to Glover's in *Philosophical Transactions* in those years. In 1677, for instance, John Winthrop (1637-1707), the English Governor of Connecticut since 1657, reported on "the Culture and Use of Maiz" in New England, where the newcomers' use of the plough was said to greatly facilitate planting (*Phil. Trans*., 12, 1677: 1065-1069). This would be highly beneficial for the English both at home and in those regions: from this moment on, they realized that the Natives' traditional products could be enhanced by the most advanced tools of the Western world.

It was not the first time that the *Transactions* referred to the latest discoveries in this field. A few years earlier, in 1670, John Evelyn (1620-1726), the famous diarist and one of the most active Fellows since the Society's foundation, had written extensively on Don Joseph Lucatello's "Spanish *Sembrador*": "fastn'd to the Plough" – he posited – "[it] Plough[ed], Sow[ed] and Harrow[ed]" (*Phil. Trans*., 5, 1670: 1058). Pictures of it and of other agricultural "Instruments" in pre-industrial times were immediately housed at the Royal Society's archives, which showed that Britain was also progressing from a technological point of view.

Other learned correspondents reported on Nature in Transatlantic regions on the eve of the eighteenth century. In 1685, for instance, there was news about how to extract "a sort of Sugar of the Maple in *Canada*" (*Phil. Trans*., 15, 1685: 988), yet the articles included in volumes 16-22 in the years 1686-1700 clearly testify to a tighter network of relations in Virginia: John Clayton (1656-1725), Rector of Crofton at Wakefield, was certainly the main contributor, even though John Banister (1654-1692), a naturalist, Allen Mullen (d. 1690), a physician, and the above-mentioned apothecary James Petiver, combined memories of their adventurous maritime journeys with detailed information about most of the natural elements in the region. Building upon the conviction that "the Parts of *Virginia* inhabited by the *English*, [were] in general of a very Fertile Soil, far surpassing *England*" (*Phil. Trans*., 17, 1693: 978), they drew the readers' attention to a new entrepreneurial approach to agriculture. It was 1693, and Clayton's description of the region dedicated a long passage to a "very acute

Ingenious Lady", who, at the time of his stay, was planning the "ensuing Year's Crop" with "the Overseer of her Servants":

> The Overseer was naming one place where he designed to Plant 30000 Plants, another place for 15000, another for 10000, and so forth the whole Crop, designed to be about 100000 Plants: Having observed the Year before he had done the like, and scattered his Crop up and down the Plantation, at places a Mile and a half asunder, which was very inconvenient, and whereby they lost much time (980-981).

Rich in theoretical discussions on how to best exploit such fertile lands, Clayton's account proposes crops as an invaluable source of economic wealth, and even mentions the term "business": Britain's plan to create a maritime empire of commerce including larger and larger areas in Transatlantic West and in the Far East, and "emulat[ing] the Portuguese and Dutch reliance on costal entrepôts rather than Spanish inland conquest and settlement" (Colàs 2007: 82), would greatly benefit from the Royal Society's research and promotional activities.

In fact, mapping, charting and surveying unknown territories was obviously important, but divulging the latest acquisitions also in the field of applied science would mark the difference between the past of Elizabethan times and the present. From this point of view, the articles in the early *Philosophical Transactions* show that advanced tools and new plantation techniques could implement the agricultural sector, while inviting specialized readers to appreciate other customs and traditions. Eager to overcome the limitations of the English soil and of its products, those readers gradually changed their conception of long-distance travel, and connected it with natural knowledge and commercial development.

Writing on Nature in the Enlightenment: An Overview

This trend became even stronger at the turn of the new century. In a period when every major European power had trading companies seeking to penetrate the markets of Asia, Africa and America, the Fellows learned to consider the East India Company and the Hudson's Bay Company as reliable sources of scientific information. Reinforcing the link between natural philosophy, travel and commerce (Hayden 2012), their members' contributions consolidated the bases of a mercantilist world where "profit was generated by the transfer of goods from one market to another" (Colàs 2007: 82-83), while providing rich and detailed information about other, even more distant countries.

In fact, in the years 1700-1750 there was great curiosity for the adventurous journeys to New Caledonia, for the unique geomorphological features of the Cape of Good Hope, and for the sea treasures in the Maluku and Philippine Islands. As for Brazil, which had only been considered as an astronomical observation point in 1674, it was specially mentioned for its coati in 1722[5]. Covering the Fellows' major areas of study, the new correspondents' writings represented a *continuum* in the Royal Society's cultural policy.

[5] The articles on such distant countries did not mention any agricultural products, but focused on precious corals, diamonds and rubies, as well as their special fauna. See, among others, *Phil. Trans*., 22, 1700: 927-946; and 23, 1702: 1419-1429.

Interestingly, though, a much larger number of *Transactions* concerned the American colonies. Apart from illustrating their unique flora and fauna, together with the Natives' plantation systems, they divulged the natural history of Carolina and the Bahamas Islands, which was divided into sections, and which was published between 1736 and 1748. It was a form of proto-scientific series with a solid diachronic basis, but what is more important, it showed that close observation was still at the basis of the Fellows' experimental method.

Time passed by, and the improvements in long-distance navigation took learned mariners even further. Complete with dense technical descriptions, their articles continued to be published by the Royal Society, which had a great impact on the way English visitors and settlers penetrated – and changed – new lands. In some cases, deforestation and intensive land exploitation could be recognized as forms of "ecological [proto-]imperialism" (Griffith and Robin eds. 1997): they were among the worst possible attacks against Nature, but they had their roots in the technological and economic challenges of pre-industrial England.

Science and the need of higher profits were thus marking the evolutionary phases of British colonial expansion. In the Age of Enlightenment, thanks to the Fellows' network of relations and to their publications, the English intellectual elite developed a far more comprehensive vision of the living world, and became far more open to "Otherness".

Conclusions

The textual path that we have followed has showed that it is time to re-consider the Royal Society's contribution to Britain's cultural and economic development. Offering detailed scientific information, and employing effective communication tools, it helped modern man to acquire a deeper sense of geographical and cultural awareness, while supporting the country's growing colonial ambitions.

In fact, most of the articles that appeared in the first issues of its prestigious journal derived from far-off lands, particularly from America and the Indies. At a time when agriculture represented the main source of economic wealth, its authors offered new insights into geology and botany, which helped learned travellers and specialized readers to enlarge their knowledge, and overcome the limitations of the English soil. The extracts that we have read suggest that close scientific observation always paralleled a more practical reflection on new farming methods and tools. As a result, the Natives' special know-how started to be taken into consideration, and it was combined with the latest technology in the civilized West. John Clayton's description of the rich crops in Virginia, for instance, may explain why on the eve of the new century an increasing number of Britons engaged in long-distance travels, and moved to the richest transoceanic regions: it was there that agriculture could be associated with the idea of 'business', which made especially America even more appealing.

It was the beginning of a new process. There was still a great interest in geology and botany, but the Fellows could not ignore that the international market was imposing more intrusive forms of land use and acquisition. For this reason, in the years 1700-1750 they went beyond the pure elaboration of commercial strategies, and showed British settlers how to re-design natural spaces, thus adapting them to their necessities. The first traces of what the academic community has termed as 'ecological imperialism' can be found in most of their contributions, even though its devastating effects were felt in the following centuries.

The Royal Society and its correspondents did not initiate a debate on such a gradual, but violent attack against Nature and the local populations in America and in the Indies, yet the exceptional value of their contribution to British culture and economy cannot be diminished. Apart from empowering all the branches of natural philosophy, they managed scientific communication effectively, and supported the main mercantile trends: in pre-industrial times, the history of thought, of travel and of imperialism could not have been more closely interconnected.

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