Translating Nature: Changes in the Perception and Utilization of Science in the Halle Mission in South India, c. 1706–1813

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Abstract

This paper explores the role of science in the protestant Danish- and English-Halle Mission in South India in the eighteenth century, c. 1706–1813. During this period, science, broadly construed and including natural history, was employed as a sort of intercultural translating medium for and in the mission. However, the way this medium was utilized changed significantly through three chronological phases. The first phase was one of pre-Linnaean science where the mission collected, transformed and circulated both texts and objects of science from India with Europe. The aim was to aid religious instruction in Europe and raise support for the mission from Europe. The second phase saw the expansion of science from the mission's Danish branch to the English branch as well as changes in the kinds of specimens collected and techniques of ordering them. In the final third phase, the role of science in the mission changed due to the introduction of Linnaean taxonomy and Physico-theology. Now scientific objects and instruments were employed as media in the evangelizing efforts of the missionaries within the local Hindu population.

Key words: India, Mission, Natural history, Tranquebar, Translation, Science.

1 Introduction

At the beginning of March 1713, a box of natural history specimens from India arrived at the Pietist Francke Foundations (Franckesche Stiftungen) in the city of Halle an der Saale, Germany (AFSt/HA185:46). It came from the Protestant Danish-Halle Mission in the Danish-Norwegian trading colony of Tranquebar (Tharangambadi), South India, and was the first of many shipments to be sent from the mission to the Foundations' natural history collection or *Wunderkammer* (AFSt/HA193:34). Many decades later, in March 1797, missionary Christoph Samuel John (1747–1813, in India 1771–1813) of the Danish-Halle Mission in Tranquebar explained in one of his many letters to the leadership of the Foundations how he employed experiments with a microscope in his evangelizing conversations with local Hindu Tamils about nature and Christianity (AFSt/M1C38a:35; Hommel 2006b, p. 1127).

These two instances indicate the Danish-(and English-) Halle Mission's long engagement with science – broadly construed and including natural history – and the change in the materials, perspectives and utilization of science that took place in the mission through the eighteenth century. Recent scholarship has shown that in the first half of the century the mission emerged as a local southern Indian centre for production and distribution of scientific knowledge. By utilizing its extensive local and global networks of Indian and European experts, the mission was able to produce data and objects of science, and circulate

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them between India and Europe. The aim of this effort was both to facilitate evangelization and teaching locally and globally, and to gain financial and political support for this work from global and local sponsors (Hommel 2006a; Whitmer 2013; Jensen 2014). However, as the eighteenth century wore on, the way science was understood and practised in the Halle mission changed significantly. Not only did the interest in science expand into the mission's other branch in India, the English-Halle Mission, it also adapted to the activities in science of the rival Moravian mission (Herrnhuter Brüdergemeine, Societas Unitas Fratrum) and to the arrival of Linnaean taxonomy and field methods in India via Tranquebar (Jensen 2015; Ruhland 2017). At the same time, ideas of Physico-theology (Natural theology) changed the missionaries' way of utilizing science (Hommel 2006b; Hommel 2010).

The scholarship on science and natural history in the Danish-English-Halle Mission is connected to the investigations in the broader field of the history of science in non-Western contexts during the Early Modern period. Central to this field is the constructivist view of science, not as a Western invention, but as a socially negotiated, produced, and situated form of knowledge, which develops through exchanges and practices in polycentric networks on a local and global scale (MacLeod 2000). In the colonial setting, this knowledge was created and utilized to various ends by both indigenous people and Europeans in the entangled and often asymmetrical power relations of the colonial encounter (Schiebinger and Swan 2005; Raj 2006; Cook 2007; Schaffer et al. 2009). In the last two decades, this approach has led to a revitalization of the study of relations between Science and Empire (Drayton 2005; Cañizares-Esguerra 2006; Delbourgo and Dew 2008; McClellan and Regourd 2011; Boomgaard 2013). A parallel, and sometimes connected, line of investigation has focussed on the relations between Christian missions and science in the overseas world – especially Jesuit missions in China and South America (Harris 1996; Jami 1999; Harris 2005; Pagani 2007; Hsia 2009; Prieto 2011). This study of science in the Halle mission is inspired by these contributions but expands the perspective by focusing on a Protestant mission in the different cultural setting of colonial India.

Turning from the wider context in the history of science to the specific historiography of science in the Halle mission, Anne-Charlott Trepp has recently suggested that in the last third of the eighteenth century, Indian nature, and knowledge about it, came to play a particular role in the Halle mission as an at least apparently neutral 'medium of intercultural translation' (Trepp 2010, p. 234, 252). This application of the concept of translation to science or knowledge of nature in the setting of a colonial mission is interesting because it relates to recent theoretical developments in both the history of science and the history of Christian missions. In the former field, Bettina Dietz (2016) has recently pointed to the potential of the concept of translation on a number of dimensions. She suggests that if translation is understood not just as the translation of texts but more broadly as 'a practice of analysing, assimilating, and affirming cultural difference', it can be useful for studies of translation within the history of science. Furthermore, this understanding of the negotiation of cultural differences converges with the abovementioned interests in the circulation of objects, individuals and concepts between various sites of doing science, including sites in the colonial world (Dietz 2016, pp. 117–121). In the field of the history of Christian mission, Heike Liebau and Joan-Pau Rubiés have also extended the concept from the translation of texts to the translation of culture, including science (Liebau 2012, p. 251; Rubiés 2017).

On such a basis, the aim of this paper is to analyse how the employment of science as a translating medium changed in the Danish and English-Halle Missions through the eighteenth century, c. 1706–1813. I will suggest that Nature, or science broadly construed as knowledge of Nature, developed into a special 'zone' in the interaction between the missionaries and the Tamil population. Through this zone, the missionaries could approach the neighbouring and much more contentious domain of religion where their ultimate goal of conversion was situated, without risking major confrontations with the Tamils over religious issues. In this zone, the missionaries employed texts and objects of science as media for translations in two directions: of Indian categories, culture and objects *from* India to Europe, and of Christianity, European ideas and objects *from* Europe to India.

The reason for including the entire eighteenth century in the analysis is that the current literature on science in the Halle mission is generally focused on either the first part of the century (Neumann 2006; Whitmer 2013; Jensen 2014) or the second part (Hommel 2006b; Klosterberg 2006; Hoppe 2010; Trepp 2010; Jensen 2015; Ruh-

land 2017; Jensen 2018). By extending the investigation to the whole century, it is possible to see the longer developments and trends in how science was utilized in the mission. Another effect of this chronological division in the literature is that the field has not yet established a cohesive chronology. Consequently, I will suggest a division of the period c. 1706–1813 into three phases. The first phase from around 1709 to c. 1745 was one of pre-Linnaean science in the Danish branch of the Halle mission in Tranquebar, whereas the second phase from c. 1745 until around 1765 saw the interest in science expand into the English branch of the mission while it became dormant in the Danish branch. During the third phase from c. 1765 to c. 1813, the influence from the Moravian mission, the introduction of Linnaean taxonomy and Physico-theology in Tranquebar caused a revival of science in the Danish branch of the Halle mission.

2 Tranquebar and the Halle missions

Tranquebar is a small, formerly colonial town located on the Coromandel Coast about 200 km south of Madras (Chennai) in Southeast India. From 1620 to 1845, it was the administrational centre of Danish-Norwegian trade and trading stations in the East Indies. The colony consisted of the fortified town itself with approximately 3000 inhabitants, and about 32 square kilometres of surrounding agricultural lands containing a few villages and 10–15,000 inhabitants (figures from around 1730). In the town itself, about 80 percent of the population was Indian; predominantly Hindu but with a significant Muslim community and small Indian Christian minorities of Catholics and Lutherans. The population in the countryside was almost exclusively Hindu (Struwe 1966, pp. 10–11). The colony remained roughly this size through most of its history, in other words it remained in the mode of the small colonial trading post of the seventeenth and early eighteenth centuries in which the claims to authority of both European and Indian culture remained fluent and necessitated continuous negotiation (Brimnes 1999, pp. 240–242). In 1845, Denmark sold its colonies in India to Britain (Rasch 1966, pp. 242–246).

In 1706, a new element was added to this multicultural society with the arrival of the first missionaries of the Protestant Danish-Halle Mission. The first missionaries, and the majority of their successors, were Germans from the centre of Lutheran Pietism, the charitable Francke Foundations in the city of Halle an der Saale in present day Germany. They were sent on the behest of the absolutist ruler of the dual monarchy Denmark-Norway, who also supplied much of the funding and logistical assistance for the expanding mission, though increasingly assisted by support from a network of nobility and pietist-reformist citizens throughout Protestant Europe (Gross 2006a, pp. 3–5). As the mission was under the direct jurisdiction of the king, it was not part of Danish-Norwegian colonial power in Tranquebar. From 1620 to 1777, Tranquebar was controlled by the semiprivate Danish East India Company (DEIC) and then became a Crown colony (Nørgaard 2006, pp. 171–172, 193–195).

In Tranquebar, the missionaries quickly established congregations, schools, a printing press, a paper mill and a new church (Jeyaraj 2006, p. 77, 83). The schools were a cornerstone in the mission's work and modelled on the pedagogic principles of the orphanage schools at the Foundations in Halle. This meant that they combined theology with a focus on 'useful' skills like reading, writing, mathematics, languages, several branches of the sciences, hygiene, gardening and crafts (Liebau 2006b, pp. 136–137, 142–145). The other main cornerstone was the mission work outside the schools and here the missionaries viewed knowledge about the Tamil population and the land as a precondition for their work. To be able to spread the Christian teachings and successfully convert the Hindu Tamils it was necessary to know their languages, beliefs, customs, laws, and physical environment etc. (Liebau 2008, p. 194).

The mission did not remain restricted to the town of Tranquebar for long. From the beginning, the missionaries ventured into the countryside and soon set up new mission stations both in Danish-Norwegian and English controlled territory. The first English station was established in Madras in 1726 followed by stations in Cuddalore, Calcutta, Tiruchirappalli, Tanjavur, Tirunelvely etc. The new stations in the English territories were supported financially by the private Society for Promotion of Christian Knowledge (SPCK) in London, while still relying on the ideology of and missionaries from Halle. This part of the mission is now referred to as the English-Halle Mission (Gross 2006c, pp. 291–292). In this way, the mission gained access to a wider network of funding, logistical resources and powerful supporters. From around 1780,

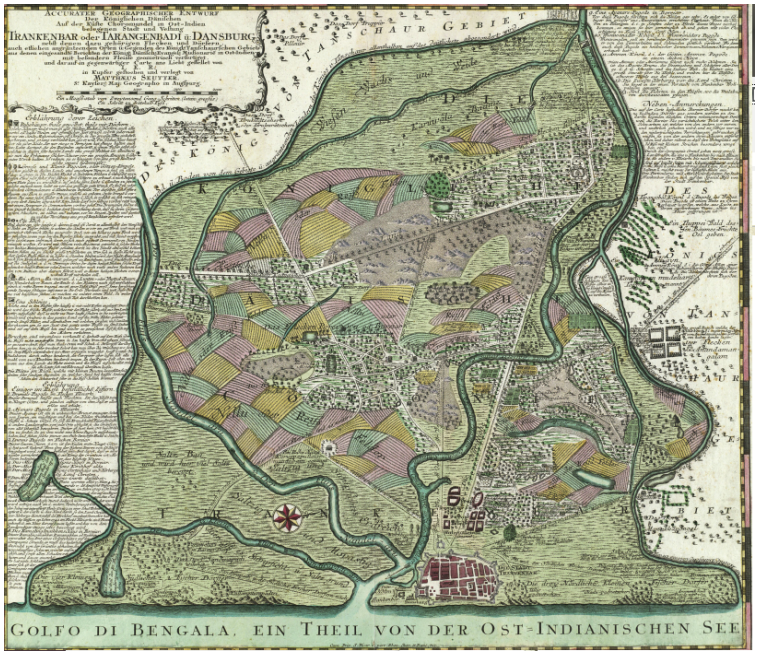

Figure 1 The colony of Tranquebar c. 1730 including the walled town of Tranquebar, the villages and agricultural lands. East is at the bottom of the map. (Matthäus Seutter, *Accurater Geographischer Entwurf der Königlichen Dänischen Auf der Küste Choromandel in Ost-Indien belegenen Stadt und Vestung Trankebar oder Tarangenbadi u: Dansburg*. Augsburg, 1730. The Royal Danish Library, CC BY-NC-ND 3.0).

the mission in Tranquebar experienced a slow decline because of failing support from Europe, both financially and in terms of personnel. By 1820, it had all but ceased to exist and in 1847, it ended officially (Gross 2006b). The English branch of the mission experienced a similar fate as support from the SPCK ceased in 1825 and the mission came to an end in 1844 (Gross 2006c, p. 293).

3 The first phase (c. 1709 – c. 1745): listing and translating for Europe

As exemplified by the box of specimens that arrived at the Foundations in 1713, the first phase started within the first decade of the missionaries' arrival in Tranquebar and it ended around 1745 (Hommel 2006a, p. 164; Neumann 2006, p. 1137). The primary reason for the missionaries' interest in science during this period was that they viewed all kinds of knowledge about the local Tamil population and the land as a precondition for evangelization. Among the various fields of knowledge they investigated, they placed the greatest emphasis on studies of religion and, as a tool for this, on language studies. The missionaries were among the very few Europeans who could speak, read and write Tamil and the first translation of the Bible into Tamil was printed in Tranquebar in 1713. The following decades saw the publication of a steady stream of dictionaries, grammars, prayer books, catechisms etc. in Tamil and other South Asian languages (Liebau 2006a; Jürgens 2006a). However, in the subfield of science the missionaries' investigations entered subjects to which we would today refer as medicine, botany, zoology, chemistry, geology, meteorology and astronomy. All these investigations were carried out in close cooperation with local informants and members of the mission's Tamil and Eurasian congregations (Liebau 2008, pp. 195–204). This emphasis on gathering knowledge reflected the attitude to knowledge in general, and particularly to scientific knowledge, at the Francke Foundations. In the Foundations' schools, science was part of the curriculum of religious instruction. Moreover, it was facilitated by the fact that the missionaries were usually graduates of the University of Halle (Liebau 2006c).

Because of this initial interest in science, the first phase saw the Foundations in Halle and the mission

in Tranquebar develop into two 'nodes' in a network on a global scale, which produced and circulated information about nature. Both nodes accumulated, translated, edited/processed and published/redistributed both texts and objects of knowledge concerning South India. Most important here was the journal of the mission, commonly known as *Die Hallesche Berichte*, the Halle Reports, which was widely distributed across Europe and beyond, and parts of it translated into English, Dutch, French and Latin. European academics responded to the information on science in the journal by sending research questions or whole questionnaires to the mission. The missionaries' answers to these queries were then usually published either in European academic journals or in the *Berichte* (Jürgens 2006b, pp. 1077–1080). Thus, the mission was not just feeding Europe with raw data about India; it was a circulation of knowledge back and forth between the two 'nodes'. However, it would be fair to say that Europe was the initiator and main recipient of the knowledge circulated.

Apart from texts, scientific specimens from India were also circulated via Tranquebar. Most of them were destined for the natural history collection of the Foundations (Hommel 2006a). Here, the specimens from Tranquebar served three purposes. First, they formed a pedagogical tool for the teaching of science to the Foundation's pupils and students. Between 1736 and 1741, the collection was re-organized specifically for this purpose following the latest scientific principles of the famous botanist Carolus Linnaeus' "*Systema Natura*" (Müller-Bahlke 1998, pp. 13–15, 32–38). Second, the specimens in the collection attracted prominent visitors, connoisseurs and potential sponsors whose goodwill was employed to strengthen the network and prestige of the Foundations and the mission. Third, the specimens were employed in a practice of gift-giving with scientific objects. The leadership in Halle requested specific specimens to be sent from Tranquebar to the collection with the explicit aim of forwarding them as gifts for what they referred to as 'good friends', that is, important economic or political supporters of the Foundations and the mission (AFSt/M1B29:43).

Accordingly, the aim of this circulation of scientific information and objects was not just religious instruction, but also to gain and maintain support for the Foundations and the mission from a wide network of readers and sponsors among common people, academics, nobility and royalty in Protestant Europe (Jensen 2014, pp. 327–331).

Turning from the global circulation to the local practices of collecting in South India, recent research has focused on how the collection of knowledge and specimens of science was carried out in this first phase of the mission's life. In her important study, Kelly Whitmer (2013) argues that academics in Europe asked the missionaries to go on fieldtrips and observe plants *in situ* and with their own eyes, as was the norm in European botany at the time. Even if the evidence for the request to observe *in situ* is unconvincing, Whitmer does demonstrate that academics in Europe, and the leadership in Halle, did ask and expect the missionaries to investigate nature and that the missionaries responded with linguistic and ethnographic investigations of the local names of objects of nature (Whitmer 2013, p. 338, 354).[1] The reason for this was partly the missionaries' aim of conversion and a related focus on language studies, philology and translation, which I will develop further in the following. Another reason was that through most of the first half of the eighteenth century the missionaries' mobility was restricted to the coastal areas controlled by Europeans because the local Indian rulers were hostile to their activities (Liebau 2008, pp. 57–58). Consequently, it was difficult for them to go on field trips.

Instead, the missionaries relied on various local informants. This is evident from the work in botany that took place in the mission when the first phase reached its peak during the years c. 1732–1744. At this time, a mixed group of employees collected, named, catalogued and shipped no less than nine herbaria with hundreds of dried plant specimens to Europe (Jensen 2014, pp. 338–339), plus a catalogue of local grasses (ALMW/DHM8/16:68; Anonymous, 1745, p. 109, note u). It was by this effort that the mission for the first time became a local south Indian centre for the production and distribution of scientific objects and information. Only one of the nine herbaria has survived until today, but it contains more than 500 specimens of dried plants, each with its Tamil name and additional information in German. It is known as the *Plantae Malabaricae* and is the largest existing pre-Linnaean col-

[1] Regarding the request to observe *in situ* (p. 338, n. 2.) it seems to rest on the interpretation of the German phrase "unter der Hand". If translated literally it means "under the hand", i.e. handling something physically, but according to standard German dictionaries the phrase dates back to the 17th century and meant doing something unofficially, or something secret. In this context, the first meaning seems appropriate. See for instance *Duden*, 2007, 'Hand', p. 751.

lection of plants from the Coromandel Coast (Wagenitz 1978). Unfortunately, the original structure of the herbarium has not been maintained (Jensen 2014, p. 340).

A closer examination of the process of making these herbaria reveals that several groups in the mission carried it out as a collective work (ALMW/DHM6/10:58). The leader of the collection, organisation and naming of the plants in the nine herbaria during the period c. 1732–1744 was one or other of the missionaries, but the people who carried out the actual collection of the plants *in situ* were not. Their identities are more obscure but can be inferred from the fact that many of the plants in the *Plantae Malabaricae* have their Tamil names printed in Tamil on tags made of palm leaf. This technique of printing with a metal stylus on palm leaf instead of writing with ink and quill on paper was only employed by Tamils and accordingly it seems that at least some of the collection and naming of the plants was carried out by Tamils (Jensen 2014, pp. 340–341). However, whether these Tamils were converts or employees of the mission is difficult to determine. The practice of buying information and expertise from Tamils outside the mission was also common at the time (Liebau 2008, p. 197, 206, 214).

The mixed Tamil and European origins of the herbaria were not only true for the collectors and organizers but are also visible in the knowledge that was the product of their work. All the botanical data generated during the production of the first five of the nine herbaria (c. 1732–1739) was edited into a manuscript called *Herbarium Tranqambariense* (AFSt/HA61) by missionary Christoph Theodosius Walther (1699–1741, in India 1725–1739). It is a catalogue of more than 1000 names and descriptions of plants from the Coromandel Coast. The organising principle of the catalogue is the Tamil syllabic alphabet and the plants are listed according to the Tamil name of the plant family they belong to. Under each plant-family name are grouped all other plants with the same stem-word (family name) but with different pre- or suffixes. Added to each plant name in this Tamil taxonomy are other names of the same plant in Indian and European languages and scripts, a botanical description in Latin and references to descriptions of the same plant in European botanical works. The result, then, is neither Tamil nor European, but a new, hybrid structure of colonial knowledge.

The hybridity of this knowledge produced in the Danish-Halle mission in the first phase goes against at least two arguments in recent scholarship. First, Josef Neumann has argued that during this first phase of scientific work in the mission there was a change in the perception of Tamil knowledge; a change from an initial perception of equality between Tamil and European knowledge to the perception that European scientific thought was the only valid categorical and methodological norm (Neumann 2006, pp. 1150–1152). Based on the above examples of the mixing of categories and methods in the *Plantae Malabaricae* and *Herbarium Tranqambariense*, this interpretation seems overstated (Jensen 2014, pp. 336–337). However, as we shall see, in the third phase European scientific thought did become the norm in the mission.

The second and more general argument is made by Londa Schiebinger. She states that travelling European naturalists working in the colonial field tended to just collect specimens for Europe and disregard the local indigenous worldviews and ways of ordering and understanding the world that surrounded the specimens. Therefore, the specimens were 'stripped of narrative' (Schiebinger 2005, p. 128). In contrast, the above examples of *Plantae Malabaricae* and *Herbarium Tranqambariense* support Whitmer's argument that the Halle missionaries included much linguistic and ethnographic information from the Tamil narrative about natural objects in their work. The reason for the difference might be that the first phase missionaries were not *travelling* naturalists. They employed what might be called a 'resident mode' of field research, which implied an interest in the local indigenous society and narratives behind the objects. After all, to the missionaries the scientific objects were primarily means to promote another end, namely evangelisation and conversion in the local context. It was only in the third phase of scientific investigations in the mission, that travelling, Linnaean field methods and observing *in situ* became the standard approach for the missionaries.

Returning to the *Herbarium Tranqambariense*, a closer examination reveals how the missionaries employed their skills in linguistics and philology to solve some of the practical problems of doing science in the colonial world. The manuscript's alphabetical ordering in Tamil with further explanations in Latin only makes sense if it was intended as a practical tool for someone conversant in Tamil and Latin, and working in a Tamil speaking area, i.e. most likely the mission in Tranquebar. Here, the local Tamil names of plants were indispensable in order to acquire a

Figure 2 A sheet from the herbarium *Plantae Malabaricae*. According to the paper slip, the Tamil name of the plant is "Töl-cuduccei". Courtesy of the Georg-August-Universität Göttingen, Dept. of Systematics, Biodiversity and Evolution of Plants. Photo Niklas Thode Jensen.

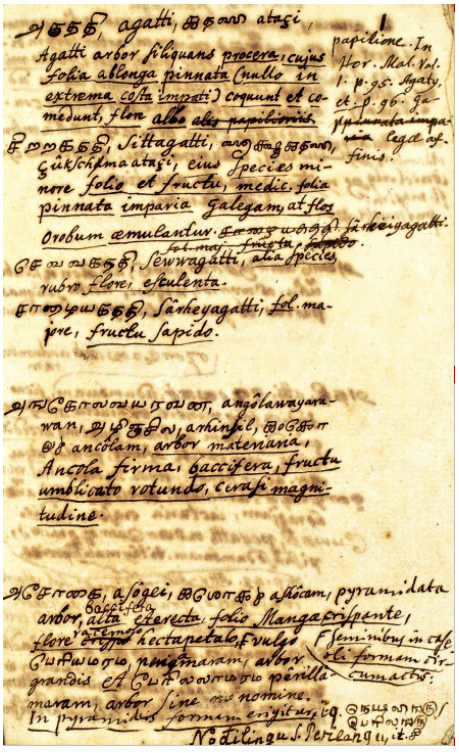

Figure 3 The first page of *Herbarium Tranqambariense* (AFSt/HA61, 1741). The first group of plants is "agatti" also known as *Sesbania grandiflora* (L.) Poiret. Archiv der Franckeschen Stiftungen, Halle an der Saale.

new specimen of a particular plant from Tamil collectors or herbalists. This problem was common in the colonies in Asia well into the nineteenth century and was usually remedied precisely by double naming in local languages and Latin and by using bilingual lists or concordances (Pols 2009, p. 182; Trepp 2010, p. 250, 252).

At the time of and prior to the production of the *Herbarium Tranqambariense*, the masters of such list-making were the catholic Jesuit missionaries. Scholarship on the Jesuits' work on natural history in South America has argued that the practice of listing was central to them, both as an administrative tool and to order the vast amount of new information and objects found in the New World. Furthermore, the Jesuits' lists were not only bi- or multilingual in indigenous names and Latin but also often organized alphabetically in indigenous languages because the lists were closely related to their parallel and crucial work of writing dictionaries and lexica of indigenous languages (de Asúa 2008, pp. 53–54).[2] As previously mentioned, the Danish- and English-Halle missionaries in South India carried out similar philological and translational work including translations of the Bible, dictionaries of various South Asian languages etc., and they did so with the same aim to aid the evangelization of the indigenous population. At times, they even worked in direct competition or cooperation with the Jesuits, who were also present on the Coromandel Coast (Jürgens 2006b, pp. 1065–1069). As part of this work, the missionaries in Tranquebar also translated Indian medical treaties, which included many references to the medical uses of minerals, plants and materials of animal origin (Stephen 2015, pp. 128–132).

To summarize, the first phase of science in the Halle mission saw the station in Tranquebar develop into a 'node' in a global circulation of scientific and other kinds of knowledge about India. However, the main direction of this flow was from India to Europe. The missionaries were not travelling naturalists at this stage but gathered information via Tamil informants and employed what may be called a *resident mode* of field research. Furthermore, the way the missionaries processed and ordered the collected information was often linguistic and employed multilingual *listing* as a translational technology. This approach was connected to the missionaries' work in translating religious texts and it had the double aim to stabilize the knowledge about India for long-distance transport and make it comprehensible to Europeans. The product of this work was a kind of hybrid colonial knowledge, which could be comprehended and used both locally in the mission and in faraway Europe.

[2]This important translational aspect of the technologies of listing within early modern science seem to have received little attention in recent research (Smith and Delbourgo 2013, p. 303; Delbourgo and Müller-Wille 2012).

4 The second phase (c. 1745 – c. 1765): How to order Indian specimens

The second phase of science in the mission was characterized by relocation of the scientific work from the station in Tranquebar to stations run by the English branch of the mission. After 1744, the scientific activities in the Danish-Halle mission seem to have all but ceased until the early 1760s (AFSt/M1B51:37; AFSt/M1B54:6). The reason for this is not clear but it might have been due to a combination of circumstances. First, the older scientifically minded missionaries had died and/or been replaced by new ones who were not particularly interested in science. Second, Mission Doctor Samuel Benjamin Cnoll or Knoll (1705–1767, in India 1732–1767), who was supposed to be in charge of matters concerning science, seems to have had personal problems during these years (AFSt/M1B41:5; ALMW/DHM2/3b:32; AFSt/M1B41:16; ALMW/DHM3/3c:1). Finally, the three Carnatic Wars raged in South India from around 1745 to 1763 and made conditions highly unstable and difficult (Dodwell 1929, 117–165; Struwe pp. 149–150, 155, 208, 214, 220). However, missionaries in the English branch of the mission started collecting and shipping scientific specimens from around 1754 (Krieger 2010, p. 71, n. 63). During the following twelve years, missionary Johann Zacharias Kiernander (1710–1799, in India 1740–17 99) shipped several crates of specimens from the mission station in Cuddalore (AFSt/M1B45:39; AFSt/M1B46:47; AFSt/M1B47:36) and later from his new station in Calcutta (AFSt/M1B48:25; AFSt/M1B51:21; AFSt/M1B51:33; AFSt/M1B55:24) to the natural history collection at the Foundations in Halle. Around the same time, his colleague Johann Christian Breithaupt (1719–1782, in India 1747–1782) sent shipments of specimens from his station in Madras to Germany (AFSt/M1B53:27; AFSt/M3H65:84; AFSt/M3H77:111).

An investigation of the correspondence relating to this

traffic reveals how the collection of scientific specimens developed in terms of its organisation, the kinds of specimens concerned and how Indian objects were processed into forms that could be shipped to Europe. In 1755, missionary Kiernander sent his first shipment of no less than 100 different kinds of seashells to the natural history collection in Halle (AFSt/M1B45:39). Seashells were an essential part of early modern natural history collections, and accordingly the collection at the Foundations already by its rearrangement in 1736–1741 contained 483 pieces (Müller-Bahlke 1998, p. 62). Presumably, the former missionaries in Tranquebar had sent many of the pieces in the Halle collection (Hommel 2006a, p. 164).

The seashells in the 1755-shipment are interesting to the development in the mission's organisation of the collecting of scientific specimens for two reasons. First, they are an early instance of the development of the Halle missionaries' regional network of scientific correspondents, a feature that became highly significant in the third phase of science in the mission. According to Kiernander, a few of the shells originated with the natural history connoisseur and Governor of the Dutch East India Company (VOC) in Colombo (Sri Lanka), Joan Gideon Loten (1710–1789) (AFSt/M1B45:39; Raat, 2010). Such connections to correspondents of science in the Dutch East Indies were not unusual in the Danish branch of the mission (Whitmer, 2013, p. 347, n. 54; AFSt/M1B11:35), but in the English branch, they were still rare. However, and this is the second point of interest, most of the shells were collected by a different group of collectors. Kiernander explained that he had made the children from the mission's schools in Cuddalore collect the shells on the beaches while they were out for some physical exercise (AFSt/M1B45:39). Accordingly, the collecting in the mission was not carried out by Tamil or European trained collectors. To employ the schoolchildren as collectors in this way was not a new idea, since as early as 1712 the Tamil doctor of the mission in Tranquebar had taken the older boys on botanical excursions and collection trips (Liebau 2008, p. 330). Nevertheless, this is the first instance when the children of the mission schools are directly linked to the collection of any kind of specimens meant for shipment to Europe. Later, in the third phase, the same approach was employed in Tranquebar, but at this time, the issue of indigenous collectors became a problem (Hommel 2006b, pp. 1127–1128).

While the children were collecting, Kiernander was in charge of the ordering of the specimens just as his colleagues in Tranquebar had been concerning the herbaria. Like them, he did not employ the Linnaean system, as it only arrived in India via Tranquebar in 1768 (see below), but nor did he employ any Indian taxonomy. Instead, he developed a different system by simply assigning a unique number to each of the 100 seashells. This made it possible, he explained, for the recipients in Halle and beyond, to order more specimens of any of the 100 kinds of shells from him by simply referring to the unique number of the specimen (AFSt/M1B45:39).[3] This simple system was a solution to two fundamental and connected problems in the Halle mission's system of exchange in scientific specimens: First, how to separate different types (species) without a universal taxonomy, and second, how to request specific types to be sent from India in order to satisfy requests from European *connoisseurs* and sponsors. However, Kiernander's almost commercial 'postal order system' does not imply that he substituted the religious aims of the specimens with commercial ones. In line with the prevailing idea of science in Halle, he expressed the hope that people visiting the natural history collection and seeing the seashells would come to wonder about Creation and thus be moved to praise the divine creator (AFSt/M1B45:39).

Kiernander's shipment of 1755 was only the first in a series. However, there was one request for specimens he did not manage to fulfil. Paradoxically, this request reveals the development in the kinds of specimens requested, the limitations of the Halle missionaries as collectors in the field, and the changing mind-set of the connoisseurs who requested specimens from them. In 1757, the leadership in Halle forwarded a request for insects and butterflies from an unnamed *Liebhaber or aficionado* of natural history (AFST/M1B46:47). It appears to be the first request in the mission for this particular kind of specimens, something that continued later in the third phase (AFSt/M1B70:28; AFSt/M1B72:46a; AFSt/M1B72:46). With the request came a detailed description from this unnamed *Liebhaber* titled 'How to preserve all kinds of insects that you want to send, so

[3] Original text in German: '*Ich habe sie mit Fleiß nummeriret, damit wenn man von dieser oder jener art nach mehrere haben wollte, man so gleich wissen könne welche es sey*'. For this idea to work, Kiernander must have had an identical set of shells with him in Cuddalore. All translations are the author's unless otherwise noted.

that they will not be damaged' (AFST/M1B46:47).[4] Compared to seashells, insects and butterflies required more careful preservation because they were not only fragile but also vulnerable to decay during the long sea voyage. Earlier on, the missionaries in Tranquebar had had similar problems with the preservation of plants for the herbaria (ALMW/DHM6/10:58). The missionaries were not trained collectors of scientific specimens and consequently the *Liebhaber* had to explain exactly how the missionaries should preserve the specimens.

Regarding the mind-set of this *Liebhaber* it was quite different from that of the missionaries in the sense that it was strikingly Linnaean. The request does not include a wish for local names or any such information pertaining to the insects. Instead, it explicitly states that when collecting it is not the size or the beauty that matters, but '...what is important are the differences between the genus and species' (AFST/M1B46:47).[5] This is a very different view than the linguistic approach in *Herbarium Tranquambariense* or the wonder of God's creation expressed by Kiernander. It is the classic Linnaean view with a focus on distinguishing genera and species, and a disregard for local forms of knowledge leading to the stripping of narrative mentioned by Schiebinger. Accordingly, this might be interpreted as the first indication (1757) that the Linnaean view of science was on its way to the mission. Still, there was not yet any expectation that the missionaries should also practice the itinerant Linnaean mode of field study and taxonomical naming. This was to come later, in the third phase of science in the mission.

To recapitulate, then, the second phase of science in the Halle mission was something of an intermezzo. The scientific work spread to the English branch of the mission, where it had not been practised before, while the groups of collectors involved, the way the objects were organized for shipment and the kinds of specimens requested all changed in various ways. However, the role of Nature as an intercultural medium of translation is not very clear. In fact, it would appear that both Kiernander's new 'postal order system' for seashells and the Linnaean collection principles promoted by the unnamed *Liebhaber* stripped the scientific objects of all indigenous Indian narratives. Still, the two cases also should remind us of the very practical problems of long-distance transportation of scientific specimens in the early modern world, which had a significant impact on the erasure of indigenous narratives (Parsons and Murphy 2012).

[4]Original text in German: '*Wie allerley Insecten zu conserviren die man verschiecken will, dass sie nicht beschädiget werden können*'.

[5]Original text in German: '*Man kann 2, 3 bis 4 von jeder art sammlen, es mögen auch dieselben gross order klein, schön oder garstig aussehen; denn es kommt auf die verschiedenheit der geschlechter, und arten an*'.

5 The third phase (c. 1765 – c. 1813): Translating Christianity with instruments

In 1765, a new request for specimens arrived at the Danish Halle-Mission in Tranquebar from the Danish-Norwegian government in Copenhagen, Denmark (ALMW/DHM8/14:28). This signalled the beginning of the third phase of science in the Danish/English Halle-Mission from c. 1768 to c. 1813, which saw the rebirth of Tranquebar as a south Indian 'centre' of Linnaean science under the auspices of both the Halle mission, the Moravian mission and the Danish-Norwegian state. The new centre included several religious and state institutions, but the Halle-mission was the most enduring. Its long-distance networks included scientists and collectors scattered across Protestant Europe to whom the missionaries in Tranquebar contributed a great amount of scientific specimens. These exchanges furnished the missionaries with honorary memberships of scientific societies in Europe and gifts of scientific literature and instruments (Hoppe, 2010, pp. 158–166; DNA, MisKol, box no. F39-7, letter no. 8; AFSt/M1C27:4; AFSt/M1C29b:17). The Halle mission's regional and local networks in Asia included connections to the Dutch Society of Arts and Sciences in Batavia (Bataviaasch Genootschap van Kunsten en Wetenschappen; Groot 2009, p. 101), to the Asiatic Society of Calcutta (AFSt/M1C33a:28), to doctors and naturalists of the English East India Company (EIC) such as Patrick Russell (1726–1805), James Anderson (1738–1809), William Roxburgh (1751–1815) and Benjamin Heyne (1770–1819), and to the Raja of Tanjore, Serfoji II (1777–1832) (AFSt/M1C31a:26; AFSt/M1H4:82; Nair, 2012, pp. xxix–xxx). In Tranquebar, the mission's scientific facilities included collections of botanical, zoological and entomological specimens (Nehring 2004, p. 221), a library with collections of scientific literature (AFSt/M1C33a:28; AFSt/M1C42b:90), and botanical gardens (DNA, MisKol, box no. F39-7, letter no. 33; AFSt/M1C29b:30). While

this revival took place in Tranquebar, the interest in science continued in the English Halle-mission, though only in some of the mission stations and with lower intensity (AFSt/M1B58:34; AFSt/M1B58:35; AFSt/M1B63:31; AFSt/M1B66:35; AFSt/M1B67:61; AFSt/M1B70:48; Nair pp. 75–76).

There appear to have been three main reasons for the revival of science in the third phase of the Halle mission. The first was the arrival of Linnaean science in 1768 with the new mission doctor and royal Danish-Norwegian botanical collector Johann Gerhard König (1728–1785, in India 1768–1785) (Hoppe 2009, p. 149). The second reason was the collection and trade in scientific specimens that took place in the Moravian mission, the other Pietist Protestant mission stationed in the Tranquebar territory between 1760 and 1803. The third reason was a new focus on Physico-theology as a tool for evangelization in the Halle mission starting around 1784 (Gröschl 2006, p. 1516, 1518).

Concerning the first reason, missionary C. S. John stated that König was the inspiration for his and his fellow missionary Johann Peter Rottler's (1749–1836, in India 1775–1836) work in science (AFSt/M1C31a:53; John 2006, p. 1486). However, König was not appointed by the mission's leadership in Halle, but by the *Missionskollegiet*, i.e. the Board of Missions under the royal government in Copenhagen. König was a student of Linnaeus and had worked as naturalist for the Danish-Norwegian government, and this was why centrally placed individuals in Copenhagen seized the opportunity to appoint him as both mission doctor and royal botanical collector in Tranquebar. Nonetheless, König left the mission again in 1774 and took up the position as naturalist for the EIC. At the same time, he gained the patronage of Joseph Banks, the powerful English naturalist and president of the Royal Society. In 1785, König died in the service of the EIC. It appears to have been through personal acquaintance with König and through his connections to the doctors and naturalists of the EIC, to Banks, Linnaeus and other European scientists that the missionaries John and Rottler developed their interests, skills and networks of science (Jensen 2018, pp. 188–198).

As to the second reason, the Moravian mission had their main station in Tranquebar from 1760 to 1803, much to the dismay of the Halle mission that viewed them as religious rivals. Seminal research by Thomas Ruhland has recently shown that in 1774 the Moravians started a commercial business of selling scientific specimens from India. It is highly likely that their collection activities started earlier. Until sometime in the 1790s, the Moravians supplied local and global European customers with thousands of specimens, primarily seashells, plants and insects. Among the local costumers were naturalists of the Halle mission such as Dr. König and missionary John, and among the global customers were prominent collectors such as Joseph Banks, Johann Christian Daniel Edler von Schreber (1739–1810, professor of Botany at the University of Erlangen, Germany) and Johann Hieronymus Chemnitz (1730–1800), the priest, conchologist and advocate for 'testaceotheology' (knowledge of God through molluscs). The Moravian mission also shipped specimens to the collection of art and natural history at their own academy in Barby, Germany, where several of their missionaries had studied botany, medicine and science more broadly. Thus, the Moravian approach to science was in many ways inspired by the Francke Foundations in Halle. As the Moravians mainly worked as commercial suppliers of scientific specimens, they were not credited in the aca-

Figure 4 Portrait of missionary Christoph Samuel John (1747–1813). Artist and year unknown. The Royal Danish Library, CC BY-NC-ND 3.0.

demic works that build on their collections. This is why previous research has misinterpreted their name *Societas Unitas Fratrum* as a group of botanists active on the Coromandel Coast, the so-called 'United Brethren' (Ruhland, 2017). On this basis, it seems likely that when missionary John in 1778 became interested in collecting and shipping scientific specimens as a possible source of income for the Halle mission and himself, the inspiration came from the Moravians (Hommel 2006, pp. 1118–1122).

The third reason for the revival of science in the Halle mission may have been the new focus on Physico-theology introduced by missionaries John and Rottler around 1784. Physico-theology, also known as Natural theology, was a type of theology that focused on the knowledge of God drawn from the "book of nature", i.e. based on ordinary experience of nature, in contrast to the knowledge of God contained as revelation in the "book of scripture", i.e. based on scripture and/or religious experiences. This branch of theological rationalism attained great significance in seventeenth and eighteenth century Europe, especially in England, Germany and the Netherlands (Vidal and Kleeberg 2007, pp. 381–382).

Physico-theology was not opposed to the Linnaean approach to natural history (Glacken 1976, p. 505). In fact, Linnaeus supported Physico-theology and so did König (Hoppe 2009, pp. 145–146). John's turn to Physico-theology was connected to his reading of European physico-theological literature around 1784, but both his and Rottler's interest in science appears to long predate their arrival in Tranquebar. On his outbound journey to India in 1770, John visited the shell collection of J. H. Chemnitz in Elsinore, Denmark, whom he later corresponded with (AFSt/M2E34), whereas Rottler on his outbound journey in 1775 visited the prominent natural history collection of apothecary Johann Heinrich Edler (?–1782) in Lübeck, Germany (AFSt/M1H8:69).[6]

As mentioned, John perceived Physico-theology as a tool for evangelization. Yet, in the Halle mission evangelization took place in two spheres: in the mission schools and outside the mission, in the mission field. In the schools, science had been part of the curriculum of religious instruction since the beginning of the century, just as in Halle (Liebau 2008, pp. 330–332). From 1784 and onwards, this effort was intensified in order to teach Physico-theology with the application of European scientific instruments such as globes, maps, microscopes, telescopes, thermometers, air pumps, and an electricity machine (DNA, MisKol, box no. F39-7, letter no. 8). In Halle, such instruments had long been used for teaching science, but in the mission instruments had only been used for research, not for teaching (Müller-Bahlke 2004; Peterson 2004. On instruments for research in the mission see: AFSt/M1B4:43; AFSt/M1B4:46; AFSt/M1B1:18; AFSt/M1B4:72; ALMW/DHM6/10:47; AFSt/M1E1:4). In the mission field, the same instruments were now employed, but here the use of science for evangelization was new. Accordingly, it seems that the use of science in the mission field was an extension of a longstanding practice in the mission schools, but that the application of *instruments* was new in both spheres.

Regarding the application of scientific instruments in the mission field, recent research by Trepp and Hoppe has pointed out that the audience, or target group, for experiments with such instruments was mainly high caste Tamils (Trepp 2010, p. 249; Hoppe 2010, p. 149, n. 31). This observation is interesting because generally the Halle mission's target group for evangelization was the lower rungs of Tamil society (Bugge 1994, p. 60). Nevertheless, there was at least one important scientific 'instrument' – or facility – which was not intended to attract only high caste Tamils. This was the botanical gardens, the first of which was constructed by Rottler in 1785 (DNA, MisKol, box no. F39-7, letter no. 33; AFSt/M1C29b:30). A few years later, in 1789, John argued that the purpose of a botanical garden was to bring together not only plants from all parts of India but also people from all walks of life, and that should be a place of entertainment and education for the Tamil population (Anonymous 1789, pp. 15–17, 38–43; AFSt/M1C30c:24). Accordingly, even if the audience for experiments with microscopes, air-pumps or electricity machines in the mission field were indeed often high caste Tamils, the mission's efforts to teach Physico-theology to the Tamils appear to have been a wider concern and not restricted to the elite.

As mentioned in the beginning, Trepp has suggested that during this physic-theological phase in the mission *nature* became an apparently neutral medium of intercultural translation between the missionaries and the Tamils

[6]Other members of the mission also visited Edler's collection on their outbound journeys, namely missionaries J. W. Gerlach and C. Pohle, merchant W. D. Becker and Mission Doctor J. D. Martini. AFSt/M1H6:56. Edler's collection is described in Anonymous, 1782.

(Trepp 2010, p. 252). This is interesting in relation to the missionaries' use of air pumps and electricity machines specifically because these two kinds of instruments had been essential in Europe in making science into a public and less sensitive domain than that of religion, a domain where people with opposing opinions could meet and discuss (Brooke 2003). It is not clear if the missionaries were trying to replicate this effect in India.

What is clear, however, is that in this third phase of science in the mission, European and Tamil knowledge of nature were not perceived as equally valid any more. Missionary John's and Rottler's adherence to Linnaean taxonomy, which is abundantly documented, seems to have excluded the validity of other ways of ordering nature (Hoppe 2010), even if the technology of double listing in indigenous languages and Latin was continued (Trepp 2010, p. 252; Jensen 2018, pp. 204–205). The change in perception is also visible in the missionaries' attitude to the skills of Tamil informants and helpers, which seem to have become increasingly negative (DNA, MisKol, box no. F39-9). One reason for this was the new Linnaean criteria for how to conduct scientific investigations in the field. In the first phase, the missionaries had left the travelling, the search for and collection of specimens to their Tamil employees and informants, while they themselves had taken care of describing and ordering data and specimens – what I have called the *resident* mode of science. Now, in the third phase, the Linnaean criteria required the trained scientist to travel around and engage with nature directly, *in situ*, in order to describe the specimen with all taxonomical details (Hodacs 2011, p. 186). As the Tamil employees and informants generally were not trained in Linnaean field methods, the missionaries generally did not trust them to collect the specimens correctly. Even the few Tamil pupils who had in fact received some training in Linnaean field methods were not expected to perform as well as the mission's European students (AFSt/M1C33a:87; Hommel 2010, p. 186).

The *itinerant* Linnaean mode of field science had been introduced in the mission by Dr. König. His attitude to local informants and their knowledge had also been ambivalent. On the one hand, he felt that indigenous people could not be trusted with the task of collecting because they did not have the (Linnaean) skills needed, yet on the other hand, he was very interested in local knowledge regardless of what ethnic group it came from (Jensen 2018, pp. 198, 200–203). It was only after König had died in 1785 that the Halle missionaries began to take up the itinerant mode and travelled through the region from Madras in the north to Ceylon in the south while collecting scientific specimens [Hoppe 2010, p. 158 (n. 56), 160 (n. 67)].

Another and more general reason why the Tamils were no longer expected to be able to carry out science as accurately as Europeans appears to have been the increase in *Orientalism* in late eighteenth century colonial India. Orientalism was the view among Europeans in India that Indian culture had declined since its high state in antiquity and that the contemporary Indian culture, society and people were mired in an incapacitating darkness of superstition and despotism (Trepp 2010, p. 255). This view was promoted by the Asiatic Society of Calcutta (founded 1784), with which the missionaries developed connections in the early 1790s. In 1793, missionary John was granted an honorary membership of the society (AFSt/M1C33a:28; AFSt/M1C39a:19; DNA, MisKol, box no. F39-8, letter no. 11; Anonymous, 1801, p. 428). Still, the missionaries also developed ideas and plans of how to bring the Indians out of this alleged darkness by educating them. One of the proposed tools for such education was the deployment of scientific instruments (Liebau 2006d).

To sum up, the third phase of science in the Halle mission was characterized by the Moravian mission's activities in science and a new focus on the connected phenomena of Linnaean science and Physico-theology. By the extension of the application of scientific instruments from the schools to the field, the missionaries tried to utilize science as a medium for intercultural translation between themselves and the Tamils. However, this medium was also inevitably a conduit for a flow of European science into India. At the same time, the reverse flow of scientific information *from* India *to* Europe was increasing, yet it was now filtered through the prism of Linnaean taxonomy and Orientalist perceptions of the skills of Indians. Consequently, it was largely stripped of indigenous narratives.

6 Conclusion

This paper has explored how the perception and utilization of scientific knowledge in the Halle Mission developed during the period 1706–1813 in three phases. In

particular, I have focussed on how science was employed as a medium of transcultural translation, as a less sensitive 'zone' of interaction through which the missionaries could approach the connected but much more contentious domain of religion where their ultimate goal of conversion was situated.

The first phase from around c. 1709 to c. 1745 was one of pre-Linnaean science in the Danish branch of the mission in Tranquebar. The missionaries here employed a resident mode of field research working with Tamil informants and employees of the mission to collect scientific knowledge, while at the same time using a linguistic and ethnographic approach to integrate Tamil taxonomies and knowledge with European knowledge, and thus translate them for Europe. Accordingly, in the first phase science in the mission did function as a medium of intercultural translation – a medium that viewed Tamil scientific knowledge as equally valid as European. However, even though the mission station in Tranquebar became a 'node' in a circulation of knowledge with Europe, the main flow of information, like the direction of the translation, was *from* India *to* Europe.

In the second phase from c. 1745 until around c. 1765, the scientific activity in the Halle mission relocated into the English branch. In this less active intermezzo in the development of the mission's scientific activities, the role of science as an intercultural medium of translation is not clear. It appears that the scientific specimens shipped to Europe during this period was in fact stripped of indigenous narratives and thus did not retain the capacity to translate culture.

The third and last phase from c. 1765 to c. 1813 saw a revival of science in the Danish branch of the mission. This great expansion in scientific activity was caused by the introduction of collecting scientific specimens in the Moravian mission, of Linnaean taxonomy and the accompanying itinerant field methods, and of Physico-theology as a tool for evangelization. The missionaries now employed scientific instruments as media for intercultural translation and interaction, but the perception of equality between Tamil and European knowledge had gone. Linnaean science was now the only valid categorical and methodological norm in the mission. The flow of scientific information *from* India *to* Europe continued, yet it was information stripped of indigenous narrative. At the same time, the application of scientific instruments as media of intercultural translation constituted a reverse flow of scientific concepts *from* Europe *to* India. In other words, in the third phase of science in the mission Nature still did function as a medium of intercultural translation. However, as it was filtered through the prisms of Linnaean taxonomy and orientalist perceptions, it was not neutral.

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