# INTRODUCTION

## Indigenous Knowledges and Colonial Sciences in South Asia

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**Abstract**

What do we mean when we use the category "indigenous knowledges"? What do we mean when we speak of "colonial sciences"? This Introduction briefly examines these questions in order to provide a context for the collection of articles presented in this issue on the making of the sciences in colonial South Asia. In doing so, it also addresses related questions: The translation of terms—does the Sanskrit word śāstra correspond to the English science? If not, what does each word mean? And the differences that arise when categories move across disciplines—development studies scholars use the term indigenous knowledges for the knowledge-forms of the original inhabitants of a territory; historians of South Asia and historians of science use it to refer to older forms of knowledge lost to colonial rule.

The contributors represent very different disciplines—anthropology, history, history of science and philology; and bring a variety of methodological approaches to the questions they address. They cover a chronological span stretching from the eighteenth to the twenty-first centuries, and address different subjects: the use of technical vocabulary in Sanskrit mathematical astronomy, astrology at universities in Banaras, the making of the *Hindi Scientific Glossary*, botanical knowledge-making in East India Company India, the philological practices of Vaidyas in Bengal, and Ayurvedic pedagogy in today's Kerala. A common thread joining the essays appears in the role played by philology in practices as different as the naming of plants, the making of procedural medical knowledge in a gurukula, and the editing of Ayurvedic texts in the context of an expanding print culture in nineteenth-century Bengal.

**Keywords:** South Asia, indigenous knowledges, colonial sciences, knowledge-making, translation, philology

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This Special Issue originated in the papers presented at a workshop held at the Max Planck Institute for the History of Science, Berlin, in 2016, "Colonial Sciences and Indigenous Knowledge Systems in South Asia". The aim of the workshop, besides creating an event entirely dedicated to the history of the sciences in South Asia, was to bring together scholars – historians of science, anthropologists and Indologists – who don't usually engage across disciplinary divides, to explore whether productive conversations were possible in spite of differences in methodological assumptions and approaches. And to help locate the points of intersection of literatures taught in departments as disjunct from each other as South Asian Studies and History of Science.

Early versions of some essays were presented at the Berlin workshop; others were commissioned for this Special Issue of *South Asian History and Culture.* The workshop was organized around three connected questions: What do we mean when we speak of "indigenous" knowledges in South Asia? What changes were produced in such knowledge forms and their associated practices with the onset of colonial rule? What do we mean when we speak of "colonial science" in South Asia? The contributors address these questions in their essays through a variety of methodological approaches, covering a chronological span stretching from the eighteenth to the twenty-first centuries.

The process of putting the essays here through double-blind review revealed exactly how difficult conversations across disciplines can be; and displayed the dissonance that historians committed to producing histories of the sciences as socially and culturally embedded knowledge feel, when asked to evaluate writing that follows a different, culturally neutral path to the transmission of knowledge. This is particularly the case with the "culture-neutral" historiography of the exact sciences inspired by Otto Neugebauer and David Pingree, a version of which is represented by our first essay. A second interesting tension appeared

when Indologists were asked to consider an ethnographer's reflections on the meaning of philology as a practice in twenty-first century Ayurveda. Indologists are trained to study ancient texts, chart their lines of descent through critical reading, compare and restore them, but not necessarily to consider the experience of classical texts in the daily life of a practitioner of a modern Indian profession.[1] The last essay in this collection analyses just such experience in a gurukula in Kerala.

Discussions of philology appear in all the essays, either as the central subject addressed, or obliquely at the margins. Global interest in the discipline has been reviving over the last decade or so; and at least two monographs and a clutch of essays have appeared on philology and philological practices in South Asia, so it is as well to say a few words about the fortunes of this form of knowledge within South Asian studies.[2]

Readers may recall an article by Sheldon Pollock in which he gave us his now-famous definition of philology as "the discipline of making sense of texts".[3] The capaciousness of that definition covers a variety of textual interventions across time and space—reading practices, forms of scripturalization, lexicography, mnemonics, manuscript studies. It has been sharpened by Whitney Cox, whose recent monograph on Indic philology insists, first, that the texts with which a potential philologist concerns herself be *prior* and *plural*—logic and necessity demand the epistemological backing of a collection of pre-existing texts for the philologist to carry out her exegesis; and second, that philology, as a technique be understood as a form of *virtuoso* reading, methodical, self-aware, and performed *in public.* This tightened definition, according to Cox, should act to check the tendency to collapse philology into just reading.[4] He goes on to provide examples of techniques of textual study, exegesis and reading in different social and institutional contexts in premodern south India, which he calls "modes of philology."[5]

But Pollock goes further—he meditates on what it means "to live one's life philologically", to use the philological practice of making sense of texts to fashion our moral and political lives.[6] In the final section of his article, on the philology of politics, he muses on what philology means as a modern academic discipline, and what its methods of "reading well" and "reading for meaning" can teach us as political actors. His exemplar is the late Edward Said, whose important contribution, he says, was "to read politics philologically, by demonstrating how the text of a political problem has been historically transmitted, reconstructed, received or falsified."[7] For Pollock, Said was not alone in reading for meaning. A host of premodern and early modern thinkers, including some in India, knew how to do this in their own way, reading carefully and critically for the truth, while showing to others the hospitality of "friendly, respectful spirits trying to understand each other".[8] The urgent necessity for such reading (and doing) in today's India will not escape the reader.

Consider the title to our issue: Indigenous Knowledges and Colonial Sciences in South Asia. To canvass the notion of "indigenous" knowledges in South Asia can be to deny the processual in the making of cultural objects; and to reinforce (however unintentionally) the claims made by the dominant ethno-nationalist projects at work in the region today. Some years ago, Pollock pointed out the problems attached to the concept of indigenism. Pressing his case for the historicity of cultural change, he summoned persuasive evidence to make his argument for the flow of cultural objects that permitted the developments we now regard as foundational markers of historical epochs. "The public display of royal inscriptions that began with Aśoka in the third century B. C. E., as well as his very idiom of rule, were borrowings from Achaemenid Persia; political inscriptions in Sanskrit began at the court of Śaka newcomers from western Asia. We have seen that an Indian called the "Lord of the Greeks" invented Indian astrology by translating a Hellenistic horoscopy into Sankrit in the

mid-second century…"[9] The closing paragraphs of the section of his chapter on Indigenism are salutary:

> From whatever vantage point we look, if we are prepared to look historically, civilizations reveal themselves to be processes not things. And as processes they ultimately have no boundaries; people are constantly receiving and passing on cultural goods. No form of culture can therefore ever be "indigenous"; that term, it bears repeating, is only the name we give to what exhausts our capacity for historicization.[10]

Against the bracing clarity of such historical reasoning, consider another use of the term "indigenous knowledge" for the knowledge borne by the original inhabitants of a territory as broadly defined—Adivasis in India, First Nations in Canada—which appears in the research of scholars of development studies working on the countries of the Global South. In an early intervention, Arun Agrawal, noted the problems with using the term "indigenous knowledge" to mark a divide with "scientific knowledge".[11] The rise of advocates of indigenous knowledge—"*neo-indigenistas*" is Agrawal's term for them—as a response to the failure of mid-twentieth-century theories of development and the withdrawal of states from centralized planning initiatives, while a welcome development for him, also exposed a slew of contradictions in the claims made for the substantive, epistemological and methodological differences between indigenous knowledge and scientific knowledge by *neo-indigenistas*: indigenous knowledge-forms are just as likely to generate abstractions and universalising conclusions as "western" science; and they can be just as systematic, objective, analytical and liable to change as science.[12] *Neo-indigenistas*, Agrawal argues, in their attempts to conserve indigenous knowledge, unfortunately advocate the same methods of documentation and storage, centralization and bureaucratization, which mark "western science". This problem is born of their non-recognition of the relationship between power and knowledge, he says, which allows them to recommend the reproduction of modes of elite control in preserving indigenous knowledge, which they should be fighting. Agrawal himself noted, though, in an article written fifteen years later, that the qualifiers indigenous and scientific when used in

conjunction with knowledge, even if representing "conceptual formations that are internally fractured and categorically indistinct", nevertheless represent a potent summary of the concerns and hopes of those who wish to protect vanishing resources and ways of life.[13]

A more recent analysis of the concept of "indigenous knowledge", by Dhruv Raina, exploring the genealogy of the term and its widening academic canvas, argues that the term and associated concepts such as indigenous science, possess a contestatory force, and operate at a meta-theoretical level in social history, and histories and theories of knowledge.[14] Its illocutionary force serves as a warning to anthropologists and indigenous rights activists of the violence that attends the dispossession of indigenous peoples' lands and cultural property. And its use makes the case for forms of knowledge and practices internal to the target societies as the basis for sustainable development. Its career within the disciplines of history and the history of science, says Raina, has been different – it's often used to refer to pre-colonial forms of knowledge, the old-world knowledges lost to colonial rule, and can, if used without caution, become "a euphemism for a cultural nationalism opposing Eurocentrism."[15]

"Indigenous knowledges" is used here primarily (and pragmatically) to mark a *chronological* divide—between the thought worlds of South Asia before and after the arrival of European colonialism. Our contributors are aware of the need to probe and historicize the precolonial realities that colonialism changed, even as they recognize that an epistemic break occurred with the onset of colonial rule. They are also aware, as Caterina Guenzi shows in her essay, that the notion of indigenous knowledges, which Raina reasons can act powerfully to contest knowledge and development agendas set in the Global North, can be harnessed to develop other forces—for example, Hindu nationalist interventions in knowledge making and education.

It seems important to flag, given our current political conjuncture, that although our issue is slanted toward discussion of Sanskritic knowledge forms, we do not mean to imply

that such forms were preponderant in the pre-colonial period, or deliberately exclude

discussion of Persianate forms of knowledge, which were an integral part of the thought

worlds of the region.[16] We are aware, as Richard Eaton has argued, that much of **South**

**Asia's** history between 1000 and 1800 can be understood in terms of the "prolonged and

multifaceted interaction between the Sanskrit and Persianate worlds".[17] It is happenstance,

then, that the papers which make up this issue unite around a set of related themes.

The representation of colonial rule as a break or rupture is a familiar trope in liberal,

nationalist, and postcolonialist writing. But the really difficult task that theorists and

historians of colonialism face, according to David Scott, is how to critically interrogate "the

practices, modalities, and projects" through which "*the varied forms of Europe's insertion*

into the life of the colonized were constructed and organized"; or in other words, examine

what that rupture consisted of and how it should be understood.[18] Scott is interested in the

emergence, at a moment of colonialism's history, of a form of power, "*not merely coincident*

*with colonialism*", "which was concerned above all with disabling old forms of life by

systematically breaking down their conditions, and with constructing in their place new

conditions so as to enable—indeed so as to *oblige*—new forms of life to come into being."[19]

This insight is valuable in helping us understand the emergence of new identities among the

colonized—among Brahmin pandits, for example—as they negotiated the new spaces that

emerged within the colonial state in which they acted and through which they were acted

upon. The significance of Scott's theorizing will become clearer as I discuss the essays by

Cristina Pecchia, Caterina Guenzi and Charu Singh.

Our title also refers to the "colonial sciences in South Asia". Before turning to a

discussion of "colonial" sciences, though, it is appropriate to ask what the sciences meant in

precolonial South Asia, and if and how they map onto the English word "science". This is not

an easy question to answer. Some forms of systematic knowledge that existed in the

precolonial period across the region can perhaps be covered by the multivalent Sanskrit śāstra, a word with a wide semantic range.[20] Śāstra, a genre of writing oriented to practice, it has been argued, theorizes the relationship between "theory" and "practice" in a way that accords absolute privilege to theory, which *always* precedes and governs practice, there being no dialectical relationship between them. The implications for knowledge-making are that all knowledge is pre-existent, and progress can only be achieved through a "regressive re-appropriation of the past".[21] Such an understanding of the making of systematic knowledge it must be emphasised, was different from European notions of a *prisca sapientia*, the lost knowledge of the ancients, that Kepler and Newton among others, claimed to have recovered through their theories. Śāstric knowledge was never really considered "lost" – it was eternally existing knowledge that had to be correctly interpreted to produce successful practice. It has also to be distinguished from the relationship between theory and forms of empiricism indicated by the English signifier "science", redolent of the study of natural phenomena through observation and laboratory experiment. The historical contingencies and discursive moves, which produced this particular signified of the English "science" have been examined by a number of scholars.[22]

Śāstra it is also argued invoked an ideology of the relationship between language and science, which until the end of the first millennium, excluded the vernaculars as vehicles of scientific discourse. Epistemically speaking, grammatical correctness and truth were considered linked, making Sanskrit the only language in which reality (science) could be correctly communicated.[23] But that changed, at least in one corner of southwest India in the eleventh century, where a group of scholars, writing in a register of language called New Kannada, produced texts on useful knowledge and vernacular science.[24]

Eric Gurevitch introduces readers to a remarkable moment under the Western Cāḷukya rulers, Jayasiṃha II, and his son, Someśvara, in which the emergence of scientific

discourse—śāstra—in a vernacular language is analysed through an examination of texts whose authors deployed the notion of "worldly science" (laukikaśāstra) to create new working objects for the sciences. He uses the phrase vernacular science quite literally, to highlight the "linguistic aspects of sciences created in the shadow of a hegemonic language" (Sanskrit), but also to describe the compositional and editorial practices of poets who developed a novel scholarly programme for lokopakāram, knowledge useful to people, through which hitherto unsystematised knowledges—architecture, well-digging, agriculture, perfumery, cooking, medicine—were brought together with older genres such as astrology or divination.[25]

What concerns us here, though, is the shift to regarding the South Asian vernaculars as appropriate media for scientific knowledge making by British colonizers, who reorganized those vernaculars through European grammatical categories to create what have been described as "technologies of colonial rule".[26] This began a process that reworked the vernaculars to make them appropriate vehicles for the truths of the *European* sciences. Meanwhile, śāstric knowledge forms and their modes of reasoning were included within a narrative of the early stages of the development of scientific rationality understood as a universal phenomenon, which produced the apogee of the modern European sciences. Discussed in studies of nineteenth-century colonial pedagogy as "engraftment", the concept refers to the ideas and practices of two men, Lancelot Wilkinson, the political agent at Sehore, and James Ballantyne, Superintendent of the Benares Sanskrit College in the mid-nineteenth century. Both men believed that the superior claims to truth represented by the sciences of Europe had first to be taught to the pandits, before it could be widely disseminated in Indian society.

In Wilkinson's project, the astronomical texts of the Hindus, the siddhāntas, were presented as corresponding developmentally to European knowledge before the "scientific

revolution".[27] His challenge was to use these Hindu texts to demonstrate how European knowledge had developed onward from there.[28] Ballantyne at Banaras, tailored the engraftment of Western knowledge to suit Naiyāyika taste, in order to accustom the minds of the pandits to grapple with new subjects of inquiry. Thus, the Nyāya philosophical system was chosen as the basis for imparting knowledge of the divisions of European science to the pandits, as he explains in his essay "On the Nyāya System of Philosophy, and the Correspondence of its Divisions with those of Modern Science".[29]  The premise entertained, against the position of the Anglicists, was that the Hindu mind was *not* a tabula rasa, so the best way to ease it into the developments represented by European science was through serious engagement with the logic of Nyāya reasoning and its categories of analysis: "When the Hindús have only halted at a stage short of that which we ourselves have reached, we should rejoice in being able to present to them our superior knowledge as the legitimate development of what is true in their views, and not in the shape of a contradiction to anything that is erroneous."[30]

The experiment with engraftment produced divergent responses from the pandits exposed to it. Bapu Deva Shastri, trained at Wilkinson's school in Sehore, and then appointed Professor of Natural Philosophy at Benares College in 1842, became a vigorous participant in the formalized public arena of the Benares Debating Club, established in 1861. Here he went on to assert that ancient Hindu philosophers had indeed conceived of the earth as a movable body; and that Bhāskara, the twelfth-century mathematician and astronomer, possessed a thorough knowledge of differential calculus long before it was known in Europe. As Michael Dodson remarks, while Ballantyne's pedagogy proceeded upon the assumption that the development of scientific endeavour was tied to a specific intellectual genealogy, "Bapu Deva seems to have understood the knowledge presented to him rather as a reflection of that which could already be accounted for in the shastra". In other words, he viewed Ballantyne's

arguments through the lens of the relationship of śāstra ("theory") to prayoga ("practical activity") as normatively presented in Sanskritic texts. [31] Against such evident subversion of the intentions of engraftment, we could counter-pose the creation of what Brian Hatcher calls a "shastric modernity", born of a concatenation of "lived experiences, normative beliefs and evolving material practices".[32]

Accompanying Hatcher's notion of this modernity, is another concept, which he calls the "modern shastric imaginary", a dynamic field, a shared space of practice and imagination in which the śāstras served as a common denominator for those pandits trying to make sense of the forces at work in their time, by negotiating between existing modes of belief and practice, and the epistemologies and technologies introduced by colonialism. The shastric imaginary is conceptualized "not only in terms of ideas and beliefs but also in terms of material practices, technologies and institutions."[33] Translated into David Scott's language of governmentality, we could explain Hatcher's shastric imaginary as the effect of a new political rationality produced by the action of colonial power creating new conditions within which to operate. These new conditions, as already mentioned, disabled old forms of life in order to enable new forms of life to come into being.[34] In the case of Hatcher's pandits, new state-society relations offered some of them—Īśvarchandra Vidyāsāgar (1820-1891) and Rāmchandra Vidyāvāgīśa (1785-1845) to name two—the opportunity to speak in terms of the categories of late enlightenment improvement and reform. Vidyāsāgar and Vidyāvāgīśa were both happy to work with bhadralok intellectuals and Europeans in the cause of social reform, but keen to bring ancient Sanskrit literature into new patterns of reflection and argumentation to challenge the status quo.[35] Others were men who imagined their social existence differently, holding fast to old ways, but willing enough to make use of newly-introduced technologies if it suited their ends.

Gangadhar Ray, whom we meet in Cristina Pecchia's essay, becomes an involuntary participant in shastric modernity. A Vaidya, a member of an upwardly mobile caste that eagerly sought middle class status, Ray is usually presented in biographical literature as a traditionalist, who embraced print technology. Pecchia shows through her philological detective work, that such was not the case. She reads Ray's philological practice as a subtly expressed protest against the shastric modern, even as he helped to produce the authoritative texts that carried forward Ayurveda's "print moment". His social practices were nevertheless circumscribed by the new form of life—a public sphere in which print technology would greatly affect the circulation and communication of knowledge—which would make a return to older forms of subject constitution difficult if not impossible. This is beautifully illustrated by the apocryphal story that made Gangadhar the owner of a printing press with which he published his commentary on the *Carakasaṃhitā*, the *Jalpakalpataru.*

Hatcher's exploration of shastric modernity, let us note, is largely focused on understanding the differing responses of pandits to the possibilities of shastric-based social reform in Bengal. For heuristic purposes, he divides the working of the shastric imaginary into two divergent (though not completely discrete) imaginaries, with the Indian revolt of 1857 as the dividing line. The imaginary at work before 1857 is cosmopolitan, and after, nationalist.

> One of the distinguishing differences between these two imaginaries lies in the different valence and efficacy given to the Sanskrit language and the *shastras*. In the cosmopolitan imaginary shared by elite Hindu intellectuals in the first half of the century *shastra* represented both an intellectual resource (a kind of treasury of knowledge) and a sophisticated set of intellectual tools for doing intellectual work (that is tools such as rhetoric, grammar, logic and exegesis). This was the heyday of shastric-based reform and shastric-centred debate…By contrast, in the nationalist imaginary, *shastra* took on a more politicized valence even as it ceased to be a lens through which to address pressing questions. By the 1880s we begin to find *shastra* held aloft as a kind of banner with which to rally Hindus in defense of their religion and national culture. In the emerging nationalist imaginary, *shastra* would come to play an increasingly symbolic role in supporting "unified" conceptions of Hinduism.[36]

These claims may be true regarding responses to social reform. But as the papers by Charu Singh and Caterina Guenzi show, at two different modern moments, characterized by different social and political imaginaries, the shastric imaginary as an intellectual resource and a set of tools for making knowledge *in the sciences* persisted. The creators of the *Hindi Scientific Glossary*, faced with an intellectual impasse, resorted to the tools provided by a traditional education in Sanskrit. In the instances discussed by Guenzi, the holders of degrees in the new science of Jyotir Vigyan, whatever their views on unified conceptions of Hinduism may have been, used their training in jyotiṣa to respond to market demand by placing a reconfigured "Vedic" science at the service of New Agers and the Hindu diaspora in Europe and North America.  Or, in Scott's terms, the effects of the re-formation of subjectivities produced through the action of colonial power continue into the post-colonial present. A discussion of Singh's and Guenzi's papers follows below. But before turning to that, let's briefly consider the meaning of the phrase "colonial sciences".

In 1997, the anthropologist and historian, Bernard S. Cohn, who had made the study of colonialism and its forms of knowledge a focus of his research, observed that in coming to India the British not only invaded a territory, but an epistemological space as well.[37] Exploring that space required different kinds of translation, including linguistic and cultural-legal translation. Learning the local languages was a first step, in the course of which the British generated an enormous apparatus of texts, including grammars, dictionaries, handbooks, and translations of texts in Indian languages. The aim of this feverish textual production was, according to Cohn, to convert Indian forms of knowledge into European objects. Its success was evident in such examples as the English translation of the Sanskrit verse lexicon, the *Amarakośa*, by the orientalist, Sir William Jones (1746-1794). Jones's *Amarakośa*, discussed in Minakshi Menon's essay, transformed the familiar format of the premodern Sanskrit lexicon, of horizontally inscribed chains of words, into a vertical list of

widely-spaced Sanskrit "crude nouns" (uninflected forms of nouns, prātipadika-s) with an interlinear translation in English. The avowed intent was to create an unambiguous procedure for stabilising the link between Sanskrit words and the things they represented, as a first step to "knowing India better than any European knew it".[38] In this case, the *Amarakośa* served as a successful point of departure for Jones's orientalist descriptions of Indian plants, which combined Sanskrit names with Linnaean diagnostics. The resulting plant descriptions brought together two very different kinds of knowledge, to create a hybrid colonial science of naming and knowing plants.[39]

One way to understand the phrase "colonial sciences", then, is to think of different knowledge forms being brought together as part of the process of learning about the colonial milieu for purposes of resource extraction or governance. The social relations that underpinned such knowledge making, have been explained variously as characterised by domination, as dialogic, or by those interested in colonial governmentality as examples of the working of different political rationalities of colonial power.[40] We should note that the objects constructed by the colonial sciences were translated, sometimes transitional objects, produced by a colonial episteme that generated ideas of the progressive development of knowledge forms, and a civilizational hierarchy of knowledges with European knowledges at the top. This was particularly evident in the way languages were understood as media for scientific knowledge making. The complexity of a language, based on its structure, vocabulary, and grammar was thought to reflect the mental development and civilizational stage achieved by its speakers. Sanskrit, on this reckoning, was a language of great power, its antiquity and expressive capabilities placing it on a par with Greek and Latin as a "classical" language. Jones's orientalist encomium in the *Third Anniversary Discourse* conveys the idea well: "The *Sanscrit* language, whatever be its antiquity, is of a wonderful structure; more perfect than the *Greek*, more copious than the *Latin*, and more exquisitely refined than

either…"[41]  Ballantyne appeared to concur, insisting that the translation of European scientific knowledge into Indian languages begin with Sanskrit. And yet Sanskrit, it was argued, evidenced a lack of significant progression, its vocabulary too limited to convey scientific advances made in Europe.[42] As Jones declared in his *Second Anniversary Discourse*, as far as the sciences were concerned, "the *Asiaticks*, if compared with our Western nations, are mere children."[43]

The orientalist interpretation of Sanskrit and its knowledge systems as lacking equivalence with European languages and knowledge systems, continues to produce effects today. One example is the way modern historiographers of colonial science examine developments in South Asian astronomy by privileging the point of view of the colonizer. This is the claim made in the opening sentences of Kim Plofker's essay, the first in our collection. What would we learn, Plofker asks, if instead, we considered a Sanskrit knowledge system as our central representative of science? This becomes the organizing question for her essay, which examines the unity and continuity of jyotiṣa as a Sanskrit genre, while tracing the influences from non-Indic sciences in the course of its evolution.

Histories of the "exact sciences" diverge widely between writing attentive to the culture-specific nature of mathematical techniques and those that treat such techniques as culture-neutral. Plofker adopts a version of the second approach, first introduced by Otto Neugebauer, and then applied by David Pingree to Indic materials.[44] This is a method of "influences and transmissions", as Christopher Minkowski explains. I quote his observations at length below to provide a frame for Plofker's essay:

> The exact sciences approach tends to be culture-neutral. Or rather, it enables one to follow the history of certain mathematical techniques, which are posited to be culture-neutral, through and across cultures. The implication is that where the mathematical techniques travel, related items of science go as well. How the whole knowledge-system functions in any given setting is posed as a separate, though associated question.

> As such the approach can imply a form of pluralist understanding of the nature of humans and human society.
>
> The exact sciences approach does require a theory of translation or transmission; and it presents a vision of the entire Eurasian continent as a single zone of historical development. Hence it combines an understanding of the durability of scientific models and parameters with an understanding of the permeability of cultural or civilizational areas. Such a highlighting of continuity and of internal development as primary is at odds with many contemporary academic approaches to the history of science and culture, which are predominantly "externalist," and which focus on the embeddedness of cultural forms, their particularity, their historicism.[45]

The essay is structured as a series of connected vignettes, which represents the history of jyotiḥśāstra as developments in distinct though overlapping strands in its technical vocabulary and textual style. Thus, we have siddhāntic astronomy, a synthesis of Vedic calendric and predictive models and Vedāṅga texts, with the Hellenistic spherical astronomy and horoscopy of the Indo-Greeks; the encounter between siddhāntic astronomy and Greco-Islamic Ptolemaic astronomy from Arabic and Persian sources, which produced a new textual form, the Sanskrit koṣṭhaka/sāraṇī or numeric-array table-text, a popular genre of the second millennium; and the meeting of Indian astronomy and European heliocentric (or crypto-heliocentric) theories, c. 1700, which produced Sanskrit translations of Latin texts.[46] The core of the essay, its chief content, examines two moments within the second and third strands. The first examines how jyotiḥśāstrins adapted the use of diagrams from Greco-Islamic texts in Mughal-era astronomical manuscripts. The second, fascinating moment concerns the translation of Philippe de la Hire's *Tabulae Astronomicae* into Sanskrit by siddhāntic astronomers.[47] She ends with a discussion of a fourth strand, the period of nineteenth-century experiments in engraftment, when Lancelot Wilkinson laboured to return jyotiḥśāstra to the purity of the siddhāntas. Reflecting on this last development, she concludes that colonial attempts to recover the "classical" roots of Sanskrit astral science, to *remove* its longstanding adaptations to foreign views, contributed to its destruction.

Plofker's essay is a field report on research in the Sanskrit mathematical sciences rather than a fully-contextualized examination of technical material, which is still understudied and difficult to problematize. It shows the high level of difficulty confronting scholars who decide to study the Sanskrit exact sciences, while providing entry points to historicize an "indigenous" form of knowledge, which the Hindu Right today proudly claims as a "Hindu" science.

Caterina Guenzi's essay, also on the Sanskrit astral sciences, represents a sharp methodological departure from Plofker's. Here, a combination of ethnography and close reading of texts succeeds in constructing a long view for shastric modernity. Guenzi claims that usefulness is the value that established the legitimacy of knowledge of the astral sciences. And provocatively asserts that "from colonial times to the present, debates about teaching *jyotiṣa* in Indian universities have been more likely to centre on the question of displaying or discrediting its usefulness than on proving or disproving its truth." The significance of the paper lies in its analysis of a crucial epistemological shift that occurred in post-colonial India, as canonical jyotiḥśāstra transformed into "Jyotir Vigyan", a supposedly modern science based on empirical observation. How did it occur? And why?

The story begins in 1791 with the founding of the Benares Sanskrit College by Jonathan Duncan, and the teaching of jyotiṣa to its students. Jyotiḥśāstra then comprised an epistemologically composite field of knowledge, including mathematics (gaṇita), astronomy (siddhānta), astrology (phalita), and divination (saṃhitā). As a Vedāṅga, it was regarded, not as a product of divine revelation, but a subordinate knowledge form intended to guarantee the correct performance of Vedic rituals. Guenzi notes, though, that Duncan made no mention of astrology or divination when he described the teaching of jyotiṣa at the College, as the study of "Astronomy, Geography and pure Mathematics". Jyotiṣa continued to be taught at the

College without remark and emerged, along with grammar, as one of the two most popular subjects among the students.

The first change occurred in the 1830s, the decade of Macaulay's notorious Minute, and the beginning of Wilkinson's experiments with engraftment to introduce the European sciences as Useful Knowledge to the natives. It was then that College supervisors registered a troubling fact: the students who studied algebra and astronomy did so to use their knowledge for astrological computations. A College pandit, questioned about this disturbing development, bluntly pointed out that astrology provided the College's graduates with a livelihood, which the study of the siddhānta-**s** on their own did not – astrology was useful knowledge, if not Useful Knowledge. This moment of epistemological fracture intensified and extended, when the teaching of astrology at the Sanskrit College was formally banned in 1845, not to be revived until the founding of Banaras Hindu University (BHU) in 1916, by Pandit Madan Mohan Malaviya.

Malaviya's nationalist dream of bringing the Sanskrit śāstras and the European sciences together at BHU tried to leverage the epistemological duality that jyotiṣa displayed. BHU was to be a university where the "ancient wisdom and culture of the Hindus" could be assimilated to European science and technology. The institutional manifestation of the project appeared at the College of Oriental Learning, where jyotiḥśāstra was taught together with European astronomy and mathematics as a single course. It failed to take, however –  there was a shortage of students – and soon the College of Oriental Learning was merged with the College of Theology to become today's Faculty of Sanskrit Vidya Dharma Vijnan ("Sanskrit Studies and Religious Sciences").

Moving on to our day and the teaching of astrology in Indian universities, Guenzi addresses the Bharatiya Janata Party-led government's efforts from 2001 to promote the creation of Vedic astrology – Jyotir Vigyan – departments.  That year, the University Grants

Commission (UGC), the government body that oversees higher education in India, published a circular that noted the "urgent need to rejuvenate the *science* of Vedic astrology". The reconstructed field of Vedic astrology as modern science, a systematic form of knowing, helped reinforce the BJP's saffronization of education; but it was also a hard-headed practical response to market demand. The brisk sale of astrological services and products in India, and the demand for commodities labelled "Vedic" among both New Agers and the Hindu diaspora in Europe and North America, made it imperative that astrologers receive institutionally certified training, and astrology as useful knowledge be standardized.

Guenzi's ethnography of the making of the new science of Jyotir Vigyan takes us into classrooms and offices at BHU, and the Sampurnanand Sanskrit University, and captures students and faculty performing their twenty-first century versions of the shastric modern. Astrology, usually the preserve of Brahmin men, is widened to include women and men of all castes, though its practice largely continues to remain with male Brahmins. Well-trained students now aspire to fill positions as dharam gurus (religious teachers) in the army, work abroad for the Mahesh Yogi Foundation, or find employment in companies that require expertise in vāstuśāstra. University faculty, meanwhile, run well-funded research projects that examine how to apply divinatory treatises to modern agriculture; or assist the growth of medical astrology, a field in which the prognostic techniques of the modern astral sciences are placed at the service of biomedical diagnostics – planetary configurations are said to reliably indicate the appearance of pathological agents, and horoscopes are studied to indicate the statistical probability of breast cancer in women. Her research reveals the quotidian labour that goes into widening the base for the outré claims made by saffronistas at venerable fora such as the Indian Science Congress, and reported by an incredulous Indian press. And shows us the consequences of remaining silent as "Hindu" science education continues to grow.[48]

Around the time Malaviya was imagining a university where the Hindu śāstras and the **European** sciences could be brought together, the Nagari Pracharini Sabha, a literary society in Banaras, published the *Hindi Scientific Glossary*. The *Glossary*, the subject of Charu Singh's paper, was part of a historical departure in the making of India's vernacular languages. In the late nineteenth century, languages began to be seen as foundational for new assertions of collective identity, and the *Glossary*, published in 1906, was a part of that key moment, in which regional "mother tongues" emerged. This was a shift, as Lisa Mitchell explains, writing of Telugu, through which a new perspective on language arrived. "In the nineteenth-century, languages and their vocabularies, literatures and audiences were increasingly assumed to exist as independent but parallel domains, rather than as intertwined with and complementary to one another within a single linguistic context."[49] Specialized glossaries had been made before in South Asia, but the making of the *Hindi Scientific Glossary* represented a new kind of activity, a reckoning by increasingly self-confident Indian elites with a colonial episteme that represented Indian languages as inadequate vehicles for the verities of European science. [50]

As the editor of the *Glossary*, Syam Sundar Das, understood, it was also new activity in another sense. "Words were but thought germs", he noted, signalling his awareness that a language grew organically when it crystallized experience through naming.[51] The makers of the *Glossary*, however, were confronted with an epistemic bind peculiar to their colonial context: they had to move *already existing* bodies of knowledge made in European languages—the germs of experience captured in English, French or German—into an Indian vernacular language. Das evocatively addressed the quandary in his English Preface:

> Patanjali says in the Mahabhasya, "No one goes to the house of the grammarian and says "Make words, I will use them" [.] But the present needs of India compel the Indians to falsify the statement of their much respected sage. The literary public has now come to the Nagari-pracharini Sabha, and has said "Make words, we will use them to revive and enrich our moribund and poor vernacular literature and make it powerful for the

service of the Indian people by translations, reproductions and adaptation from the valuable works and ideas of the rising Western nations." This glossary is the result. Some have criticised this action of the Sabha rather adversely. They say that we were practically placing the cart before the horse by beginning at the wrong end. True it is that a language cannot be created. It creates itself.[52]

Singh's essay ably captures the pride of the Nagari Pracharini Sabha's language activists, as they set to work and produced a glossary of technical terms, which was conceived and executed entirely by Indians, at a time when few Indians had access to a scientific education or could aspire to scientific careers. The organizing trope for her analysis of the process of creating the *Glossary* is translation, understood as "epistemological crossing".[53] How do you move knowledge made within one linguistic-epistemological community to another with very different knowledge-making practices? Is it possible to create equivalences between words and meanings in different languages? Can you create equivalence at the level of the word? If so, how?

The gist of her argument, inspired by Lydia H. Liu's classic study, *Translingual Practice*, and Marwa Elshakry's more recent research on translating Darwin into Arabic, is that linguistic equivalence is never a given.[54] It has to be constructed word by word. The translation of terms is a contingent process, the creation of equivalences occurring within a field in which debates and reformulations lay bare the linguistic, epistemic and socio-political hierarchies at work in the act of translation. That contingency is made apparent in the second section of Singh's paper where she examines translation in action. The outcome of the *HSG* translators' actions was never a given, even though the end product, the *Glossary*, ironically enough, consolidated aspects of the colonial episteme.

Making the *Glossary* involved multiple stages and procedures, which reproduced British insistence on due process. A set of committees superintended each stage. Syam Sundar Das, recounted the names of a multi-lingual crew of Indian literati chosen as advisers and translators, in the absence of trained scientists – T. K. Gajjar, who set out to produce a

vernacular thesaurus of Gujarati and Marathi technical terms, Madhav Rao Sapre, a reputed writer in Marathi, the members of the Bangiya Sahtya Parishad, which had published its own list of technical terms, and eminent Sanskrit scholars, Sudhakar Dwivedi (1860-1910) and Mahavir Prasad Dwivedi (1864-1938). This glossary was to be authorised by the authoritative voices recorded in its production.

To help us understand the process of creating equivalence between English and Hindi, Singh takes up a single case, that of chemistry, and the construction of tentative terminologies for its technical terms. The translator in this case was a university graduate, one Thakur Prasad, whose *Chemical Terminology* presented the *Glossary's* public with an intermediate list of names. It is in following his tactical choices of words that we see how translation, transliteration and inter-vernacular resonance worked in practice. The editors who revised Thakur's translations, however, undid his work in one fell swoop. His translated names for elements vanished, replaced by English names in transliteration, as did his lengthy explanations of the logic of naming. The result? "The multiple stages, multilingual resonance and play of publics in the Sabha's lexicography became, in the final form of the glossary a bare list. In the methodically produced modern lists of the *HSG*, the authority of science was rendered mostly through the authority of Sanskrit neologisms." These are the concluding words of Singh's essay, and they leave us with critical questions to reflect upon.

Why, for instance, did intellectuals of the period decide that glossaries were the most suitable genre for assimilating modern scientific knowledge into the vernaculars? And why did the *Glossary's* makers, having created multiple stages to perfect their practice, including consultations with experts in vernacular languages, resort in the end to the authority of Sanskrit?  On the first question, Singh suggests that the influence of the famous Bengali savant, Rajendralal Mitra, who had produced a scheme for composing glossaries as a way to transfer European scientific terms into the vernaculars, may have been responsible. This is

very possible. But a second reason, too, may have been at work. Any male child of the twice-born castes undergoing a traditional education at the time, would have begun his formal studies by memorizing the Sanskrit verse lexicon, the *Amarakośa*. What could have been more natural for the upper-caste men who made up the *Glossary's* various committees than to turn to the culturally familiar mode of learning word meanings through glossaries and lexicons? Or to create Sanskrit neologisms to consolidate the authority of the *Glossary*? [55] The thought-world of these men, their "shastric modernity", is evident in Singh's example of Thakur Prasad, the translator of the *Chemical Terminology*, choosing to translate Bromine as "*brāhmiṇa*" rather than "*aruṇaka*" (bright), because of the word's connection to the god Brahma and his red complexion ("*brahman*" is the first of Brahma's epithets in the *Amara*). We could also read the return to Sanskrit as a demonstration of the recursive power of the colonial episteme and its orientalist hierarchy, which privileged Sanskrit and its knowers as civilizationally superior to other natives; and which the *Glossary's* compilers, all men of the upper castes, helped to perpetuate.

Lexicographical and philological practice is also the subject of the next paper, which studies the botanical knowledge making of the eighteenth-century British orientalist, Sir William Jones (1746-1794). Minakshi Menon analyses the most famous of Jones's botanical essays, on the spikenard of classical antiquity, in which he demonstrates the uses of philology for fixing the identity of plants described in ancient texts. The European botanists of Jones's day usually followed the nomenclatural protocols laid down by Carolus Linnaeus in his *Philosophia Botanica* (1751) and *Species Plantarum* (1753) in naming plants. Linnaeus named plant species in different ways, sometimes to signify their essential character, often after fellow botanists, or his patrons. Naming plants after collaborators had the advantage of strengthening his social relations, and expanding his authority in the republic of botany, but

such names conveyed little or no information to botanists about unfamiliar plants, working only to recall plants already familiar to them.

Jones pointed out that Linnaean plant names had no purchase in a colonial milieu such as India– they conveyed nothing at all to native auditors. As an orientalist, his recommendation to fellow botanists was to learn the Indian names of plants, preferably in Sanskrit, "because a learned language is fixed in books, while popular idioms are in constant fluctuation, and will not, perhaps, be understood a century hence by the inhabitants of these *Indian* territories, whom future botanists may consult on the common appellations of trees and flowers [.]"[56] His source for Sanskrit plant names, as already mentioned, was the *Amarakośa*, and it is with its list of plant names in hand that Jones wrote his botanical essays.

To make his case, Jones chose the example of the spikenard, a commercially valuable plant, the best sort of which was thought by classical commentators to grow in India; and which Linnaeus identified as a grass, and placed among his polygamous plants in the genus *Andropogon.* The key point made in both essays, through careful philological reasoning— Jones uses philology to mean both the study of languages and the study of manuscripts—is that the *Indian* Spikenard, the nard of the ancients, is not a grass, but a thing, a plant-part or the ingredient in an unguent without a clear identity in Linnaean terms. Fixing its botanical identity meant following its names in Sanskrit, Persian and Arabic, until word and plant-part were finally brought together in both Sanskrit and Arabic. The Sanskrit jaṭāmāṁsī and the Arabic sunbul, Jones was able to show, were one and the same object. Establishing the jaṭāmāṁsī's Linnaean identity, however, required a second step, trained seeing (*autopsia*).

By the early eighteenth century, observation as a form of disciplined experience had emerged as an epistemic category in Europe.[57] It was explicitly linked to *autopsia*, and as a natural knowledge-making practice was marked by special ways of seeing carried out by knowledgeable people in specific circumstances. Making exact observations of natural

phenomena meant focusing both the eye and the intellect on the separate parts of the natural object in question, and confirming its status through repeated observations over time. And if possible, getting the details you observed confirmed by other observers.[58] Botanists were particularly skilled at teasing out fine details of plant habit through attentive scrutiny. Jones's success in identifying the jaṭāmāṁsī as a *Valeriana—Valeriana jatamansi* Jones—was a mediated process, vitally dependant on the observations and the drawing of the plant made by his friend, Mr. Burt, as was its later identification by William Roxburgh, the Superintendent of the Calcutta Botanic Garden.

Jones's philological, evidentiary reasoning and observational skills came together to produce a method for botanical knowledge making, which Menon calls "philological empiricism". Modern philologists, too, are adept at similar forms of reasoning about manuscripts and printed books, to determine provenance, authorship, or period of composition, as Cristina Pecchia demonstrates in her paper on Gangadhar Ray's edition of the *Carakasaṃhitā*.

Pecchia's research is undertaken at a time when interest in philology is high in the academy, and Sheldon Pollock's definition of philology has sparked imaginative re-thinking of its meaning in the Indian milieu. The focus of her essay is the philological practice of the eminent Bengali vaidya, Gangadhar Ray Kaviraj (1798-1885), who worked assiduously to transmit the textual heritage of Ayurveda in the nineteenth century. She throws Gangadhar's philology into high relief by comparing his activities to those of two other men, who were equally engaged in the dissemination of Ayurvedic knowledge, the printer-publisher Bhuvana Chandra Vasaka, and Pandit Madhusudan Gupta (1800-1856), made famous by the colonial government as the first Indian to dissect a human cadaver. Little is known about Bhuvana Chandra's business activities, but he appears to have followed a publication strategy that made Sanskrit texts across a variety of genres, accompanied by modern Sanskrit

commentaries, available to a specialist readership. Madhusudan, a lecturer at the Native Medical Institution and then at Calcutta Medical College, held the Chair in Anatomy at the latter institution, and was evidently comfortable straddling Ayurveda and European medicine—he was one more "shastric modern".

Pecchia makes a disarmingly simple point – the philological activity of Kavirajes and Pandits in the nineteenth century was crucial to transmitting the legacy of Ayurvedic knowledge. In Gangadhar's case, such activity was carried out at a remove from the emerging culture of print in nineteenth-century Bengal, even as it benefited from it. The book as a material artefact was appropriated as a sign of modernity by Vaidyas as they cemented their caste and class status, and worked to stabilize their group identity, which was moving up the social ladder in Bengal. This did not imply, Pecchia argues, that they parted ways with traditional manuscript culture, or the oral-aural communication through which Ayurvedic pedagogy continued to be practiced. Pictorial representations from the end of the nineteenth century affirm the epistemic status of the printed book, but the knowledge presented between its covers was the result of the manuscript activity of traditionalist philologers such as Gangadhar. In fact, the print edition of Gangadhar's *Carakasaṃhitā* originated in a philological exercise undertaken long before its publication was contemplated, and which is interpreted by Pecchia as a protest against the appearance of Madhusudan Gupta's printed *Suśrutasaṃhitā* under the aegis of the colonial state. She thus reads Gangadhar's philology as an effort to shore up Ayurveda's epistemic foundations at a time when European healing ideas and practices were reshaping it as a form of knowledge.

Readers who attend carefully to Pecchia's argument will be struck by the dexterity of her own philological practice, as she analyzes the meaning of the temporal gap between the first printing of the *Suśrutasaṃhitā* (1836), and the appearance of the print version of Gangadhar's *Carakasaṃhitā* thirty years later (1868). In order to make the case that

Gangadhar, while working on his manuscript – now held at the Sarasvati Bhavan Library in Varanasi – was *not* preparing it for print, she compares it to the available fascicles of different print editions of both the *Carakasaṃhitā* and the author's commentary on it, the *Jalpakalpataru*, establishes the dates of their appearance through research on the *Records in the Bengal Library*, and traces their publishers through comparing title pages. These first fruits of her research are presented in Appendices I-IV, and, we are told, will be supplemented soon by analysis of specific data from Gangadhar's editions and original writings.

The final essay by Anthony Cerulli, which complements Pecchia's, is good to think for a number of reasons. We may never know if or how Gangadhar's pedagogy shaped his philological practice; but in a part of central Kerala there still exists a style of teaching among Malayali physician teachers, vaidya-gurus, Cerulli calls them, known as mukhāmukham ("face-to-face") instruction, a rigorous philological investigation of Ayurveda's bṛhattrayī, the three great Sanskrit classics, the *Carakasaṃhitā*, the *Suśrutasaṃhitā*, and the *Aṣṭāṅgahṛdaya*, during clinical practice.

An education in Ayurveda today, in Kerala and elsewhere in India, reproduces the institutional structures of pedagogy first introduced by the colonial state. Colleges with large student bodies and numerous faculty educate students in classrooms with the help of textbooks, within an epistemological framework that emphasizes healing through medical substances. Collegiate Ayurveda, does not, according to Cerulli's student-interlocuters, address larger questions of health and well-being, as gurukula training, carried out in the home of the teacher, does. How does the vaidya-guru heal patients, and how does she train students to become healers? We learn that it is the procedural medical knowledge imparted by gurus that draws students to gurukula education. In the gurukula, theory and medical etiquette are taught through a set of dynamic relations—students learn how to interpret and

perform healing as everyday text-based acts, as they watch their gurus interact with individual patients.

"A Malayali vaidya-guru's ability to heal rests on her aptitude to apply textual models to present clinical contexts. Philology in the Ayurvedic gurukula starts with detailed studies of established texts—including primary sources, commentaries, and related vernacular sources—and progresses toward the application or the practice or performative use of knowledge formed during textual study." In these two sentences, Cerulli captures the meaning of healing through philology-as-practical application, and raises an important question for the reader: What does it mean to say that methods to produce reliable readings of texts (*tantrayukti*) are performed in clinical practice? The answer is the substance of Cerulli's ethnography. But before turning to that, a little historical information.

Medical pedagogy, in fact all forms of traditional pedagogy in pre-colonial India, had well-developed ways of passing on the texts of a tradition. They were orally conveyed—you learnt them from the lips of your guru. Even once texts acquired a material form, as manuscripts or printed books, oral-aural communication remained a primary form of transmitting knowledge. Keralan Ayurvedic pedagogy, mukhāmukham practice—the word itself is derived from the Sanskrit mukhādmukha—is attested to in ancient texts including the *Carakasaṃhitā*, from different parts of India. The difference Cerulli perceives between the Indological pursuit of philology *in* the South Asian past and his own research is this: the textual interpretation and text-based practices that informed Ayurvedic education in south India over the centuries can be observed and analysed in the clinical performance of the actors in his ethnography. Bhaskaran, the patriarch of the gurukula, which is the subject of Cerulli's study, repeatedly points this out—texts must become embodied practice in the life of a vaidya.

To read and unpack textual information the vaidya-guru teaches his śiṣya to treat a memorised text "like a pack of cards", lacing together verses from different sections of a text, pulling up information from different sources, to create a textual field within which a patient's condition is addressed. Thus, a "new" text emerges with each patient treated, and retreats into the memory at the close of a case: "After a patient has left the gurukula clinic, or when a case study has been put to rest, the textual field unravels. It's not captured in students' notebooks or on a tape recorder. It is no longer needed. A new collection of texts will be knitted when prompted by the ailments of a new patient or case study." This is philology as clinical practice.

Cerulli's ethnography undoes my pragmatic use of the phrase "indigenous knowledges" to separate the pre-colonial thought worlds of South Asia from the colonial. It reveals the difficulties of trying to historicize phenomena which are both as dynamic and as long-lived as mukhāmukham. How do we read mukhāmukham in Kerala? As a vestige of a pre-colonial practice that persisted through colonial epistemological changes, into the present? As a practice that was significantly reconstructed under colonial rule, for instance through the Ayurvedic Revitalization Movement? As a practice whose pre-colonial "integrity" survived in pockets of central Kerala until its rapid transformation, under conditions created by the economic liberalization begun in the 1990s? We may never know. Perhaps it is enough that for the young healers Cerulli describes, maintaining health and well-being exceeds timely clinical intervention to embrace *applicatio*, the attentive learning and employment of the meaning of texts, to the questions of life and death which arise daily in their clinical practice.

Let me stop here by pointing out what this Special Issue leaves out. Authors who presented papers at the Berlin workshop on parts of the South Asian region known today as Pakistan and Bangladesh had committed their papers for publication elsewhere. It may

therefore have been appropriate to change "South Asia" in the title of the present collection to "India". However, during the course of the workshop, this editor was relentlessly trolled online for having the impertinence to refer to the region rather than the nation in the title of the workshop. I have chosen, therefore, to retain South Asia here as a protest against the ever-narrowing space for intellectual discussion and debate in India today.

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**Notes**

[1] For the history of the emergence of this tension, and his formulation of the concept of "Ethno-Indology", see Michaels, "'At the point of confluence of sociology and Indology': Louis Dumont's postulate reconsidered".

[2] For global comparative approaches to philology see Grafton and Most (eds.), *Canonical Texts and Scholarly Practices*; and Pollock, Elman, and Chang (eds.), *World Philology*. Works on philology in South Asia include, *inter alia*, Cox, *Modes of Philology in Medieval South India*; Mantena, *The Origins of Modern Historiography in India. Antiquarianism and Philology*; and Kinra, "Cultures of Comparative Philology". This inaugural issue of *Philological Encounters* contains several other essays on philology and South Asia.

[3] Pollock, "Future Philology? The Fate of a Soft Science in a Hard World".

[4] Cox, op. cit., 4-5.

[5] Cox, op. cit.

[6] Pollock, "Future Philology", op. cit., 935.

[7] Ibid., 960.

[8] Ibid., 961.

[9] Pollock, *The Language of the Gods in the World of Men*, 537.

[10] Ibid., 538-539.

[11] Agrawal, "Dismantling the Divide Between Indigenous and Scientific Knowledge".

[12] Ibid., 422-427. For a second project interrogating the dichotomy between indigenous knowledge and science for the benefit of science educators, which problematizes the dyad through creating more "authentic" categories – "*Indigenous ways of living in nature*", "*neo-indigenous ways of knowing nature*" and "*Eurocentric sciences*"—see Aikenhead and Ogawa, "Indigenous knowledge and science revisited". They explore similarities and differences between the three categories in order to build bridges between "indigenous knowledges" and "Eurocentric sciences" as a way to decolonise materials for school science education.

[13] Agrawal, "Why "indigenous" knowledge?", 157-158. This article is part of a journal issue, which explores the relevance of working with indigenous peoples on issues of environmental management, and includes, *inter alia*, useful essays by Berkes, 151-156; Allen et. al., 239-242; and O'B Lyver et. al., 219-223.

[14] Raina, "The vocation of indigenous knowledge and sciences as metaconcepts".

[15] Raina, ibid., 278.

[16] I thank Caterina Guenzi for her insistence that we make this point explicit.

[17] Eaton, *India in the Persianate Age*, 13.

[18] Scott, "Colonial Governmentality", 191-220 (emphasis original).

[19] Ibid., 193 (emphasis original).

[20] "Śāstrá, n. [from root: śas, "to teach"] an order, command, precept, rule RV.; Kāv.; Pur.; teaching, instruction, direction, advice, good counsel, MBh.; Kāv &c.; any instrument of teaching, any manual or compendium of rules, any book or treatise, (esp.) any religious or scientific treatise, any sacred book or composition of divine authority (applicable even to the Veda, and said to be of fourteen or even eighteen kinds…") Monier-Williams, *A Sanskrit-English Dictionary*, 1069.  I have deliberately chosen to list the meanings offered for śāstra from Monier-Williams's dictionary, as it was compiled to assist colonization and proselytization in India, and included word meanings likely to have been encountered by nineteenth-century colonial actors. See notes 4 and 5 in the "Preface to the New Edition". Ibid., vii and viii.

[21] Pollock, "The Theory of Practice and the Practice of Theory in Indian Intellectual History", at 499. Also, idem., "The Idea of Śāstra in Traditional India". For a critique of Pollock, using the field of Alaṃkāraśāstra as his example, McCrea, "Standards and Practices: Following, Making and Breaking the Rules of *Śāstra*", 229-239. On contemporary modifications to śāstra in quotidian contexts by individuals and groups, see Prasad, *Poetics of Conduct*, especially chapters 3 and 4.

[22] Dear, "What is the History of Science the History *Of*?", is useful reading for those who wish to understand how natural philosophy became rearticulated with instrumentality in the European sciences of nature in the seventeenth and eighteenth centuries; and Elshakry, "When Science became Western: Historiographical Reflections", which builds on Dear's

arguments; for thoughts on how to re-establish the commonalities between some histories of the European sciences (astronomy) and European humanism (philology) through considering similarities in their *practices*, see Daston and Most, "History of Science and History of Philology". Daston and Most consider their focus on practices key, in order to widen the scope of inquiry into the sciences to include knowledge-making in "non-western" cultures.

[23] Pollock, "The Languages of Science in India", 22.

[24] Gurevitch, "The uses of useful knowledge", 1-31.

[25] Ibid., 23-24.

[26] Dirks, "Foreword". Cohn, *Colonialism and its Forms of Knowledge*, ix-xvii. The last twenty years have witnessed a lively debate about colonial knowledge, its producers, and the different roles played by Europeans and indigenous intellectuals in its constitution. The strong position in postcolonial studies, well-represented by Dirks, makes the case for colonial knowledge as the creation of colonizers who imposed European epistemological norms and forms on their colonized subjects. A second position, which Phillip Wagoner characterizes as "collaborationist" (he includes himself within it) highlights the contributions of pre-colonial intellectuals in shaping colonial knowledge-forms. His examples include Thomas Trautmann's research on the making of the Dravidian Proof in colonial Madras, and his own study of colonial epigraphy. But see Wagoner, "Precolonial Intellectuals and the Production of Colonial Knowledge".

[27] See Wilkinson, "On the use of the Siddhántas"; and idem., "Valuable Purposes". The current state-of-play on the historiography of the scientific revolution is assessed in the essays in the *Journal of Early Modern History*, 2017. For an incisive critique of what she calls "the disciplinary neurosis of the history of science", the narrative of sixteenth-and-seventeenth-century European science as the origin of the modern world, and the "Scientific Revolution" as its Big Bang moment, Daston, "What *Isn't* the History of Knowledge?"

[28] See Dodson, "Re-presented for the Pandits."

[29] Ballantyne, "On the Nyāya System of Philosophy."

[30] Idem., *A Synopsis of Science*, xxi.  For an accessible account of the Nyāya system, Adamson and Ganeri, *Classical Indian Philosophy*, especially chapters 25-28.

[31] Dodson, op. cit., 298. Pollock, "Theory of practice", op. cit.

[32] Hatcher, "Pandits at Work", at 45.

[33] Ibid., 48.

[34] Scott, op. cit.

[35] Ibid., 47-51.

[36] Hatcher, op. cit., 49.

[37] Cohn, "Introduction", *Colonialism and its Forms of Knowledge*, 4.

[38] William Jones to the second Earl Spencer, Crishna-nagar, 4-30 August 1787 in Cannon, 751.

[39] The postcolonial theorist, Homi Bhabha, was one of the first scholars to use hybrid and hybridity in the early 1990s, as metaphors to represent an in-between space where cultural identities emerge without settling into received polarities. Bhabha, *The Location of Culture*. The word hybrid as a descriptor for colonial forms of knowledge and its knowledge-makers, has been at the receiving end of critiques that read "essentialist visions of biologically pure parents being written into the word". For a discussion, see Mukharji, *Doctoring Traditions*, 25-27. For those of us concerned with developments in eighteenth-century colonial science in Anglo-India, the use of the word serves as a useful metaphor for two reasons. First, the word

would have been thoroughly familiar to the actors of the period, whose thinking, it could be argued, it shaped. While hybridity can mean different things, its eighteenth-century usage was unambiguous: "Hy'bridous, adj. (*hybrid*, Latin). Begotten between animals of different species," in other words, a cross. Johnson, *A dictionary of the English Language*. Second, the metaphor is analytically valuable for historians who seek to recover the processes of botanical knowledge-making in colonial India, and wish to challenge simple notions of the diffusion and circulation of European botanical knowledge into the colonies.

[40] See citations in note 26; David Scott, op. cit.

[41] Jones, *Third Anniversary Discourse*, 77.

[42] Dodson, "Translating Science, Translating Empire".

[43] Jones, *Second Anniversary Discourse*, 42.

[44] Neugebauer, *The Exact Sciences in Antiquity*; Pingree, *History of Mathematical Astronomy*. For a very different approach to Plofker's, which examines the biographies of Sawai Jai Singh's astronomers and their intellectual beliefs and practices in making its point**/constructing its argument**, Sharma, "Sawai Jai Singh's Hindu Astronomers".

[45] Minkowski, "The Study of Jyotiḥśāstra and the Uses of Philosophy of Science", at 591.

[46] Montelle, Plofker, *Sanskrit Astronomical Tables*. See Chapter 2 for the content and classification of table texts.

[47] For the translation of de la Hire into Persian at Jai Singh's behest, see Joseph DuBois's preface to the Latin manuscript held at the Palace Library in Jaipur, discussed by Mercier in "Account by Joseph DuBois of Astronomical Work Under Jai Singh Sawā'ī".

[48] PTI. 2021; Solomon. 26 June, 2019; The Wire. 2021; Mathrubhumi.com. 2021. For an analysis of the many lives of the Vedic sciences in India today, see Subramaniam, *Holy Science*.

[49] Lisa Mitchell, "Parallel languages, parallel cultures", at 447-448.

[50] See Truschke, "Defining the Other", on the making of bilingual Sanskrit-Persian glossaries for astronomy and cosmology.

[51] Das (ed.) *The Hindi Scientific Glossary*.

[52] Ibid., xviii.

[53] See Liu, *Translingual Practice*, 1.

[54] Liu, ibid.; Elshakry, *Reading Darwin in Arabic*.

[55] In this context, the number of Brahmins on the *Glossary's* various committees is very suggestive. See Das, *Preface*, op. cit.

[56] William Jones, "The Design of a Treatise on the Plants of India", 2-3.

[57] Daston, "The Empire of Observation, 1600-1800".

[58] Ibid.