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NOTES & DÉBATS

LES LUMIÈRES ET L'ASTRONOMIE INDIENNE

La rédaction a reçu il y a quelque temps des réactions critiques à un article publié dans cette Revue *il y a une dizaine d'années. Nous en publions ici une version synthétique, suivie d'une réponse de l'auteur aux critiques et d'une note de la rédaction.*

1. REMARKS ON AN ARTICLE BY DHRUV RAINA

Jacques Wagner

In 2003, the *Revue d'Histoire des Mathématiques* published an article by Dhruv Raina entitled: "Betwixt Jesuit and Enlightenment historiography: Jean-Sylvain Bailly's History of Indian Astronomy" (tome 9, fascicule 2, pp. 253–306). According to the summary, "the paper traces the influence of the Jesuit historiography of India on the landscape of French Enlightenment historiography—and in particular on Bailly's quaint antediluvian theory of the origins of Indian Astronomy."

The Jesuits did have an influence on Bailly and other 18th century historians in that they undertook scientific field work: ethnography in the

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newly discovered countries, and even traditional astronomy or mathematics. Their accomplishments were not without ulterior motives, though, as they desired to give their doctrine a scientific appearance in order to encourage more new converts among the colonized populations, even to the point of compromise with the colonial powers—which is why they were chased out of Japan at gunpoint at the end of the 16th century. But this use of scientific work or authentic documents, which were then transmitted by the Jesuits, did not imply a connivance with the aims of the Jesuits. It therefore comes as a surprise to read in Dhruv Raina's article on page 292 that: "Unwittingly, though it may appear, Laplace validated Bailly's chronology and then provided legitimacy to the Christian / Biblical chronology." Laplace and Bailly never shared the political aims of the Jesuits, and in this particular case Laplace confirmed 3102 BC as the date of the beginning of the Indian Kali-Yuga, using the mean annual motion of Saturn, and consequently confirmed the existence of an advanced civilization in and around India a long time before the Bible's Chosen People and monotheism entered stage. This was devastating for the Jesuits' attempts to justify Biblical chronology by way of scientific facts.

Furthermore, Dhruv Raina writes on page 254: "Yet his *Traité de l'Astronomie Indienne et Orientale* [Bailly 1787] and his *cause célèbre*, the hypothesis concerning the antediluvian origins of Indian astronomy were controversial and animated subsequent scholarship." The problem is that this famous hypothesis is *not* found in Bailly's *Traité* of 1787, though it is stated in Bailly's Third Book of *Histoire de l'Astronomie Ancienne* of 1775. It is presented again in the *Lettres à Voltaire* [1777] and [1779], but does not occur again in any of Bailly's later writings. Dhruv Raina reiterates his allusion on page 264. Reviewing the sixth chapter of the treatise, he writes: "In order to establish his antediluvian hypothesis, Bailly first seeks to establish that the Indians had borrowed nothing from other people in comparative perspective." Indeed, throughout the rest of his 1787 *Traité*, Bailly refutes any borrowing from other peoples and deduces that Indian astronomy is grounded on authentic Indian observations made at the beginning of the Kali-Yuga. The hypothesis of the Indians being simple repositories and not inventors of an antediluvian scientific astronomy is abandoned. So it seems that Dhruv Raina read Bailly's *Traité de l'Astronomie Indienne et Orientale* only superficially.

This impression is strengthened by the comparison Dhruv Raina sketches with Montucla. It is quite natural to compare Bailly's *Histoire* (1775) with Montucla's works and Dhruv Raina's preference for Montucla

is probably well founded. However, it is incongruous to compare Montucla's works with Bailly's *Traité* (1787), which is essentially a treatise of Astronomy bringing into play high-level mathematical techniques and having the ambition of verifying the principles of Celestial Mechanics from the Indian astronomical tables and reciprocally inferring a dating for these tables from Celestial Mechanics. In his *Traité*, Bailly scarcely mentions Laplace, but constantly refers to Lagrange, with whom he had worked on Jupiter's satellites. "J'offre avec plaisirs ces résultats à M. de la Grange,…& aujourd'hui il apprendra avec satisfaction qu'il y a eu une ancienne Astronomie dans l'Inde qui peut servir de preuve & de confirmation à cette savante théorie." [Bailly 1787, p. 168].[1]

Last but not least, on page 261, Dhruv Raina tries to make us believe that the sources of Bailly's 1775 *Histoire* and of his 1787 *Traité* are not substantially different. Yet an essential difference lies in the influence of Guillaume Le Gentil and the Tables of Tirvalore on French indology. In the *Histoire*, Bailly just skims over Le Gentil's works; whereas these, along with the Tables of Tirvalore, are the foundations of the *Traité de l'Astronomie Indienne et Orientale*. It is obvious that Bailly completely changed his mind about the Indians and their astronomy under the influence of Le Gentil.

Moreover, on page 265, Dhruv Raina asserts that, in 1760, Le Gentil met the Jesuit Cœurdoux in Pondicherry and was manipulated by him. But all French sources attest that, in 1760, the English Navy blockaded Le Gentil on Mauritius Island, so that he could not have reached Pondicherry until the end of the Seven Years' War against England, in 1768. Anyway, neither Le Gentil nor Bailly ever felt like following in the Jesuits' footsteps. The Jesuits' influence in France culminated in 1685 with the repeal of the Edit de Nantes, but it waned progressively during the 18th century until Choiseul eventually expelled them from France in November 1764. The Jesuits, demonized by all English sources, could only return to France in 1815, thanks to England's victory in Waterloo.

Nevertheless Dhruv Raina is right in asserting that, when Bailly started to write his *Histoire de l'Astronomie*, he shared most of the prejudices of his era and refused the idea of any kind of creative genius in non-European peoples. Hence the theory of antediluvian astronomy, which began as a linguistic theory—and not as a racist theory, as Dhruv Raina would have it—deprived the Asian peoples (with the notable exception of the Persians) of any credit due for contribution to the conception of astronomy:

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1 I have the pleasure to present these results to Mr. de la Grange… and today he will be happy to discover that there has been an antique astronomy in India that proves and bears out his own learned theory.

"Quand on considère que ces peuples, et surtout les Indiens, n'ont rien ou presque rien inventé, on ne peut s'empêcher de penser que toutes ces connoissances, où la propriété du nombre sexagésimal imprime un caractère d'uniformité, sont l'ouvrage d'un seul et même peuple,… ce peuple éclairé, antérieur au déluge, et l'instituteur de tous les peuples de l'orient; peuples qui n'ont été que dépositaires jusqu'à ce que le génie de l'Europe vînt reprendre le fil des idées astronomiques."[2]

And yet, just after this and in the same book, he reviewed Le Gentil's *Mémoires sur l'Inde* [Le Gentil 1772a;b;c; 1784], and confronted with irrefutable facts, he attributed the discovery of the precession of equinoxes to the Indians (p. 111). In *Lettres à Voltaire* [1777] and [1779], he expounded his theory of antediluvian astronomy once more, but in [Bailly 1787] he gave it up once and for all and on the contrary praises Indian astronomy. So he did break with the pernicious trend of opinion within the Enlightenment itself, which untimely came to the conclusion that non-European peoples were intellectually inferior and should be put under guardianship. At a time when many people in France had dreams of revenge against England, enabling France to resume colonization, Bailly and his accounts of India's prodigious astronomers were most unwelcome. His philosophical stance against all kind of colonization played a major role in his dismissal from political life in 1791 and his execution by guillotine in 1793.

But Bailly's *Traité* was never translated into English. Bailly's true record would interest Dhruv Raina—who is always ready to denounce racial prejudice—and would undoubtedly make him rewrite his account. What is most interesting in Raina's article is the difference of opinion he expresses with Sen and other Indian historians of astronomy pp. 266–267: "Present-day Indian historians who read Bailly approvingly do so because they have ignored Bailly's exchange with Voltaire and have not closely scrutinized the racial theory disguised behind his history of antediluvian astronomy." But the theory of antediluvian astronomy is based on linguistics and historical comparisons (the antediluvian people playing the same role in Asia as the Roman Empire in Europe), and not on some obscure racial theory. Anyway, it has nothing to do with the Jesuits' schemes. There

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2 [Bailly 1775, p. 80]: When we consider that these peoples, and particularly the Indians, invented little or nothing, we cannot help thinking that all this knowledge, to which the sexagesimal number system lends a certain uniformity, is the work of one single people; that enlightened people from before the Flood, teacher of all the peoples of the East. These peoples were only repositories of knowledge until European genius came to pick up the torch of astronomical ideas.

remains the question of Bailly's prejudices, but Bailly clearly changed his mind between 1775 and 1787. In his 1787 *Traité de l'Astronomie Indienne et Orientale*, he celebrates the genius of Indian astronomers (see pp. 200, 203, xxxvi, lxiii), and concludes thus: "Ces peuples… sont nos aînés; ils ont l'avantage des années, ou plutôt des siècles, et ils éclairent notre industrie de leur longue et antique expérience."[3]

At about the same time as the *Traité*, he writes a commendation of Captain Cook which was published in 1790 and which enlightens his whole philosophy: "La vie de Cook est un exemple, que sa mort soit une leçon. François, Anglois, peuples rivaux par le génie, soyons-le par l'humanité; que la philosophie par nous cultivée fasse une fois le bonheur du monde! elle éclaire sur les vrais intérêts: elle proscrit également et la guerre et les colonies comme une double cause d'appauvrissement."[4] Even after the brutal murder of Cook at the hands of the Hawaiians, Bailly takes the defense of the natives against "civilized" interference: "Malheureux insulaires, qu'avez-vous fait? …Mais plutôt, Européens, qu'avez-vous fait vous-mêmes? …N'avez-vous pas à vous reprocher ces idées de supériorité et de domination qui vous accompagnent dans les pays nouveaux? Quel droit avez-vous sur les peuples tranquilles d'un autre hémisphere? Vous voulez qu'on respecte la propriété individuelle et vous violez la propriété nationale! Comment osez-vous prendre possession d'un pays habité, attenter à la liberté du souverain, employer le fer et le feu pour vous faire justice? Que répondriez-vous si les insulaires vous disoient: c'est vous qui l'avez tué?"[5]

"L'Angleterre regrette un grand homme; la France demande son éloge: on le pleure à Taïti, dans cet asyle des mœurs innocentes; on le pleure dans

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3 [Bailly 1787, p. lxvj]: These peoples… are our elders. They have taken advantage of a great number of years, or rather centuries, and they enlighten our Science by their long and antique experience.

4 [Bailly 1790, p. 347]: Captain Cook's life is exemplary and his death should be a lesson to us. French people and English people, rivals for genius, should also be rivals for humanity. The philosophy we have in common can for once make the whole world happy because it enlightens the actual stakes: it forbids both war and colonization, because they both bring impoverishment to either side.

5 [Bailly 1790, p. 346 and 348]: Unfortunate islanders, what have you done? …Or rather, what have you done yourselves, Europeans? Should you not blame yourselves for those ideas of superiority and domination that you bring with you to the New World? What rights do you have over the peace-loving peoples of a faraway hemisphere? You demand respect for individual ownership and you violate national ownership! How can you dare to lay hands on an inhabited country, conspire against the freedom of the sovereign, enforce your domination by sword and fire? What would you answer if the islanders said to you: YOU killed him.

l'isle malheureuse où il a fini sa destinée; et cette douleur commune aux nations sauvages et aux nations civilisées, est le plus bel éloge qu'aient jamais obtenu la vertu et le génie."[6]

Indian historians formed their opinions during a period when French was the universal language and there was no risk of translation mistakes. So clearly they understood Bailly's true story: that of a man who broke with the prejudices of his time and suffered rejection for it.

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[1772a] Premier Mémoire dur l'Inde, particulièrement sur quelques points de l'Astronomie des Gentils Tamoults, *Mémoires de l'Académie Royale des Sciences*, 1772, pp. 169–189.

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Smith (Edwin Burrows)

[1954] Jean-Sylvain Bailly, astronomer, mystic, revolutionary, 1736–1793, *Transactions of the American Philosophical Society*, 44(4) (1954), pp. 427–538.

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6 England mourns the loss of a great man, France praises him, the people weep in Tahiti, this shelter of innocent customs. They weep also on the unfortunate island, where his destiny came to its end, and such a sorrow, that the savage nations and the civilized nations have in common, is the best commendation virtue and genius ever obtained.

2. REPLY TO JACQUES WAGNER

Dhruv Raina

Thank you very much for your close reading of my paper. I now respond to some of your comments.

The sources on which Le Gentil and Bailly relied for their construction of Indian astronomy were based on texts and the reports of the Jesuits. I have written a paper on a couple of French Jesuit manuscripts on Indian astronomy which were material for Delisle, Le Gentil and Bailly[7]. I am not making a very original point in stating that the Jesuit construction of Indian knowledge systems seeped into Enlightenment historiography—Sylvia Murr made the point far more eloquently than I have, and so have so many others. The history of ideas is replete with instances where we unwittingly internalize aspects of the arguments of our opponents—this is something we have learned from Duhem. I do not state that the Jesuits and savants shared a political or ideological platform. But certain views of India and ways of reading Indian texts came from the Jesuits—they had no other recourse.

Related to the above point, there is no connivance between Laplace's calculation and the Jesuits. One of the functions performed in the Jesuits "discours sur l'Inde" by a version of the antediluvian theory was to fit a non-Christian people into a Christian conception of time. What the calculation does is to support the argument for the existence of a pre-Noahic people—which was not Laplace's intention.

I have read both the *Traité* and the *Histoire*. Having seen Le Gentil's sources, I can establish that Le Gentil's sources were no different from that of the Jesuit astronomers—even the Indian interlocutors he mentions in his writings were students of the Jesuits. Further, I do not pit Bailly against Montucla—I simply try to understand why Bailly's histoire is treated so shabbily when compared to Montucla's—although, as I point out in other articles, both wrote disciplinary histories and I see both these disciplinary histories within the landscape of eighteenth century history of science.

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7 D. Raina, "The French Jesuit Manuscripts on Indian Astronomy: The Narratology and Mystery Surrounding a Late Seventeenth - Early Eighteenth Century Project" in F. Bretelle-Establet (ed.) *Looking at it from Asia: the Processes that Shaped the Sources of History of Science*, Boston Studies in the Philosophy of Science, Springer, 2010, pp. 115–140.

The Jesuits too, in their writings on India, worked with an antediluvian theory and as you rightly point out, so did other scholars in the seventeenth century. I even find it in the writings of a scholar like Olaf Rudbeck. And even if Bailly did not get his antediluvian theory from the Jesuits—and he did not—his sources on Indian astronomy, as was the case with China, were the Jesuits. And both Bailly and the Jesuits employed the theory for certain purposes. Which is not to say that they were entirely wrong about Indian astronomy or entirely prejudiced. We cannot forget that it was through the French Jesuits that modern Europe became aware of the antiquity of the sciences in India.

I wish to clarify that the larger aim of my work is to show how the history of astronomy and mathematics begins to change and in fact departs from the openness of the mid and late eighteenth century and crystallizes in Eurocentrism by the middle decades of the nineteenth century.

3. EDITORIAL NOTE

Agathe Keller

Jaques Wagner is wrong in stating that Bailly abandons the antediluvian hypothesis in his 1787 *Traité de l'astronomie Indienne*. Indeed, the first sentences of this text, the opening of the preliminary discourse, quoted by Dhruv Raina on p. 271, note 18, clearly states: "Les Indiens existent en corps de peuple depuis un grand nombre de siècles: ils en ont conservé les traditions; & ce peuple peut être regardé comme le possesseur des plus précieux restes de l'antiquité. Ces restes sont d'ailleurs aussi purs qu'ils sont antiques; car dans son indolence il possède sans acquérir, & son orgueil l'empêche de rien adopter: Il est encore aujourd'hui ce qu'ont été ses premiers auteurs qui ont tout institute." [Bailly 1787, p. i] And at the end of the preliminary discourse he writes again (clxxx, my emphasis): "*On voit que les Indiens sont les plus riches héritiers de cette Astronomie primitive; ils sont du moins les dépositaires des plus précieux restes*; car ils ne possedent pas tout, puisqu'ils regrettent l'Astronomie siddhantam, comme les Chinois regrettent celles de Fohi. *On voit encore que les Chinois, les Perses les Chaldéens, les Grecs d'Alexandrie n'ont fondé leur science que sur quelques débris de cette Astronomie primitive*, & que son premier siége (*sic*), le lieu de son établissement, peut avoir été à l'occident de la Chine, au nord de l'Inde,

entre quarante & cinquante degrés de latitude, comme nous l'avons annoncé dans l'histoire de l'Astronomie ancienne."

Still, this text also claims at times that Indians did invent the astronomy they possess (p. lxxiij in the preliminary discourse): "*Nous croyons que les Indiens*, c'est-à-dire, les ancêtres & les auteurs des Indiens actuels, *ont été les inventeurs de l'Astronomie assez perfectionnée dont nous venons de rendre compte*, parce que cette Astronomie existe en effet chez eux, & en corps de science; parce qu'ils la pratiquent pour ainsi-dire sans la connoître, par une habitude qui résulte d'une science perdue & dégénérée en routine aveugle; parce qu'ils la conservent, d'une part, avec un attachement qui décèle leur titre de propriété & d'invention, &qui nait de leur respect pour les institutions de leurs ancêtres, & de l'autre, avec un dédain pour toutes les connoissances étrangères, une opiniâtreté dans leurs propres opinions, qui n'a pu s'établir & se sortisier que par le tems, (*sic*) & qui est la preuve d'une possession immémoriale."

Thus, Bailly's position is clearly ambiguous: is this "quite sophisticated" ("assez perfectionnée") astronomy of Indian origin created by Indians alone, or was it based on an even more sophisticated astronomy transmitted by an antediluvian people?

In the rest of the text, Bailly seems to hesitate: was the whole system transmitted to the Indian subcontinent or only parts from which their astronomy was created? This hesitation can be found at the end of the preliminary discourse and at the end of the treatise itself: "Ces déterminations démontrent que l'Astronomie a été cultivée dans toutes les régions dont ces villes sont les capitales; &; par conséquence qu'elle s'est étendue de l'est à l'ouest, depuis Bénarès jusqu'à Nagar, & en hauteur jusqu'à Samarcande & Sera Merropolis. Voilà tout ce que je peux dire dans ce moment sur les lieux où fut l'origine des connoissances astronomiques; le reste appartient à un ouvrage d'une autre nature que celui-ci." In fact, much of the *Traité* discusses the latitudes at which observations could have been made. The point of such reconstructions being of course to establish who made such observations.

It is true, as underlined by Wagner, that in D. Raina's article all of Bailly's ideas on the origins of Indian astronomy are presented as a monolithic system. No evolution of Bailly's thought is discussed. D. Raina cautiously reproduces Bailly's vagueness on what exactly was the antediluvian people's legacy on Indian astronomy. His study focuses essentially on his letter to Voltaire of 1777 and on his *History of Astronomy* (1775). The *Traité* is briefly evoked for its Jesuit sources. Dhruv Raina notes (p. 264) without discussing

the consequences on the antedeluvian theory: "The originality and antiquity of Indian astronomy, for Bailly (in the *Traité* of [1787]), resided in the accuracy and diversity of most of the methods. (…) These features of Indian astronomy so enamoured Bailly that he felt the evidence was sufficient to suggest that Indian astronomy was not plagiarized. Furthermore, he agreed with Le Gentil that the finer points of their mathematical rules were evidence of the superiority of their methods." [Bailly 1787, p. 159] But then, if Indian astronomy was not plagiarized, does this not mean that it was not considered to be an antediluvian heritage? In this sense, J. Wagner, although not quite exact in his criticism of Raina's article, does pinpoint a vagueness that belongs to both Bailly's theory and Raina's article.

Finally, there is an obvious misprint in Raina's article: the date of arrival of Le Gentil in Podicherry should read 1769, and not 1760 (year in which he famously hoped to, but did not, arrive on the coromandel coast).