



Translation of Newton's *Principia* into Arabic under the aegis of the East India Company: a rumour turning into a myth?

K. Razi Naqvi¹

Received: 3 May 2021 / Accepted: 6 April 2022 / Published online: 24 May 2022
© Indian National Science Academy 2022, corrected publication 2022

Abstract

Tafazzul Husain Khan (1727?–1800?), who began his career in the court of Awadh, spent the last two decades of his life as a trusted ally of the East India Company. What set him apart from other court officials were not so much his erudition, political acumen and negotiating prowess, as his favourite pastime: delving into mathematics and astronomy. Contact with the Company personnel, some of whom were conversant with oriental languages and/or contemporary scientific advances, provided him with the opportunity to brush up his mathematical knowledge, and induced him to embark upon—and, according to some, bring to fruition—the task of translating a few important mathematical treatises, among them Newton's *Principia*. According to Campbell, the author of an obituary notice (published in 1804), “he translated the *Principia* from the original Latin, into Arabic”. The evidence gathered by Campbell is examined, and found insufficient to warrant this astounding and oft-repeated claim. Of the three tracts authored by Tafazzul (all published posthumously in abridged versions), none can be described as a translation of Newton's *Principia*. Until the emergence of some tangible evidence, any talk of his translations of the *Principia* and other western treatises can only be characterised as rumour, a process in which recall is often accompanied by distortion.

Keywords Diwan Kanh Ji · Indian Mathematics (1780–1830) · John Tytler · Maulavi Ghulam Husain · Reuben Burrow · Tafazzul Husain Khan

1 Introduction

“Don't cite a publication unless you have read it yourself” is one of the golden rules of academic authorship (Blanchard, 1974), and perhaps one that is flouted most frequently. But even those who abide by the rule merely shift the burden of veracity from their shoulders to those of the author(s) they cite. If this primary source happens to be reliable, and is cited by a multitude of subsequent authors, the process serves to advance learning. However, if the primary source is of doubtful authenticity, or contains factual errors—even small ones (for example, incorrect dates, erroneous spellings of proper names)—multiple citations of this work will generate what may be called the academic equivalent of rumour.

To offer a justification for invoking the concept of rumour, I begin with the words of Bernard Hart (1916), a British psychiatrist:

Rumour is a complex phenomenon consisting essentially in the transmission of a report through a succession of individuals. It may be provisionally regarded as the product of a series of witnesses, each of whom bears testimony to a statement imparted to him by his predecessor in the series. The reliability of a rumour depends, therefore, upon the accuracy with which each such statement is transmitted, and ultimately upon the accuracy of the report furnished by the first member of the series, who is assumed actually to have seen or heard the event in question.

To be sure, the above passage refers specifically to information communicated by word of mouth, but some trivial adjustments will make it applicable to formal citations or written statements about the authorship of manuscripts.

Three decades later two American psychologists, Allport and Postman (A&P), wrote an entire book on the

✉ K. Razi Naqvi
razi.naqvi@ntnu.no

¹ Department of Physics, Norwegian University of Science and Technology, 7491 Trondheim, Norway

Table 1 Transliteration of some Persian letters

Urdu letter	<i>Eol</i>	This work	Urdu letter	<i>Eol</i>	This work
ث	th	ṭ	ج	dj	j
خ	kh	k̄	ذ	dh	ẓ
ژ	zh	ẓ	ش	sh	š
ض	ḍ	ẓ	غ	gh	ḡ
ق	q	q	و	w	v, w

psychology of rumour (Allport & Postman, 1948). They defined a rumour as a specific (or topical) proposition for belief, passed along from person to person, usually by word of mouth, without secure standards of evidence being present. The central feature of their definition is its insistence that rumour thrives only in the *absence of secure standards of evidence*. A&P identified two prerequisites for rumour: the theme of the story must be of some import to both the speaker and listener, and the true facts must be shrouded in some kind of ambiguity. Among the multiple causes for this ambiguity, and the resulting (often involuntary) corruption of the original report, only one—the incapacity of the rumour-receiver to grasp the vital detail(s)—is germane to the issue discussed below.

2 A note on transliteration

The transliteration scheme used here is a slightly modified version of that used in the *Encyclopaedia of Islam* (Gibb et al., 1986, p. 8); all seven digraphs used in the encyclopaedia, as well as two other symbols, will be replaced by those shown in Table 1.

The letter ن (*nūn*), when it occurs at the beginning of a word or syllable, is sounded like *n*; at the end of many words or syllables in which it is preceded by a long vowel, it stands for a soft nasal sound like that of *n* in the French word *garçon*; in Urdu, the nasal character is explicitly acknowledged by the omission of the dot; this undotted *nūn*, called *nūn-i ḡunna*, will be represented by *ṅ*. When *nūn* is followed by the labials ف, پ, ب, it assumes the sound of *m*. The choice made in the *Persian-English Dictionary* of F. Steingass (1977), namely *m*, will be respected; for example, دنباله (*tail*) will be transliterated as *dumbāla*, not *dunbāla*.

In Urdu ه (the *two-eyed hē*) has been used, since about 1880, only as the final part of signs showing aspirated sounds (which are not found in Persian). The Greek letter ω will represent aspiration of the sound corresponding to the preceding letter; with this convention ه = bω, ه = ṭω, etc.

When transcribing names in which the Arabic definite article *al* is sandwiched between two words, the final vowel of the preceding word (often a *u*) will be dropped and a hyphen will be inserted between *al* and the second word.

3 Who was Tafazzul Ḥusayn Kān?

Tafazzul Ḥusayn Kān (1727?–1801?), who will henceforth be called Tafazzul, was known in his days as a *littérateur*, mathematician, diplomat and much else. He lived an eventful life, earning both praise and opprobrium, but only those events will be highlighted here which are relevant to his academic activities. The qualifier *Kaśmīrī* was often appended to the above three names, but he was born in Siyālkōt, Kaśmīr being the region where his ancestors had once lived (Ḡulām ‘Alī Kān, 1864). The honorific, *Kān-i ‘Allāmā*, meaning “a scholar par excellence” became a part of his name after he achieved eminence for his multidisciplinary erudition.

4 Principal sources for Tafazzul’s life and works

The standard reference for the personal and political aspects of Tafazzul’s life is *‘Imād al-Sa‘ādat*, written by Ḡulām ‘Alī (1864), a Company employee. Among other frequently cited authors in this context are Abū Tālib (1885), Basu (1943) and Cole (1988). A short but informative biographical sketch is available in an excellent article by Guenther (2010). Only those details of Tafazzul’s life will be mentioned here which have a direct bearing on his mathematical studies. The major sources for these aspects of Tafazzul’s life are listed below. Each source will be assigned a label (written in bold italics) which will be used for further reference to it in the rest of this article.

Tuhfa: A Persian book (Šuštārī, 1847) with a title usually abbreviated as *Tuhfat al-‘Ālam*. Authored by ‘Abd al-Laṭīf Kān Šūštārī, who became a personal friend of Tafazzul, this book provides further glimpses into the schedule followed by Tafazzul during the last years of his life.

Obituary: An obituary notice written by Lawrence Dundas Campbell (Campbell, 1804). More details about this source are given later.

Leaflet: Syed Mahomed Ali (hereafter SMA), a descendant of Tafazzul, published a leaflet titled *Life of Tuffuzzool Hus-sain Khan* (Ali, 1908), a choice that might lead a reader into expecting more than is delivered; it consists of five *Extracts* (1–5, listed on pp. i–ii), none of which is from the pen of the compiler. Part I consists of *Extracts* 1 and 2, the first of which is taken from Lord Teignmouth’s *Memoir* (Shore, 1843), and the second from a review of the *Memoir*, published a year later (Anonymous, 1844). Part III, which is of no interest to us, reproduces *Extracts* 3 and 5, two official



letters concerning pensions granted by the Company to Tafazzul's cousin and son. The text of Part II was meant to be identical with that of *Obituary*, but a great many clerical discrepancies and errors crept in when the text was typeset for inclusion in *Leaflet* (see Appendix C). The original sources for the texts of *Extracts* 1, 2 and 4 have existed in the public domain for quite some time, which means that citing *Leaflet* now amounts to drinking polluted water when clean is available.

UrduBio: More than ten years after the publication of *Leaflet*, SMA wrote an Urdu biography (1921), which draws from *Imād al-Sa'ādat*, *Tuhfa* and *Obituary*, and provides very little additional information of value.

Chronograms: Thomas William Beale, whose main literary interest was collection and composition of chronograms (in Persian and Urdu), published a massive collection of chronograms (along with some biographical information in prose) under the title *Miftāḥ al-Tawārīk* (Beale, 1867). This rather unusual compilation (in Persian) was described in some detail by Elliot in *The History of India as told by Its Own Historians, The Muhammadan Period* (Elliot & Dowson, 1877). The literal meaning of the title is *Key to Histories*, but a glance at the contents makes it clear that Beale is using the noun *tārīk*, which could mean *history* or *chronogram*, in both senses. A concise biographical note, not a single word of which is superfluous, may be found in this book. A translation of the note will be presented later.

So far as Tafazzul's mathematical studies and writings are concerned, there are only two cardinal references, namely *Tuhfa* and *Obituary*. When allowance is made for Šūstarī's numerous mis-transliterations of European names (see below), *Tuhfa* and *Obituary* agree except on one crucial point: *Tuhfa* does not include the *Principia* among the books translated by Tafazzul.

A minute examination of these sources will not be carried out in this section, but some general observations appear to be necessary for preparing the ground.

It is difficult enough to transcribe European names in Urdu, but the task becomes much harder for an author writing in Persian, which has a significantly smaller inventory of consonants and vowels than Urdu; furthermore, Šūstarī follows (with very few exceptions) the customary omission of short vowels even when he transcribes European names, and seems to rely on memory rather than meticulous note-taking. To take just one example now, he mentions a certain *مستّر بارلو* (*miṣṭar bārlo*), calls him “a sage the likes of whom are few even in England” (Šūstarī, 1847, p. 454), and states that it was this scholar who imparted Western learning to Tafazzul. When Edward Rehatsek reviewed *Tuhfa* for a

library catalogue edited by him (Rehatsek, 1873), he came to the eminently reasonable conclusion that Šūstarī must have meant “Mr. Barlow”, and there indeed was a Sir George Hilario Barlow in the neighbourhood (Buckland, 1906), but hardly likely to have been a good enough mathematician to be called a sage with few peers. The name of the real sage was “Reuben Burrow” (Buckland, 1906). Other spelling aberrations will be mentioned later.

Far more alarming than transcription idiosyncrasies and scribal transgressions is that Šūstarī has earned the reputation of having been well informed about post-Newton astronomy. For example, Schaffer (2009) writes: “...ʿAbdu'l-Laṭīf Shushṭarī, Tafazzul's friend and biographer, ... learnt the orthodox Newtonian views that comets were planets moving in ellipses round the Sun in one focus”. This is what we have learnt about planets and periodic comets from Kepler and Newton. As to what Šūstarī was told by his astronomically educated friends we can only speculate, but anyone who reads *Tuhfa* will find out that, according to its author, the sun is located at the centre of the ellipse! Even those who cannot read Persian will be able to see his “heliocentric” illustration of the solar system on p. 360. Since the lithographic edition was published long after the author's death, it is important to rule out the possibility that the illustration (in which Mars and Earth are shown, probably as a result of an oversight, orbiting along a common path!) was prepared by an inattentive person who atrociously misrepresented the trajectory of a comet drawn by the author, one should go to p. 352 (line 2) and note the word *وسط* (*wast*), which means “in the middle or centre of”. A reader of *Tuhfa* with a sound knowledge of elementary astronomy cannot fail to notice that its author had misconstrued the teachings of Newton. Also, our author appears to be out of touch with the history of astronomy, for he calls (p. 351) *کوپرنیکوس* (*kūparnikūs* = Copernicus), the inventor of the telescope! One is driven to the uncharitable conclusion that, despite claims to the contrary, Šūstarī's knowledge of European astronomy and mathematics was much too paltry and muddled to earn him a place in this discussion.

5 The received wisdom about Tafazzul: part 1

For describing Tafazzul's mathematical exertions and their concrete manifestations, Rizvi (1986) has effectively paraphrased, in his two-volume work on the socio-intellectual history of Twelver Shī'ism in India, the account given on p. 443 of *Tuhfa* (see Fig. 1). Most other authors have relied heavily, and a few exclusively, on the information presented in *Obituary*.

In the rest of this section, braces are used to separate my passing comments on Rizvi's account (Rizvi, 1986,



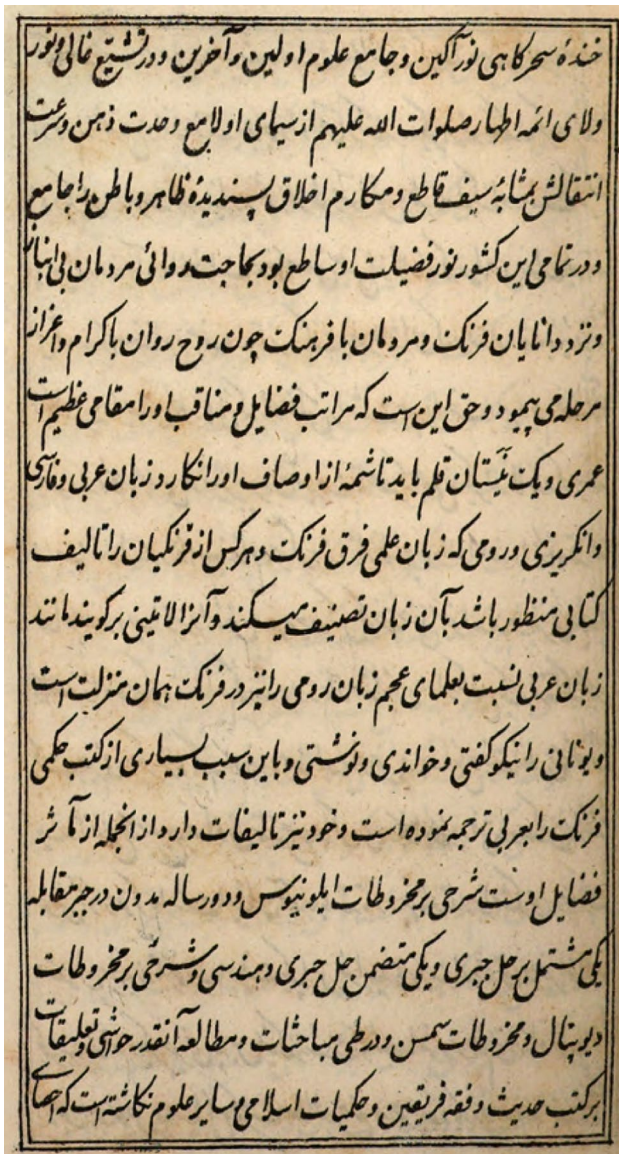


Fig. 1 Page 443 of *Tuhfa* (Šūstarī, 1847); an English translation of the text is presented in Appendix A

p. 228), which is reproduced below (with all the typographic errors left intact):

...Tafazzul Husayn learnt Greek, Latin and English and obtained considerable proficiency in these languages. He translated many philosophical works from Western languages into Arabic and wrote some original ones on philosophy, *hikma* and mathematics. He was the author of the following works:

1. Commentary on the *makhrūtāt* (Conica) of Abullūniyūs (Appollonus) of Tyana (ca 81–96).

{It will become clear, after reading § 9, that this notion is probably based on a misunderstanding of the contents of the manuscripts *Tafazzul copied* for Warren Hastings. As for the phrase “of Tyana” (inserted by Rizvi), let us note that *our* Apollonius, the famous geometer, was from Perga, and was born some 250 years before Jesus; his namesake from Tyana will be recalled later for a different purpose.}

2. Two treatises on Algebra.

{Šūstarī stated: “two treatises on algebra, one containing algebraic solutions, the other algebro-geometric solutions”. We will return to this item in § 10.}

3. Commentary on the *makhrūtāt* by Devanpal [Diophant and Simson/Robert Simson].

{The text within the square brackets reflects Rizvi’s decipherment of the two names mentioned by Šūstarī. Recall that short vowels are usually omitted in Persian writing. The second name has no long vowels and its consonants are *smnsn*. Rizvi inferred that the cluster stood for *simnsan*, written in Persian characters as سمنسن; Robert Simson, a recognised mathematician, did write a text on conics, but Tafazzul made no mention of Simson, not for this book nor for any other by him. As for the first author, readers familiar with the names of European mathematicians would be able to guess that they are looking at a mauled form of *de l’Hospital*, the French mathematician whose name is familiar to every student of calculus. With this background, Šūstarī’s text can be given the following truly literal rendering: “commentary on conics of *dilopitāl* and on conics of *simnsan*”.

4. Persian translation of Newton’s (d. 1827) *Philosophiæ naturalis principia mathematica*.

{*Persian translation?* In lines 8–10 of the text in Fig. 1, Šūstarī likens the status of Latin in Europe to that of Arabic in the non-Arab Muslim world, and speaks specifically of translations (by Tafazzul) of several European philosophical works into Arabic. In fact, Rizvi himself states, in the second sentence of the passage quoted above “translated ... from Western languages into Arabic”. The “Arabic or Persian?” question will continue to vex us. (Newton died in 1727.)}

5. A book on Physics.

{This item and the next have no counterparts in Šūstarī’s text.}



6. A book on Western astronomy. {See § 10}.

It is natural to enquire into the fate of Tafazzul's putative writings (original works as well as translations). Rizvi, having anticipated the question, does not keep his readers waiting, and answers it immediately after his list of Tafazzul's written contributions:

Some of these books [which ones?] were taught in Shīrī seminaries in the nineteenth century but are now scarce. He also wrote commentaries and glosses on the works of *fiqh*. His devotion to teaching and studies knew no bounds. Early in the morning he taught mathematics to scholars. He then performed his official duties. In the afternoon he lectured on Imāmiyya (Isnā^ʿ Ashariyya) *fiqh*. Before sunset he taught Hanafi *fiqh*. After night prayers immersed himself in study and research. After his morning prayers he slept for a very short time. Before he went to bed his musicians played for him. No physician could persuade him to take more rest. He was enamoured of the company of scholars. Shustarī [Rizvi's spelling] frequently called on Tafazzul Husayn. The latter also paid return visits and both discussed problems of rational and traditional sciences. Shustarī was proud of considering himself as one of Tafazzul Husayn's disciple[s], although he had not studied regularly under him.

Apart from the first sentence (which looks, in the absence of concrete evidence, a face-saving gesture), the above passage is essentially a translation of what Šūstarī wrote in *Tuhfa* (Šūstarī, 1847, p. 444). I cannot help recall what Gibbon wrote about Apollonius of Tyana (Gibbon, 1887, p. 22): "His life is related in so fabulous a manner by his disciples, that we are at a loss to discover whether he was a sage, an imposter, or a fanatic." The last epithet will have to be replaced, in Tafazzul's case, by one of the many disparaging alternatives used by his detractors (Beale, 1867; ^ʿAbd al-^ʿAzīz, 1897; Srivastava, 1979): utter unbeliever, perfidious and treacherous, spy.

Let us turn now to *UrduBio* (SMA, 1815). The account of Tafazzul's scholarly output occupies about a page and a half in this booklet with fifty pages of text; an excerpt of the relevant section is displayed in Fig. 2. Urdu authors of that era (early twentieth century) used few punctuation marks, and made excessive use of the letter "و" for a purpose similar to that served by the ampersand sign "&"; in Fig. 2, one sees only dashes, which are Urdu equivalents for full stops, and parentheses. SMA uses Šūstarī's incorrect, two-dotted spelling ایلونیوس (*Elūniyūs*) for *Apollonius*, writes Emerson as ارسن (*Irsan*), and *de l'Hospital* as ڈل ہاسپٹل (*del hāspital*), but in the literal translation presented below, such slips will be ignored; a few additional pauses will also be inserted for the sake of making the passage readable. After extolling

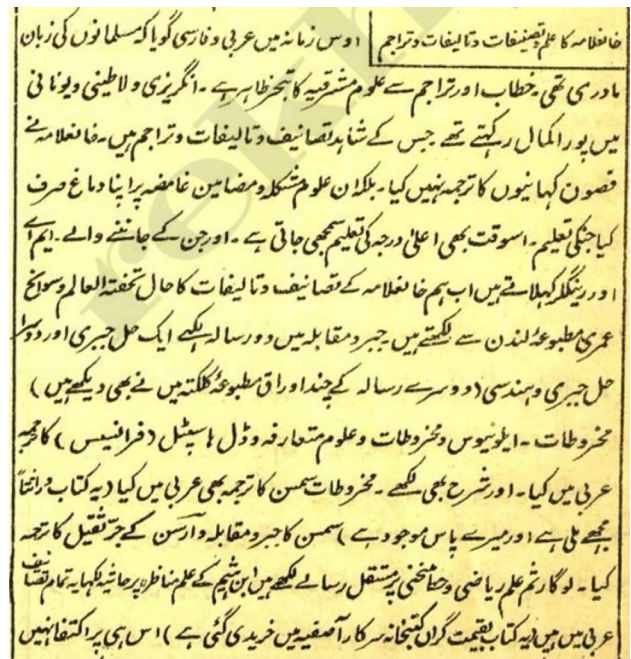


Fig. 2 An excerpt from *UrduBio* (Ali, 1921, p. 37)

Tafazzul's mastery of Arabic and Persian, SMA tells us that he wielded complete

command over English & Latin & Greek, the proof of which are his writings & compilations & translations. Kān-i ^ʿAllāmā did not translate romances & fables; rather, he taxed his mind with hard sciences & abstruse topics of the kind whose study is considered even today as advanced education, and those who acquire knowledge of this kind are called M.A.'s and wranglers. We will now refer to *Tuhfat al-^ʿĀlam* [*Tuhfa*] and the biography published in London [*Obituary*] for describing Kān-i ^ʿAllāmā's (original) compositions & compilations. [He] wrote two algebraic treatises, one on algebraic solutions and another on algebraic & geometric solutions. (Indeed, I have seen some pages of the second treatise, published in Calcutta). [He] translated into Arabic Apollonius's conics & conics & common notions [alternatively, axioms] & de l'Hospital (Frenchman) and also wrote commentaries. [He] also translated Simson's conics into Arabic (I inherited this book and it is still in my possession). [He] translated Simson's algebra and Emerson's mechanics. [He] wrote *mustaqil* [original, independent] tracts on logarithms, mathematical science & curves, marginal comments on Ibn-i Haycām's knowledge (or science) of disputations [see below]. All these works are in Arabic. (This book was acquired at great expense by the Government Āṣīfya Library. This is not all. [Fig. 2 ends here; Tafazzul's theological writings are mentioned in



the last two lines of the page, and excerpts from *Obituary* are quoted on the next page.]

Unfortunately, one cannot tell which particular book was bought by the library of the Hyderabad State. It is also regrettable that SMA could not arrange for a publication of the translation of Simson's book on conics, making it available for examination by those who believe that seeing (but not only seeing, also reading carefully) is believing. What engulfs SMA's claim (about inheriting the translation of Simson's *Conics*) in a dense cloud of doubt, calling into question his competence, is the fact that Tafazzul (who never mentioned Simson) claimed to have translated, among other books, Thomas Simpson's book on *algebra* and a tract of Apollonius (but *not* that on conic sections).

The phrase "knowledge (or science) of disputations" is my translation of the title علم مناظرة (*'ilm-i munāzira*) mentioned by SMA; if ibn al-Hayṣam (Latinized as Alhazen) did write such a book, I have yet to come across it. I will assume that SMA meant كتاب المناظر (*kitāb al-manāzīr*), usually translated as *Book of Optics*.

A concise summary of what we have just read, unencumbered by cavillings on SMA's faulty text, would be helpful before we move on. SMA averred that he would base his account on *Tuhfa* and *Obituary*, but the text itself does not bear this out. Let us list some of the discrepancies. (i) Whereas *Tuhfa* states that Tafazzul wrote a *commentary* on Apollonius's *Conics*, SMA claims that Tafazzul translated this book into Arabic. *Obituary* speaks neither of a commentary nor of a translation. (ii) SMA chooses to include the two books on algebra mentioned in *Tuhfa*, but not in *Obituary*; he also claims to have seen some pages of one of these books. (iii) Neither *Obituary* nor *Tuhfa* credits Tafazzul with marginal comments (glosses) on Alhazen's *Book of Optics*.

Let us conclude this section by looking at what is stated in *Chronograms* (Beale, 1867, pp. 371–2). The prose part of his note is translated below:

Tafazzul Ḥusayn Ḳān Kašmīrī

He is also known as *Kān-i 'Allāmā*. Among all the writings of this peerless individual are one on the astronomy of the *ḥukamā* (philosophers) of Europe and two more manuscripts on *ṣanā'at-i jabr wa muqābala* (the art of algebra). Shortly before the demise of Nawāb Āṣaf al-Dawla he [Tafazzul] achieved eminence as the Nawāb's representative; afterwards, during the reign of Nawāb Sa'ādāt 'Alī Ḳān, he went for a sojourn in Calcutta; while returning home, he passed away in Muršid-Ābād on the fifteenth of Šawwāl 1215 Hijra [which corresponds, according to my reckoning, to 1st March 1801]. The text of a panegyric chronogram

penned by Šāh Muḥammad Ajmal Ilāh-Ābādī is given below [skipped here].

The reader will have noticed that Beale does not mention *any* works of translation. He refers to only three books, which correspond to items 6 and 2 in Rizvi's list (at the beginning of § 5). It will be convenient to introduce descriptive names for these books; accordingly I will name item 6 as *Copernican Astronomy*, and the other two tracts as *Algebra* and *Algebra-in-Geometry*.

6 The received wisdom about Tafazzul Part 2

The news that Tafazzul had accomplished an Arabic translation of Newton's *Principia* was broken to the English-reading public by the publication of *Obituary*, an essay written by Lawrence Dundas Campbell (Campbell, 1804), the then editor of a book series with a title that will be abbreviated in the main text (but not in the bibliography) as *Asiatic Annual Register*. Successive volumes in the series are not numbered, and the editor's name appears in the front matter of only some volumes; however, the missing information may be found in a catalogue that is available in the public domain (*Asiatic Ann. Reg.*, n.d.). For our purpose it will be sufficient to note that every volume is divided into many independent sections, each of which is paginated separately, and that biographical accounts of various notables, including Tafazzul's obituary, are presented in a section designated as "Characters".

The subscribers to the *Asiatic Annual Register* (who are listed at the beginning of each volume) were deeply interested in the affairs of the East India Company, and many, perhaps most, of them must have been familiar with the names of the top-ranking servants of the Company (and their immediate subordinates). The likes of Warren Hastings, Lord Teignmouth, Marquis Cornwallis and Sir William Jones still need no introduction, but the reader of this article would find it helpful to acquire a nodding acquaintance with some other characters, including two brothers, David Anderson (1750–1828) and James Anderson (1758–1833), who are commemorated in the gallery of benefactors of Edinburgh University Library. We are told (*EdinUnivLibr*, n.d.) that they may have both studied

at the University of Edinburgh like their elder brother Francis, but only James appears to have graduated. They entered the service of the East India Company, David as a writer or clerk, and James as a cadet in the HEIC army. They became assistants to and close friends of Warren Hastings, Governor-General of Bengal, for



whom David was a major political diplomat, and James a Persian interpreter. David returned to England with Hastings in 1785, and gave evidence for the defence at Hastings' impeachment; James returned to England the following year. David helped Hastings prepare his defence for his impeachment, and was one of the few witnesses who refused to be browbeaten by the managers of the prosecution, Edmund Burke, Charles James Fox and Richard Brinsley Sheridan.

Like Hastings they assembled their own collections of Oriental books and manuscripts. David gifted 113 volumes from his extensive collections of Oriental manuscripts to the University, and James' nephew Adam Anderson gifted his uncle's 54 Persian manuscripts after the latter's death.

7 Synopsis of Tafazzul's English obituary

The text of *Obituary* occupies eight double-column pages. Campbell informs us that he solicited information about Tafazzul's life and works from David Anderson and Lord Teignmouth, and both replied. The former also enclosed two letters he had received, after leaving India, from Tafazzul. When a passage is quoted from *Obituary*, the spellings for proper names written in Latin characters will be retained; three of the excerpts reproduced here contain a footnote each, which are placed *here* at the bottom of the column containing the footnote mark.

The first three columns of *Obituary* contain introductory comments and a brief account of Tafazzul's life from his birth "in the celebrated valley of Cashmir" [!] up to the time when he decided to leave the court of Lucknow and accept an offer from Warren Hastings to become "assistant to Major Palmer in conducting some political negotiations with the Rana of Gohud". For subsequent events in Tafazzul's life, we turn to David Anderson's letter, which was reproduced in toto by Campbell, but here we will be content with a single paragraph:

During the intervals of these tedious and vexatious negotiations [in November 1781], Tofuzzel Hussein delighted to pass his time with my brother, Mr. Blaine, and myself, in conversing on the different laws, customs, and manners of Europe and of Asia; on Persic, Arabic, and Hindu literature; and above all, on the sciences of mathematics and astronomy, in which he had made a considerable proficiency, derived partly from his study of Arabian authors, and partly from his communications with *the learned Mr. Broome* [my italics]. These conversations he always enlivened, by occasionally intermixing sallies of wit and pleasantry. He became, at this time, anxious to learn the English

language, and my brother took great pains to teach it to him. He did not then make much progress, but he continued to pursue this study with such ardour and application, that he was, some years afterwards, able, not only to read, but to write English with accuracy.

Some credible evidence, to be presented in § 9, suggests that in all likelihood "the learned Mr. Broome" was Captain Ralph Broome. Reuben Burrow, the man who had the capacity to widen Tafazzul's mathematical horizons, was still in England in 1781. In *Obituary* his name is consistently misspelt as "Ruben Burrows", and the error has percolated to the works of those who have cited this source without checking whether a mathematician with such a name went to work in India in the late eighteenth century.

After Anderson's letter (which occupies just over four columns) comes to its end, Campbell continues the narrative in his own words:

In 1788, a reconciliation took place between the vizier Assof-ud-Dowlah and Tofuzzel Hussein, and the latter was soon after appointed vakeel from the court of Lucknow to the British government. In this capacity he resided some years at Calcutta, where he cultivated the society of Sir William Jones and Lord Teignmouth (then Mr. Shore), and where, at the hospitable mansion of his friend Mr. Richard Johnson, at Russipughilee, he had every facility afforded him of pursuing his favourite studies of mathematics and astronomy; and had also an opportunity of availing himself of the instruction of Mr. Ruben Burrows, the celebrated mathematician; by which means he acquired a knowledge of the philosophy of Newton. And with a view of combining his study of the languages with that of the sciences, he translated the *Principia* from the original Latin, into Arabic.

The material presented immediately afterwards (four columns, amounting to almost a quarter of the entire text) quotes at length from the two letters sent by Tafazzul to David Anderson, in both of which he speaks mainly of his services in the interests of the Company, but one paragraph in the second letter (written in Persian) does provide a glimpse of his scholarly activities:

You ask me if I continue my studies as usual, or if my employment in public business has diverted my thoughts from literary pursuits?—Some time ago, I employed myself, for a few months, in reading the history of England, chiefly with a view of acquiring competent knowledge of the language. I have since given it up, and have been engaged in translating the



Principia of Sir Isaac Newton, Thomas Simpson's book on Algebra, Emerson on Mechanics, Apollonius de *Sectione Rationis*, translated into Latin by doctor Halley, and a work on Conic Sections by (دالوپتال)¹ *Del-hospital* a Frenchman. All these books I am translating into Arabic, besides several short treatises on Logarithms, curve lines, &c. &c. Some of them I have already finished, and some more of them will soon be brought to a conclusion.—In short, I continue to devote my leisure hours to these pursuits.

The text of footnote 1 has so many blemishes that a correction is warranted: “Guillaume François Antoine de l'Hospital, the celebrated author of the *Analyse des infiniment petits*, and the friend of Malebranche.”

In *Obituary* Campbell corroborates Tafazzul's account of his “literary pursuits” by adducing an “extract of a letter from his friend and associate in these labours, Mr. Ruben Burrows, to Lord Teignmouth”. The excerpt reads:

Tofuzzel Hussein continues translating the *Principia* of Newton, and I think we shall soon begin to print it here in Arabic:—my notes and explanations are to accompany the translation².—He has likewise translated Emerson's *Mechanics*, and a *Treatise on Algebra*, (that I wrote for him) into Arabic. He is now employed in translating Apollonius de *Sectione Rationis*. The fate of this work is singular; it was translated from Greek into Arabic, and the Greek original was lost; it was afterwards translated from Arabic into Latin, from an old manuscript in the Bodleian library; the Arabic of it is now totally lost in Asia.—*I translated the Latin version into English, and from the English Tofuzzel Hussein is now rendering it into Arabic again.* [My italics].

We come at length to the letter written by “Lord Teignmouth, who was long intimately acquainted with this singular man”, and it will be sufficient for our purpose to quote the second of the two long paragraphs which appeared in *Obituary*:

Mathematics was his favorite pursuit; and perceiving that the science had been cultivated to an extent in Europe far beyond what had been done in Asia, he determined to acquire a knowledge of the European discoveries and improvements; and, with this view, began the study of the English language. He was at this time between forty and fifty; but his suc-

cess was rapid; and in two years he was not only able to understand any English mathematical work, but to peruse with pleasure the volumes of our best historians and moralists. From the same motive he afterwards studied and acquired the Latin language, though in a less perfect degree; and before his death had made some progress in the acquisition of the Greek dialect.

Campbell winds up *Obituary* by adding a solitary concluding sentence: “We have nothing to add to this summary of his qualifications and endowment, except our anxious wish, that the whole account may have been rendered sufficiently interesting to reward the perusal of those, who are best able to estimate the merits, and discriminate the peculiarities of his character”.

To fulfil Campbell's anxious wish, some two centuries after he expressed it, is the purpose of this article.

As Lord Teignmouth's letter of appreciation says nothing about Tafazzul's writings, we dip into his *Memoir* (where Tafazzul's name is spelt as Tufuzzool Hossein Khan), and we find there (Shore, 1843, p. 403): “His fame as a scholar and a mathematician was established by a Translation of Newton's ‘Principia’ into Persian, and an original Treatise on Fluxions”. We will return to this two-part remark in § 14 when we come to speak of the first two English translators of the *Principia*.

It is time now to look at the statements made by some other people who knew Tafazzul well, including the two grandees mentioned by Campbell, namely Sir William Jones and Warren Hastings.

8 Other witnesses. Part 1: Sir William Jones, Reuben Burrow and James Dinwiddie

We find at least one mention of Tafazzul in a letter (Nr. 520, dated 13 Sept. 1789) written by Sir William Jones (1746–94) to William Steuart. The first sentence of a rather long postscript reads (Jones, 1970, pp. 838–40): “Give my best compliments to Major Palmer & tell him that his friend Tafazzul Husain Khān is doing wonders in English & Mathematicks. He is reading Newton with Burrow, & means to translate the *Principia* into Arabick”. At the end of the sentence, Cannon (the editor) has added a footnote to announce, as did Campbell in *Obituary*, that the translation did come to fruition: “William Palmer (1740–1816) was Resident at Lucknow in 1782 and at Sindhia's Court, 1797–8. ... His former Indian colleague completed the Arabic translation”. (My italics).

Jones and Burrow, being active members of the Royal Asiatic Society, knew each other intimately, and we may safely conclude that Burrow (not Burrows, not Barlow) was the name of the person who introduced Tafazzul to the works

¹ *Del-hospital*. William Francis, Marquis de l'Hospital, the celebrated author of the *L'Analyse des infiniment petits*, and the friend of Malbranche.

² The translation was finished, but it has not been printed; and we believe Mr. Burrows never added the annotations he mentions.



of English and European mathematicians. Jones expresses, in another letter (Nr. 460, written on 17 June 1787), the hope that “the ingenious author [Burrow]” would find the time to prepare a *Dissertation on the Astronomy of the Hindus*. To this remark, Cannon added the following footnote: “Reuben Burrow (1747–92: *D.N.B.*), mathematician and a loyal Society member, never finished his astronomical treatise. Several of his short papers and lists are in *Asiatick Researches* (ii).”

Campbell and Cannon use, when speaking of Burrow, the phrase “never added the annotations” and “never finished his astronomical treatise”, as if they are censuring him for contriving the early demise which prevented him from fulfilling his promises and plans!

Reuben Burrow was perhaps the only employee of the Company with a genuine mathematical flair. A short account of his life and expertise is needed to understand what role he played in Tafazzul’s mathematical training. According to an obituary (“Z.”, 1814), Burrow sailed for India in 1782, and the

first employment after he arrived at Calcutta was private teaching; this we learn from a paragraph which appeared in one of the English newspapers, stating, that a Cashmirean, one of M. Burrow’s pupils who understood English, was translating Newton’s *Principia* into Persian!

At this point Tafazzul understood English (but not Latin). Burrow, who knew Latin and some French before he set sail for India, seems to have acquired a working knowledge of Persian after his arrival in India (see below). It is conceivable that, after Tafazzul and Burrow became well acquainted, the duo *planned* to translate (into Arabic and/or Persian) some important tracts written by English and French mathematicians. However, Burrow soon found a well paid job in the Company, and was very active in the *Asiatic Society*, which means that he could not have devoted much time to supervise (or collaborate with) Tafazzul, who too was busy with political conjuring and delivering theological lectures. Burrow’s unexpected death in 1792 must have been a great blow to Tafazzul.

The arrival (in September 1794) of James Dinwiddie, a scientific entrepreneur and odd-jobber, passionate advocate of experimental science, and presenter of scientific shows, must have been a godsend to Tafazzul. Dinwiddie’s letter (dated 27 Feb 1796) to Joseph Hume confirms the conjecture (Proudfoot, 1868, p. 134):

The only good mathematician I have met with, in this country, is a native, the Nabob of Oude’s vakeel—his name Tuffoz-ul-Hussien. He is well-known to Mr. Hastings, who sends him out mathematical books. He has translated Newton’s *Principia* into Arabic; also Maclaurin’s *Fluxions*, and the uncouth Emerson’s *Mechanics*. He has been a constant attendant on me

since my arrival in Bengal, and is extremely pleased to see the application of theory to practice. Of the latter he had not the least knowledge.

Fluxions are mentioned again, but now Tafazzul is said to have merely translated Maclaurin’s book, not authored one of his own.

9 Other witnesses. Part 2: Warren Hastings

A book critical of the impeachment proceedings against Warren Hastings was published in 1790 (Broome, 1790). Its author, Ralph Broome (d. 1805), had learnt enough Persian to earn his bread as a translator for the Company, and was, in one reviewer’s opinion (Anonymous, 1790), “well informed in Oriental laws, Mohammedan manners, and British transactions in Hindostan”. He was probably the person whom David Anderson called the “learned Mr. Broome”, Tafazzul’s first guide to western mathematics. At any rate, Ralph Broome, the author of the said book, described an incident that is worth recalling here (Broome, 1790, p. viii). After a chance encounter between Broome and Hastings, they dined together, and during the dinner Hastings expressed

a wish that I would call on him at his house in town, where he wanted to show me an Arabic book, which was given to him by a native of India as a mathematical treatise, and supposed to contain problems unknown to Europeans.—I understood that I had been mentioned to him by some of the natives as the likeliest Englishmen [sic] to translate such a work, as it required a knowledge of Arabic and Mathematics, two kinds of learning seldom united in one person residing in India.

This invitation I did not accept, nor did I ever see him again till long after he was impeached.

If Broome was fluent in both Arabic and mathematics, he *was* learned.

In the year 1798, the East India Company appropriated a room for the new building at the India House, to serve as an Oriental Repository, and they invited their servants in India to deposit valuable oriental works in it; on the 18th of February 1800, they appointed Charles Wilkins, Esq., to be their Librarian (Gordon, 1835). On the 23rd of February 1809, Warren Hastings wrote a long note of enquiry to Wilkins, parts of which are reproduced below:

To Charles Wilkins, Esq.

Sir,

Being desirous of making a sale of all my Persian, Arabic, and Sanscrit, I think it my duty, independently of my interest, to make the first tender of them to the East India



Company, for their valuable museum under your charge. ... Of their value, I have no standard, or other means, for forming an estimate, and wish to submit it to the same authority to which I have referred my first proposal, if this shall be accepted; candidly confessing, that the books, whatever may have been my original purpose in collecting them, are of no use to me now, but in the pecuniary profit which I may derive from the disposal of them. I have the honour to be, &c.
Warren Hastings, &c.

A month later, Hastings wrote again: “My dear Wilkins, I am going back to the country immediately. Be so kind as to ask the Chairman whether he will consent to take my books for the Company. I cannot transport them back again, and their warehouse hire will be an accumulating charge to me. I have, therefore, made my determination, which depends for its immediate performance on his. This do, my dear friend, obtain for me, and let me know it as soon you are in possession of it.—Yours affectionately, Warren Hastings; the 23d of March 1809.”

Wilkins replied with the following valuation: Persian and Arabic books (190 in all) at £ 3 a piece and 12,120 leaves of Sanskrit and Hindovi material at 2 s. 6d. for eight leaves. Hastings was offered the total sum of £ 759 7 s. 6d; on the 7th of April 1809, he wrote:

My dear Wilkins, I thank you for the trouble which you have taken. I approve of your valuation of my books, and should have approved of it, if it had been less. Yet, I own, I wish that a separate estimate were made of the mathematical books, because I have been told that some of them are curious and uncommon, and two of them [of a set of three (see below)] are beautifully written and drawn, and well selected. They are from the hand of Tofuzzel Hossein Khaun. I will tell you frankly, that I had made up my mind to present them to the Company, if the Chairman made any demur about the purchase. Of course I leave the disposal of them wholly to your judgment, and final determination. ...
Yours affectionately,
Warren Hastings &c.

The final determination remained the same as the first, and the two manuscripts of Tafazzul (in his own calligraphic handwriting) fetched Hastings the paltry sum of £6. Unfortunately, Hastings did not reveal the contents of the two manuscripts, nor whether any of his other “mathematical books” were also “curious and uncommon”. Had an Arabic (or Persian) translation of Newton’s *Principia* been among the books he wanted to get off his hands, would Hastings have been just as demure about the pearl in his Indian collection, and Wilkins equally thrifty?

A set of three MSS., items 743–745 in Otto Loth’s catalogue (Loth, 1877) of the Arabic books in the India Office

Library, fit the description given by Hastings; the catalogue adequately describes the contents of each item, and the cover pages of the online versions (QatarDigLib, n.d.-a, n.d.-b, n.d.-c) provide some additional, non-trivial details. We need only a condensed description here. Items 743 and 744 are copies of earlier translations (in Arabic or Persian) of the first and second parts (respectively) of a collection, edited by Naṣīr al-Dīn Ṭūsī, of ancient Greek treatises; item 745 is a copy of a pre-existing Arabic translation of Books 1–7 of *Conics* of Apollonius of Perga.

The script, ornamentation and binding of the volumes indicate that all three belong to a set of mathematical tracts. The name(s) of the copyist(s) are not recorded. Two features of item 745 are not shared by its companion volumes. First, according to my judgment, its scribe is not the same as the person (Tafazzul, according to Hastings) who copied the Ṭūsī selections. Second, one finds, between front papers i and ii, a loose leaf of paper on which is inscribed a brief note in Persian, written in the free running scribbling style known as *shikaṣṭa*. This is evidently a personal message for someone whom the writer addresses in the top line as “خان صاحب مشفق و مهربان” (*kān ṣāhib muṣṭiq-o-meherbān*, meaning *benevolent and kind kān ṣāhib*); the message in the next two lines—about deferment of a meeting between the writer and the recipient (line 2) and a prescription for constipation (line 3)—will be of interest only to such as want to know, for academic or personal reasons, the composition of the laxative.

10 Calcutta School-Book Society digs out three mathematical MSS. of Tafazzul

In 1817 the Calcutta School-Book Society (CSBS) was formed for answering the demand for printed books of a sufficiently high quality at low prices (Ohdedar, 1966). In their second annual report, the Society made an exciting announcement (Anonymous, 1819, pp. 17–8):

Three valuable Mathematical MSS. compositions of the celebrated Tufuzzool Hoosyn Khan (the Prime Minister of the late Nuwwab Vuzeer Asif’ood Dowluh) and the property of his son Tujumool Hoosyn Khan of Lukhnow, have been kindly lent to this Society in order to their being copied. One of them exhibits a view of the Copernican System of Astronomy, the other two are Algebraic treatises. It may be attributed to the enquiries of your Committee that their existence has come to light, and *their preservation been secured*.³ [Emphasis added here.]

³ A brief notice and extract of these works drawn up by Mowluee Hydur Ullee is intended to form a part of the Persian abstract account of the Society’s proceedings and Report for the past year, illustrated by a copper-plate engraving of the Solar system.



ĤAIDAR ‘ALĪ, *Maulavī*. See TAFAZZUL ĤUSAIN KHĀN. احوال سه كتاب النخ [Āḥwāl i sih kitāb.] Account of three mathematical works . . . drawn up by . . . Hydur ‘Ullee. 1819. 8°.

14117. a. 2 (1.)

TAFAZZUL ĤUSAIN KHĀN. احوال سه كتاب تفصل حسين خان مرحوم [Āḥwāl i sih kitāb.] Account of three mathematical works, of Tufuzzool Hoosyn Khan, . . . drawn up by Mowluwee Hydur ‘Ullee. pp. 23. Calcutta, 1819. 8°.

14117. a. 2 (1.)

Fig. 3 Two entries for *Persian Synopsis* in a catalogue of the Library of the British Museum (Blumhardt, 1889). The upper entry occurs in column 108; the lower, in column 330

Presumably, this Persian document (to be named henceforth as *Persian Synopsis*) was given a meaningful Persian title by its author. A hint as to what this title might have been may be gleaned from a catalogue of the Library of the British Museum (Blumhardt, 1889), where its identification tag is 14117. a. 2 (1). It makes two appearances, once under the name of the author and once under Tafazzul’s name (see Fig. 3). One notices that the Persian titles in the two entries are not identical, that the first has definitely been truncated, and that the second might have been abbreviated.

Two other cataloguers list *Persian Synopsis*, but skip the Persian title; Zenker (1846) gives the same English title as that stated by Blumhardt (1898), whereas Deloncle (1879) provides an equivalent French description in which Tafazzul’s name is misspelt as “Cafazzoul Houssein-Khan”. This 23-page summary (of *three* tracts, written by Tafazzul in Arabic) has now become a rare book. Though I have not been able to find *Persian Synopsis* in the public domain, the effort to find it did dredge up some additional information in the pages of a recent commercial catalogue (John Randall, n.d., p. 43), and of the publicity brochure for an auction (Rare-Books, 2016). The most valuable part of the additional information is an illustration with the legend *sōlar sistam murattabah ḥakīm kūparnikūs* (meaning *the solar system as organized by the philosopher Copernicus*).

We know that Tafazzul’s son Tajammul lent three unbridged MSS. to CSBS for the purpose of being copied. What happened to the copies and to the originals themselves, which were presumably in Tafazzul’s own hand, and which

must have been returned to Tajammul? Were there any copies prepared within the author’s lifetime by professional scribes? None of these questions I am able to answer with certainty, but I can aver reading the following remark in the same report where their recovery had been announced with so much joy (Anonymous, 1819, p. 43):

The MSS. some months ago obtained from Lucknow, the compositions of the famous Tufuzzool Hoosyn Khan, and in a fair way of becoming food for *worms*, not *students*, furnish a case in point to shew the truth of Mr. Robinson’s observations, that our interposition may save valuable performances from perishing.

The Society’s sense of achievement—that, thanks to the efforts of their Committee, the “preservation [of the three Tafazzul manuscripts had] been secured”—seems to have been premature (or dashed, if it was just an earnest hope). The Committee members might have concluded that worms had caused enough damage to prevent a mathematically untrained scribe from making useful copies. The worms, it seems, were allowed to do their work for a few more years (see below).

11 John Tytler connects with Indian mathematicians

John Tytler (1787–1837) arrived in India in 1813, and was assigned in the beginning of 1814 to the civil station of Patna. There he met Dīwān Kanh Jī, an Indian scholar who had prepared a compendium (written in Persian) of whatever mathematics he could learn from Indian and foreign sources; fortunately, he included the contents of *Algebra* and *Algebra-in-Geometry* in two sections of the compendium. Referring to Tafazzul as “the late Tafazzul Husain Khan”, the Dīwān informs the reader that Tafazzul prepared his material by translating English books into Arabic. The first of these sections (pp. 546–579) covers algebra and the second (pp. 579–624) discusses the solution of geometrical problems by means of algebraic analysis. The printed version of the compendium, which provides the English equivalent of all important terms (written in Persian characters), uses the term “geometric algebra” for what may also be named “algebra-assisted geometry”. The compendium is commonly dubbed *Khazanat al-Ilm* (also *Khazanat-ul Ilm*), though the full title is a little longer and far more informative (Kānh Jī, 1837; HEIC-Library, 1845, p. 224). The contents of the compendium inspired Tytler to publish two articles



(Tytler, 1820, 1832), the first of which concluded with the following words (Tytler, 1820):

It is but justice that I should add, that my first knowledge of this rule was obtained from the *Khazanut-ul Ilm*, which is a complete system of Arithmetic, Algebra, and Geometry, as far as known to the *Arabians* and *Hindus*, composed in the present day by Khan Jee, a most intelligent inhabitant of *Patna*. On my requesting to know from what original authors the rule was taken, this gentleman was kind enough to favour me with the above extract. No more I think is required to demonstrate, that his own work highly deserves translation and publication.

The publication of Kanh Ji's *Khazanut-ul Ilm* became a printing ordeal, which is described already in the middle of the title page. The description is divided into three centred blocks of text in the format shown below:

Adopted for publication, by the General Committee of Public Instruction, for the general use of the Persian Colleges under their control, and printed up to the 492nd page under the supervision of Dr. J. Tytler. Suspended by order of Government, and transferred with other unfinished Oriental works to the Asiatic Society, in March 1835, and completed at the Society's expence, under the gratuitous supervision of Maulavi Mansur Ahmed Bardawani, one of the teachers at the College Haji Mohsin, Hoogly, September, 1837.

Failing health compelled John Tytler to discontinue his involvement with the book; he decided to leave India, and arrived in England in May 1835. Despite being "broken in health, depressed in spirits, and impaired in fortune" (Wilson, 1837), Tytler spent a great deal of energy on promoting the work of "a Maulavi, by name Gholaum Hosain", who had come to see Tytler (shortly before his departure) in the hope that the latter would recommend his manuscript to the Government Education Committee. Tytler obliged by endorsing the book enthusiastically in a long and characteristically thorough article, published posthumously (Tytler, 1837).

Whether or not Gulam Husayn received any financial assistance from the Education Committee is not known (at least to me), but we know from an 1838 report on the state of education in Bengal that the book was published (Adam, 1838, p. 71):

Maulavi Gholam Hossein, dwelling at Sahebgunge in the thana of that name, has written in Persian a compilation called *Jam-i-Bahadur Khani*, from various Arabic works on arithmetic, geometry, astronomy, and the natural sciences with additions of his own. This work has been printed and contains 720 pages. He is now engaged in

the preparation of astronomical tables to be entitled *Zij Bahadur Khani*. The names of both works are intended as a compliment to his patron Bahadur Khan, one of the sons of Mitrajit Singh, the Raja of Tikari.

Passionate about the publication of scientific books in Arabic, Tytler wrote as well as translated several pieces himself. To quote from his obituary (Wilson, 1837):

The interest first imbibed by Mr. Tytler at Patna from the example and aid of his friend Khan Ji, in these arduous and abstruse enquiries, continued unimpaired to the last: and, after his return to England, he communicated to the Royal Asiatic Society an analysis of a work analogous to the *Khazanat al Ilm*, named the *Jamia Bahadur Khani*, by Maulavi Gholam Hosein, a scientific native in the service of Buhadar Khan, the son of the Raja of Tikari, another of Mr. Tytler's Patna friends, and a patron of mathematical learning. Mr. Tytler also prepared for the Ashmolean Society of Oxford, an account of an Arabic version of the Conic Sections of Apollonius, and of other mathematical works originally written in Europe, of which he had brought home a manuscript copy.

So much space has been devoted to Tytler in an article about Tafazzul, because if a presentable Arabic translation of the *Principia* had existed, Tytler would probably have been informed by his Indian "men of mathematics". I have not come across a reference to any of Tafazzul's putative translations in one of Tytler's articles. However, the rumour must have been floating around, as may be judged from the concluding remarks, in a few pages devoted to book reviews. After spending one paragraph on the Indian and Arabian part of *Khazanat al-Ilm*, the reviewer states (Anonymous, 1833):

The European part of the *Khizanut-ool-Ilm* consists of two sections: first, a complete translation by the Dewan of Bonnycastle's Algebra; secondly, an extract consisting of a collection of Geometrical Problems from the papers of the celebrated *Tufuzzool Hosain Khaun* of Delhi. This person during his life, was considered we believe, the best Mohammadan mathematician in India, and he appears to have employed his time [all his time?] in translating European mathematical works into *Arabic*; after his death, which took place some years ago, Government, we are told, made strong efforts to obtain his MSS, but in consequence of legal disputes between his relations these were unsuccessful, and the fate of the papers is probably not known. It is much to be wished that they could be procured.

Tafazzul did spend, we happen to know, a few years in Delhi but many more in Lucknow, and—not by the bye—the second section of *Khazanat al-Ilm* is not (as already stated



above) quite “an extract of Geometrical Problems from the papers of” Tafazzul. The rest of the statement may also have been vitiated by some imprecision or involuntary distortions, but perhaps not enough to have squeezed all truth out of the words. If that is granted, one may go on to conclude that, some thirty years after his demise, the unraveled portions of the mathematical papers of Tafazzul—which might have included some presentable translations—were still in the hands of his heirs. We also have to assume that the reviewer was not speaking of the three short tracts that had been loaned by Tafazzul’s son to CSBS.

12 Tafazzul’s mathematical works: separating rumour from fact

By now we have heard so many claims on behalf of Tafazzul that it is not easy to recall who said what. Did Tafazzul translate the *Principia* into Arabic or Persian? Did he use the original Latin text of Newton or an English translation? Did he also write an original treatise on fluxions, or did he merely translate Maclaurin’s tract? Did he translate other books as well? Emerson’s *Mechanics*? A book on conic sections by de l’Hospital and another on the same topic by Robert Simson? Did he also translate Burrow’s English version of a book of Apollonius? Did he translate Simpson’s book on algebra, or that written for him by Reuben Burrow, or both?

It will be well to recall, before attempting to answer the above questions, what A&P wrote about rumour (Allport & Postman, 1948, p. 43): “To be sure, in rumour there is often some residual particle of news, a “kernel of truth,” but in the course of transmission it has become so overlaid with fanciful elaboration that it is no longer separable or detectable. In the rumoured story it is almost always impossible to tell precisely what the underlying facts are, or indeed whether there are any at all.”

Let us recall SMA’s words in *UrduBio* (see Fig. 2 or the English rendering which follows it): “He wrote two algebraic treatises, one on algebraic solutions [i.e. *Algebra*] and the other on algebro-geometric solutions [i.e. *Algebra-in-Geometry*]. (Indeed, I have seen some pages of the second treatise, published in Calcutta).” The first sentence is correct, but SMA is just echoing Šūštarī here, for he has not seen either of these tracts; the few pages of *Algebra-in-Geometry* published in Calcutta that crossed his eyes must have been in *Persian Synopsis*, or in *Khazanut-ul Ilm* (Kānh Jī, 1837), which were both written in Persian, not Arabic.

On the basis of what has been presented above, we should readily agree that *Algebra*, *Algebra-in-Geometry* and *Copernican Astronomy* form the kernel of truth in the reports concerning Tafazzul’s prolific authorship of mathematical works, and these are precisely the three tracts Beale chose to mention in *Chronograms*.

Had there been no trace of *Khazanut-ul Ilm*, whose author was adept at mathematics, besides being a contemporary of Tafazzul, we would not have been half as confident about the existence of *Algebra* and *Algebra-in-Geometry*. Before proceeding to look at claims concerning translations of specific mathematical treatises, it will be helpful to recall a similar case from the distant past.

Aristarchus of Samos has come to be recognised as the first known proponent of a heliocentric model for our solar system, although the proposal is not to be found in his only extant manuscript (Heath, 1913; Evans, J., n.d.); the recognition is based on the authority of Archimedes, a virtuoso astronomer himself. It need hardly be said that, though we must be prepared to listen to less eminent witnesses, we should not take, when speaking about a matter of such importance, the word of someone with a questionable competence. The absence of a manuscript that is claimed to have been written in the near or distant past need not be an impediment to its being attributed to a given author, but the requirement about the credentials of those who vouch for its existence at some point in time, for its author’s identity and its contents, cannot be relaxed.

In Tafazzul’s case, we should not be expected to take *anyone’s* word about his written works, unless the testimony comes from a person who has seen Tafazzul’s translation of the *Principia*, has read one or two chapters, and has the requisite competence, which amounts in this case to possessing the capacity to comprehend written Arabic and/or Persian *and* knowing enough mathematics to be able to judge the fidelity of the translation. Among Tafazzul’s contemporaries, the only one who does not fall through the sieve of competence is Reuben Burrow, and he did not go beyond saying that Tafazzul “continues translating the *Principia* of Newton”; we may even give Sir William Jones the benefit of the doubt, but he too went no further than announcing (only once) that Tafazzul, “is doing wonders in English & Mathematicks”, and that he “is reading Newton with Burrow, & means to translate the *Principia* into Arabick”. Among those who arrived after Tafazzul’s decease, John Tytler was uniquely qualified to judge the issue, but (to the best of my knowledge) he did not mention coming across any work of translation by Tafazzul.

Was Tafazzul an impostor, then? A considerable amount of preliminary discussion about the very task of translating a mathematical treatise is needed before we attempt to answer this question.



13 Different types of translations

Let us refer to the opening remark of a passage (quoted above) from *UrduBio*, in which SMA extolls Taffazul's mastery of foreign languages: "He also had complete command over English, Latin and Greek, as may be judged from the works written, edited and translated by him." We will be able to judge only when we find a manuscript or two. Apart from this obvious objection, it is crucial to emphasize that, since mathematics itself is a language, a translator who has nearly the same grasp of the subject as the author (of the work to be translated) need not be an expert in the source language.

For a striking illustration of the truth of the above statement, we need only return to Burrow's account of the translation, from Arabic to Latin, of *De sectione rationis*, and supplement it with the nitty gritty of this particular translation project. The original Greek version was lost (but not before it had been translated into Arabic). The Bodelian library had acquired an Arabic manuscript through the efforts of Edward Bernard, who began, but did not complete, a translation of it, and the task eventually fell to Edmond Halley, who succeeded, *though he knew no Arabic*, in producing a translation that has been much admired! In the preface to his Latin translation, Halley (1706) stated the curious circumstances under which the translation was performed. Though an English rendering of the relevant passage is available (Molland, 1994, p. 221), our purpose will be better served by quoting a longer excerpt from a memoir that was published along with Halley's correspondence and papers (Folkes, 1937):

In 1706 he publisht Apollonius's book, *De sectione Rationis*, by him translated, or rather decypher'd, from an Arabic Manuscript, in the Bodleian Library; for he did not, at that time, understand the Arabic Tongue, but only translated the whole by the assistance of a very few pages of it already translated by Dr. Barnard, which he made use of, as a Key to the rest; and this he did with such success, through his being so great a Master of the Subject, that I remember the Learned Dr. Sykes, (our Hebrew Professor at Cambridge, and the greatest Orientalist of his time, when I was at that University,) told me, that Mr. Halley talking with him upon the subject, shew'd him two or 3 passages which wanted Emmendation, telling him what the Author said, and what he shou'd have said, and which Dr. Sykes found he might with great ease be made to say, by small corrections, he was by this means enabled to make in the Text. Thus, I remember, Dr. Sykes expresst himself, Mr. Halley made Emendations to the Text of an Author, he could not so much as read the language of.

When it comes to the translation of Newton's *Principia*, the magnitude of the task presented, in the first few decades after its publication, a far bigger challenge, because the novelty of the approach put the translator at an enormous disadvantage. The person who translated the *Principia* into French was the Marquise du Châtelet, who knew Latin and English, and was no mean mathematician herself (Huffman, n.d.; Zinsser, 2001). Like Tafazzul, she led a busy life, but she spent all her spare time on converting Newton's text into a version that would be intelligible to the mathematicians of Europe, most of whom were more familiar with French than with English, and were in tune with the new concepts, nomenclature and notation pioneered by Leibniz. Émilie du Châtelet saw no point in slavishly translating the *Principia* into French; she decided instead to re-dress Newton's arguments in the garb of Continental calculus, and was thereby able to consult two eminent French mathematicians, who were part of her circle of friends, had embraced and digested Newton's ideas, but rejected the cumbersome mathematical apparatus he used for preparing the *Principia*. As for Newton's text itself, Zinsser has quoted from du Châtelet's letter to Daniel Bernoulli: "m. Neuton's Latin is one of the difficulties" (Zinsser, 2001).

For Tafazzul, whose knowledge of Latin could not have been other than superficial, and an understanding of Newtonian physics hardly better, making an Arabic translation that adhered closely to the Latin version of the *Principia* must have been a tough nut to crack, even with a helping hand from Burrow.

Both Halley and Mme du Châtelet wanted to, and succeeded in, preparing presentable translations. There also arise occasions when a reader wants to prepare a translation only for their own benefit. One learns, after observing capable collaborators who have a totally inadequate knowledge of English, that many of them compensate for their linguistic deficiency by "translating" into English the key papers in their discipline by writing manually the meanings (in the language of their choice) of all unfamiliar English words and phrases, placing the dictionary equivalents, whenever possible, directly above the relevant part of the printed English text. With perseverance they manage to garner an informal, syntactically dishevelled, set of word strings that answers their needs even if the whole falls far short of a presentable translation. When the documents happen to be photocopies of an original, the translator is free to use a pencil or write with a pen (using, when helpful, inks of different colour). If copies are not easy to make, most people would use a pencil, and this, we are told by Hutton (1815, p. 64), is how Burrow prepared translations for his own use:

The late Mr. Reuben Burrow collected, in India, many oriental manuscripts on the mathematical sciences, both in the Sanscrit and the Persian languages, the lat-



ter being translations only of the former: most of these he bequeathed by will to one of his sons there But one or two of these Burrow left to his friend Mr. Dalby, ... being the Persian translations of the Bija Ganita and Lilawati, with an attempt at an English translation of some parts of them by Mr. Burrow; but these attempts being mostly interlineations written with a black-lead pencil, are in danger of being obliterated.

Among the people who spoke of Tafazzul's translations, only Burrow said "we shall soon begin to print it here in Arabic", and one learns that his "notes and explanations" were meant to be an integral part of the *printed* and presentable translation of the *Principia*. Burrow's premature death made that hard nut harder still—well-nigh impossible for Tafazzul to crack on his own.

14 Who remembers the first two English translators of *Principia*?

Of the first two English translations of Newton's *Principia*, only that prepared by Andrew Motte and published in 1729 is widely known. According to Bernard Cohen (1963), "a second and independent translation appears to have been made at the same time by Henry Pemberton, Newton's collaborator and disciple". Pemberton knew some mathematics, but no one would have called him a mathematician; Cohen provides interesting details about this translation, which did not prove to be remunerative. As for Motte, Cohen writes: "We know next to nothing about Andrew Motte. I have been unable to find any information concerning his life, e.g., his date of birth, his education, or his literary and scientific career. Nor have I found out when he undertook to translate the *Principia*, or under what circumstances". The only trace he has left as a man of letters is the following line (Cave, 1734): "Mr Andrew Motte, Author of *The Laws of Motion*, and several other Tracts in the Mathematics."

Let us return now to the remark from the *Memoir* of Lord Teignmouth: "His fame as a scholar and a mathematician was established by a Translation of Newton's '*Principia*' into Persian, and an original Treatise on Fluxions", and just suppose that the sentence had finished after the word "Persian". I wonder if Lord Teignmouth also realized that recognition as a mathematician requires more than the ability to translate a mathematical tract, however magnificent that tract may be, and felt the necessity of conferring extra glory on his friend Tafazzul by crediting him with an original work on fluxions.

15 Drawing the threads together

It has been argued above that many Company employees made assertions (about the nature and extent of Tafazzul's mathematical accomplishments) that were unsubstantiated and—even if the rumour raisers, Tafazzul included, did not think so—highly implausible. As is typical of the situations where rumour thrives, the Company servants transmitted information that they had not bothered to, or failed to, contextualize when they first received it. Was it this author or that? this book of a particular author or that one? translated from Latin or from English? into Arabic or into Persian? translated a book on some abstruse topic or wrote one himself?

Rumours are topical, therefore short-lived. Any rumour that lives long enough turns into a myth. It remains to be shown that the rumour (about Tafazzul's translation undertakings), which lay dormant for more than a century, has been gaining currency among contemporary scholars, and is now turning into a myth. Challenging a potential myth, rather than delving into the undeclared motives, either of the originators of the rumour or of its more recent perpetrators, has been my aim here.

16 Revival of the rumour and its dissemination

The list of authors who have accepted one or more of the claims asserted without proof in *Tuhfa* and *Obituary*, or by other friends of Tafazzul, and used it to buttress one or another point of view is rather large; otherwise the use of the term "rumour" would not have been warranted. Some of the works which have propagated the rumour are mentioned below and commented on at the end of the list: (Āzād, 1907; A. Yusuf Ali, 1940; Basu, 1943; Parulekar, 1945, p. 5; Anand, 1963; Rizvi, 1986; G. Khan, 1993; Charette, 1995; Tavakoli-Targhi, 1996, 2001, 2004, 2011; Bayly, 1999; Robinson, 1997, 2001; Minault, 2000; Rahman, 2002; Dalrymple, 2002; Chancey, 2003; I. G. Khan, 2003; Raj, 2008; Schafer, 2009; Raj, 2009, 2011; Chatterjee, 2012; Sen, 2014; Yazdani, 2016, 2017; Ehrlich, 2018; Bergunder, 2018; Bakshi, 2021).

It stands to reason, that in this group of publications, *Tuhfa* and *Obituary* are the most frequently cited sources, since these are truly the fons et origo of the rumour. A few additional comments appear to be in order, and these are listed below.

1. Tafazzul's name appears prominently in Muḥammad Ḥusayn Āzād's legendary *Āb-i Ḥayāt*, first published in 1880 (Āzād, 1907), and translated into English in 2001 (Āzād, 2001). This book is cited by SMA as item 8 in the list on p. 7 of *UrduBio*. Āzād's passage describing



Tafazzul has a footnote; in the English version (Āzād, 2001), the second sentence of the footnote (p. 255) reads: “He had learned the English and Latin languages too; he had translated the *Differential*, and so on, of Newton Sahib into Persian”. Āzād was evidently unaware that Newton Ṣāhib abhorred the *differential* and its creator, and it was wise of Āzād Ṣāhib to use the escape hatch “and so on” (translation of *vağayra*), which prevented him from committing further blunders.

2. Of all the disseminators cited above, Yusuf Ali is the most cautious, for he wrote (A. Yusuf Ali, 1940, p. 74): “Tafazzul Husain Khan, the Wakil of Nawab Asaf-ud-Daula at Calcutta, about 1788–92, was engaged in translating Sir Isaac Newton’s *Principia* from Latin into Arabic (or was it Persian?). He also attempted to translate books on Algebra, Mechanics, Conic Sections, and Logarithms. He knew many languages, including Greek. He died in 1800, and a notice of him appeared in the Asiatic Register (Vol. V, 1803; Characters, p. 7).” (Apart from the book title *Principia*, all italics are mine.)
3. With no reasons given by Yusuf Ali for his scepticism, the tentativeness of his understatement is more likely to be lost than not.
4. M. R. Anand cites no one for the statement, but his phraseology (“attempted to translate”) suggests that he was influenced by Yusuf Ali.
5. Robinson states the following and feels no need to substantiate the statement (Robinson, 1997, 2001): “Indeed, in the late eighteenth and early nineteenth centuries Lucknow was a major intellectual centre training scholars who took pleasure in engaging with European science such as the polymath Tafazzul Husain, who translated Newton’s *Principia* into Arabic, and ...”.
6. Minault (2001) states in footnote 31: “In fact, Newton’s *Principia* and other works of European mathematics and astronomy that supported the heliocentric view of the universe had already been translated into Arabic and Persian in India in the late eighteenth century by Maulawi Tafazzul Husain Khan of Lucknow. He is mentioned in the *Asiatic Annual Register* of 1803, pp. 1–8; and in Abu Talib Khan, Ma’āthir-e Tālibī (personal communication between the author and Md. Tavakoli-Targhi). Cf. Tavakoli-Targhi, “Orientalism’s Genesis Amnesia” and ...”

Two other points must also be made here:–

- (a) Anyone who, when alive, was a pillar of the Awadh court, and commanded, when dead, sixteen columns in the *Asiatic Annual Register* couldn’t have been a mere Maulawi. However, Minault is in very good company: even SMA, the descendant who wrote Tafazzul’s biography, used this honorific in the title. Tafazzul gets more than a mention in the *Asiatic Annual Register*, but he is

credited there with only an Arabic translation of Newton’s *Principia*; true, Abū Tālib Kān also wrote about Tafazzul, but in a different book (Abū Tālib, 1885), and for a different role, namely a key player in the political affairs of Awadh after Asaf-ud-Daula became the Nawāb.

- (b) After Minault (2000) has cited *Obituary*, her mention of Tavakoli-Targhi’s 1998 article “Orientalism’s Genesis Amnesia” does not add further weight to the translation claim, because the latter author also cites *Obituary* for support. The rumour is continued by Schaffer (2009) when he cites the Minault footnote in a footnote of his own (Nr. 32): “Gail Minault ... cites Tafazzul’s translation of Newton in connexion with Muslim students’ demand for astronomy teaching in the Urdu curriculum at Delhi College in the 1840s.”

1. William Dalrymple’s presence among the disseminators is easily explained. Šuštārī was related to one of the protagonists in *White Mughals*, wherein Tafazzul is accorded—because he is greatly admired by Šuštārī—a very long footnote on p. 271. That Dalrymple is not intimate with Tafazzul may be deduced from the fact that when this dignitary is first presented to the readers (line 7), his full name is declared to be “Abu Talib Tafazul”! Whatever the cause, Schaffer quotes Šuštārī through *White Mughals*, the indirect quote ending on the remark (Schaffer, 2009, p. 59): “Latin, ... the learned tongue of the Europeans in which they write their scholarly books, and which has the same position among them as Arabic among non-Arab Muslims.” Šuštārī may have thought so, but the analogy, useful though it is, breaks down when it is stretched as far eastward as India (see the next item for a fuller discussion).

2. Since acceptance of one or both of the primeval sources (*Tuhfa* and *Obituary*) is a trait common to nearly all the disseminators, it is perhaps unfair to choose Yazdani as a representative. However, his comments on other sources provide a more telling indication of the danger of suspending one’s judgment. In a long footnote full of bibliographic data, Yazdani mentions that Anand (1963), Bayly (1999), and Rizvi (1986) averred that Tafazzul translated the *Principia* into Persian. This, Yazdani argues, “seems to be unlikely since even in the Persianate world scientific texts were usually written in Arabic”, after which he goes on to cite some other authors who have stressed the singular status of Arabic in the Muslim world. To clinch the argument by removing any lingering doubts, Yazdani refers to Schaffer (2009), because he (Schaffer) “even provides archival evidence from British contemporaries that Tafazzul translated Newton and other scientific works into Arabic”. Schaffer has indeed taken great pains to collect the comments of Tafazzul’s contemporaries, but their



words, being mere assertions, do not satisfy the criterion of secure evidence; what is needed, at the very least, is a written assessment of Tafazzul's translation of the *Principia*. One's faith in the offhand comments of Tafazzul's contemporaries is shattered by their lack of unanimity. Recall that Schaffer also refers to "the collection of primary sources" in (what has been named here as) *Leaflet*, and one finds, on p. 1 of Part II, the remark "His fame as a scholar and a mathematician was established by a Translation of Newton's "*Principia*" into Persian".

Yazdani has assumed, as did Šuštārī some two centuries ago, that what was true for the Persianate world was true also for India-under-the-Muslim-rule, an assumption that overlooks the fact that the Persianate world was predominantly peopled by followers of Islam, whereas Muslims of India were vastly outnumbered by Hindus; indeed, an examination of the historical development of literature in India does not support the assumption. Both Muslim and Hindu authors adopted Persian as the medium for secular topics; Arabic or Sanskrit (depending on their religion), for religious texts. We have already seen two examples: Dīwān Kanh Jī (a Hindu) and Maulavī Ġulām Husain (a Muslim) both wrote their mathematical texts in Persian. Ironically, it was Tytler who championed, rather quixotically, the cause of Arabic as the medium for disseminating scientific knowledge among Indian Muslims, and prided himself for being their benefactor.

There is no need to build a cogent case by marshalling afresh the pertinent details, for Sherwani has already dealt with the issue capably. He begins the discussion with the apt remark (Sherwani, 1969, pp. 81–96): "It is strange that in spite of the virtual hegemony of Muslim rulers in a large part of India during the period under review [ca. 1200–1760], the output of Arabic literature produced in the country was comparatively meagre and was mostly confined to religious topics." Also, one should not overlook the fact that a scholar like Āzād did not find it odd that Tafazzul chose to translate "Newton's *Differential* and so on" into Persian.

17 Concluding remarks

That Tafazzul—with only a cursory knowledge of Latin, deprived of able mathematicians' company, and disinclined to turn his back on competing, non-scientific scholarly commitments—managed to complete, during the nine years or so that elapsed between Burrow's death and his own, a presentable translation of not just one, but of around half a dozen mathematical texts, including Newton's *Principia*, is a claim hard to accept on the basis of currently available evidence.

Whoever continues to endorse undocumented claims about Tafazzul's translation output should be reminded of what Sir William Jones wrote in a different context (Jones,

1970, p. 738): "that Moses wrote any of the psalms, may be true; but ought not to be roundly asserted without proof".

Appendices

Appendix A: Šuštārī's account of Tafazzul's life

English translations of several passages from *Tuhfa* are sprinkled throughout *White Mughals* (Dalrymple, 2002); some authors have used such ready-made excerpts as source material, if not quite as a back-door entry into *Tuhfa*, presumably because they are unable to read Persian. This is a precarious strategy, because Dalrymple himself thanks a Bruce Wannell for "wonderful translations from the Persian" (page 34). The translator, though admirably competent, has a habit of hopping over chunks of Šuštārī's text without any warning, and has good reasons for doing so (see below).

In this appendix, I will comment on what Šuštārī, who has been called "Tafazzul's friend and biographer" (Schaffer, 2009), wrote about Tafazzul's life and works (in the five and a half pages devoted to the topic). Since the assessment presented below is based on an English rendering of a few Persian passages, some preliminary comments on the difficulty of translating a Persian text of that era are necessary.

First: not only are vowel marks and the *ezafe* (transliterated here as *-i*) omitted, but also the extra slanting stroke that distinguishes *gāf* (گ) from *kāf* (ک) is dropped routinely; these parsimonious steps are consistent with the supposition—flattering to some but frustrating to others—that only a highly literate adult will read the text, and such a reader needs no scribal crutches. Second: marks of punctuation were unknown when *Tuhfa* was written. Third: the Persian script has no equivalent of the cases (upper and lower) for each letter. Fourth: no italic or bold fonts, properly so called, were available for adding emphasis in a typical manuscript page.

No intelligent author writing in Persian could have been unaware of the aforementioned limitations, and various devices were employed to mitigate the difficulty caused by the lack of visible segmentation in the text. The most important among these devices is the symbol و when it is used a *conjunction* meaning "and". A second device, both a help and a hindrance, is the use of rhyming; helpful because a sentence cannot end before the rhyming pair (or triplet etc.) is completed, but a hindrance for a translator because often the individual words in the pair happen to be synonymous or superfluous. Like most of his contemporaries, Šuštārī was prone to excessive use of rhyming.

The stage has now been set for reading (in translation) Šuštārī's "biography" of Tafazzul, which starts in the middle of p. 442, and ends on p. 447. I will proceed in two steps.



An overliteral translation of the relevant text on p. 442 will be displayed first, using a mock Persian style, in that the translated passage will contain no *conventional* punctuation marks, no upper case letters, and—apart from one exception—no italics. Rhyming in the original text will be made visible by transcribing the phrases in italics; the meanings of the phrases will be provided in footnotes immediately after the end of the passage. In order to enhance the intelligibility of the English version, I have added, within square brackets, the equivalent of what is implicit in the Persian original, and also inserted a “currency symbol” (¤) as an indication for a short or intermediate pause.

[tafaẓẓul] is among the dignitaries of the capital city lāhōr & his auspicious birth took place in that famous city & afterwards without soliciting the post [he was] appointed as the ambassador representing nawwāb āṣaf al-dawla yaḥā k̄ān ¤ sovereign of the entire province of awadh & lakhknaʿū ¤ stationed at [the headquarters of] the English government ¤ [he was] one of the pre-eminent *fuzalā-i nāmdār*^{1a} & the doyen of *ḥukamā-i rozgār*^{1b} & was ¤ in all branches of knowledge ¤ a *fāẓil-i bī-naẓīr*^{2a} & *ʿallāma-i taḥrīr*^{2b} especially in *ḥikmiyyāt* & *ilāhiyyāt* (= philosophy & divinology) ¤ plato of the epoch & aristotle of the age ¤ abided awhile in šāhjāhān-ābād under the tutelage of contemporary scholars & in banāras ¤ from the words of [in the company of] *failsuf-i aʿzam*^{3a} & *imām-i akram*^{3b} *šaiḳ-i ajjal* [= šaiḳ the magnificent], šaiḳ ʿalī ḥazīn ¤ acquired knowledge to a high level & attained an exalted status ¤ his speech-making & exposition [made him] the envy of the *ĉah-ĉa-i bulbul-i hazar dāstān dar bahārān*^{4a} & an inimitable model for the *qah-qaha-i kubk-i darī dar kohsārān*^{4b} ¤ his open nature was like [p. 442 ends here.]

1a: renowned scholars; 1b: scholars of the age; 2a: unrivalled master; 2b: superb scholar-writer; 3a: the great philosopher; 3b: noble leader; 4a,b: laughter of two song birds, each a familiar motif in Persian poetry.

Only Abū Ṭalib (1885) and Šūštārī give Lahore as Tafazzul’s place of birth; other authors name Siyālkōt instead. Also, Šūštārī is the only one who mentions Šaiḳ ʿAlī Ḥazīn as one of Tafazzul’s teachers. SMA notes both discrepancies; concerning the place of birth, he writes that his elders confirmed that, as stated in *ʿImād al-Saʿādat* (Ġulām ʿAlī, 1864), Tafazzul was born in Siyālkōt; about Tafazzul receiving some instructions from ʿAlī Ḥazīn in Banāras, SMA neither confirms nor denies it, saying merely “It is possible”.

We move now to p. 443. As before, the English version below will not use standard punctuation marks, because the actual text uses none (see Fig. 1). An additional symbol (||) will be needed as a substitute for an em dash (—). Since this translation will be compared with another rendering, upper

case letters will no longer be shunned, and bold font will be used for some words, so that they may serve as signposts and facilitate the comparison. Speaking of Tafazzul, Šūštārī continues:

His open nature was like morning bursting forth ¤ *nūr āgīn* (drenched in light) & repository of *ʿulūm-i awwalīn-o-ākīrīn* [= sciences alpha-to-omega] & a most devout and **pious** Shīʿa & his face illumined by the light of the authority of the holy Imāms ¤ may Allāh’s blessings be upon them all ¤ his well-focussed mind & its agility to transfer [its contents to others] like a sharp-edged sword & his munificent attitude ¤ manifest & hidden ¤ combined to form an agreeable whole & in this entire country the light of his beneficence was made patent by the succour he provided to those who had no friends & to the gatherings of western sages and people with good breeding he was the life and soul [treated] with dignity & respect & the truth is that his virtues and excellence have placed him on a high pedestal ¤ a whole lifetime and a reed bed [for making pens] is necessary for recording even a soupçon of his endowments ¤ Arabic & Persian & English & Rūmī {||} the scholarly language different from the vernacular & any European who desires to write a book uses this language & they call it **Latin**, and the status it enjoys in Europe is similar to that accorded by **non-Arab** scholars to Arabic {||} & **Greek** [he] spoke read and wrote well & for this reason he had **translated several** scholarly books of Europe into Arabic & had composed his own books as well & the most noteworthy among which are a commentary on the Conics of ايلونيوس (*Ēlūniyūs*) & compiled two tracts on **algebra** one containing algebraic solutions & one embracing algebraic & geometric solutions & [wrote] commentaries on the Conics of ديوپتال (*Diōpitāl*) and the Conics of Simson & through debating & book-reading wrote so many marginalia and glosses on books of ḥadīc & **jurisprudence** of the two sects & Islamic philosophy & other [?] *ʿulūm* [sciences, or branches of knowledge] that even a fraction [end of p. 443].

As it happens, Dalrymple has also quoted, in a long footnote in *White Mughals* (Dalrymple, 2002, p. 271), an excerpt from the pages of *Tuhfa*. Tafazzul is described there as a

pious Shiite, who also knew, apart from Persian and Arabic, English and the Roman tongue which they call **Latin**, which is the learned tongue of the Europeans in which they write their scholarly books, and which has the same position among them as Arabic among non-Arab Muslims. Tafazzul even knew **Greek**



and had **translated several** books by European scholars into Arabic, apart from his own writings on **algebra** and **jurisprudence** [p. 444 begins]. India should be proud to have brought forth such a scholar ... however much his position gave him the attributes of wealth and status, he never changed his courteous and egalitarian behaviour towards the poor and the weak'; Seyyed Abd al-Latif Shushtari, *Kitab Tuhfat al-^sAlam* (written Hyderabad, 1802; lithographed Bombay, 1847), p. 450 [sic].

The reader will be able to see what (and how much) is missing from the *White Mughals* translation, and perhaps will also be able to understand why the translator decided to lighten his own (and the reader's) burden.

What Šuštari wrote about the status of Latin among European scholars was true once, but not at the beginning of the nineteenth century, when *Tuhfa* was written. Galileo had already perceived, when he published his famous *Dialogo* in 1632, the advantages of writing in vernacular Italian rather than scholarly Latin. *Optics*, Newton's second book, was written in pellucid English. Marquis de l'Hospital's text on differentials was, like his text on conics, in French. For better or for worse, Latin started losing ground in the early decades of the eighteenth century, so much so that d'Alembert was alarmed (d'Alembert, 1995):

The practice today of writing everything in the vulgar tongue has doubtless contributed to strengthening this prejudice [against the ancients], and perhaps is more pernicious than the prejudice itself. Since our language was spread throughout all Europe, we decided that it was time to substitute it for Latin, which had been the language of our scholars since the renaissance of letters. I acknowledge that it is much more excusable for a philosopher to write in French than for a Frenchman to make Latin verses. I would be willing even to agree that this practice has contributed to making enlightenment more general, if indeed broadening the outer surface also broadens the mind within. However, an inconvenience that we certainly ought to have foreseen results from it. The scholars of other nations for whom we have set the example have rightly thought that they would write still better in their own language than in ours. Thus England has imitated us. Latin, which seemed to have taken refuge in Germany, is gradually losing ground there. I have no doubt that Germany will soon be followed by the Swedes, the Danes, and the Russians. Thus, before the end of the eighteenth century, a philosopher who would like to educate himself thoroughly concerning the discoveries of his predecessors will be required to burden his memory with seven or eight different languages.

Appendix B: A closer look at the astronomy in *Tuhfa*

The word *hakīm* and its plural *hukamā'* occur rather frequently in *Tuhfa*. The singular form may be translated roughly as *sage, learned, wise, doctor, physician, scientist*, etc. On p. 352 a new section begins, whose heading (given in the margin) may be rendered as follows: *opinions of European sages about the positions and movements of fixed stars and planets*. A translation of the first six lines is given below:

The luminous Sun provides light to the fixed stars and the planets, benefitting thereby *bajamī'* *'awālim* (*all the worlds*) and providing sustenance to all. It remains stationary in the centre of the planetary orbits, while all the other bodies describe orbits around it, and acquire light from it. It does not move [from its position] but spins around its axis from the west to east. The (globe of the) Earth is counted as one of the planets and it goes around the sun, at a distance of forty five crores and fifteen lac miles (451.5 million miles) from the sun, and the sun is ten crores and two lac (100.2 million) times bigger than the Earth. What appears to be the rising of the Sun from the east is an error of perception ...

Šuštari's ideas about the fixed stars are as baffling as his cavalier attitude towards numbers (with four significant figures), and his omission of the source of the data mentioned by him. Numbers, when handled by someone who is not numerate, signify nothing. To take account of the uncertainties of observations, and to eliminate the need of a calculator in the discussion, let us round off the Sun-to-Earth distance to 450 million miles, and the relative size of the Sun to 100 million. Our first task is to find data that would have been considered reliable in his time.

The required information was available in *A New Theory of the Earth*, a book written by William Whiston (1667–1752)—student and friend of Newton, and his successor to the Lucasian chair of mathematics in Cambridge, but a marginalized figure during the last two decades of his life. First published in 1696, his book went through six editions, the last in 1755. Whiston gives the mean distance of the Earth from the Sun as 81 million miles; the diameters of the Sun and the Earth, as 763,000 and 7970 miles respectively. This means that the diameter of the Sun (relative to that of the Earth) is about 100 (not 100 million). To give Šuštari the benefit of the doubt, let us define the relative size of the Sun to be the ratio of the *volumes* of the two bodies; the relative size of the Sun now comes out to be 100^3 , or 1 million, still very much smaller than the number quoted by Šuštari.



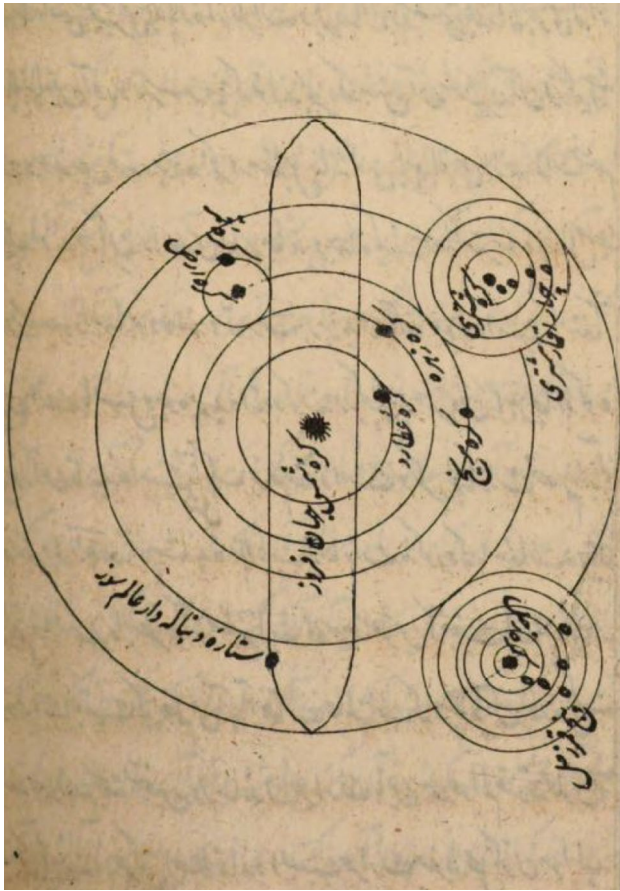


Fig. 4 The solar system as depicted in *Tuhfa* (Šuštarī, 1847, p. 360)

Šuštarī was fascinated by the fact that Newton’s law of gravitational attraction was able to account not only for the motion of the planets but also for the behaviour of the comets, which had previously been regarded as vagrant bodies coming in and out of our view at random intervals. He showed his enthusiasm by inserting a figure—the only illustration in a book of some 600 pages—that portrays the Newtonian conception of the solar system. It will be helpful to read, before examining this figure, a modern translation of how Newton described the arrangement of celestial bodies in our solar system (Newton, 1999, p. 586):

The six primary planets revolve about the sun in circles concentric with the sun, with the same direction of motion, and very nearly in the same plane. Ten moons revolve about the earth, Jupiter, and Saturn in concentric circles, with the same direction of motion, very nearly in the planes of the orbits of the planets. And all these regular motions do not have their origin in mechanical causes, since comets go freely in very eccentric orbits and into all parts of the heavens. And with this kind of motion the comets pass very swiftly

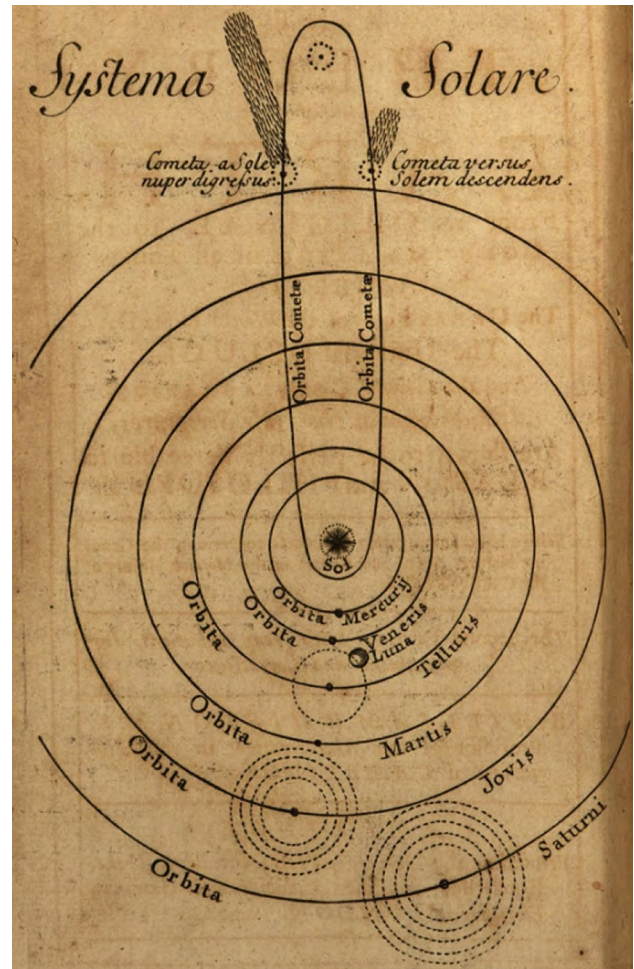


Fig. 5 The solar system as sketched by Whiston (1708) in *A New Theory of the Earth*

and very easily through the orbits of the planets; and in their apelia, where they are slower and spend a longer time, they are at the greatest possible distance from one another, so as to attract one another as little as possible.

Figure 4 reproduces the model of the solar system presented in *Tuhfa* (Šuštarī, 1847, p. 360). One finds five sun-centred circles in the figure, though one would expect to see six, one for each planet. That Mars and the Earth have been placed in the same orbit is clearly an oversight (not necessarily on the author’s part), but the discrepancy is unlikely to mislead a reader who has learnt some astronomy. That the closed, non-circular trajectory, supposed to show the path of a comet, is also centred at the sun betrays Šuštarī’s utter misapprehension of cometary orbits. Figure 5 is taken from *A New Theory of the Earth* (Whiston, 1708), where it appears as the frontispiece.



Apart from the comet, the names of all other bodies shown in Fig. 4 begin with the word كره (*kura*), which may be translated in the present context as *spherical body*; since this word serves no useful purpose, it will be dropped without further comments. The Sun is called *šams-i jahān afrōz*, meaning *Sun, the world-illuminator*. The Persian word for a comet is *sitāra-i dūmbāla-dār* (meaning *star with a tail*), but the more elaborate label *sitāra-i dūmbāla-dār-i ‘ālam sōz* (*world-scorching tailed star*) is used in the figure. If we allow for the author’s fondness for verbosity, the epithet applied to the Sun needs no explanation, but the relevance of the descriptive tag attached to the comet might not be equally obvious to the average reader.

The heart of Whiston’s new theory was the role played by comets. Being an ardent admirer of Newton, Whiston made free use of the scriptures and of Newton’s concept of gravitational attraction and his theories of comets to concoct a unified theory of the creation—as well as the destruction—of the Earth. The scope of the book can be more easily grasped if we look at the complete title: *A New Theory of the Earth, from Its Original, to the Consummation of All Things: Wherein the Creation of the World in Six Days, the Universal Deluge, and the General Conflagration, as Laid Down in the Holy Scriptures, are Shewn to be Perfectly Agreeable to Reason and Philosophy*. For a while the book became a best seller and was highly praised by many, including John Locke (Locke, 1751, p. 534). This theory gets a warm reception in *Tuhfa*.

Šuštārī, who transcribes *Millennium* as مليون (*milyōn*), writes (p. 354): “a comet, because of its close approach to the sun during its travel, becomes extremely hot, and if [in that state] it collides with a planet, especially the Earth, the planet is scorched; this is how *qiyāmat*, which is called *milyōn*, is to be interpreted; the whole world is incinerated, and not a single living being (man or beast) is left, nor any trace of minerals or vegetation; this view is at variance with that held by the ancient sages, who did not believe in *qiyāmat*.” Šuštārī does not mention Whiston, but it is hard to think of any other author who spoke so much, and with such passion, about comets and the Millennium (Naqvi, 2015, pp. 159–64). Whiston’s theory did not exert any lasting influence in Britain, and he had become, already in his lifetime, the butt of many a satirist. One of Šuštārī’s Company friends must have introduced him to Whiston’s theory, and might even have shown him Fig. 5 in a copy of *A New Theory of the Earth*. This conjecture would also explain the great resemblance between Figs. 4 and 5, and might also be one of the many details whose loss is lamented in *White Mughals* (Dalrymple, 2002, p. 376): “In a similar manner, although the exact details are now sadly lost, James and Abdul Lateef Shushtari seem to have been spending their nights on the Residency roof, busy comparing notes to see how Indian, Islamic and European astronomical systems

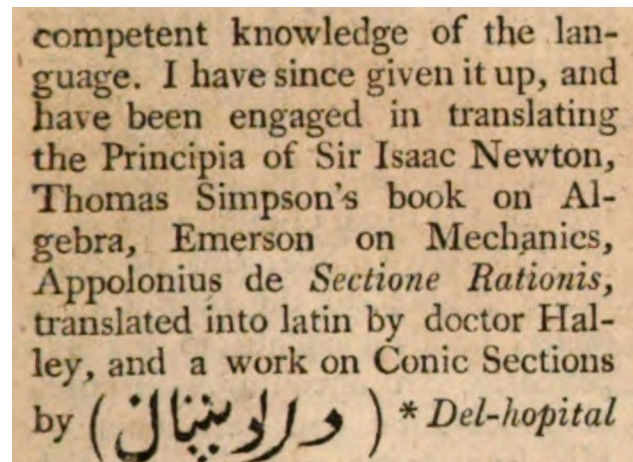


Fig. 6 An excerpt from p. 7 of *Obituary* showing the segment where the name *de l’Hospital* (misspelt) is written in Persian; the rhombus at the extreme left is an obvious printing error

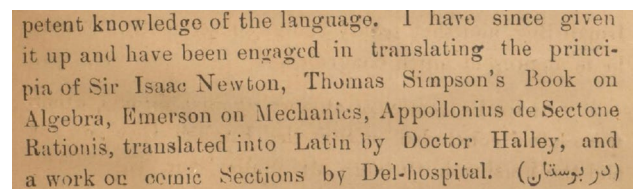


Fig. 7 This excerpt from p. 6 of *Leaflet* (Part II) should be compared with the text in Fig. 6 to appreciate the nature of corruptions which accompanied the typesetting of *Leaflet*. To select just one example from the text in Latin characters, “Conic Sections” has been replaced by “comic Sections”; the meaningless expression in Persian characters (در بوستان) differs from its counterpart in Fig. 6, and bears no relation to the context

could be reconciled, and what each could learn from the other.”

Whiston died long before the announcement, in 1781, of a new planet, that came to be called Uranus, but *Tuhfa* was written more than twenty years after the discovery. One might expect that an author like Šuštārī, who wanted to introduce the new astronomy to his readers, would not omit the most recently discovered planet, but the news had either not reached him, or he did not consider it important enough to deserve a mention.

Readers who have followed thus far do not need more examples to form their estimates of the scientific part of Šuštārī’s book. For my part, I believe that, since dilettantism is not an asset for someone who wants to popularize science, Šuštārī should have set himself the humbler goal of acquiring a sound knowledge of astronomy and mathematics before filling the pages of *Tuhfa* with information he was unable to acquire or digest first-hand.



Appendix C: Scrutiny of Pamphlet

It has been stated earlier (§ 4) that the relevant parts (namely I and II) of *Leaflet* are meant to be mere copies (but in a different format) of documents that had been published earlier, and that the text in each part is replete with typesetting errors. The purpose of this appendix is to substantiate this remark by showing snippets from *Obituary* and Part II of *Leaflet*. Figures 6 and 7 compare short segments from the two sources. It is worth recalling that Anderson had sent to Campbell a translation of Tafazzul's Persian letter. The names (in Latin characters) of British authors and the titles of their works escaped mutilation, but, in *Obituary*, the French name *de l'Hospital* was garbled as *Del-hopital*, and incorrectly transcribed in Persian lettering; someone familiar with the Persian script and the context is likely to ignore the left most diacritical point and read the unvocalized text as *dālūpītāl*. Whoever typeset (or edited) the text for *Leaflet* failed to realise that the dot was spurious and “corrected” the Persian text to *دربوستان* (*darbūstān*), an expression that can only be called gobbledygook.

Declarations

Conflict of interest The author affirms that he has nothing to disclose as regards relationships or interests that could impart bias to the contents of this article.

References

- ʿAbd al-ʿAzīz, Š. (1897). *Malfūzāt*. Mēraṭo: Maṭbaʿ Hāšmī. Retrieved from <https://archive.org/details/in.ernet.dli.2015.295621>
- Abū Ṭālib, M. (1885). *History of Asafu'd Daulah, Nawab Wazir of Oudh, Being a Translation of Tafzihu'l Ghaffin: A Contemporary Record of Events Connected with His Administration* (W. Hoey, Trans.). Allahabad: North-Western Provinces and Oudh Printing Press. (The title page names and describes the author in the following words: “Compiled by Abu Ṭālib, an official of the day”).
- Adam, W. (1838). *Third Report on the State of Education in Bengal*. G. H. Huttman, Bengal Military Orphan Press.
- Ali, S. M. (1908). *Life of Tuffuzzool Hussain Khan, Khan-i-Alluma, Minister of Nawob Vazeer of Oudh*. Cheekoty Veerunnah & Sons, Printers. (On the title page, the author's full name, Nawob Syed Mahomed Ali (abbreviated to SMA in the present work), is followed by the phrase “Pensioner of Lucknow, a descendant of the said Minister”).
- Ali, S. M. (1921). *Sawānih ʿUmrī Nawāb Maulawī Tafazzul Husayn Kān*. Hyderabad (India): Matbaʿ Fayz al-Karīm. (The image in Figure 2 is taken from the online version available here: <https://www.rekhta.org/ebooks/sawaneh-umri-nawab-tafazzal-husain-khan-syed-mohammad-ali-khan-ebooks>).
- Allport, G. W., & Postman, L. (1948). *The Psychology of Rumor*. Henry Holt and Company. (In quoting from this work, I have changed “rumor” to “rumour”).
- Anand, M. R. (1963). *Is There a Contemporary Indian Civilisation?* Asia Publishing House.
- Anonymous. (1790). Art. 19. An elucidation of the articles of impeachment preferred by the last parliament against Warren Hastings, Esq. late Governor General of Bengal. *The Monthly Review*, 3(9–12), 334–35.
- Anonymous. (1819). *The Second Report of the Calcutta School-Book Society's Proceedings*. Printed at the School and Mission Presses. Retrieved from: https://books.google.no/books/about/The_Second_Report_of_the_Calcutta_School.html?id=1Z1PAQAAMA_AJ&redir_esc=y
- Anonymous. (1833). VII. Analysis of books. *Journal of the Asiatic Society of Bengal*, 2, 551–57. (The pages given here refer to the entire section VII; the quoted passage occurs at the end (p. 556).)
- Anonymous. (1844). Art. II.—Memoir of the life and correspondence of John Lord Teignmouth; by his son, Lord Teignmouth, 2 vols. 1843. *The Calcutta Review*, 1(2), 42–94.
- Asiatic Ann. Reg. (n.d.). *The Asiatic annual register, or, a view of the history of Hindustan, and of the politics, commerce and literature of Asia*. Retrieved from <https://catalog.hathitrust.org/Record/000501985>
- Āzād, M. Ḥ. (1907). *Ab-i Hayāt*. Nawal Kišōr Printing Press. (Originally published in 1880. The full name of the author is Muḥammad Ḥusayn Āzād.) Retrieved from <https://archive.org/download/Aab-e-hayatByMohammedHussainAzad>
- Āzād, M. Ḥ. (2001). *Ab-e Hayāt: Shaping the Canon of Urdu Poetry* (trans: F. W. Pritchett). Oxford University Press. (The full name of the author is Muḥammad Ḥusayn Āzād.) Retrieved from <https://dsal.uchicago.edu/books/PK2155.H8413/index.html>
- Baksi, P. (2021). *Karl Marx and Mathematics*. Aakar Books.
- Basu, P. (1943). *Oudh and the East India Company, 1785–1801*. Lucknow: Maxwell Company. (Tafazzul's academic achievements are mentioned on p. 24.)
- Bayly, C. A. (1999). *Empire and Information: Intelligence Gathering and Social Communication in India 1780–1870*. Cambridge University Press.
- Beale, T. W. (1867). *Miftāḥ al-Tawārīk*. Lucknow: Nawal Kišōr. (Many, perhaps most, native denizens of Awadh were disconcerted by Tafazzul's participation in the dethronement of Wazīr ʿAlī Kān (WAK). Beale reproduces, at the end of his biographical note on Nawab WAK (p. 367), three poems with chronogramic distiches which are extremely scathing towards Tafazzul, calling him *mulhid-i Kašmīr* (atheist from Kašmīr) and *namak ḥarām* (betrayer who once broke bread (literally salt) together, a common expression for those who turn out to be disloyal and perfidious).
- Bergunder, M. (2018). Die koloniale Ausgrenzung der indischen Astronomie. Überlegungen zum Verhältnis von indischer Gelehrsamkeit und britischem Orientalismus in der zweiten Hälfte des 18. Jahrhunderts. In R. Klöber & M. Ludwig (Eds.), *HerStory. Historical Scholarship between South Asia and Europe: Festschrift in Honour of Gita Dharampal-Frick* (pp. 121–37). CrossAsia-eBooks. Retrieved from <https://doi.org/10.11588/xabooks.366.517>
- Blanchard, D. C. (1974). References and unreferences. *Science*, 185(4156), 1003.
- Blumhardt, J. F. (1889). *Catalog of Hindustani Printed Books in the Library of the British Museum. Printed by Order of the Trustees of the British Museum*. Longmans & Co. (See item 14117. a. 2 (1.)).
- Broome, R. (1790). *An Elucidation of the Articles of Impeachment Preferred by the Last Parliament Against Warren Hastings, esq. late Governor General of Bengal*. John Stockdale.
- Buckland, C. E. (1906). *Dictionary of Indian Biography*. Swan Sonnenschein.
- Campbell, L. D. (1804). An account of the life and character of Tofuzzel Hussein Khan, the Vakeel, or Ambassador, of the Nabob Vizier Asssof-ud-Dowlah, at Calcutta during the Government of Marquis Cornwallis. *The Asiatic Annual Register or a View of the History of Hindustan and of the Politics, Commerce and Literature of*



- Asia, 5(Section: Characters), 1–8. (Note: The entire volume is subdivided into several sections, each with its own pagination.)
- Cave, E. (Ed.). (1734). Deaths. *The Gentleman's Magazine*, 4(2), 107.
- Chancey, M. K. (2003). In the Company's Secret Service: Neil Benjamin Edmonstone and the First Indian Imperialists, 1780–1820. Doctoral dissertation. Florida State University.
- Charette, F. (1995). *Orientalisme et histoire des sciences: L'historiographie des sciences islamiques et hindoues, 1784–1900*. Master's dissertation. Université de Montréal.
- Chatterjee, P. (2012). *The Black Hole of Empire: History of a Global Practice of Power*. Princeton University Press.
- Cohen, I. B. (1963). Pemberton's translation of Newton's *Principia*, with notes on Motte's translation. *Isis*, 54(3), 319–351.
- Cole, J. R. I. (1988). *Roots of North Indian Śrīsm in Iran and Iraq: Religion and State in Awadh, 1722–1859*. University of California Press. Retrieved from <http://ark.cdlib.org/ark:/13030/ft0f59n6r9/>
- d'Alembert, J. L. R. (1995). *Preliminary Discourse to the Encyclopedia of Diderot* (R. N. Schwab & W. E. Rex, Trans.). University of Chicago Press. Retrieved from <https://quod.lib.umich.edu/d/did/did222.0001.083?view=text;rgn=main>
- Dalrymple, W. (2002). White Mughals: Love and Betrayal in Eighteenth-Century India. HarperCollins UK. (See footnote on p. 271)
- Deloncle, M. F. (1879). Catalogue des livres orientaux et autres composant la bibliothèque de feu M. Garcin de Tassy: suivi du catalogue des manuscrits hindoustanis, persans, arabes, turcs (No. pt. 4). Paris: Adolphe Labitte. See item 588. Retrieved from <https://gallica.bnf.fr/ark:/12148/bpt6k5817979v#>
- EdinUnivLibr. (n.d.). David Anderson (1750–1828) and James Anderson (1758–1833): East India Company officials and friends of Warren Hastings. (This anonymous item has been attributed to the author shown above to avoid multiple occurrences of Anonymous authors.) Retrieved from <http://www.docs.is.ed.ac.uk/docs/lib-archive/bgallery/Gallery/records/eighteen/anderson.html>
- Ehrlich, J. (2018). The East India Company and the Politics of Knowledge. Doctoral dissertation. Harvard University
- Elliot, H. M., & Dowson, J. (1877). *The History of India as Told by Its Own Historians: The Muhammadan Period* (Vol. 8). Trübner and Company.
- Evans, J. (n.d.). Aristarchus of Samos. *Encyclopedia Britannica*. Retrieved from <https://www.britannica.com/biography/Aristarchus-of-Samos>
- Folkes, M. (1937). *Memoir of Dr. Edmond Halley*. In E. F. MacPike (Ed.), *Correspondence and Papers of Edmond Halley: Preceded by an Unpublished Memoir of his Life by One of his Contemporaries and the 'Éloge' by d'Ortous de Mairan*. (pp. 1–13). London: Taylor and Francis Ltd. (The identity of the author is not certain; see the editor's comments in the Preface.)
- Gibb, H. A. R., et al. (Eds.). (1986). *The Encyclopaedia of Islam: New Edition*. Volume 1. E. J. Brill.
- Gibbon, E. (1887). *The History of the Decline and Fall of the Roman Empire*. John Murray.
- Gordon, P. (1835). The Oriental Repository at the India House. *Alexander's East India and Colonial Magazine*, 10 (7–12), 61–6; 130–42. (The authorship of this anonymous article has been attributed to Peter Gordon in: <https://www.worldcat.org/title/oriental-repository-at-the-india-house/oclc/74351141>)
- Guenther, A. M. (2010). Seeking employment in the British empire: Three letters from Rajah Gobind Ram Bahadur. *Fontana*, 12, 129–154.
- Ġulām 'Alī, K. (1864). *Imād al-Sa'adat*. Lucknow(?): Matba' Munṣī Nawal Kiṣōr. (The full name of the author is given as Sayyid Ġulām 'Alī Kān.)
- Halley, E. (1706). *Apollonii pergæi de sectione rationis libri duo*. Theatro Sheldoniano.
- Hart, B. (1916). The psychology of rumour. *Proceedings of the Royal Society of Medicine*, 9, 1–26.
- Heath, T. (1913). *Aristarchus of Samos: The Ancient Copernicus*. Oxford University Press.
- HEIC Library. (1845). *A Catalogue of the Library of the Hon. East-India Company: Supplement*. Vol. 1. J. & H. Cox. Retrieved from <https://books.google.no/books?id=uqccqFSxGynEC>
- Huffman, C. J. (n.d.). Mathematical treasure: Émilie du Châtelet's Principes Mathématiques. Retrieved from <https://www.maa.org/book/export/html/841298>
- Hutton, C. (1815). *A Philosophical and Mathematical Dictionary* (Vol. 1). Charles Hutton and others.
- John Randall. (n.d.). The Languages of South Asia. Retrieved from <https://www.booksasia.com/PDFs/Cat%2031%20South%20Asia%20Languages%202017.pdf>
- Jones, W. (1970). *The Letters of Sir William Jones* (Vol. 2) (G. Cannon, Ed.). Clarendon Press.
- Kānh Jī, D. (1837). *Kāzānat-ul 'Ilm dar Fann-i Hīsāb*. Calcutta: Asiatic Society. (The English translation of the front page gives the book title as *Khazanat ul Ilm, or The Treasury of Science*; the name of the author, as “Dewan Kānh Jī, of Patna”).
- Khan, G. (1993). *Indian Muslim Perceptions of the West During the Eighteenth Century* (Ph.D. thesis). University of Oxford. (Other authors have referred to a book with the same title-and-author, published (1998) by Karachi Oxford University Press. Dr Gulfishan Khan has informed me that the contents of the book and the thesis are identical.)
- Khan, I. G. (2003). The Awadh scientific renaissance and the role of the French 1750–1820. *Indian Journal of History of Science*, 38(3), 273–301.
- Locke, J. (1751). *The Works of John Locke, Esq: In Three Volumes* (Vol. 3). S. Birt and 12 others.
- Loth, O. (1877). A Catalogue of the Arabic Manuscripts in the Library of the India Office. London: Stephen Austin and Sons. (The older labels, used before Loth, for the three MSS. mentioned in this work are as follows: Loth 743 (IO Islamic 1249), Loth 744 (IO Islamic 923), Loth 745 (IO Islamic 924).)
- Minault, G. (2000). Qiran al-Sa'adain: the dialogue between eastern and western learning at Delhi College. In J. Malik (Ed.), *Perspectives of Mutual Encounters in South Asian History, 1760–1860* (pp. 260–277). Brill.
- Molland, G. (1994). The limited lure of Arabic mathematics. In G. A. Russell (Ed.), *The 'Arabick' Interest of the Natural Philosophers in Seventeenth-Century England* (Vol. 47, pp. 215–223). E. J. Brill.
- Naqvi, K. R. (2015). *Can Science Come Back to Islam?* Author.
- Newton, I. (1999). *The Principia: Mathematical Principles of Natural Philosophy* (B. Cohen & A. Whitman, Trans.). University of California Press.
- Ohdedar, A. K. (1966). *The Growth of the Library in Modern India: 1498–1836*. The World Press Private Ltd.
- Parulekar, R. V. (1945). *Survey of Indigenous Education in the Province of Bombay (1820–1830)*. Asia Publishing House.
- Proudfoot, W. J. (1868). *Biographical Memoir of James Dinwiddie*. Edward Howell.
- QatarDigLib. (n.d.-a). IO Islamic 1249 (Loth 743). Retrieved from http://www.qdl.qa/en/archive/81055/vdc_100022536511.0x000001
- QatarDigLib. (n.d.-b). IO Islamic 923 (Loth 744). Retrieved from http://www.qdl.qa/en/archive/81055/vdc_100022555137.0x000001
- QatarDigLib. (n.d.-c). IO Islamic 924 (Loth 745). Retrieved from http://www.qdl.qa/en/archive/81055/vdc_100022532234.0x000001
- Rahman, T. (2002). *Language, Ideology and Power: Language Learning Among the Muslims of Pakistan and North India*. Oxford University Press.



- Raj, K. (2008). Settling differences, managing difference: The urban and intellectual dynamics in eighteenth-century Calcutta. *Revue D'histoire Moderne et Contemporaine*, 55–2(2), 70–100.
- Raj, K. (2009). Mapping knowledge go-betweeners in Calcutta, 1770–1820. In S. Schaffer, L. Roberts, K. Raj, & J. Delbourgo (Eds.), *The Brokered World, Go-Betweens and Global Intelligence 1770–1820* (pp. 105–150). Science History Publications.
- Raj, K. (2011). The historical anatomy of a contact zone: Calcutta in the eighteenth century. *The Indian Economic & Social History Review*, 48(1), 55–82.
- Rare-Books. (2016). [ASTRONOMY] KHAN, TUFUZZOOL HOOSYN. Account of three mathematical works by Tufuzzool Hoosyn Khan, Deceased, drawn up by Moluwee Hydur 'Ulee. Retrieved from <https://doyle.com/auctions/16bp01-rare-books-autographs-photographs/catalogue/206-astronomy-khan-tufuzzool-hoosyn>
- Rehatsek, E. (1873). *Catalogue Raisonné of the Arabic, Hindostani, Persian, and Turkish MSS. in the Mulla Firuz Library*. Managing Committee of the Mulla Firuz library.
- Rizvi, S. A. A. (1986). *A Socio-Intellectual History of the Isnā'asharī Shī'īs in India*. Ma'rifat Publishing House.
- Robinson, F. (1997). Ottomans-Safawids-Mughals: Shared knowledge and connective systems. *Journal of Islamic Studies*, 8(2), 151–184.
- Robinson, F. (2001). *The 'Ulama of Farangi Mahall and Islamic Culture in South Asia*. Hurst & Company. (For Tafazzul, see p. 223.)
- Schaffer, S. (2009). The Asiatic enlightenments of British astronomy. In S. Schaffer, L. Roberts, K. Raj, & J. Delbourgo (Eds.), *The Brokered World, Go-Betweens and Global Intelligence 1770–1820* (pp. 105–150). Science History Publications.
- Sen, J. (2014). *Astronomy in India, 1784–1876*. Pickering & Chatto Publishers. (Tafazzul's translation of *Principia* is mentioned on p. 134)
- Sherwani, H. K. (1969). *Cultural Trends in Medieval India: Architecture, Painting, Literature & Language*. Asia Publishing House.
- Shore, J. (1843). *Memoir of the Life and Correspondence of John, Lord Teignmouth* (Vol. 1). Hatchard and Son.
- Srivastava, D. B. (1979). *The Province of Agra: Its History and Administration*. Concept Publishing Company.
- Steingass, F. (1977). *Persian-English Dictionary*. Routledge and Kegan Paul.
- Šūštārī. (1847). *Tuhfat al-ʿĀlam wa risāla-i ẓayl al-tuhfa*. Bombay: Mirza Zinal Abideen Kermany. (The full name of the author is ʿAbd al-Laṭīf Ḳān Šūštārī. The manuscript was finished in 1801; the pagination given here refers to the lithographed edition printed in 1847.)
- Tavakoli-Targhi, M. (1996). Orientalism's genesis amnesia. *Comparative Studies of South Asia, Africa and the Middle East*, 16(1), 1–14.
- Tavakoli-Targhi, M. (2001). *Refashioning Iran: Orientalism, Occidentalism, and Historiography*. Palgrave.
- Tavakoli-Targhi, M. (2004). The homeless texts of Persianate modernity. In R. Jahanbegloo (Ed.), *Iran: Between Tradition and Modernity* (pp. 129–157). Lexington Books.
- Tavakoli-Targhi, M. (2011). Early Persianate modernity. In S. Pollock (Ed.), *Forms of Knowledge in Early Modern Asia: Explorations in the Intellectual History of India and Tibet, 1500–1800* (pp. 257–290). Duke University Press.
- Tytler, J. (1820). Essay on the binomial theorem; as known to the Arabs. *Asiatic Researches*, 13, 456–466.
- Tytler, J. (1832). An essay on the extraction of the roots of integers, as practised by the Arabs. *Asiatic Researches*, 17, 51–168.
- Tytler, J. (1837). Analysis and specimens of a Persian work on mathematics and astronomy. *Journal of the Royal Asiatic Society of Great Britain and Ireland*, 4(2), 254–272.
- Whiston, W. (1708). *A New Theory of the Earth* (Second edition). Benj. Tooke.
- Wilson, H. H. (1837). The late John Tytler, Esq., of the Bengal Medical Service. *Asiatic Journal*, 23, 1–16. (The obituary, published anonymously, has been attributed to Horace Hayman Wilson.)
- Yazdani, K. (2016). The persianate intelligentsia in precolonial India. *The Indian Economic & Social History Review*, 30(4), 6.
- Yazdani, K. (2017). *India, Modernity and the Great Divergence: Mysore and Gujarat (17th to 19th C.)*. Brill.
- Yusuf Ali, A. (1940). *A Cultural History of India During the British Period*. D. B. Taraporeval Sons & Co.
- "Z.". (1814). Memoir of Reuben Burrow. *The New Monthly Magazine*, 1(6), 536–538.
- Zenker, J. T. (1846). *Bibliotheca orientalis: manuel de bibliographie orientale*. Guillaume Engelmann. (See item 1079.)
- Zinsser, J. P. (2001). Translating Newton's *Principia*: The Marquise du Chaâtelet's revisions and additions for a French audience. *Notes and Records of the Royal Society of London*, 55(2), 227–245.

