

SOME LETTERS FROM CHARLES HUTTON¹ TO ROBERT HARRISON²

BY KIND PERMISSION OF THE REVEREND ANGELO RAINE, M.A., OF YORK,
THE OWNER OF THE ORIGINALS.*

WOOLWICH 13 *Janry* 1779.

MY DEAR SIR,

Nothing but the want of a proper occasion to trouble you could so long

* The thanks of the Association are due to the Reverend Angelo Raine for permission to print copies of these letters, and to Mr. Sidney Melmore for making the transcripts and sending them to the *Gazette*.

The letters, if of slight mathematical interest, give a vivid picture of an age of vigorous work and robust controversy. Some brief notes have been added concerning the more important persons mentioned in the letters. Mr. Melmore, Professor W. M. Roberts, Royal Military Academy, Woolwich, Professor E. H. Neville, and Mr. F. Puryer White, have supplied some of this material; other information comes from the *Dictionary of National Biography (D.N.B.)*, the *Encyclopædia Britannica*, Hutton's *Mathematical and Philosophical Dictionary*, and R. C. Archibald, "Notes on some Minor English Mathematical Serials", *Mathematical Gazette*, April 1929.

The notes are intended to be simple identifications, and hence, in many cases, the titles of books and papers have been quoted without being checked by comparison with the originals.

¹ Charles Hutton (1737–1823) was born at Newcastle-on-Tyne, the youngest son of a pitman, who died when Hutton was five years old. The *Penny Cyclopædia* says that the family, a Westmoreland one, was connected by marriage with that of Sir Isaac Newton. Hutton himself as a boy worked in the pits, but turned school-master at the age of eighteen, first in Jesmond, then a village just outside Newcastle; in 1760 he opened a mathematical school in Newcastle, where among his pupils were John Scott, later Lord Chancellor Eldon, and Bessie Surtees, with whom Scott eloped. In 1773 the Professorship of Mathematics at the Royal Military Academy was awarded to Hutton on the results of an open competition and examination: among the examiners were Maskelyne (3), Horsley (10) and Landen (17). In 1774 he became a Fellow of the Royal Society, and in 1779, Foreign Secretary of the Royal Society, as described in the first letter. From this post he retired within a few years, owing to disagreements with the President, Sir Joseph Banks. Banks was something of an autocrat, and Hutton's retirement has been described as virtual dismissal.

The *D.N.B.* refers to Hutton's "simplicity of habits and equability of temper", but his many controversies and some records of the R.M.A. suggest that he may have been a little cantankerous. At one time he was thought to take more interest in the houses which he built at Woolwich and sold to the Government, than in his duties at the "Shop"

Hutton wrote a number of books and papers, among which may be mentioned his large two-volumed *Mathematical and Philosophical Dictionary* (1796, 1795), and his *Mathematical Tables, containing common hyperbolic and logistic logarithms* (1785), notable for an historical introduction, learned and valuable if a little unfair to Napier. This book of tables is said to have inspired Maseres' (25) work on logarithms.

² Robert Harrison (1715–1802) was appointed Master of Trinity House School, Newcastle, in 1757; John Scott (Lord Eldon) and his brother William (Lord Stowell) were among his pupils. After his retirement he lived at Durham. According to a footnote to pp. 443–4 of a *History and Antiquities of Newcastle-upon-Tyne* (doubtless early nineteenth century, but title-page missing), Harrison was "a profound mathematician" with a valuable collection of mathematical books, and "understood Greek and Latin and had a competent knowledge of the Oriental languages". On his removal to Durham, "he was a member of a newspaper or coffee-room in that city, where he sometimes smoked a pipe. This indulgence being prohibited by a general order, he struck his name out of the subscription-list, adding, 'Vanished in smoke' . . . When in Newcastle, he was called *Beau Harrison*, and in Durham, *Philosopher Harrison*".

have prevented me from having the pleasure of addressing you. I hope you have enjoyed good health & every other happiness during the interval. As to my own health, it is pretty well; but I am here almost as recluse as a hermit, being almost single in my studies & manner of thinking in this place, my nearest neighbour in these respects being the Astron. Royal (3) at Greenwich with whom I have the honour to be on very good terms. I herewith send you a small assortment of *American* seeds some of them mixed with a little of that sacred soil so nourishing to the seeds of freedom! there is little more of it that we can now call ours! These seeds are the joint collection (chiefly in the neighbourhood of New York) of our friend Williams (4) & a Cap. Blomefield (5) who has just brought them over with him to be sent to the Durham hermit. This latter gentleman (B) is a very intimate acquaintance of W's, & intends to do himself the pleasure to write to you soon, being furnished by W with your address for that purpose. W. is now a full Capt. he having lately succeeded to a company, & would have come over at this time to Europe to join it but has been tempted to remain in A. by the temporary office of Major of Brigade which may be worth near 20 s. pr Day to him. He was become very fat & had his health well till lately that a dangerous fever seized him, from which he is just happily recovered. He sometimes I find snatches an opportunity, in spite of stern Bellona & the furies, of sacrificing to Minerva & the Muses, & by turns amusing himself & others with Mathematics, Music, Poetry, Painting, &c & diffusing rational entertainment all around him. If any plays or entertainments are to be represented, W. directs the machinery, paints the scenes, points out the subjects, teaches the Dramatis personae & the band of Music, writes and speaks the prologue & epilogue, acts the principal part &c, &c. He has lately been contriving or improving a circular sliding rule, has divided & made one himself, taught an Instrument Maker in N.Y. to execute them for his Brother Brigs. & has printed there the description & use of it. In short he is all in all.

I herewith also send you a few sets of three papers I have had printed in the Philos. Transactions, one of which brought me the honour of Sir Godfrey Copley's annual prize Medal (6), I have also sent as many Copies of the Presi-

³ Nevil Maskelyne, Astronomer-Royal 1765–1811; famous as the founder of the *Nautical Almanac* and for his Schiehallion experiment (1774). Hutton was selected to determine, from Maskelyne's observations, the estimated mean density of the earth; several references to this work appear in these letters. Hutton at this time had as a colleague Bonnycastle, chiefly remembered for *The Scholar's Guide to Arithmetic*, and later was joined by John Evans, F.R.S., so perhaps his loneliness was thereby relieved. See also under (1).

⁴ "Our friend Williams." This is probably Edward Williams, R.A. (see Kane's *List of R.A. Officers*). He became a Captain in 1775, and was on the staff of the Governor of New York, 1778–1780, and died, a Lieutenant-Colonel, in 1793. The reference will be understood by remembering that this country was then in a perilous position. We were at war with the revolted American colonies, and with half Europe; fifteen months earlier Burgoyne had surrendered at Saratoga, two years later Cornwallis capitulated at Yorktown. In the summer of this year 1779, the combined fleets of France and Spain swept the Channel and threatened Plymouth.

⁵ Blomefield was the very celebrated Gunner of his day, who went to America in 1776 as a Brigade Major, and was wounded before Saratoga. In 1780 he was made Inspector of Artillery and of the Brass Foundry (in the Arsenal). Here he carried out a drastic purge, condemning 496 pieces in one year. From Blomefield dates the high character of British cast-iron and brass pieces (see Kane, *loc. cit.*). At Woolwich the degree of fame of the big men in the R.A. (and Woolwich soldiers generally) is marked by the names of public-houses and roads; Bloomfield Road is a main road in Plumstead.

⁶ The papers (1776–1778) for which Hutton was awarded the Copley Medal of the Royal Society were on "The force of exploded gunpowder and the velocities of balls"

dent's speech made at the presenting of the Medal. After keeping a set yourself, let me request the favour of you to send a set to Mr. Emerson (7), to Mr. Geo. Anderson N.Castle, to Dr. Rotheram (8), Mr. Lowthian (9), & such other persons as you may think proper together with my Compts to each gentleman. I wished to have had another paper of mine ready to have sent much larger than all the others, viz the Computations for determining the general attraction of matter, by which it appears that the mean density of the earth is to that of common stone, in the ratio of 9 to 5 nearly; but as those sheets are not yet printed, they must be sent at another opportunity.

On the resignation of Dr. Horsley (10), one of the two reading & minuting Secretaries to the R.S. two candidates were put in nomination for his office, viz. the Rev. Mr. Maty (11) (son of the late Dr. Maty many years secretary) & your hble servt. It soon appeared so clear both to my friends & myself that the majority of the members usually attending the meetings seemed to give the preference to us in their wishes, that we contented ourselves with doing very little more than announcing my intention. My Competitor's party, on the contrary, went about, with every possible means of interest, to every member, & by one means or other surprized a great number into promises to vote for him, by which means it happened that we were left in a considerable minority by the votes of many against me whose wishes were for me. And with the declaration of all the Society that the office should be quite at my service the next opportunity if I continued in the mind to accept it. They also did me the honour to elect me into the Council for the ensuing year, & have presented me with what is sometimes called the Latin Secretaryship & sometimes the Foreign Secretaryship. The duty of it consists in trans-

⁷ William Emerson (1701–1782) was born at Hurworth, near Darlington; after a short spell of teaching, he devoted his time to mathematics, living at Hurworth on a small income left to him by his father. Emerson wrote books on most branches of mid-eighteenth-century mathematics and natural philosophy, the earliest being his *Doctrine of Fluxions*. He had a big reputation in his day, too big, according to De Morgan; but he declined to become F.R.S. The account of Emerson in Hutton's *Dictionary* exhibits him as a hot-tempered and odd-mannered man; possibly he and Hutton were a pair. Hutton says: "His manner and appearance were that of a rude, and rather boorish countryman; he was of very plain conversation, and indeed seemingly rude, commonly mixing oaths in his sentences, though without any ill intention" Emerson was a determined walker, hating to ride in a carriage, and, again according to Hutton, "He often walked up to London when he had any books to be published" As regards his books, he had a habit of omitting his name from the title-page; if his prefaces were not signed, half his books would be anonymous.

⁸ Rotherham or Rotheram was a common surname in the South Tyne area; and the famous dissenting academy at Kendal was run by Caleb Rotheram. But this Rotheram is probably John, Professor of Natural Philosophy at St. Andrews, born at Hexham, educated at Newcastle Grammar School at the time when Hutton was teaching in Newcastle. John Brand, *History and Antiquities of the Town and County of Newcastle-upon-Tyne*, I, p. 447, footnote, quotes from the *Newcastle Courant* of September 22, 1770, a notice of the publication of "Dr. Rotheram's *Philosophical Enquiry &c* concerning the waters in or near Newcastle" The *D.N.B.* gives among his works *A Philosophical Inquiry into the Nature and Properties of Water*.

⁹ Lowthian is probably Samuel Lowthion; according to Brand (*loc. cit.*) "a popular preacher, and published several sermons. He died of the gout in his head, Nov. 17th, 1780"

¹⁰ Samuel Horsley, well known for his theological controversy with Priestley and as the editor of the only edition of Newton's Works. See also under (1).

¹¹ P. H. Maty took a strong part in the dispute between Banks and Hutton. Rather surprisingly in view of this letter, Maty seems to have been on Hutton's side, though this may have been rather as against Banks than for Hutton.

lating into English such papers as are sent to the Society from abroad by Foreigners, those papers being usually written in French or Latin. They are translated in order to their being read in English to the mixed Company at the ordinary meetings of the Society. I have finished one very large translation already, & as I have lately been not inattentive to such studies, I hope to acquit myself to satisfaction in the business.

I mentioned Mr. Emerson, pray how does he do? I hope as well as can be expected for his age; present him with my best wishes for his happiness, & if you please mention to him my doubts concerning the truth of what he asserts in the Schol. near the bottom of pa. 433 of his Miscellanies, about Bernouilli's two probs, that he may consider what is proper to be done against a new edition if it be printed. I can prove the truth of the conclusions of the two solutions in I think a manner that will satisfy him, & will communicate it to him if he think it worth his while, or if he be not himself already convinced of the truth of them. This conduct indeed concerning these two probs surprizes me much: for if he thought the solns wrong, he ought to have given true ones if they admit of them; but if not, the probs & false solns ought not to have come into his book: & his assertion that "the solutions are wrong, for both the quantities are infinite" is very extraordinary; for he well knows that the sum of a series is not always of an inf. magnitude when the number of terms is inf. & if he thought the sum inf. for any other reason, he should have shewn it. Possibly he does not yet know that we are not now to expect any more Fame's Palladins (perhaps you will say that is no loss), that terrible & ugly fellow who with such long strides pursued poor Tristram into France, having lately stretched the great Capt. Heath in terra.

I am, Dear Sir, Yours most sincerely & affectionately,

CHA. HUTTON.

WOOLWICH, 4 Aug. 1779.

DEAR SIR,

Two or 3 days since I sent to the Durham waggon a parcel for you. It contains 7 copies of a paper I have lately had printed in the Philos. Trans. which I desire the favour of you to distribute to the same Gentlemen to whom you delivered the copies of my former papers. This last paper is a computation to ascertain the mean density of the whole globe of the earth; a very important problem, and a work of immense labour. You will perceive what the Data & Conclusions are, which I believe are not far from the truth, tho' it be the 1st experiment of the kind. I have accompanied them with one copy of the paper containing the astronomical observations, which is intended for our own use, & is a proper companion to my paper. I have no letter from our friend Williams since I last wrote to you, but I hear he is well at New York. Mrs. Poole lives at Dover, & I believe is very well. Mr. Thos. Williams (their brother) is lately come from India, in a very bad state of health; he also at present I believe is at Dover. Harry's (my son) (12) station is at Coxheath Camp. My own health &c pretty well as usual, so have nothing to tell you farther concerning myself, unless I mention that the University of Edinburgh have just now done me the honour to grant me a Diploma for the Degree of Dr. of Laws!

I forgot to mention above, that I could wish you to give one of the Copies of the paper to Mr. Hartley of Yarm, & to present my respects to him.

¹² "My son Harry" rose to the rank of Lieutenant-General, and died in Ireland, 1827. He must have been well thought of, for when in 1814 a large number of Gunners were retired, he received a pension of £700 per annum. Coxheath Camp was one of the Militia camps established during the American war, at a time when a French invasion of this country seemed likely.

Mr. Muller (13) was himself in an error, instead of Mr. Robins (14), concerning the subject of his censure of him. And now for my friend Mr. Emerson. In the first place I must say that his whole conduct concerning the 2 probs of Bernouilli quite amazes me, nor could I easily have believed that a man of his knowledge & good sense could have committed so many inconsistencies & improprieties. I agree with you that the problems are little other than Algebraic Juggles, but still their solutions are not false, nor can the two quantities in the probs have any other possible meanings than one each, if letters & symbols have any determinate signification at all notwithstanding what Mr. E. says about the duplicity of the meaning. I like Bernouilli as little perhaps as Mr. E but in endeavouring to expose the former I was sorry that the latter exposed himself, for the method he made use of to do it appears to me highly improper even tho' B. had been in an error concerning these solutions. I repeat it therefore, it was with reason that I thought his conduct *extraordinary* & that it *surprised* me, for I hold it utterly unworthy the character he has long borne for mathematical knowledge. It has also given me some concern to find Mr. E. receive with evident ill-humour the well-intended hints of his friend. My time is too much employed for me to concern myself with any person whom I regard not, & I wished to give him an opportunity of correcting his oversights in a public manner himself & prevent his enemies from doing it for him in a disagreeable manner. And it is not impossible some such thing may happen, for since I wrote to you, I have received from a Diary Correspondent a request to propose these very probs in that work on purpose to correct Mr. E's oversight; so that possibly such a thing may be sent to some other place where it may [be] used against him. But as I do not desire to trouble his repose, I wish not to communicate to him anything more on this subject, what I have farther to say on it being for your own satisfaction & at your own request. I shall just remark however that I had another motive for mentioning these probs to him, which was that as he possibly & unfortunately might not have a great number of years yet to live, & that as I foresaw I might have some care of any future editions of his books, I was desirous of procuring from himself any corrections or hints of improvements which he might wish to have made; which was a motive that had his honour for its object. And indeed I have already by his own consent the care of a new edition of his Algebra which is in the press.

Let us first take an example in numbers to each of the probs viz., in the 1st prob. take $a = 6$, & let us approach to the sum of the series by beginning at the farther end of it & tracing it backwards. Now the last term of the series is \sqrt{a} or $\sqrt{6}$ which is less than 3, i.e. $\sqrt{a} < 3$; take in the last term but one, then $a + \sqrt{a} < 6 + 3 < 9$, or $\sqrt{a + \sqrt{a}} < 3$; take in the antepenult. then $a + \sqrt{a + \sqrt{a}} < 6 + 3 < 9$, & $\sqrt{a + \sqrt{a + \sqrt{a}}} < 3$ and thus by continually adding another term the sum will be always less than 9, & the root of the sum less than 3; so that the value of the series approaches continually to the No 3, which is its limit or the sum of the inf. series. So that in this instance the

¹³ Probably John Muller, Professor of Fortification at the "Shop" and the first of the civilian staff at its foundation in 1741. "The father of engineering for 40 years in Britain."

¹⁴ No doubt Benjamin Robins, a versatile performer in many fields, mathematics and gunnery in particular. He was an unsuccessful competitor for the Professorship obtained by Muller at the R.M.A. Robins invented the ballistic pendulum (about 1740), and was the first man to determine the velocity of a shell. Mathematically, he may be remembered for his *Discourse concerning the Nature and Certainty of Sir Isaac Newton's Methods of Fluxions, and of Prime and Ultimate Ratios*, and other papers on the same topic.

series is not only finite but = to B's theorem,

$$\text{for } x = \frac{1}{2} + \sqrt{a + \frac{1}{4}} \text{ is } = \frac{1}{2} + \sqrt{6\frac{1}{4}} = \frac{1}{2} + \sqrt{\frac{25}{4}} = \frac{1}{2} + \frac{5}{2} = 3.$$

Again take $a = 1$, & $b = 8$ in the 2nd prob. & trace the series back as before. The n th $\sqrt[n]{b} = \sqrt[n]{8}$ is < than 3, & $a \times \sqrt[n]{b} = 1 \times \sqrt[n]{8}$ less than 3, conseq. $\sqrt{a + \sqrt[n]{b}} < 2$, i.e. the last couplet is less than 2; repeat this operation, then $b \times \sqrt{a \times \sqrt[n]{b}} < 16$, & $\sqrt{b \times \sqrt{a \times \sqrt[n]{b}}} < 4$ & $\sqrt{a + \sqrt{b \times \sqrt{a \times \sqrt[n]{b}}}} < 2$ i.e. the two last couplets less than 2; & the same thing happens after ever so many couplets; ∴ the series approximates infinitely to the no 2, which is the value of B's theorem

$$x = \sqrt[3]{aab} = \sqrt[3]{1 \times 8} = 2.$$

Proceed we now to the investigations of the general theorems. And first for the 1st prob. Let $s^2 - s = a$, then shall s be the sum of the inf. series

$\sqrt{a + \sqrt{a + \sqrt{a + \sqrt{a}}}}$ &c. For since $s^2 - s = a$, or $s^2 = a + s$, or $s = \sqrt{a + s}$, $s >$ (greater than) \sqrt{a} ; add a to each, so shall $s + a > a + \sqrt{a}$, but $s^2 = s + a$, $s^2 > a + \sqrt{a}$, or $s > \sqrt{a + \sqrt{a}}$; add a again, then

$$s + a \text{ or } s^2 > a + \sqrt{a + \sqrt{a}} \quad \& \quad s > \sqrt{a + \sqrt{a + \sqrt{a}}};$$

then adding & extracting again, it will be $s > \sqrt{a + \sqrt{a + \sqrt{a + \sqrt{a}}}}$. And thus the series approaches continually to the value of s which is its limit. Since then $s^2 - s = a$, $s = \frac{1}{2} + \sqrt{a + \frac{1}{4}}$ = the sum of the inf. series.

Again in the 2nd prob. let us begin the operation at the farther end of the series, & trace its value backwards towards the beginning by actual multiplications & extractions. The last term of the series being $\sqrt[n]{b}$ or $b^{\frac{1}{n}}$, let it be multiplied by a & the root taken, so shall $a^{\frac{1}{2}} b^{\frac{1}{2}} = \sqrt{a + \sqrt[n]{b}}$; mult. by b & take the root, then by a & take the root, so shall $a^{\frac{5}{8}} b^{\frac{5}{8}} = \sqrt{a \sqrt{b \sqrt{a \sqrt[n]{b}}}}$;

repeat the operation so shall $a^{\frac{21}{32}} b^{\frac{21}{32}} = \sqrt{a \sqrt{b \sqrt{a \sqrt{b \sqrt{a \sqrt[n]{b}}}}}}$; in like manner the next operation will give $a^{\frac{85}{64}} b^{\frac{85}{64}}$; the next $a^{\frac{321}{128}} b^{\frac{321}{128}}$; &c. where it is evident that the exponent of a is always double of that of b ; that the exponent of a after any one extraction is always found by adding $\frac{1}{2}$ to $\frac{1}{4}$ th of its exponent in the preceding expression; & that the exponent of b is found by continually adding $\frac{1}{4}$ to $\frac{1}{4}$ th of its former one. But in all the expressions the exponent of b is a vulgar fraction whose denominator is always 1 more than three times its numerator, so that when its numerator is n its denominator is $3n + 1$, & this property will continue without end, for $\frac{n}{3n + 1}$ being any exponent of b , by the construction of the series the next exponent will be $\frac{1}{4} + \frac{1}{4}$ of

$$\frac{n}{3n + 1} = \frac{1}{4} + \frac{n}{12n + 4} = \frac{4n + 1}{12n + 4}$$

where the denom. is still = 1 + 3 times the numerator. Now when the series is supposed to be infinitely continued, n is infinite, & then the exponent $\frac{n}{3n + 1}$ is = $\frac{n}{3n} = \frac{1}{3}$ the expon. of b ; & $\frac{2}{3}$ the expon. of a ; conseq. the value of the inf. series is $a^{\frac{2}{3}} b^{\frac{1}{3}} = \sqrt[3]{aab}$, as in the solution. Hence it appears that the sum of the series are finite & rightly assigned by Bernoulli.

I am, my Dr Sr with much respect & gratitude

Your much obliged & obedt Servt

CHA. HUTTON.

WOOLWICH, 31 May 1780.

DEAR SIR,

I sit down to ask how do you do, without having anything material to tell you on my part, things here being in statu quo, & I have not had a letter from our friend Williams this 12 months. I sometimes however hear of him, & know that he is well, tho' he has had a bad & long fever since my last receipt.

How does the old Gentleman at Hurworth? Some months since I sent to him 7 Copies of an additional paper of mine on the *place of greatest attraction* on the side of a hill. I sent them by a Mr. Wright, a near relation of his, who was formerly a Coal Viewer about Tanfield &c. but has been for some years past in Scotland, where he was returning from London after being up on some business. The parcel was accompanied with a letter to Mr E. in which, after keeping one of the pamphlets himself, I desired him to send the rest to you to dispose of as the former ones had been. Have you received them, or heard of them? I often meet with Newcastle people in London, but the sight of my much esteemed friend H. would afford a real pleasure indeed. I met young Mr. Smith lately: he is just going out to India. I am sorry to learn by him that the Grecian Lady is in danger of losing that language again, or at least does not pursue it, her mother having assumed the whole direction of her, for fear her learning should spoil her Marriage! We have just come out the 2nd Vol. of Horsley's Newton (the Cuts all done by Beilby of N.C.). Lately publish'd also a most excellent work on Infinite Series, by a Mr. Henry Clarke (15) (not my friend Sam. (16)). Mr. Landen has (17) just finished from the press a 1st Vol. of Mathematical Memoirs. He intends

¹⁵ Henry Clarke, Professor of History, Geography and Experimental Philosophy at the Military College, Great Marlow (afterwards Sandhurst), author of several mathematical books. This book, *A Dissertation on the summation of infinite converging series with algebraic divisors, exhibiting a method not only intirely new, but much more general than any other which has hitherto appeared on the subject* (1779), is "translated from the Latin of A. M. Lorgna, Professor of Mathematics in the Military College of Verona" and has "illustrative notes and observations" and "an appendix, containing all the most elegant and useful Formulae which have been investigated for the Summing of the different Orders of Series" It is dedicated, in the florid style of the time, to Hutton. Clarke declares in his preface that Lorgna's methods are to be preferred to Simpson's, "both with respect to the perspicuity of his investigations, and the generality of his conclusions" Landen (17) considered that due credit had not been given to Simpson's work, and published some tracts on the subject, about which Hutton remarks: "Mr. Landen did not shew less mathematical skill in explaining and illustrating these theorems, than he has done in his writings on original subjects; and that the authors of them [De Moivre, Stirling, Thomas Simpson] were as little aware of the extent of their own theorems, as the rest of the world were before Mr. Landen's ingenuity made it obvious to all"

¹⁶ "My friend Sam" Clark started the *Diarian Repository* as a rival to Hutton's *Diarian Miscellany*; this, and other actions of Clark's, provoked Hutton considerably. The *Repository* was described as edited by a "Society of Mathematicians", but this appears to have been a Society with one member only, "my friend Sam"

¹⁷ John Landen, an estate agent, wrote on many mathematical topics, and is best remembered for his work on elliptic arcs, the genesis of the familiar Landen transformation of elliptic functions. As regards the *Mathematical Memoirs*, the first volume contained results on the motion of a body under no forces; attacking the general problem later, Landen obtained results differing from those of d'Alembert and Euler, which "made him long dubious of the truth of his own solution" (Hutton). Eventually he published it, and was thereupon engaged in a controversy in which Wildbore (19) took part. In spite of a serious and painful illness, Landen was able to prepare a second volume of the *Memoirs*, and a copy of the published work was placed in his hands the day before his death, which occurred in 1790. See also under (1).

going on if health permit, which is in but a delicate & doubtful way. His death would be indeed a great public loss, as he is a most excellent Mathematician & very worthy Man.

Old Peat (18), the author of the Gent. Diary, is dead ; & I have procured that work for the rev. Mr. Wildbore (19), a near neighbour of a revd Mr. Geo. Walker (20) now at Nottingham, whom you may have formerly seen at Mr. Lowthian's or about N.C. after which he lived some time at Durham (being the Dissenting Minister) whence he sent some excellent probs & solutions to the Ladies' Diary under the Signature of *P.M. of Durham*. I sometime hear the highest character of a Dr. Scott (21) of Oxford, who I think was an old pupil of yours in N.C. He is at present a Candidate (on the Whig Interest) for Member for Oxford University, as is also (the persian) Mr. Jones (22), author of the Synopsis Palmar. Mathes. & editor of Sir I. N's Miscellaneous pieces. There is a 3rd Candidate, but I know not who. It is said Dr. Scott is safe for one.

Hoping you enjoy a good State of health, I remain

Your most sincere & affectionat hble Sert

CHARLES HUTTON.

WOOLWICH, 19 *March* 1781

DEAR SIR,

I take the opportunity of my son's going thro' Durham to send the papers accompanying this. He is going down to Scotland where he is ordered on duty, & has directions to wait upon you if the Stage Coach stop long enough in Durham to permit him so to do. I don't find that I have much new intelligence to give you. Our friend W. was very well at New York pr. last Accots & in a way of making money, so the longer the conquest of America is protracted from year to year, the better for him & most others concerned in it. How is Mr. Emerson? I know not of any thing in the Transactions about the rotation &c of Venus, but there was lately read a paper at the Society, from a Mr. Herschel (23) at Bath, concerning his observations of the

¹⁸ "Old Peat", Thomas Peat, "Writing-Master and Teacher of the Mathematicks at Nottingham", was a founder of the *Gentleman's Diary or the Mathematical Repository* in 1741; he was connected with the *Diary* till his death, editor 1757-1780. For Hutton's close connection with the *Diary*, see Archibald, *Gazette*, XIV, pp. 379-400.

¹⁹ The Rev. Charles Wildbore, of Sulney, Notts., edited the *Diary* till 1802. See also under (17).

²⁰ The Rev. G. Walker was born at Newcastle and educated at the dissenting academy at Kendal under Caleb Rotheram. Among his works are *A Treatise on the Conic Sections. In five books.* (1794), though in spite of the title-page, this is only Book I, nothing further being published: and *On the doctrine of the sphere, in six books: to which is added an appendix, containing the solution of a problem for ascertaining the latitude and longitude of a place, together with the apparent time* (1777).

²¹ William Scott, later Lord Stowell, a former pupil of Harrison's (2), D.C.L. Oxford 1779, is said by the *Encycl. Brit.* to have contested the Oxford University seat unsuccessfully in 1780. If his brother John, later Lord Eldon, was taught by both Harrison and Hutton (1, 2) this reference seems curiously vague, but the identification is probably correct.

²² Hutton seems here to confuse father and son. William Jones, author of *Synopsis Palmariorum Matheseos* and editor of the Newton tracts, died in 1749. His younger son, Sir William Jones, was the linguist and Persian scholar, and to him this sentence must refer; he was a candidate but withdrew before the election.

²³ "a Mr. Herschel at Bath" is undoubtedly William (later Sir William) Herschel, "the most illustrious astronomer of the latter half of the 18th century" (Rouse Ball).

rotation &c of the planets, which paper I believe will be printed in the *Transacs*. The Society have begun their meetings at their new apartments at Somerset House, which are more spacious & elegant than the former. The account of the last voyage on Discoveries is already drawn up by Cap. King, one of the 2 Commanders who brot the two ships home after the death of Cap. Cook, but probably we shall not see it published these 2 years, owing to the delay of the plates, which are to be executing in the very best manner by the best engravers. You will perhaps smile when I tell you I am become *Astrologer General* to the Stationers' Co having entered into agreeemt with them for the sole conducting of all the Almanacs. Not that I can execute them all myself, but shall likely employ assistants to make most of the calculations & certainly all the Prognostications, these belonging to a Science far above my pitch. The conduct of the almanacs had been in the family of the Wings (24), from father to son, ever since the famous Vincent Wing Astronomer & Astrologer, & has only ceased with the death of the late Tycho Wing the last year; the present representative of the family being a young man not at all concerned in such matters, the Co [thought] that it would be proper to make a change. Speaking of these things brings to my mind a good anecdote of a young attorney of N.C. whom we know very well which I shall here copy in the words of my correspondent who lives near the Mr. Wright in Nottinghamshire mentioned below, which Mr. Wright has for many years written the Prognostications in Moore's Almc & has the character of a great conjurer, telling the people their fortunes &c. & to this Sidropher it seems our curious townsman applied himself. My correspondent's words are, "Mr. Wright shew'd me a letter from a gentleman of Newcastle, I think a Mr. H—— an attorney, giving him an account of his second marriage & elegant situation. This gentn, some years since, sent to Mr. Wright to calculate his nativity; and he, like all other fortune-tellers, told him great things. Afterwards having paid his addresses to two ladies at once, he sent to Mr. Wright, who had told him he was to have two wives, to know whether he should marry A or B; he ordered him to marry A, which he did & in the letter which I saw he acquaints Mr. Wright with her death, & that he had just married B"! This may afford a laugh at N.C. sometime.

I remain,

Dr Sr Yours most sincerely,

CHA. HUTTON.

I send pr my son 2 copies of the paper on Cubic Equas to Mr. Anderson of N.C.

WOOLWICH COMN.

MY DEAR FRIEND,

We both (Mrs. H. & myself) thank you a thousand times most sincerely & affectionately for your kind remembrance of us, & especially of our dear lovely angel, for ever to be lamented. O my friend never did I think it possible I could feel such severe affliction! And sure never parents had so much cause. It is indeed impossible to express her excellence. This mournful event has quite altered all my future views & plans. I had begun a manufactory & otherwise engaged in plans of business. Now I am hastening out of them with all speed, in order to return to a retired & recluse situation for the gloomy remainder of a lingering existence.

I am sorry, my friend, on several accounts that of late years you have written so little, as your writing if your health would permit, might be so

²⁴ For the astronomical-astrological dynasty of the Wings, see *D.N.B.*

cheering to your friends, & so useful to the public. But since you last left us, my dear friend, many has been the heavy ream of paper I have been obliged to write. The Dictionary alone (not half my occupation) has amounted to upwards of 3 reams of folio paper, all written, & mostly by my own hand, except some copying by the dear hand of my departed angel. An immense task. I now however have reached the end of it, & I am repaid by the very favourable manner in which it is received by the public. It will add much to my happiness if it yield any amusement to my friend in the perusal, for whose sake I am sorry it is printed in so small a type, much against my will. Two parts are now published, which you receive with this, making the 1st vol. but wanting the preface, which will accompany the fourth or last part. These I order to be sent by the proprietor Mr. Johnson. Along with them I send a present of one of the Copies of the Logarithms presented to me by Mr. Baron Maseres (25), along with his Compliments to you. There is another vol. of the Logs printing.

I remain, with sincere regard & affection,

My Dear friend,

Your obliged Servant

CHA. HUTTON.

P.S. I send also 2 Copies of the pamphlets relating to the disputes in the R. Soc. one for yourself, & the other to bestow where you best may

Mr. R. Burdon, the member for Durham, has treated me very shabbily. The project for the Stone Bridge at Sunderland he referred to the Consideration of myself & Mr. Soane (26) an eminent architect. On this business I had a vast deal of trouble, many calculations, & a great many journeys to London, & besides one's judgment may be supposed worth something. In consequence of our report & advice the Commissioners saved a great many thousand pounds. When all was over, we expected they would make us a handsome present, as the genteelest way. Instead of that Mr. B. desired to know what quantity of trouble we had had, and how much we rated it at, & would not be put off, but insisted upon our naming a certain sum. And, as if this were not degrading enough, after we had thus been brought to name 150 gs each for our Judgment & opinion, he refused to give us more than 50 for the whole!

WOOLWICH, Aug. 13, 1795.

MY DEAR FRIEND,

I really thought you had been possessed of my Logarithms & Conic Sections, & Tracts. I send orders now to Mr. Johnson to supply all these (none of which are my property) & to send them through Mr. Ritson along with the 3d part of the Dictionary. The two vols of *Scriptores Log* please to bestow any where that you please. Thank you for the list of Errata in the Dictionary, & pray be so good as to continue the collection of them.

²⁵ F Maseres, "Mathematician, historian and reformer", *Cursitor-Baron of the Exchequer*. Although a reformer, he clung to old customs (see Lamb's *Essays of Elia*), and in mathematics he and William Friend, De Morgan's father-in-law, resolutely rejected the concept of negative numbers. Maseres is best known mathematically for his *Scriptores Logarithmici*.

²⁶ "Mr. Soane, an eminent architect", is possibly John (later Sir John) Soane, the architect of the Bank of England and founder of the Soane Museum. At this date Soane already had won a silver and a gold medal of the Royal Academy, and must have been known as a promising young man. Burdon is a well-known Durham surname.

I have just received from the West Indies, my son, with the loss of his right eye by a musket shot; & along with him, my grandson, the son of my daughter Camilla, who with her husband Capt. Vignoles died of the yellow fever in the West Indies; a most noble dashing boy of 2 years old. There is one of the Errata, above mentioned, I cannot make out; it is this, [p 57 1 Arian]; be so good as explain it.

Mrs. Hutton is laid up in bed, with the Gout in both feet, but desires to be commended to you, along with

Your affectionate friend
and obliged servant

CHA. HUTTON.

SIR,

I have here sent you Clark, but if Mr. Hutton publishes any of my observations upon it, I desire he may publish them as his own, for I will have nothing to do with the fellow. You have seen (I doubt not) the remarks published in the Gent. Magazine for March against my Astronomy, and my answer in the last magazine. He is some such fellow as Clark. But I have a fuller solution, which I wud not publish in my own name, but get some friend to publish; after I see what answer they give to what I have written. I hear from London, that two sets of Ladies' Diary questions are publishing, and both of them give us all the trifling things, along with what is valuable. I wud advise all the Trifles to be struck out. Printing is dear, and who will buy them.

I am Sr your
most humble servt

W. EMERSON.

HURWORTH
Oct. 1. 1771.

1486. Who has forgotten the moment, if ever he experienced it, when, hovering on the outskirts of the calculus, he was enabled to guess what a mathematician is, just as he had guessed one morning what poetry was and had seen all words, as he now saw all figures and symbols, in a radiance of significant order? Whoever remembers this, though even the foothills of the calculus have since become too steep for him, remembers an expansion of his whole life, an enduring advance in his realization of himself and of the world, and is grateful to the mild little men by whom these things come.—Charles Morgan in “Menander’s Mirror”, *Times Literary Supplement*, March 31, 1945. [Per Mr. A. P. Rollett.]

1487 William Bowes, of Yorkshire, the best bowler of his kind in cricket to day, is a very learned-looking man. I have sometimes suspected that “Bowes” is only a term he uses for cricket, and that, like Will Hay, he conducts private research under his own name, and probably lectures to a small but discerning coterie of fellow-scientists. In the lounge of an hotel, the evening before an Australian Test of 1934, he presented, for my solution, a geometrical problem over the sherry. He might as well have invited Professor Einstein to field for him at close short-leg.—*Observer*, May 11, 1941.