Art. III.—*Les Œuvres d'Euclide, en Grec, en Latin, et en Français, d'àpres un manuscrit très ancien que était resté inconnu jusqu'à nos jours.* Par F. Peyrard. Ouvrage approuvé par l'Institut de France. Paris: (Vol. i. 1814; vol. ii. 1816; vol. iii. 1818.)

[Augustus De Morgan[1]]

[*Dublin Review*, 11 (1841), pp. 330-355.]

There are two Euclids. We do not mean one of Megara, and another or Alexandria; our distinction is of quite another kind: we mean that there are two Euclids who have written elements of geometry. The first, we have no doubt, was of Alexandria, and has left writings, which have come down both in Greek and Arabic. The manuscripts of these writings differ from each other, as manuscripts will do; and when the best has been made of them which criticism will allow, the errors of humanity may be seen peeping through the manifold merits which they contain. The other Euclid was a native of Utopia, and though probably as ancient as his namesake of Alexandria, was hardly known till after the invention of printing. He wrote works on geometry which were absolutely perfect; a fact so certain, that no one editor of *this* Euclid ever scrupled at rejecting, adding, or altering, wherever there appeared occasion for either process. And what could be more proper? Euclid was perfection; this sentence is not perfection, therefore this sentence is not Euclid. And though editors did sometimes differ about the true mode of turning imperfection into perfection, this proved, of course, not the fallibility of Euclid, but their own. Each of them could see it in the rest, and so it happens that many others can see it in all. After the battle of Salamis, each commander thought Themistocles only second to himself; for which they were laughed at, and Themistocles placed first: every editor of Euclid of Utopia thinks Euclid of Alexandria better than the first Euclid in the hands of any but himself; the inference is as clear. The perfect Euclid is better known in our country than the human one, according to the perfection of Robert Simson, a profoundly learned geometer of the last century. This excellent man (we have as much of right to make him complete as he had

[1] [DRW: The contributor of this unsigned review is identified as De Morgan in the *Wellesley Index to Victorian Periodicals, 1824–1900.* The review is also included in the listing of De Morgan's publications presented in Sophia Elizabeth De Morgan, *Memoir of Augustus De Morgan* (London, Longmans Green and Co., 1882), p.407.]

to do the same to Euclid) dreamed three times that Theon, a contemporary of the Emperor Theodosius, had translated "Molly put the kettle on" into Greek, and distributed the fragments through the books of the perfect Euclid, altering the context so as to make no violent appearance of transition. He awoke only to set about an edition, in which, by supernatural assistance (for human had he none), he not only threw out the vile kitchen song, but "restored to him those things which Theon, or others, had suppressed, and which had then many ages been buried in oblivion." If any reader doubt our story, and require us to produce authority for it, we will do so as soon as he shall produce any one single manuscript, or set of manuscripts, which collectively bear out Robert Simson's restorations,—but not till then.

This preface may serve as well as another, to express that we intend to treat of Euclid of Alexandria,—who is either the Homer of geometry, or else Homer is the Euclid of poetry. It has been the good fortune of both never to be surpassed; and to complete the parallel, one Pope served Homer just as Simson served Euclid—set him forth as he ought to have written instead of as he did write. I cannot be denied that an Englishman with a head full of Pope and Simson, has very good notions, both of poetry and geometry; but, for all that, he who would write on Homer must discard the first, while one who would describe Euclid must make light of the second, or at least of his omissions and restorations.

The little we know of the rise of geometry in Greece comes from Proclus, in his commentary on Euclid; a writer who lived, it is true, five centuries after the Christian era, but who appears to have had access to sources of historical information which are now lost. Passing over his story of the floods of the Nile obliging the Egyptians to invent geometry, we come, among several minor names, to the mention of Pythagoras, Eudoxus, and Euclid. The first, it is said, changed geometry into the form of a liberal science; and looked at its principles, and considered its theorems, *immaterially* and *intellectually* (ἀΰλως καὶ νοερῶς): we suppose Proclus means to say that Pythagoras was the inventor of demonstration, and that his predecessors were experimental geometers. He also wrote on *incommensurables*,[2] and on the regular solids. Eudoxus generalized many propositions, and added three proportions to the three generally known, mean what it may: he also employed analysis in

[2] Ἀλόγων is the Greek word, which always meant incommensurables. But Barocius, whose Latin is highly esteemed, translated it, *quæ explicari non possunt*, and the late Thomas Taylor, the Platonist, who translated Proclus with the love of a disciple, follows Barocius, and cites Fabricius, who thought the words should be ἀναλόγων, proportionals. But surely "incommensurables" makes perfect sense, and we know that some rather acute ideas of incommensurables must have preceded Euclid's theory of proportion. The words of Proclus are, τὴν τῶν ἀλόγων πραγματείαν καὶ τῶν κοσμικῶν σχημάτων σύστασιν ἀνεῦρε.

augmenting the properties of Plato's sections (the conic sections). Then comes Euclid, who collected the elements (ὁ τὰ στοιχεῖα συναγαγὼν), put many propositions of Eudoxus into order, and perfected others; strengthening many previously weak demonstrations. He lived in the time of the first Ptolemy, for (Proclus has no other reason) Archimedes mentions him in his first and other books. And they report that when Ptolemy asked him, if there were no easier mode of learning geometry, he answered that there was no royal road. There is nothing else of any importance either in Proclus or elsewhere; and we must confess that the account of that writer is so pithy and cautious, that we are inclined to give its details more credit than has been usually accorded to them. If Proclus had been given to collect hearsay, he would hardly have written so briefly on the author whom he was annotating: he would, for example, at least have copied the eulogium of Pappus (A.D. 370, or thereabouts) on the suavity of Euclid's manners. We conclude, then, that about the year 300 B.C. Euclid collected the scattered elements of geometry, which had been prepared by his predecessors, and organized them into the system which bears his name.

The first editor of Euclid was Theon, who lived A.D. 380, or thereabouts, and who, as he himself informs us in his commentary on the Syntaxis, had given an edition (ἔκδοσις) of Euclid; and, among other things, had added to the last proposition of the sixth book. The addition has evidently been made, and follows the "which was to be proved," with which Euclid always ends. This Theon had nearly run off with all the merit; for many of the manuscripts of the Elements head them as if they had been collected by him; and one (mentioned by Savile) has in the margin a distinct statement that Theon was the person who arranged them. There is answer enough to this, first in the silence of the best authorities upon this point, secondly in a quotation of Alexander Aphrodiseus, a commentator on Aristotle prior to Theon, who quotes both Euclid and a particular proposition. He certainly makes the number of this proposition one earlier than it is in our present edition, which seems to indicate (if he have not quoted wrongly) that some one later than himself has made an insertion. But Euclid has been signally avenged; for since the time of Savile, and more particularly since that of Simson, Theon has been made to bear the blame of everything which appeared to any editor short of perfection. Every schoolboy in England, who has looked into the notes to his Simson, has been taught to connect "Theon" and "some unskilful editor." Every editor, from Grynæus[3] downwards, has felt himself able to

[3][DRW: each occurrence of the name of Grynæus, the editor of the first printed Greek edition of Euclid's *Elements*, is printed as "Grynœus" in the 1841 printed text of this review.]

please his fancy, with an assurance to his readers that he was only undoing Theon.

It is difficult to say when or how Euclid disappeared, any more than other Greek writings: but it is certain that by the seventh century no trace of him was left in Europe. Boethius is said to have translated the first book; but in all probability this pretended translation only refers to the mere description of the four first books which that writer gave, and which continued for a long time to be the only text book on the subject. The Saracens, who are reported to have destroyed the library of Alexandria (though their subsequent acquaintance with Greek literature would make one suspect they took the books out first), found the treasures of geometry; which the northern barbarians had extirpated throughout the West, and began the task of translation, though not until they had been in possession of Alexandria nearly a century and a half. Translations of Euclid were made under the auspices of the caliphs Haroun al Raschid and al Mamon (we follow D'Herbelot in the spelling); and there was a considerable number of commentaries and abridgments. There were also, a little later, two celebrated translations, which became known in Europe. The first by Honein Ben Ishak (who died A.D. 873), which was corrected by Thabet Ben Corrah, an astronomer of unlucky fame (A.D. 950), who revived a notion of some of the Greeks, which gave a large motion of trepidation (as it has been called) to the ecliptic. The second was by Nassireddin (died A.D. 1276) an astronomer of note, and for a long time the sole authority for Asiatic longitudes and latitudes among the Westerns. The Mahometans returned Euclid into Christian hands again, in the following manner. Athelard, or Adelard, a Benedictine of Bath, who travelled all over Europe and the East for his improvement, brought back with him Euclid, and probably other translations from the Greek. His epoch is well settled, since Bale describes him, as stating himself (in one of his treatises) to have been living in the year 1130. He is mentioned as a man of very extensive knowledge, and a devoted follower of Aristotle (a writer only then beginning to be generally read). He translated Euclid into Latin; and his version, instead of having lain manuscript to this day, as was once supposed, has been sufficiently shown to have been that which was first printed, and which kept its ground until the introduction of the Greek text. The first printed edition appeared in 1482; it was printed by Ratdolt of Venice, who informs us that the difficulty of printing diagrams was then overcome for the first time: and it bears the name of Campanus, but in an equivocal manner: at the end it is stated that the work of Euclid of Megara,[4] and the comment of Campanus, are finished. This Campanus is known to be the author of an almanac for

[4] A very common mistake of the time.

the year 1200, though some have placed him later, and some earlier.

It was at one time supposed that the translation of Euclid was first made from that of Nassireddin, and, probably on such a supposition, that work was printed in Arabic at Rome in 1594. But a comparison of dates will show this to be impossible, be it either Campanus or Adelard who made it. Nassireddin was certainly in the prime of life when he accompanied the Tartar chief Hulaku, the grandson of Jenghis Khan, in the invasion of Persia, his native country (some say the renegade was the adviser of the expedition). This was about A.D. 1260, and his translation was most probably subsequent to his settlement as the chief astronomer of the conqueror. It may be, then, that the translation of Honein, or Thabet, by whichever name it is to be called, is the one which was used: there is, it is stated, a manuscript of this translation in the Bodleian Library, from which the question might be settled. M. Peyrard procured a proposition out of the printed Nassireddin to be translated, and found no very close agreement between it and the corresponding proposition of Adelard: besides, the Arabic work is a translation with a commentary, the Latin one a translation with a different commentary. There is, however, yet something to be said. According to D'Herbelot, Othman of Damascus, a writer whom he places between Thabet Ben Corrah and Nassireddin, without giving any more precise date, saw a Greek manuscript of Euclid at Rome, and found it to contain much more (forty diagrams more) than the Arabic versions to which he had been accustomed, which only contained one hundred and ninety diagrams.[5] He accordingly made a new translation, and as D'Herbelot does not mention Nassireddin at all as a translator, but only as a commentator, we are left to infer that in all probability Adelard obtained either the translation of Othman or some one based upon it, and that Nissireddin was but an arranger and commentator of the same.

The translation and commentary of Adelard (called that of Campanus) was printed in 1482, 1491, and again by the celebrated Lucas Paciolus, with additional comments, in 1509. As yet there was no news of any Greek text, until 1505, when Bartholomew Zamberti, of Venice, published a new Latin version from the Greek; containing the elements, data, and other writings, in Latin, with critical notes. The elements out of this edition, the notes excepted, were reprinted by Henry Stephens, at Paris, in 1516, together with the Latin of Adelard: so that five folio editions of Euclid were published within

[5]So says D'Herbelot, but there must be some numerical confusion; for 190 diagrams would be the first six books, or thereabouts, and forty diagrams more would not serve for all the other books. The Easterns furnished Adelard with 497 propositions, being the thirteen books of Euclid, and the two additional books of Hypsicles. The Greek of all this contains only 485 propositions; and there are 18 wanting, and 30 redundant, in the Arabic.

little more than half a century after the invention of printing. This text of Zamberti shows what root the notion of Theon's editorship had taken. The proposition is always headed "Euclid," the demonstration "Theon:" and in the edition of 1516, Euclid is again the author of the proposition; the demonstration from the Greek is called Theon's *commentary*, and that from the Arabic Campanus's *commentary*: while in the two last books, the demonstration is Hypsicles' *commentary*.

We now come to the Greek text, and may here explain our particular object in writing this article. The Greek text of Peyrard, in three volumes quarto, which will presently be more particularly described, has been hitherto a scarce book in England, and even in France it seems to have gone out of notice. A little time ago, however, we were surprised by procuring a very new-looking copy, and by finding that it could be got both in England and France. We have no great difficulty in explaining this: there is a tide in the affairs of books, which taken at the flood, leads on to second-hand shops, and empties the publisher's warehouse. But if the book be too heavy for this tide to float it, and yet too valuable to come in a short time to wrap up figs and sugar, it remains in the publisher's hands, and is called *stock*; not that it pays any interest, but because it stands stock-still. When once a book is well abroad in the world, and comes to be known of the second-hand booksellers, the true preservers of books, it never goes out again; but a book may remain publisher's stock for many a year, as we very well know. Dodson's *Mathematical Repository*, published in 1743, was let out of somebody's stock a few years ago, and, all of a sudden, the second-hand shops all had copies, *uncut*. Barlow's tables remained in the publisher's stock long after the second-hand booksellers had begun to mark it "scarce": Sir J. Herschel's edition of Spence's writings was snug in Edinburgh for twenty years, while the second-hand booksellers wondered they had never seen a copy, and almost considered it a supposititious publication: the translation of Nassireddin, already noticed as published in 1594, was, according to Brunet, in stock at Florence in 1810. When, therefore, we saw Peyrard, as good as new, uncut, and with a paper cover as fresh as if Bachelier had just announced it, we knew that the chain was broken somewhere, and that it would begin to make its appearance like a new work: we did not remember having seen it reviewed, and we considered that the subject would possess interest in a country which has, more than any other, adhered to Euclid.

The first Greek text (containing the Elements in fifteen books, and the Commentary of Proclus) was published at Basle, in 1533, by Hervagius, under the editorship of Simon Grynæus, dedicated to Cuthbert Tonstall, bishop of Winchester and London, well known to mathematical antiquaries for his treatise *De arte supputandi*, and to theological historians for his resistance to Henry's divorce. Two manuscripts were employed, furnished by private friends, and one of Proclus, which was procured from Oxford. Various editions followed, which it is unnecessary to cite, because they were all taken, as to text, from the Basle edition. It may be necessary, however, to remind the reader that in this century there was a fashion of publishing Greek mathematicians with the enunciations only in Greek and Latin, and all the rest in Latin: a practice, no doubt, arising out of the notion already alluded to, that nothing but the enunciation was Euclid's. But it was imitated in editing other writers, Archimedes for instance: and a Greek and Latin title-page made bibliographers (those men of title-pages) slip down "Gr. Lat." in their lists. In this way it would cost nothing but an overhauling of catalogues to furnish out a dozen Greek Euclids of the sixteenth century; particularly if we followed the catalogists in another of their errors. Our readers ought to know, or, not knowing, ought now to laugh at, the story of the *nouveau riche* who would be learned, and bought books in large numbers, but after a time wrote to his bookseller complaining that if he must have nothing but Operas, he would rather they were not all written by Tom. A great many titles, as they stan in catalogues, are really Tom's Operas: there as So-and-so's Works, containing &c. &c. (one or two of them); the catalogue maker has down Mr. So-and-so in a moment for a complete edition, looks at the bottom of the page, writes down a place and date (a wrong one, maybe) and passes on.

The next original Greek text was that published at Oxford in 1703, containing all the works of Euclid, certain or reputed, and edited by David Gregory, then Savilian professor. The University of Oxford has the honour of having published the best editions of the three great geometers, Euclid, Apollonius, and Archimedes. In mentioning the first it may be worth while to give a slight account of all. The design of printing Greek mathematics on a large scale originated with Dr. Edward Bernard (died 1697), who preferred the Savilian chair to preferment in the Church, that he might organize a large system of recovering and combining mathematical antiquities. Henry Savile himself, the founder of the chair, was a diligent collector and collator of manuscripts, and possessed several of Euclid, which he bequeathed to the university. And he did not abandon his chair to its first professor, until he had filled it himself time enough to deliver thirteen lectures on the foundation of Euclid's elements, which were published the following year, in 1621. Dr. Bernard did not complete any of his design, but only left behind him a synopsis of it, describing the contents of fourteen intended bulky volumes; to wit: 1. Euclid; 2. Apollonius; 3. Archimedes; 4. Pappus and Hero; 5. Athenæus; 6. Diophantus; 7. Theodosius, Autolycus, Menelaus, Aristarchus, Hypsicles; 8–14. Ptolemy. *Quantus Scriptor*! he adds, and well he may. These volumes were to contain commentaries, selections from the moderns, &c. It is singular enough that the first three volumes (the commentaries, &c. excepted) have been published, and that in the order proposed by Bernard. And now we are to ask, when is the Oxford edition of Pappus and Hero to appear? There is no writer who more requires the publication of an edition than Pappus; and as the Archimedes was executed by a foreigner, and published by the university, we shall be curious to see which takes place first; the preparation of a good edition by an Oxonian, or the presentation of one from abroad. It can hardly be doubted that, if it were worthily done, Oxford would feel it an hereditary duty to defray the publication. "Neque gravata est Acad. Oxon. in patrocinium suum recipere quod Euclidi et Apollonio suo velut cognationis jure tertium Opus accederet," says Robertson in the preface to the Archimedes.

David Gregory, the successor of Dr. Bernard, used in his edition (folio, Greek and Latin, with hardly any notes or various readings) the manuscripts which Savile had left, "in hunc ipsissimum usum," his notes on the Basle edition, &c.; and those of Dr. Bernard. A very careful collation was made by Dr. Hudson, the Bodleian librarian. The best testimony to this edition is the smallness of the number of what Peyrard calls its "mendae crassisimæ," one hundred and fifty-one in the whole of fifteen books of the Elements. The French editor had some reason (as we shall see) to feel a little galled; and the feeling must have been strong when he paraded under such a title (we take some consecutive ones from the commencement) that Gregory had let pass ἀνίσας for ἀνισους; ΓΗΘ for ὁ ΓΗΘ; τῷ ἐλάσσονι τό μεῖζον for τὸ ἐλάσσον τῷ μείζονι; τῶν for τῆς; τοῦ for τοῦ ἀπὸ τοῦ; τῆς for τοῦ; ἡ for τοῦ; &c. We shall by and by examine M. Peyrard himself on such points.

The edition of Apollonius appeared in 1710, under the care of Halley, the successor of David Gregory; and even Peyrard would be obliged ot admit it ot be the best printed Greek text, for it is the only one: but it would not be easy to edite another with more care and success. The Archimedes was not published till 1792. Joseph Torelli of Verona had prepared every thing for press with great care, and the University of Oxford, through Earl Stanhope, had negotiated for being allowed to print it. Torelli refused, during his life, to let the superintendence pass out of his own hands; but he having died, his executors saw no other way of procuring publication than by renewing the old negotiation, which succeeded.

M. Peyrard was a scholar, and an admirer of Euclid, who published in 1804 a French translation of the first four, the sixth, eleventh and twelfth books of the elements, *leaving out the fifth book*! and a translation of Archimedes (a very good one) in 1808. He undertook to publish the complete text of Euclid, Archimedes and Apollonius; and beginning with the former, proceeded to examine the manuscripts of the elements, which are in the Royal Library at Paris, 23 in number. He soon found one, marked No. 190, which appeared more complete in some parts, and less redundant in others, than any of the rest. It also had much the advantage in antiquity, having all the characters of manuscripts at the end of the ninth century. This manuscript had lain in the Vatican Library long enough, said the French, who paid a visit to Rome some time or other in the last century, and found plenty of things which they thought the Pope could do without. Monge, who has so many better titles to fame, was searching the city with the eye of a hawk and the nose of a greyhound for spoil, and found out the manuscript in question, which, with others, was sent to Paris. We know how Peyrard styles such a transaction both in Latin and French (his preface is in both languages): "il fut envoyé de Rome à Paris." "à Româ Lutetiam fuit missus." This is very bad scholarship; *missus* in Latin never bore the sense in which the French then used the word *envoyé*. When the time came for restitution, permission was obtained for this manuscript to remain in the hands of Peyrard until his edition was completed, one volume only having then been published (in 1814). Two more followed in 1816 and 1818, and here the work closes; having been originally intended to include all the writings of Euclid. It contains the thirteen undoubted books of the Elements; the two of Hypsicles; and the Data; the first and third of which M. Peyrard considers the only writings of Euclid, without given any reasons for the rejection of the others. This is a convenient plan enough, but one which tends to destroy confidence in the follower of it. To take issue on a single point;—Pappus, in the commencement of his sixth book, refers to the second proposition of Euclid's Phœnomena: on looking into the book of Phœnomena which has come down to us under the name of Euclid, we find the second proposition of that book to contain the matter of Pappus's reference. Now the latter has always been considered as very good authority on the mathematical writings of the ancients: we do not say M. Peyrard was bound to follow him; but, if only out of decent respect to the whole of the learned world, and to avoid being thought to have practised a mere evasion, he ought to have favoured his readers with some reason for rejecting such testimony as that of Pappus. M. Peyrard has added the various readings of the Oxford edition, and of the twenty-two manuscripts which lawfully belonged to the Royal Library at Paris: having himself generally followed the one marked No. 190, which, as above explained, was "sent" to Paris. Before we enter further on this work, we mention one more new text which has appeared since that of Peyrard.

This is an unassuming octavo volume published at Berlin in 1826, by Ernest Ferdinard August. It contains the Greek text of the thirteen books of the Elements (without Latin), some historical notes, various readings, mostly from Proclus, Peyrard, and Gregory, with some from three manuscripts belonging to the Library at Munich. It appears to us to be very judiciously done, and very correctly printed, as to the Greek. Not but that we entered upon it with a little bias against the author, when we saw in the first page of the preface that Tonstall was printed Constall, and in the second, that Bart. Zamberti of Venice, and Candalla, two very distinct persons, were represented as Bartholomeus Venetus, and Zambertus Candalla. Such things, however, seem exceptions.

Thus on the whole it appears that the present text of the Elements of Euclid depends upon about thirty-five manuscripts, few of them however containing the whole; the results of which are presented in the four editions of Basle, Oxford, Paris, and Berlin.

The particular point which most strikes a reader of Peyrard is his preference for the Vatican manuscript, and his contempt for the editions of Basle and Oxford. We do not wish to be considered as thinking lightly of the French editor, to whom, as admirers of Euclid, we feel under singular obligations. Every scholar will admit that, by the description given of the Vatican manuscript, it was most desirable that an edition should be founded upon it, and that there ought to be a decided partisan of the said manuscript to do it. All the various readings are given in such a manner that the reader has before him the Vatican manuscript, the Oxford edition, or a compost of the twenty-two manuscripts of the Royal Library, whichever he pleases. But, while acknowledging freely the real and substantial addition which Peyrard has made to our knowledge of Euclid, we are compelled to say, that he gives no testimony of that scholarship which would make his individual opinion valuable, nor of that care which would give him a right to speak as he has done of his predecessors. We are afraid, moreover, that the animosity which his countrymen naturally felt towards England in 1812–1818, has coloured his views materially. In an ephemeral production, we should not have thought it worth while to notice such a *misère*: but, having before us the very careful edition of Gregory in 1703, and finding by subtraction that from 1703 to 1816, it is one hundred and thirteen years, we look forward to A.D. 1929, and picture to ourselves the smile with which any critic of that day, French or English, will, after wondering what could make Peyrard undervalue an edition so much more correct than his own, suddenly recollect that the battle of Waterloo was fought in 1815.

The French, for the last half century, have not been conspicuous cultivators of Greek; and it was notorious that of all the *savans* of the Bonapartean era, no one but Delambre was tolerably well versed in that language. There was hardly such a thing as a school of classical criticism in the country: and this being taken into account, the merit of Peyrard is much enhanced by the very circumstances which prevented his book from being what it would have been, if he had been a German. As soon as the first volume of the translation was finished and printed, it was referred by the Minister of the Interior to the two classes of the Institute, that of literature, and that of mathematics. The latter class appointed a commission, consisting of Delambre and Prony,—that is of Delambre, for Prony was not, we believe, a scholar. But if Peyrard himself had dictated the report (and we shall cite something curious on this point presently) he could not have had his ideas more completely adopted. The Oxford edition is the mere copy of that of Basle, though *it passes* for the best of all—M. Peyrard is a judicious editor,—the misprints, inevitable in a work of this nature, are much fewer than those of the Oxford edition of Archimedes—the work fulfills *all* the conditions that could be exacted—and the edition is evidently superior to all the rest. On the first point, namely, that the Oxford edition is a servile copy of that of Basle, Peyrard had forgotten to give his counsel proper instructions. Had he read[6] the preface of Gregory, he would have known better. But the information that errors are fewer than in the Oxford Archimedes, is a curious little bit of information, and contains some generalship. Why did they not say fewer than the Oxford *Euclid*, which would have been more to the purpose; especially since Peyrard had signalized this as the incorrect Basle edition with new faults of its own? Why, simply because the *reporters themselves* had detected in the seven first books—about the third part of the whole—more than two-thirds as many misprints as Peyrard's research had detected in all the fifteen books of Gregory. It was much safer, therefore, to bring in the Archimedes, which they took on Peyrard's word to be full of faults (*fourmille de fautes*); though they did not see what a very modified compliment they thus paid. Peyrard's faults are worse than the *mendæ crassissimæ* of the Oxford edition; Gregory's eye, though it sometimes passed one Greek word for another, never let slip one that was not Greek: Peyrard let go σκέσις for σχέσις; τριῶσι for ποιῶσι; μιγέθους for μεγέθους; πρῶτως for πρῶτος; ἐφαπάπτηται for ἐφάπτηται. And yet the sheets were first read by himself then by M. Jannet, then by M. Patris, and then by himself again; and no one was sent to press until every error had been corrected, or, as the printers say, a perfectly clean revise was always sent back. Besides this, M. Nicolopoulo, of Smyrna, read a large number of the proofs. All this reading rather surprised us; and it also puzzled us to understand how Delambre and Prony came to examine so minutely as to detect a misplaced accent, or a wrong aspirate. Did Peyrard furnish them with a list of his own, to make their report look more minute? We should

[6]He read one part, at least, very incorrectly. He tells us that Gregory admits that all the writings, except the elements and data, are very evidently not Euclid's. Gregory admits no such thing; of some he properly doubts; of some he expresses no doubt.

not breathe such a suspicion, if it were not for a curious circumstance which we will now explain.

Peyrard sometimes forgets that he is editing Euclid of Alexandria, and shows some disposition to restore Euclid of Utopia. In *all* manuscripts, the seventh of the first book has only one case, that in which the vertex of one triangle falls *inside* the other not being considered. Of course all commentators have supplied the deficiency: Grynæus and Gregory let Euclid stand. The case is plain enough; *aliquando bonus dormitat geometriæ Homerus*, and Euclid took the case of the vertex of one triangle falling within the other as obviously impossible. Peyrard thought that he could make one demonstration do for both cases, by drawing the second figure, and adding a few words: this he informs us in his preface he has done, and Delambre and Prony assure us in their report that he has drawn the new figure, and added a line, which they tell us is *entre deux crochets*. Looking to the various readings at the end, in which Peyrard puts his own text in one column, and that of the Oxford and the manuscripts in two others, we find that, at the reference 3, the words καὶ αἱ ΒΓ, ΒΔ ἐκβεβλήσθωσαν ἐπ′ εὐθείας ἐπ′ [sic] τὰ ΕΖ are part of the text; on which Peyrard remarks, *Desunt in omnibus codicibus et in omnibus editionibus.* Well then, we turn to the text; we find no such words in the whole proposition, we find no second figure added, and, to three words or so, everything as in the Oxford! Grant for a moment that the reporters looked at the various readings instead of the text, as would have been their best plan in the first instance, where did they find the crochets? They were evidently examining a printed work, for they detected misprints; where were the crochets? Perhaps such things would not remain in the text, but flew off, by the laws of attraction, into the heads of the examiners, carrying with them the intercepted words. And if they got their information from the various readings, how came they to overlook ἐπ′ τα for ἐπί τὰ, they who made eighteen corrections, by their own account, in these very various readings. Or was this the state of the case; did Peyrard furnish them with the materials of the report, and a list of errata to look business-like, telling them what he meant to do with the seventh proposition, and did do in the list of various readings, but forgot to do in the text? We regret very much being forced upon this supposition, but we ask any candid reader how it is to be avoided?

The class of literature evaded the question of the minister, in a short letter from their secretary, in which they administer what may be called a rap on the knuckles to the worthy, but too self-sufficient, editor. After referring to the report of the other class, with which the subject had most to do, they observe that the text seems (*lui a paru*) more correct in the new edition—but that the Basle edition (no mention of the Oxford one, February 26, 1814) though containing some misprints, not as many as is commonly thought, and easily corrected, will always be precious to the lovers of Greek literature—that the new edition was carefully done, but that some errors had crept in, particularly towards the end of the volume.

The Berlin editor, E.F. August, has insinuated his opinion in the following manner. After describing the Oxford preface, he adds, "Atque revera tanta cura hæc editio instituta est, ut digna esset, qua per totum seculum matheseos studiosi nec Græci sermonis inperiti uterentur." After a similar description of Peyrard's preface, with a preliminary compliment to his labour and industry, he says—not one word. In the fifth proposition of the sixth book (the only one which he thus treats) August has pointed out five misprints, no one of which is in the Oxford edition. We ourselves sat down with the determination to read till we came to an erratum not noticed in the list: we took the first proposition of the fifth book, and at the eighteenth word of the demonstration we found our mark; πολλαπλάσιον for πολλαπλάσια, the Latin is multiplic*es*. We feel then, from all these things, that Peyrard's Euclid is by far the most incorrectly printed edition which exists. For ordinary mathematical students, we should decidedly recommend the Berlin edition, which is more easily obtained than the Oxford, of which it possesses the merit, without the inaccuracies of the Paris edition. It also gives the principal points of the Vatican manuscript. At the same time, the critical scholar will feel that he is not in possession of Euclid unless he have by him the edition of Peyrard, for the sake of the manuscript just mentioned, the twenty-two others, and their comparison with the Oxford edition. And though Peyrard was not what he imagined himself to be, yet from that to absolute insignificance is a *longum intervallum*, of which a little indulgence, no more than due to his intentions and industry, may put him at the point of bisection.

From the Latin and the Greek we may pass to the English. The first English dream of geometry was the *Pathway to Knowledge*, by Robert Recorde, published in 1551, containing no system of demonstration, but "one book of conclusions geometricall," and "one book of theorems geometricall." The first contains the problems of the first four books of Euclid constructed; the second the theorems in the same books described without demonstration. This is done after the example of Rheticus, and "that wittie clarke" Boethius. Euclid is mentioned once, in a manner which shows that Recorde considers all demonstration to be the work of "Theon and others that write on Euclide:" the old story again. This work of Recorde is as much an edition of four books of Euclid as some others that went by that name in his day. But nothing that can properly be called by the name of Euclid was published until 1570, in which year Sir Henry Billingsley (who Dee tells us was the translator) published an edition containing the whole of the fifteen books, with all manner of commentaries, and an additional book on solids by Flussas; together with a long preface and notes by John Dee. Had it not been for Dee himself, in the catalogue which he subsequently published (in his epistle to the archbishop of Canterbury), it would never have been known that the worshipful Sir Henry Billingsley was the translator: and considering that the plan, preface, and notes are Dee's, and that the worshipful knight is altogether unknown, it must be presumed that he worked under Dee's advice and direction. The name of Billingsley does not occur either in the first edition or the second and last (1671); we have always had a firm persuasion, that the knight was either Dee's pupil, working under his directions in the mechanical translation, or his patron, who had bought the credit of the edition. We shall not speak here of Scarburgh, Barrow, Cotes, Simson, Horsley, &c., except in general comments where occasion arises: we shall merely add, on this branch of the subject, that the Clarendon press, besides the best Greek version, has also produced the most English Euclid, in the most Euclidean English; we speak of the translation of the thirteen books, by James Williamson, Oxford, 1781, in 2 vols. 4to. The translation is here as literal as any authorized version of the Bible; and, in like manner, the additional words of English necessary to complete the sense are inserted in italics.

As to the editors who amend to their fancy, and then say, this must be what Euclid wrote, we have of course nothing to do with them, writing as we now are upon evidence and evidence only, and being exceedingly dubious of *the fact* that Euclid, any more than Thucydides, wrote otherwise than as it is set down that he wrote in the remaining manuscripts. If these be corrupt let them be restored, if possible, by context, by comparison, or by good conjecture within the most approved canons of criticism. If, after all, the Alexandrian Greek will not do to teach geometry by (which is quite another question) let him be amended or abandoned, but let not such amendments be called Euclid. Robert Simson producing that which he thinks best, in the way of addition, alteration, or comment, is not only bearable, but admirable; Robert Simson declaring that whatever he thought Euclid should have written, must be that which Euclid did write, is a false critic, and a teacher of falsehood, though of course not intentionally; Robert Simson declaring that he had discovered, by reflection, words and sentences of Euclid which had been buried in oblivion for ages, was not one whit less absurd than the discoverers of hidden treasures by the divining rod: and those who printed Robert Simson's notes in school Euclids, were guilty of great inconsistency, unless they could excuse themselves by saying they intended to destroy any notions of sound criticism which a youth might acquire from the notes to the classical authors, by the perusal of those attached to his mathematical guide.

It is much to be regretted that the solid initiation which Euclid enables the student to obtain, is beginning to be abandoned; and if there be one thing more than another which the friends of liberal education should bestir themselves upon, it is the defence of this unequalled system. "Lagrange," says Peyrard, "often repeated to me that geometry was a dead language; and that he who did not study geometry *in Euclid*, did exactly like one who learnt Greek and Latin by reading modern works written in those languages." We may trace the consequences of the abandonment of Euclid in the general state of elementary writing in every country in which it has been abandoned. Algebra, left to the habits which it forms without geometry, always grows lax in its reasonings; and those who have lost Euclid, have always formed a less rigorous system. If we could find any tendency to deny these assertions, we might argue the grounds on which such denial was made: but no one pretends to show the substitute for Euclid; no one professes that algebra[7] is everywhere of equal rigour. Some desire mathematics only as an instrument in the investigations of physics: let them have their approximative system, by all means; but we are now speaking to those who think of the formation of the mind to the utmost exactness of which it is capable, and who see clearly that it has pleased God that the higher and finer parts of civilization should be much advanced by the cultivation of critical accuracy in all things in which it is attainable. To be brought by degrees to the keenest perception of truth and falsehood, is the highest intellectual hope of man. Now in this process there is, so far as mathematics are concerned, no commencement like Euclid; a writer who seized realities, separated the necessary characters from all that was artificial or conventional, and took the ground on which the beginner could appreciate what he was doing, in a manner which never was equalled, and probably never will be. When we look at his rude, but certain, mode of exhibiting to the young mind, not yet prepared for the nicest distinctions, the raw material of its own conceptions, and using it in a manner which obtains such an instantaneous and intuitive assent as never could be given before to anything in which there was progression from one idea to another, we think we see that mind first feeling its own feet, and learning the possibility of walking alone. Its faint and tottering steps may indeed need the strong support of which it is conscious, but there is a hardness in the ground, and a success in each successive step, which gives an increasing confidence in the future. Many and many a student, mystified by algebra, as taught in its principles—amused to contempt by a science of which (to him) the subject-

[7]It may be hoped that algebra will be thoroughly rigorized by the views which have lately been promulgated; but the time may be distant at which these views can be made the elementary foundation of the subject; and even then, it may be found that its abstract nature requires a strength of mind previously drawn from geometry.

matter is all conundrum about apple-women, who tell each other how many apples they have got in language which needs an equation; and men who buy flocks of sheep at prices which can only be told by completion of a square and extraction of a root—many such students, we say, have only their Euclid to give them any idea of what real science is: that is, at the commencement of their career. They may afterwards find algebra to be what could not have been guessed from equation books; but were it not for what they see from the beginning in geometry, they would have no encouragement to hope for either light or knowledge, from the first year's study.

Independently of the positive superiority of Euclid, there is a strong reason for retaining his system, drawn from the frailty of humanity. There is no reasonable prospect of retaining sound demonstration if Euclid be now abandoned; for it is evident that such abandonment as has been made, has arisen from a disposition to like easy laxness better than difficult rigour. We will not speculate upon what *might* be substituted for the Elements, when we have reason to know what *would* be substituted: the former question may be adjourned until the advocates of change show themselves to be really actuated by a love, not of scientific results, but of scientific truth. As long as Euclid is in request, be it only by a minority, the majority are ashamed of more than a certain amount of departure from soundness: but the direction of that departure shows clearly enough what would take place if, instead of merely retiring into the darker places, the *algebraists* were allowed to put out the light altogether. There is not a better work, next after Euclid, than the Geometry of Legendre; which, when the dangerous elements are past, has an elegance unknown in Euclid himself. But, considered as an exposition of geometrical principles, it is hardly worth a passing notice: the first books are a mixture of arithmetic and geometry, in which the province of the two sciences is confounded, or they are made, in all points of real difficulty, to darken each other; which Euclid, by keeping them distinct till the proper time, has made each help the other. In Legendre, the horse and foot are in alternate ranks, instead of separate regiments; and one part of the service is always either cramping the movements of the other, or getting tripped up by it. When the two *arms* are likely to quarrel, a general order comes from head-quarters in the shape of a *supposition*, or an *imagination*: "par exemple, si A, B, C, D, sont des lignes, on peut *imaginer* qu'une de ces quatre lignes, ou une cinquième, si l'on veut, *serve* à toutes de commune mesure." (Book III., note on the definitions.) How nice! Legendre knew as well as any body that there are abundance of cases in which lines *have no common measure*: then, says he, you must *imagine* a line which *serves* as a common measure to them all, a sort of acting common measure, which does the duties, and receives the pay and appointments, under a commission signed by the imagination. Euclid, stupid Euclid, had no imagination. The stark staring nonsense which we have quoted, and which can only be treated with ridicule, is but a sample of what we may expect, if we abandon what we have, before we have received something better. Lacroix, to whom elementary writing, in everything but geometry, is more indebted than to any other man living, does not proceed quite so absurdly; but he only escapes at the expense of declaring geometry to be an approximate science. He proves that a common measure may be found with an error *imperceptible to the senses*, and on such a common measure he founds his geometry. Let such ideas take clear possession of the field, and we should soon come to this—that algebra would be held perfectly sufficient, and that all which is necessary at the outside might be proved by a rule and compasses, or by an imagination, according to the taste of the learner; nay, even an act of parliament would perhaps be thought sufficient.

The senamte of the University of London (not what *was* the University of London, now University College, but the body which was chartered in 1837) in the announcement of the qualification required from candidates for the degree of B.A., specifies the following amount of knowledge in geometry: the first book of Euclid—the principal properties of triangles, squares, and parallelograms, treated geometrically—the principal properties of the circle, treated geometrically—the relations of similar figures—the eleventh book of Euclid to Prop. 21. We do not think this attempt to abandon Euclid a particularly happy one. The first article seems to be a concession to true geometry, by way of compliment to the vigorous growth which it has heretofore gained in our country. The second might be mended in two ways; squares and parallelograms looks like Londoners and Englishmen, or cats and animals, while *treated geometrically* is a puzzle. Does it mean that a young student, who must learn the first book of Euclid, is at liberty to deduce the properties of squares *and* parallelograms which he does not find there, in any way which he pleases, from any other system? The same question may be asked of what are called the principal properties of the circle; and if the answer be in the affirmative, we cannot but wish the new University would have taken a page out of the book of the old ones; while if it be in the negative, we may well ask, why was it not simply required that the candidates should have studied the first *four* books of Euclid? Next come the relations of similar figures, no doctrine of proportion being mentioned except what in a preceding part of the same list is called *algebraical* proportion. Here again a doubt arises, as to what is to be learnt: will it do if a student come with Legendre's acting common measure, or Lacroix's tiny errors *qui échappent aux sens par leur petitesse*? These are questions which many of the well-educated portion of the community will ask themselves before they make up their minds to think the B.A. degree the London University a worthy object of ambition for their sons: these are questions which the enemies of the liberal cause will answer their own way in their own minds: they will turn to the ancient institutions, which, whatever may have been their faults and their prejudices, have kept the ark of liberal knowledge among us through centuries upon centuries, and will say with a smile, and what is worse, will be justified by the event, that the London University will be a mother of learning when Oxford and Cambridge are defunct—but not till then. Hoping for a better result, we trust that the day is not distant when *methods* will appear of more importance than *mere matters of conclusion* to those who guide the new institution: a very few years will point out the working of the present chequered scheme.

We shall now turn our attention to one point of the text of Euclid on which lawless alteration has been perpetrated, in what are called the *axioms*. Euclid distinguishes three preliminaries to geometrical discussion: *definitions*, in which he is not metaphysically anxious to satisfy any canon of definition, but only to be very sure that his learner shall understand of what things his words speak;[8] *postulates* (αιτήματα), demands upon the sense of the reader, without which he professes to be unable to proceed to reason on the properties of space; κοιναι ἔννοιαι, common notions, matters of intuitive assent, which are common to all men, or common to all sciences (most probably the former; if the latter, the question about to be discussed need not be entered upon), which must be granted, because it is a matter of experience that all men do grant them, even those who never heard of geometry. The postulates are six in number (we translate literally from Euclid): 1. Let it be demanded from every point to every point to draw a straight line. 2. And to produce a terminated straight line continually in a straight line. 3. And with every centre and distance [from that centre] to draw a circle. 4. And that all right angles are equal to one another. 5. And that if a straight line falling on two straight lines make the angles within and towards the same parts less than two right angles, those two straight lines produced indefinitely will meet towards those parts at which are the angles less than two right angles. 6. And that two straight lines cannot enclose a space.

The common notions or opinions are: 1. Things equal to the same are equal to one another. 2. And if two equals be added the wholes are equal. 4. [*sic.*] And if from equals equals be taken away, the remainders are equal. 5. And if from unequals equals be taken away, the remainders are unequal. 6. And the doubles of the same are equal to one another. 7. And the halves

[8]All the objections made to Euclid's definitions, distinctly show that the objectors knew what Euclid meant: that is, that so far as they were concerned the definitions were good.

of the same are equal to one another. 8. And things which fit one another are equal to one another. 9. And the whole is greater than the part.

The distinction drawn by Euclid, between that which the learner is now to grant, and the recapitulation of that which he always has granted, is clear and natural enough. Archimedes (in the sphere and cylinder) introduces, for the first time in geometry that we can find, the word axioms (ἀξιώματα), things thought worthy (of something): the worthiness is worthiness to precede discussion, for the axioms of Archimedes are only definitions, pure verbal definitions, with mere statements preliminary to definition. Torelli translates the word *pronuntiata*, and Eutocius in his commentary fairly calls them definitions; his own *postulates* Archimedes calls (λαμβανόμενα), things taken. Geminus, according to Proclus, taking the distinction of theorem and problem, which was established by his time, though Euclid knew nothing about it (for πρότασις, proposition, is all the heading that Euclid gives), chose to fancy that a postulate and a common notion should become a postulate and an axiom; and that the postulate should be of the nature of a problem, something to be proved or made evident. Proclus wants to give into this idea, but had not enough of Robert Simson in him to alter his manuscript, in which five postulates existed, the sixth (two right lines cannot inclose a space) having been removed among the common notions by the writer. And thus Euclid rested, all (including the celebrated Vatican MSS.), except two, of the manuscripts of Peyrard;[9] some (he does not say how many) of those of Gregory; the Greek from which Zamberti took his Latin; the printed Arabic; the summary of Boethius, who suppresses the last postulate entirely; the newly-examined manuscripts of August;—place the fourth and fifth postulate as in the list given above, and many the sixth also. But Grynæus, for it cannot be traced higher, in the Basle edition, carried the views of Geminus into complete operation, and put the fourth and fifth postulates (as they were called) among *common notions*! We do not know how far he was followed before the time of Gregory, not having thought it necessary to look over any more texts for the purpose of this article than those which give new readings; one only we have before us, the anonymous Greek of 1620, attributed to the celebrated Briggs (Ward, p. 127) which follows Proclus, and gives five postulates. Gregory, who followed the Basle edition somewhat too often, coincided with Grynæus, against the practice of his predecessor Savile, who rather approved the notion of Geminus, but still allowed five postulates to remain. The texts of Peyrard and August have restored Euclid's

[9] In nine manuscripts (the Vatican included) the fourth and fifth are postulates; in none, common notions. In four manuscripts (the Vatican included) the sixth is a postulate; in seven, a common notion.

six postulates, which seems to us common sense. Distinguish postulates into demanded problems and demanded theorems, if any one pleases, but in the name of arrangement, how can the celebrated demand in the theory of parallels rank under the same head as that "things which are equal to the same are equal to one another." The misplacement of this axiom about parallels has cost many a trial at this old difficulty, and procured Euclid all manner of reproaches which he did not deserve. He has been made to say, "I give you this common notion as a most self-evident theorem;" whereas he only said, "whether this be easy to you or not, I can't proceed till you grant it." And let it be observed, that none of the opponents of Euclid's text cast a thought upon the absence of "axioms," and the use of "common notions." The word axiom had got into their heads: thus Barrow, after a long and cloudy lecture about principles, axioms, &c. with a full consideration of Aristotle, Proclus, &c. decides that Euclid was inaccurate (hinting at the same time a doubt of the correctness of the text) when he made a simple demand, and called it a demand.

Such is the specimen of the manner in which the text of Euclid has been handled, and it will make many persons doubt whether they have ever read that writer, with whom till now they have supposed themselves well acquainted. We can assure them, however, that Robert Simson is, *when* he translates, as good a translator as he might have been a critic, if he had not had that unfortunate dream about Theon which we have related. He, or any editor, might judiciously have practised something like condensation after the first book; for from first to last, Euclid fights every step of the way as if he were arguing with an opponent who would never see one iota more than he was obliged to do. And in all probability this was actually the case. Watch Proclus's account narrowly, and it will appear most probable that this work of Euclid ushered connected demonstration into the world. We may think it very likely then that the prominent idea before Euclid's mind was, not "this proposition can be demonstrated," but "there is such a thing as demonstration." To such a leading notion it would matter nothing what the definitions were, as long as they were well understood between the two parties; nor what the postulates were, as long as they were what no one of the time objected to. Neither would it matter that every postulate should be expressed, since, in the absence of any thing like previous guide, it would be natural to insist only on those preliminaries which had already been agitated in the previous attempts which we must imagine to have been made. It is only in some such way that we can give anything like a surmise at the reason why Euclid has really several more postulates than the six which he places at the beginning of his work. For example, that if of two bounded figures, one be partly inside and partly outside the other, the boundaries must somewhere intersect, is a very admissible postulate, but quite as necessary to be mentioned as that two straight lines cannot inclose a space. This is taken for granted without mention in the very first proposition. Again, that if two straight lines meet in a point, they will if produced cut in that point; that a straight line of which any one point is within a bounded figure, must, if produced indefinitely, cut that figure in two points; that if two points lying on opposite sides of a straight line be joined, the joining line must cut the straight line; that two circles may coincide in one point only, one of them being entirely within, or entirely without, the other; and perhaps some others—are all tacitly assumed. As to common notions, we might instance "things which are unequal to one another cannot be equal to the same," which is frequently used, and might be set down in a list which contains "the whole is greater than its part." It is not easy to see any probable reason for Euclid's preliminary selection, unless it be admitted as such, that he was writing on the point of demonstration generally, with reference to some particular opponents, whose requisitions he knew, or thought he knew.

All the earlier editions of Euclid announce him to be Euclid of Megara, who founded a sect of philosophers in that town. Diogenes Laertius, Suidas, and Aulus Gellius, give some account of Euclid of Megara, but not as a geometer: Proclus and Heron, who give an account of the geometer, do not mention Megara: Plutarch alone calls Euclid of Megara a geometer. It may therefore be concluded that the philosopher of Megara is altogether a distinct person.

We must now conclude an article which the bibliographer may think too concise, and the general reader too long. What do people care about old books and old editions? Little enough we are obliged to admit,—as little, in fact, as they care about accurate history. But every now and then an historical article is bearable; and many persons may just feel that degree of interest in Euclid which will enable them to glance at an account of the writer about whom they doubted when they were boys, whether his name was that of a science or a man. Let them doubt on this point still, as much as they please, on condition that there shall be no coalition of the two designations, no joining of the manes. May all good powers protect us from ever hearing Euclid called a *man of science*! We once read of him in a French book as *ce savant distingué*, and must confess we did not feel in a concatenation accordingly. But to return to old books: there are about them indications of old times which may be worthy subjects of ridicule to the modern man, who will himself be looked at in a similar light when his time shall come; or rather when his time shall be past, and the time of others shall come. What will our speechifiers at public meetings say to one which was held on the eleventh of August 1508, in the church of St. Bartholomew at Venice;—

present, the Rev. Lucas Pacioli,[10] of the order of minorite Franciscans, in the chair; the diplomatic ministers of France and Spain; various men of learning not otherwise distinuishable; seventeen ecclesiastical functionaries; ten doctors and professors; fifty-nine physicians, poets, printers, (including the celebrated Aldus), and gentlemen without title; besides citizens of Venice. The meeting being constituted, the reverend chairman proceeded to business, namely, the opening of his explanations of the fifth book of Euclid. His address (of which we regret we have not room for a full report) was with some few exceptions (among which we may number his statements of the necessity of the doctrines of proportion to a full understanding of those of religion) as much to the purpose as if it had been delivered immediately after dinner at the London Tavern, or at any period of the day at Exeter Hall; at least after making due allowance for his profession, which prevented him from speaking against the Catholics, and for his utter ignorance of Irish affairs. The effect of his explanation was to induce one of the ecclesiastics present to declare by letter to another, that the fifth book of Euclid excelled all the others as much as those others excelled the writings of other men. This we know, because, oddly enough, the account of this public meeting, with the names of the persons present, and the letter just alluded to annexed (dated March 12, 1509), is inserted bodily in the edition of Euclid published (or at least finished) by Fra Lucas himself, June 21, 1509. It sticks between the fourth and fifth books; and looking at the date of the letter and that of the completion of the work, it appears that two hundred and thirty folio pages of close black letter were composed, or at least revised, in less than half the number of days. Oh Lucas Pacioli! what would he have said if he could have known that his lectures would have been one day dragged from their obscurity to prove nothing but the rate at which printing went on in his day.

[10]This gentleman, under the name of Lucas di Borgo, is a personage in the history of algebra; but those who persist in calling him Di Borgo, might just as well call Hobbes by the appelation of "Hobbes of," leaving out "Malmesbury." Lucas Paciolus du burgo Sancti Sepulcri, is his proper title.