THE ARITHMETIC OF JEHAN ADAM, 1475 A.D.

By LYNN THORNDIKE, Columbia University

In a manuscript of the fifteenth century in the Bibliothèque Sainte Geneviève, Paris,[1] is an arithmetic in French. Both its text and author appear to have passed hitherto unnoted in works upon the history of mathematics. Yet it seems to contain an earlier example of numeration carried as far as trillions than has hitherto been recorded.[2] It was composed in the year 1475. As the introductory epistle at the beginning of the manuscript states, the author is Jehan Adam, who was secretary to Nicolle Tilhart, who in his turn was notary, secretary, and auditor of accounts to Louis XI, king of France from 1461 to 1483. That monarch more than once figures in the examples given in our text. Thus under Addition (fol. 9v) we are told, "le Roy donne a mons^{r} Lepaunatier IIII^{m}V^{c}XXIII (i. e. 4523), a mons^{r} Leschaconn II^{m}III^{c}XLI (2341), a mons^{r} Lesciuer III^{m}II^{c}XXIII (3223), a mons^{r} le maître doustel XIII^{c}XLII (1342). . ." ("The king gives Monsieur Lepaunatier 4523, M. Leschaconn 2341, M. Lesciver 3223, Master Doustel 1342"). Or in the first example of halving (*Mediacion*, at fol. 5r) we read, "The king gives the half of 51607 livres to Monsieur de Hourluum, that is, 25803 livres, ten sous."[3]

---

[1] Ste. Geneviève MS Français 3143.

Since this article went to press Professor David Eugene Smith has called my attention to an item in the 1898 sales catalogue of the library of Prince Boncompagni which indicates that he had somehow come into possession of a recent copy or facsimile of the work of Jehan Adam. This copy was apparently made from our Sainte Geneviève MS., but the sales catalogue states that Boncompagni had asked Marre to search for the original MS. in the Bibliothèque Nationale and other libraries of Paris, and that he had failed to locate it. It is nevertheless duly listed in Ch. Kohler's *Catalogue des manuscrits de la Bibliothèque de Ste. Geneviève*, published in 1893. The following is the notice in the *Catalogo della Biblioteca Boncompagni*, Parte Prima, Roma, 1898, p. 94: "499. Adam Iehan. Traicté d'arismetique pour la pratique par gectouers (SIC) faite et compillé a Paris en lan mil 475, della Biobl. di 79 carte membranacee, salvo le prime due e le due ultime che sono cartacee. Scritto nel sec. xix. Facsimile, con grande accuratezza eseguito, con iniziali e figure a oro e colori e titoli rubricati. Il Princ. Boncompagni, avendo pregato il Sig. Marre di ricercare se l'originale del detto trattato di Jehan Adam si trovasse nella biblioteca Nazionale od in altra di Parigi, egli gli fece sapere che ogni ricerca in proposito riusci infruttuosa."

[2] The earliest example hitherto known appears to have been in the *Triparty* of Nicolas Chuquet, a bachelor of medicine in Paris, dated 1484 at Lyons.

See Aristide Marre, "Notice sur Nicolas Chuquet et son Triparty en la science des nombres" in Boncompagni's *Bullettino di Bibliografia e di Storia delle Scienze Matematiche e Fisiche*, Tomo XIII, 1880, pp. 555-592, followed at p. 593 *et seq.* by Chuquet's text. I owe this reference and other helpful suggestions to the kindness of Professor David Eugene Smith. Chuquet carried the nomenclature on beyond trillion and quadrillion to *nonyllion*, as the form is given in the printed text, or *nouyllion* (or, *novyllion*) as I read it in the facsimile of the manuscript (Paris, Bibliothèque Nationale, MS Français 1346; once Codex Colbert 2170, Regius 7483) in Professor Smith's library. Neither Chuquet nor his modern editor mentions the arithmetic of our Jehan Adam which is earlier by nine years.

[3] fol. 5r, "Mediacion est assavoir combien monte la moictie dun nombir proposi Exemple Le Roy donne la moitie de li^{m}vi^{c}vii l. (i. e. the sign for livres) a mons^{r} de hourluum cest xxv^{m} huic cens troys livres dix sols . . . ."

Our arithmetic is of the abacus type, reckoning by *jetons* or counters.[1] This word is commonly spelled *gectoners* in our manuscript,[2] but the form *greton* also occurs at least once.[3] Jehan Adam, however, although he still usually employs the Roman numerals, was acquainted with the Hindu-Arabic numerals. At fol. 9r he writes them out as far as 100, then by hundreds up to one thousand,[4] "2000, 8000,[5] etc. Et ainsi jusques infini en assemblent les nombres digitz articulz."

Our arithmetic is the only, or at least the chief, treatise in the manuscript, which is a small, illuminated codex with seventy-five leaves of text in all. The writing is in a fairly large hand, so that there is not very much text per page. The spelling of the old French is at times difficult to decipher. Illuminated figures to illustrate graphically the sums and calculations of the text also occupy some of the space. None occurs, however, between fol. 33r and fol. 60r inclusive. The manuscript has been incorrectly bound so that the leaf now numbered fol. 5r-v and devoted to the topics of Halving and Doubling should be transposed with the leaf now numbered fol. 13r-v, which continues the opening chapter of the text proper begun on fol. 4v. At fol. 63r this main body of text proper ends after three lines at the top of the page. Most of the page is then left blank until, near the bottom of the page, comes the rubric, "Conclusion et fin de ce present traicte en continuant lespitre escripte au commencement dicelluy." That is to say, the author here resumes the epistle with which he opened his work at fols. 1-4. His devout conclusion terminates at fol. 66r with the words, " . . . . a laquelle nous puissons tous venir a la reste de nos jours. Amen." This *Explicit*, as it would seem, is then followed at fols. 66v-69v by a table of contents. The manuscript, however, does not end

[1] See E. Littré, *Dictionnaire*, 1869; "Les jetons se réduisent à une échelle dont les puissances successives au lieu de se placer de droite à gauche comme dans l'arithmétique ordinaire se mettent du bas en haut chacune dans une ligne où il faut autant de jetons qu'il y a d'unités dans les coefficients." Littré cites Buffon, *Ess. arithm.*, (*Œuvres*, X, 781).

More recently the whole matter of these *jetons* or *jettons* has been the subject of elaborate treatment with handsome plates by Francis Pierrepont Barnard, *The Casting-Counter and the Counter-Board*, Oxford, Clarendon Press, 1916, 358 pp., lxiii Pl. For briefer accounts, with especial reference to early printed arithmetics and the history of mathematics see David Eugene Smith, *Computing Jetons*, The American Numismatic Society, New York, 1921; and the same author's recent *History of Mathematics*, 1924, vol. II, chapter 3.

[2] fol. 4r, "arismeticque pour la praticque par gectoners"; fol. 20v, Rubric, "Septiesme et dernier espece darismeticque par gectoners." Littré, *op. cit.*, cites De Laborde, *Emaux*, p. 328, for the form *gectons* in the fourteenth century, "Gectons de la chambre des comptes de Monseigneur le duc d'Orléans." *Gecton* also occurs among some fifty forms of the word in French which Professor Barnard lists at pp. 26-27 of his aforesaid work, but neither of our forms, *gectoners* or *greton*, is among them. Possibly in the two passages quoted *gectoners* may denote those who make use of the counters or *gectons*.

[3] fol. 7r, "Item noctes que le premier greton dembas vault ung."

[4] By a slip 600 is written twice.

[5] Our author employs the old characters, 8, ϒ, and ʌ, for four, five, and seven respectively.

there, but, with a "regle pour faire une taille de Monnoye," and further text and headings, goes on to fol. 75r. Perhaps these apparent additions should be transposed back into the text at some point.

Jehan Adam divides arithmetic into nine parts: numeration, addition, subtraction, halving, duplication, multiplication, division, progression, and extraction of roots.[1] He states, however, that in this present treatise he will treat of only seven of these parts, leaving progressions and the extraction of square and cube roots to another treatise.[2] Whether it is in existence or was ever written by him, I do not know. He is aware, moreover, that arithmetic may be subdivided differently. Thus Master Bartholomew of Roumanis (or Romains?), professor of Holy Scripture, makes but five parts of arithmetic, namely, addition, subtraction, multiplication, division, and extraction of roots. And it is true that halving is simply dividing by two, and that doubling is simply multiplying by two, while progression may be explained as addition. Division is of two sorts, "*simple et miste.*"[3]

The most interesting and novel feature of Jehan Adam's work is the paragraph and the illuminated figure in his section on Numeration which he devotes to the twenty decimal numbers from one to ten trillions (*dix trimillions*).[4] These are represented in the figure by as many counters (*jetons*), balls, or circles, superimposed one above another as if on an abacus, and with only one ball or counter for each denomination. Instead of "billion" Jehan writes *bymillion*, and instead of "trillion," *trimillion*.[5] He quotes the Latin verses of Alexander of Villa Dei[6] which enumerate up to ten figures (1,000,000,000), but then he goes on by himself to the twentieth figure or *dix trimillions* (10,000,000,000,000,000,000). Explaining the illumination, he says:

"Also note that the first counter from the bottom stands for one, the second stands for ten, the third stands for one hundred, the fourth stands for one thousand, the fifth stands for ten thousand, the sixth

---

[1] fol. 13r, "Et est assavoir que en arismeticque sont ix especes Numeracion Addiction Substraction meditacion dupplacion Multiplicacion division progression Extraction de Radices.

[2] fol. 4r.

[3] fol. 21v. The treatment of simple division continues to fol. 28v; then follow mixed division and the rule of three. "En division mixte la regle de trois est la forme a laquelle toute subtille question se doit reduire tant per nombre houpt que autier (or, *aultre*)."

[4] The text occurs at fol. 7r; the illumination on fol. 7v.

[5] Chuquet, on the other hand, spells the words in question "byllion" and "tryllion."

[6] fol. 8v,

"Unum prima, secunda decem, dat tercia centum,
Quarta dabit mille, millia quinta decem,
Centum mille sexta dat, septima millia mille,
Mille dat octava millesies decies,
Centesies nova dat millesies quoque mille,
Millesies mille millesies decima,
Sic per millarium centenum denariumque."

These lines do not occur, however, in the version of the *Carmen de Algorismo* of Alexander of Villa Dei published in J. O. Halliwell's *Rara Mathematica*, 1841, pp. 73-83.

stands for one hundred thousand, the seventh stands for a million, the eighth stands for ten millions, the ninth stands for one hundred millions, the tenth stands for one thousand millions, the eleventh for ten thousand millions, the twelfth for one hundred thousand millions, the thirteenth for a billion, the fourteenth for ten billions, the fifteenth for a hundred (thousand)[1] billions, the sixteenth for a thousand billions, the seventeenth for ten thousand billions, the eighteenth for a hundred thousand billions, the nineteenth stands for a trillion, the twentieth for ten trillions."

Jehan Adam makes one or two brief incursions into the history of arithmetic. He has several suggestions to make as to the etymology of the word.[2] Arithmetic he derives from the Greek, *Ares*, meaning virtue, and from the Greek word for number. But the art is also called Algorismus from the Arabic, meaning an introduction to numbers, and this word may come from Algos, the name of the Arabic inventor of the art, and *Richmos*, a Chaldean word for number, or perhaps from the Greek *al*, equivalent to the Latin *in*, and *gogos*, equivalent to *dictio*. In another passage besides "the noble philosopher, Algus," (Jehan seems to have no preference as between the Latin and Greek forms of proper names) "the inventor and first compiler" of arithmetic, are listed Aristotle, Plato, Pythagoras, Isidore, Boethius, Albert, Alexander of Villa Dei, Masters Bartholomew des Roumanis, John of Sacrobosco, Johannes de Lineriis, Jean de Meun,[3] and Jehan Loquemeron, as past masters of the art.[4]

The problems of our arithmetic range from such simple ones as to multiply 2321 by xxiiii,[5] or, "If twelve ells of cloth are worth 34 livres, how much will 26 ells be worth,"[6] to more complicated problems concerning the division of profits among merchants forming a company and contributing different amounts of capital,[7] or even investing different sums for different periods of time,[8] or "touching a serpentine concerning which the King wants to know

[1] "cent mil bymillions" is evidently a slip for "cent bymillions." The French text of the passage reads: "item noctes que le premier greton dembas vault ung, le second vault (. . . . here some words seem to be omitted) cent, le quart vult mille, le Ve vault dix M, le VIe vault cent M, le VIIe vault Milion, Le VIIIe vault dix Million, Le IXe vault cent Millions, Le Xe vault Mil Millions, Le XIe vault dix mil Millions, Le XIIe vault Cent mil Millions, Le XIIIe vault bymillion, Le XIIIIe vault dix bymillions, Le XVe vault cent (mil) bymillions, Le XVIe vault mil bymillions, Le XVIIe vault dix Mil bymillions, Le XVIIIe vault cent mil bymillions, Le XIXe vault trimillion, Le XXe vault dix trimillions."

[2] fol. 4v.

[3] One might expect mention of John of Meurs (Johannes de Muris) rather than of the second author of *The Romance of the Rose* in a list of arithmeticians, but Iehan de Mehung seems unmistakably to denote the latter.

[4] fols. 2v—3r, "Et depuis Aristote platon pitagoras ysodore Boisse Alebert Alixandre de Villedieu Maistres bartholomieux des Roumanis Iehan de sacro bosco Iehan de Ligneriis Iehan de Mehung et Iehan Loquemeron en ont si bien oy (?) souverament traicte que nulle Reprehencion ny doit estre faicte."

[5] fol. 16v.

[6] fol. 30v.

[7] fol. 33v

[8] fol. 42v

the quantity of each metal that will be in one of the broken pieces."[1] We also have "Rules" for over-charge and annulments (? *recindemens*),[2] for recovery of annulments,[3] for equal and mixed proportion,[4] for fractions[5]—as to divide a sum in ratios of 1/2, 1/3, and 1/4, or 1/3, 1/4, 1/5, and 1/6—and for alloying money.[6]

It is interesting to associate this arithmetic of Jehan Adam composed in 1475, with the important *Triparty* of Nicholas Chuquet,[7] finished in 1484. Both works were thus composed within a decade of each other, both were written in French and by authors intimately connected with Paris, and they are the first two works known to employ the terms, billion and trillion. There is another similarity and sign of close connection between them. The master Bartholomew, "des Romanis" or "des Roumanis," whom Jehan Adam mentioned at least twice, is also cited and a passage from his work criticized in the appendix to Chuquet's *Triparty*, where he is called "*maistre berthelemy de rōmans*, formerly of the Order of Friars Preachers at Valence and doctor in theology."[8] Similarly Jehan Adam spoke of him as "*professeur en la saincte escripture.*" What was the debt of our two authors to this Bartholomew and can his own work be recovered?

THE EARLY CONTRIBUTIONS OF CARL SCHOY[9]

By DAVID EUGENE SMITH, Columbia University

The recent appointment of Dr. Carl Schoy as "Lehrauftrag für Geschichte der exacten Naturwissenschaften im Orient" in the University of Frankfort am Main, the work beginning on October first of the current academic year, is so significant in the study of the history of mathematics as to deserve more than a mere passing notice. The number of scholars who are proficient not only in mathematics and astronomy but also in the eastern languages has always been limited, even as it is today. Woepcke, who began as a Privatdozent at

---

[1] fol. 41r.

[2] fol. 36r, Rubric, "Regle de trop charge et Recindemens."

[3] fol. 38v, Rubric, "Aultre Regle et maniere de Repprendre les Recindemens."

[4] fols. 44v-45r.

[5] fol. 46r *et seq.*

[6] fol. 59v, Rubric, "Regle pour aloyer monnoye avecques au lire monnoye."

[7] See note 1a above.

[8] Aristide Marre, "Appendice au Triparty en la science des nombres de Nicolas Chuquet Parisien," in Boncompagni's *Bulletino di Bibliografia e di Storia delle Scienze Matematiche e Fisiche*, Tomo XIV, (1881) pp. 415-16 and 442.

[9] See also in this connection a "Note on the mathematics of the Arabs" by Professor L. C. Karpinski published in the MONTHLY (1925), pp. 44-45.