

GREGORY OF SAINT-VINCENT AND ZENO'S PARADOXES

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H. Bosmans, "Saint-Vincent (Grégoire de)", Biographie nationale belge XXI, 141–171; H. Bosmans, "Documents inédits sur Grégoire de Saint-Vincent", Annales de la société scientifique de Bruxelles 27 (1903), 43–44; H. Bosmans, "Lettre inédite de Christophe Grienberger sur Grégoire de Saint-Vincent", Annales de la Société d'Emulation pour l'Etude de l'Histoire et des Antiquités de la Flandre 1 (1913), 41–50; E. Sauvenier-Goffin, "Note au sujet des manuscrits de H Bosmans relatifs à Grégoire de Saint-Vincent", Bull. Soc. Roy. Sci. Liège 21 (1952), 301–302; E. Sauvenier-Goffin, "Les manuscrits de Grégoire de Saint-Vincent", Bull. Soc. Roy. Sci. Liège 20 (1951), 413–426; 427–436; 563–590; 711–732; 733–737; Charles Naux, "L'Opus geometricum de Grégoire de Saint-Vincent", Rev. Histoire Sci. Appl. 15 (1962), 93–104; Charles Naux, "Grégoire de St. Vincent et les propriétés logarithmiques de l'hyperbole équilatère", Rev. Questions Sci. 143 (2) (1972), 209–221; H. van Looy, "Chronologie et analyse des manuscrits mathématiques de Gregoire de Saint Vincent (1584-1667)", Archivum Historium Societatis Jesu 49 (1980), 279–303; H. van Looy, "Chronology and analysis of the mathematical manuscripts of Gregory of Saint Vincent (1584-1667)", Historia Mathematica 11 (1984), 57–75; J.-P. Le Goff, "De la méthode dite d'exhaustion : Grégoire de Saint-Vincent", in La démonstration mathématique dans l'histoire, éd. IREM, Besançon, 1989, 197–219; O. Van de Wyver, "L'école de mathématiques des jésuites de la Province Flandro-Belge au XVIIe siècle", Archivum Historicum Societatis Jesu 97 (1990), 265–278; Jean Dhombres, "Las progresiones infinitas: el papel del discreto y del continuo en el siglo XVII", Lull 16/30 (1993); A. Meskens, "Gregory of Saint Vincent : A Pioneer of the Calculus", The Mathematical Gazette 78 (1994), 315–319.

Mathématique universelle, tome 2, Louis Bertrand Castel, p. 25, 47, 1758

G.W. Leibniz, Interrelations between Mathematics and Philosophy Archimedes Volume 41, 2015, pp 111-134 Date: 19 Apr 2015 Leibniz as Reader and Second Inventor: The Cases of Barrow and Mengoli Siegmund Probst

Evangelista Torricelli and the Common Bond of Truth in Greek Mathematics Andrew Leahy Mathematics Magazine Vol. 87, No. 3 (June 2014), pp. 174-184

1673D1676. Arithmetische Kreisquadratur, Volume 6 By Gottfried Wilhelm Leibniz

The Problem of the Earth's Shape from Newton to Clairaut: The Rise of, John L. Greenberg, p. 242, 261.

John Napier: Life, Logarithms, and Legacy By Julian Havil

Newton et les origines de l'analyse: 1664-1666 - Page 305, Marco Panza Torricelli

Before Newton: The Life and Times of Isaac Barrow, Mordechai Feingold

The Oxford Handbook of the History of Mathematics edited by Eleanor Robson, Jacqueline Stedall

Date: November 14, 2015.

- Clavius and Mathematics in the Collegio Romano AgustŠn UdŠas
 The 16th century Iberian calculatores CP CALDERON - Revista de la Union,
 1989 - inmabb.criba.edu.ar
Institutions physiques, p. 193, chapter IX, 1742, tome I; 1740, p. 184.
Lettre inédite de Christophe Grienberger sur Grégoire de Saint-Vincent, *Annales
 de la Societe d'Emulation, I, 1913, p. 50.*
*Sets and integration An outline of the development 1972, pp 75-154 The integral
 from Riemann to Bourbaki Henri Lebesgue*
Correspondence of James Jurin, 1684-1750, Editions Rodopi, p. 465.
Vieta, Varia Responsa, 1593, Opera, 347-435: infinite geometric sum.
*Las progresiones infinitas: el papel del discreto y del continuo en el siglo XVII
 J Dhombres - Llull: Revista de la Sociedad EspaŪola de Historia É, 1993 - dial-
 net.unirioja.es*
*Guarino Guarini and Universal Mathematics CS Roero - Nexus Network Jour-
 nal, 2009 - Springer*
Geometric progressions B Burn - BSHM Bulletin, 2007
The History of the Calculus and Its Conceptual, Boyer
*Descartes geometric series: letter to Clerselier, June 1646, Descartes 1972, vol.
 4, p. 442.*
*Costabel, P., Descartes et la mathématique de l'infini, Historia Scientiarum, 26,
 37-49, 1985.*
 I point out that Torricelli gave a geometric proof of the sum of a geometric series
 in his De dimensione Parabolae [1644]. For Torricelli's proof, I refer to Panza
 [1992, 307-308].
 1684-1691, D. T. Whiteside, p. 33
 Huygens letters.
 Westfall [30, p. 33]
 The Arithmetic of Infinitesimals, John Wallis, p. xx.
 Gregory Saint-Vincent [25, p. 102], book II, part I, scholion to proposition
 LXXXVII. See Whiteside [31, p. 300].
Encyclopédie, "mouvement", p. 464, "le premier qui en"
 Journal de Trévoux, 1736, p. 1113
 Leibniz: Letter to Foucher 1693; letter to Mr. de Bauval.
 Chastellet [10, p. 179, chap. IX]
 Vincent Leotaud, *Examen circuli quadraturae*, 1654
 Pierre Bayle, *Dictionnaire historique et critique*, 1696, "Zenon d'Elée"
Analise des infiniment petits, Edmund Stone, p. xlvii
 Wilson [33, pp. 74, 204]
 Thomas De Quincey, *The Collected Writings of Thomas De Quincey*, vol. 5,
 p. 349.
 Duhem [11, p. 56]
 Nicholas of Cusa [18, p. 593]
 Mancosu [20]

REFERENCES

1. Roger Ariew, *The infinite in Spinoza's philosophy*, Spinoza: Issues and Directions. The Proceedings of the Chicago Spinoza Conference (Edwin Curley and Pierre-François Moreau, eds.), E. J. Brill, 1986, pp. 16-31.

2. Norman Biggs, *Thomas Harriot on continuous compounding*, BSHM Bulletin: Journal of the British Society for the History of Mathematics **28** (2013), no. 2, 66–74.
3. Paul P. Bockstaele, *Four letters from Gregorius a S. Vincentio to Christopher Grienberger*, Janus **56** (1969), 191–202.
4. Carl B. Boyer, *The history of the calculus and its conceptual development*, Dover Publications, 1959.
5. Angelo de Bruycker, *'to the adornment and honour of the city': the mathematics course of the Flemish Jesuits in the seventeenth century*, BSHM Bulletin: Journal of the British Society for the History of Mathematics **24** (2009), no. 3, 135–146.
6. Bob Burn, *Geometric progressions*, BSHM Bulletin **22** (2007), no. 3, 183–184.
7. R. P. Burn, *Alphonse Antonio de Sarasa and logarithms*, Historia Math. **28** (2001), no. 1, 1–17.
8. Jean Dhombres, *Is one proof enough? travels with a mathematician of the Baroque period*, Educational Studies in Mathematics **24** (1993), no. 4, 401–419.
9. ———, *Une mathématique baroque en Europe: réseaux, ambitions et acteurs*, L'Europe mathématique (Catherine Goldstein, Jeremy Gray, and Jim Ritter, eds.), Éditions de la Maison des sciences de l'homme, Paris, 1996, pp. 157–184.
10. Émilie du Châtelet, *Institutions de physique*, Prault fils, Paris, 1740.
11. Pierre Duhem, *Medieval cosmology: theories of infinity, place, time, void, and the plurality of worlds*, University of Chicago Press, 1985, Edited and translated by Roger Ariew, abridged from *Le Système du monde*.
12. Mordechai Feingold, *Jesuits: Savants*, Jesuit Science and the Republic of Letters (Mordechai Feingold, ed.), MIT Press, 2003, pp. 1–46.
13. Marcus Hellyer, *Catholic physics: Jesuit natural philosophy in early modern Germany*, University of Notre Dame Press, 2004.
14. Josef Ehrenfried Hofmann, *On the discovery of the logarithmic series and its development in England up to Cotes*, National Mathematics Magazine **14** (1939), no. 1, 37–45.
15. ———, *Das Opus geometricum des Gregorius a S. Vincentio und seine Einwirkung auf Leibniz*, Deutsche Akademie der Wissenschaften zu Berlin. Mathematisch-Naturwissenschaftliche Klasse. Abhandlungen **13** (1942), 1–80.
16. Dale Jacquette, *David Hume's critique of infinity*, Brill, 2000.
17. Vincent Jullien (ed.), *Seventeenth-century indivisibles revisited*, Birkhäuser, 2015.
18. Charles H. Lohr, *Metaphysics*, The Cambridge History of Renaissance Philosophy (Charles B. Schmitt and Quentin Skinner, eds.), Cambridge University Press, 1988, pp. 537–638.
19. Antoni Malet, *From indivisibles to infinitesimals: Studies on seventeenth-century mathematicalizations of infinitely small quantities*, Universitat Autònoma de Barcelona, 1996.
20. Paolo Mancosu, *Philosophy of mathematics and mathematical practice in the seventeenth century*, Oxford University Press, 1996.
21. J. E. McGuire and Martin Tamny, *Certain philosophical questions: Newton's Trinity notebook*, Cambridge University Press, 1983.
22. Ad Meskens, *Gregory of Saint Vincent: a pioneer of the calculus*, The Mathematical Gazette **78** (1994), no. 483, 315–319.
23. Ch. Naux, *L'Opus geometricum de Grégoire de Saint-Vincent*, Revue d'histoire des sciences et de leurs applications **15** (1962), no. 2, 93–104.
24. Carla Rita Palmerino, *Two Jesuit responses to Galileo's science of motion: Honore Fabri and Pierre Le Cazre*, The New Science and Jesuit Science: Seventeenth Century Perspectives (Mordechai Feingold, ed.), Archimedes: New Studies in the History and Philosophy of Science and Technology, vol. 6, Springer, 2003, pp. 187–227.
25. Gregory Saint-Vincent, *Opus geometricum quadraturae circuli et sectionum conii. Decem libris comprehensum*, Apud Ioannem et Iacobum Meursios, Antwerp, 1647.
26. Chikara Sasaki, *Descartes's mathematical thought*, Boston Studies in the Philosophy of Science, vol. 237, Kluwer Academic Publishers, 2003.
27. Herman Van Looy, *A chronology and historical analysis of the mathematical manuscripts of Gregorius a Sancto Vincentio (1584–1667)*, Historia Math. **11** (1984), no. 1, 57–75.
28. G. H. W. Vanpaemel, *Jesuit science in the Spanish Netherlands*, Jesuit Science and the Republic of Letters (Mordechai Feingold, ed.), MIT Press, 2003, pp. 389–432.
29. William A. Wallace, *Galileo, the Jesuits and the medieval Aristotle*, Variorum, 1991.

30. Richard S. Westfall, *Never at rest: A biography of Isaac Newton*, Cambridge University Press, 1983.
31. D. T. Whiteside (ed.), *The mathematical papers of Isaac Newton, volume VIII: 1697–1722*, Cambridge University Press, 1981.
32. Derek Thomas Whiteside, *Patterns of mathematical thought in the later seventeenth century*, Arch. Hist. Exact Sci. **1** (1961), no. 3, 179–388.
33. Catherine Wilson, *Leibniz's metaphysics: A historical and comparative study*, Manchester University Press, 1989.

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