Bibliographic Notices

by

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Norbert Brunner, *75 years of independence proofs by Fraenkel-Mostowski permutation models*, Mathematica Japonica **43** (1996), 177–199. A survey of the technique, application, and history of independence proofs using permutation models, prefaced by a sketch of the history of the Axiom of Choice and Fraenkel's original method of proving its independence. The focus is on **ZFA** (**ZF** without the Axiom of Foundation) and various choice principles in **ZFA**. Many of the examples considered are taken from point-set topology.

Michael Byrd, *Parts III–IV of 'The Principles of Mathematics'*, Russell (n.s.) **16** (1996), 145–168. A detailed account of the writing of parts III–IV of *The Principles of Mathematics*, based upon an examination of the variations between the manuscript and the finished text and collating the various drafts of the manuscript.

Roger Cooke, *Uniqueness of trigonometric series and descriptive set theory, 1870-1985*, Archive for History of Exact Sciences **45** (1993), 281–334. The problem of the uniqueness of trigonometric series expansions is one of apparently narrow scope which led to fundamental changes across the entire world of mathematical research. Heine's invitation to Cantor to collaborate on this question led Cantor to invent a new language that changed forever the way mathematicians thought about their subject.

Richard Courant and Herbert Robbins, *What is Mathematics? An Elementary Approach to Ideas and Methods*, second edition, revised by Ian Stewart, New York/Oxford, Oxford University Press, 1996. Ian Stewart brings this well-known and much-beloved text up-to-date by making minor corrections and adding a new chapter on "Recent Developments," in which he notes, for example, that the four color problem and Fermat's Last Theorem have been solved, that infinitesimals and infinite quantities have regained renewed respectability through nonstandard analysis. The new chapter includes a section (§4) on the continuum hypothesis and another (§5) on set-theoretic notation. The bibliography has also been updated.

Nigel J. Cutland, Vítor Neves, Franco Oliveira & José Sousa-Pinto, *Abraham Robinson— a biographical note*, in Nigel J. Cutland, Victor Neves, Franco Oliveira & José Sousa-Pinto (editors), *Developments in nonstandard analysis* (Harlow, Longmans, 1995), iv–vi.

John W. Dawson, Jr., *Logical Dilemmas: The Life and Work of Kurt Gödel*, Wellesley, MA, A K Peters, 1997. This is the first full-scale definitive biography of Kurt Gödel, integrating the account of personal aspects of his life and his work, with careful attention to his intellectual biography. The biographer, a leading Gödel scholar who cataloged and studied the Gödel *Nachlaß* and participates crucially in the publication of Gödel's collected works, takes pains to separate the myths that developed around Gödel's enigmatic personal life from the reality.

Keith DEVLIN, *Goodbye, Descartes: The End of Logic and the Search for a New Cosmology of Mind*, New York, John Wiley & Sons, 1997. The author presents a history, from the ancient Greek logicians' efforts to devise laws of thought, through Leibniz's work in developing a *calculus ratiocinator* and especially a *lingua characteristica*, to the recent present, including of course the work of Turing in computability theory, of how the concept of mind as a logic machine developed and became widely accepted. He also seeks to show how efforts to use logic to build "thinking machines" failed and why no machine can ever be built which can think the way humans think.

Yvonne DOLD-SAMPLONIUS, *Interview with Bartel Leendert van der Waerden*, Notices of the American Mathematical Society **44** (1997), 313–320. The author conducted a wide-ranging interview (originally published in German in 1993 and then published in Italian translation in 1995) with van der Waerden on the occasion of his 90th birthday. We learn, in addition to much else, that when van der Waerden was a student at the University of Amsterdam, he took a course from Brouwer on foundations of intuitionism; in this connection, der Waerden recollected (p. 314) that he once interrupted Brouwer's lecture to ask a question, and as a consequence was told by Brouwer's assistant that he must not ask questions. It is noted that Brouwer would not give courses on topology, but always and only on the foundations of intuitionism, because he became convinced that his results in topology were not correct from the point of view of intuitionsim.

Leonhard EULER, *Letters of Euler to a German Princess on different subjects in Physics and Philosophy*, translated from the French by Henry Hunter, with a new introduction by Andrew Pyle. Bristol, Thommes, 1997. This is a 2-volume reprint of the 1795 edition published in London by H. Murray. This work is of interest to logicians and historians of logic as the source of Euler diagrams.

José FERREIRÓS, *Traditional logic and the early history of sets 1854–1908*, Archive for History of Exact Sciences **50** (1996), 1–67. Cantor is rightly considered the founder of transfinite set theory, but sets emerge into mathematics earlier. The work of Riemann and Dedekind, in particular, offers clear examples of the use of set language in mathematics, and the elaboration of foundational views based on the notion of set.

Ralph S. FREESE, *Alan Day's early work: congruence identities*, Algebra universalis **34** (1995), 4–23. For $\mathcal{V}$ variety, Con$\mathcal{V}$ is variety of lattices generated by the congruence lattices of algebras in $\mathcal{V}$. This is a survey of Day's early work on Con$\mathcal{V}$ and congruence varieties and a summary of the contemporary results on congruence varieties that flowed from Day's work.

Ivor GRATTAN-GUINNESS, *How did Russell write 'The Principles of Mathematics' (1903)?*, Russell (n.s.) **16** (1996), 101–127. The author examines archival materials and employs textual analysis on those materials to document and analyze the chronology of the writing of *The Principles of Mathematics*. It is concluded that the received account of the writing of the *Principles* as recollected by Russell and accepted as standard in the history of logic is inaccurate; in particular, Grattan-Guinness ascertains that: (1) Parts I and II were written no earlier than the summer of 1901 and did not at all exist in 1900, except possibly in preliminary sketches which are no longer extant; (2) as originally envisioned in 1900, the *Principles* did not advocate logicism, Russell arriving at that position only around January 1901; (3) Russell apparently arrived at his logicist view as a result of a generalization of his views about geometries; and (4) the Russell paradox and the studies on ordered series written for Peano's journal are integral to the conception of the *Principles*, rather than ancillary to its completion. The remainder of Grattan-Guinness' task is to present a revised account of the development of the *Principles* and the features of its contents.

Hélène GISPERT, *La théorie des ensembles en France avant la crise de 1905: Baire, Borel, Lebesgue . . . et tous les autres*, Revue d'histoire des mathématiques **1** (1995), 39–81. French mathematical circles took up the new concepts and methods of set theory within the context of a current specific to French mathematics, the new theory of functions. It bore the hallmarks of this incorporation, and differed in important respects from the version presented by Cantor.

Eric HAMMER, *Peirce on logical diagrams*, Transactions of the Charles S. Peirce Society **31** (1995), 807–827. An exposition and analysis, in modern model-theoretic terminology, of Peirce's existential graphs which Peirce devised as a boolean-valued model for relational logic, first-order and higher-order logic. The completeness of Peirce's graph-theoretic rules is proven.

Eric HAMMER, *The calculations of Peirce's 4.453*, Transactions of the Charles S. Peirce Society **31** (1995), 829–839. Analysis of the calculations which Peirce reported (as found in 4.453 in the Hartshorne & Weiss edition of his *Collected Papers*) to determine the n-place relation R in a first-order n-ary sentence (up to equivalence) in normal form. The author states (p. 829) that he wishes to show in this article that: "The computations shed light on the beta fragment of the system of existential graphs as well as on its notational variant, first-order logic."

Đuro Kurepa Memorial Volume, Publ. Inst. Math. (Beograd) (n.s.) **57** (**71**), (1995). Includes a biographical sketch by Žarko Mijajlović (pp. 13–18) and a selcted bibliography of Kurepa's publications in set theory, topology, and number theory.

Б. А КУШНЕР, «Успенских пишет о Колмогорове», Истприко-матемтические исследования (вторая сер.) 1 (36), № 2 (1996), 165-191. Russian version of the paper "Memories of Mech.-Math in the 'sixties, inspired by Uspensky's JSL article on Kolmogorov's work in logic," first published in *Modern Logic* 4 (1994), 165-195.

Solomon MARCUS, *Mathematics and humanities: Irina Gorun (1953–1985)*, Libertas Math. **15** (1995), 233–236. Brief sketch of the life and work of the Romanian-born computer science graduate student Irina Gorun, who worked on formal language theory and λ-calculus and on applications of algebraic structures and formal grammars to the study of the structures of literature and poetry. At the time of her death, she was writing a doctoral thesis on the λ-calculus under the direction of Albert R. Meyer.

Donald MACKENZIE, *The automation of proof: a historical and sociological exploration*, Annals of the History of Computing **17** (1995), 7–29. A history of the use of computers to automate mathematical proofs. The study places technical features in their wider intellectual and practical context. Three broad strands are identified: automatic theorem proving to simulate human deduction; that in which the way humans deduce is considered irrelevant; and interactive theorem proving.

Maurice MARGENSTERN, *L'école constructive de Markov*, Revue d'histoire des mathématiques **1** (1995), 271–305. After sketching the emergence of intuitionism and of recursive function theory in the early years of this century, a sketch is given of the main features of the constructive school as fashioned by A A Markov, Jr. (1903–1979) and the major results thus obtained in real analysis.

Denis MIÉVILLE, *Calcul et raisonnement chez Lesniewski*, in D. Miéville, (editor), *Raisonnement et calcul* (Neuchâtel, Université de Neuchâtel, 1995), 135–147.

Wayne C. MYRVOLD, *Peirce on Cantor's paradox and the continuum*, Transactions of the Charles S. Peirce Society **31** (1995), 508–541. The various stages of Peirce's views on Cantorian set theory are detailed. It is noted in particular that Peirce arrived independently at a proof of Cantor's theorem on the nondenumerability of the reals. It is argued, moreover, that Peirce was unaware of Cantor's theorem, especially since, unlike Cantor, Peirce does not use a diagonal argument. An independent attempt at a proof of the continuum hypothesis is likewise ascribed to Peirce. It is found that Peirce's notion of the continuum is closer to Dedekind's rather than Cantor's, and Peirce's efforts in developing a proof arise from his criticisms of Cantor's proof. Peirce's solution to the Cantor paradox is based upon the conclusion that Cantor's theorem cannot properly be applied to a supermultitudinous collection (such as the set of reals) to obtain a still larger collection (such as the power set of the reals).

Jaimie NUBIOLA, *C. S. Peirce: Pragmatism and logicism*, Philosophia Scientiae **1** (2), (1996), 121–130. After placing Peirce's pragmatism within the context of the general history of philosophy, the author turns to the question of whether Peirce adhered to logicism. The examination of Peirce's understanding of the nature of logic is carried out within the framework of the debate between Susan Haack and Nathan Houser on the question of Peirce's logicism. The author concludes that Peirce did not seek to reduce mathematics to logic.

Peter ØHRSTRØM and Per F. V. HASLE, *Temporal Logic, from Ancient Ideass to Artificial Intelligence*, Dordrect/Boston/London, Kluwer Academic Publications, 1995. This book examines the history of temporal logic from ancient times through the medieval period to the present from the aspect of a variety of philosophical perspectives. The first part of the book is a study of the history of the concept of time from the perspective of the history of logic and focuses on ancient and medieval work, with some consideration as well to the loss of interest in these issues in the Renaissance. This history is developed from the standpoint of modern symbolic logic and raises the general question of the reliability and suitability of studies of historical systems of logic undertaken from the perspective of modern logic. The second part is devoted to modern work in temporal logic, most notably that of Arthur N. Prior, who rediscovered temporal logic, with reference to his nineteenth- and twentieth-century predecessors, and it discusses the connection which Prior explicated between temporal logic and modal logic. The third part of the book examines modern applications of temporal logic in computer science and artificial intelligence. In this context an effort is made to relate contemporary applications of historically significant work to contemporary problems in computer science and artificial intelligence; the most notable is perhaps the exposition of the relation between the calculus of duration and Charles Peirce's existential graphs to deductive databases.

Adrian RICE, *Augustus De Morgan (1806 – 1871)*, The Mathematical Intelligencer **18**, no. 3 (1996), 40–43. Very brief informal sketch of De Morgan's life and assessment of his accomplishments.

Fred SEDDON, *Aristotle and Łukasiewicz on the Principle of Contradiction* (Ames, Iowa, Modern Logic Publishing, MLP Books, 1996). The author presents a section-by-section evaluation of Łukasiewicz's analysis of Aristotle's treatment of the Principle of Contradiction, as this was presented in Wedin's English translation of Łukasiewicz's famed article „Über den Satz der Widerspruchs bei Aristoteles.“ A biographical sketch of Jan Łukasiewicz by Jan Woleński is also included.

Hans SLUGA (editor), *Logic and Foundations of Mathematics in Frege's Philosophy*, New York, Garland Publishing, 1993. A collection of many significant previously published papers on Frege's philosophy of mathematics and philosophy of logic.

Jamie TAPPENDEN, *Extending knowledge and "fruitful concepts": Fregean themes in the foundations of mathematics*, Noûs **29** (1995), 427–467. The author explores the question of whether the philosophical foundations of mathematics have any direct bearing on mathematical research, and if so, whether it has any noticeable impact on mathematical research. The contemporary answer is sought via an exploration of Frege's answer to these these questions, especially as given by Frege in the *Grundlagen der Arithmetik*. The answer given by the author is rooted in traditional logicism.

Zeszyty Nauk. Wyż. Szkoła Ped. Powstańców Śl. Opolu Mat. **28** (1992). In Polish. The entire issue is dedicated to the logician Jerzy Słupecki. It includes the paper by Mieczysław Omyła, „Jerzy Słupecki‘s interpretation of certain nonclassical logical systems“ (pp. 71-76) in which the author seeks to provide a synthesis of results of three of Słupecki‘s papers in which he formalized some ideas of Łukasiewicz‘s three-valued logic, the modal logic S5, and some versions of non-Fregean logic.