

THE
BULLETIN
OF
SYMBOLIC LOGIC

EDITED BY

ANDREAS R. BLASS, Managing Editor

JOHN P. BURGESS MATTHEW FOREMAN AKIHIRO KANAMORI
PHOKION KOLAITIS MANUEL LERMAN H. DUGALD MACPHERSON

REVIEWS EDITORS

ALASDAIR URQUHART, Reviews Managing Editor

LEV BEKLEMISHEV DAVID EVANS ERICH GRÄDEL
GEOFFREY HELLMAN DENIS HIRSCHFELDT THOMAS JECH
JULIA KNIGHT MICHAEL C. LASKOWSKI VOLKER PECKHAUS
WOLFRAM POHLERS SŁAWOMIR SOLECKI

VOLUME 9 · NUMBER 3 · SEPTEMBER 2003
ISSN 1079-8986

PUBLISHED QUARTERLY BY THE ASSOCIATION FOR SYMBOLIC LOGIC, INC.
WITH SUPPORT FROM INSTITUTIONAL MEMBERS

*Copyright ©2003 by the Association for Symbolic Logic. All rights reserved.
Reproduction by photostat, photo-print, microfilm, or like process by permission only.*

TABLE OF CONTENTS

ARTICLES

The empty set, the singleton, and the ordered pair, by AKIHIRO KANAMORI ..	273
Computable and continuous partial homomorphisms on metric partial algebras, by VIGGO STOLTENBERG-HANSEN and JOHN V. TUCKER	299
Survey of the Steinhaus tiling problem, by STEVE JACKSON and R. DANIEL MAULDIN	335
A universal approach to self-referential paradoxes, incompleteness and fixed points, by NOSON S. YANOFKY	362

COMMUNICATIONS

Finite conformal hypergraph covers and Gaifman cliques in finite structures, by IAN HODKINSON and MARTIN OTTO	387
--	-----

REVIEWS

H. B. Enderton, <i>A Mathematical Introduction to Logic</i> . Reviewed by Natasha Dobrinen	406
P. B. Andrews, <i>An introduction to mathematical logic and type theory: to truth through proof</i> . Reviewed by Mitsuru Yasuhara	408
David Marker, <i>Model Theory: An Introduction</i> . Reviewed by Bradd Hart	408
Articles in <i>Paraconsistency: the logical way to the inconsistent</i> . Reviewed by Casey N. McGinnis	410
P. Bernhard, <i>Euler-Diagramme</i> . Reviewed by Michael Beaney	412
Y. Rogozhin, <i>Small universal Turing machines</i> . Reviewed by Maurice Margenstern	414
W. Mitchell, E. Schimmerling, and J. Steel, <i>The covering lemma up to a Woodin cardinal</i> . Reviewed by Itay Neeman	414

IN MEMORIAM

In memoriam: Walter Felscher, 1931–2000, by MICHAEL RICHTER	417
Notices	419

THE BULLETIN OF SYMBOLIC LOGIC (ISSN 1079-8986) is published quarterly, in the months of March, June, September, and December, by the Association for Symbolic Logic, Inc., 124 Raymond Avenue, Poughkeepsie, NY 12604-0001, USA. Periodicals postage is paid at Poughkeepsie NY and at additional mailing offices. The BULLETIN is distributed with THE JOURNAL OF SYMBOLIC LOGIC: the 2003 annual subscription price for the two journals is \$450. Online subscription is available from Project Euclid; visit <http://projecteuclid.org/bsl>. **Postmaster:** Send address changes to *The Bulletin of Symbolic Logic, Journals Division UIP, 1325 South Oak Street, Champaign, IL 61820-6903, USA*. Business correspondence should be sent to the Secretary-Treasurer of the Association, Charles Steinhorn (address on inside back cover).

The BULLETIN and the JOURNAL are the official organs of the Association for Symbolic Logic, an international organization for furthering research in symbolic logic and the exchange of ideas among mathematicians, philosophers, computer scientists, linguists, and others interested in this field. The BULLETIN invites submission of *Articles* and *Communications* and publishes reviews of publications in logic.

Continued on inside back cover

THE
BULLETIN
OF
SYMBOLIC LOGIC

EDITED BY

ANDREAS R. BLASS, Managing Editor
JOHN P. BURGESS MATTHEW FOREMAN AKIHIRO KANAMORI
PHOKION KOLAITIS MANUEL LERMAN

REVIEWS EDITORS

ALASDAIR URQUHART, Reviews Managing Editor
LEV BEKLEMISHEV DAVID EVANS ERICH GRÄDEL
GEOFFREY HELLMAN DENIS HIRSCHFELDT THOMAS JECH
JULIA KNIGHT MICHAEL C. LASKOWSKI VOLKER PECKHAUS
WOLFRAM POHLERS SŁAWOMIR SOLECKI

VOLUME 9
2003

PUBLISHED QUARTERLY BY THE ASSOCIATION FOR SYMBOLIC LOGIC, INC.
WITH SUPPORT FROM INSTITUTIONAL AND CORPORATE MEMBERS

The four numbers of Volume 9 were issued at the following dates:

Number 1, pages 1–128, March 12, 2003

Number 2, pages 129–272, May 15, 2003

Number 3, pages 273–424, September 10, 2003

Number 4, pages 425–586, November 18, 2003

Numbers 1–4 of this volume are copyrighted ©2003 by the Association for Symbolic Logic, Inc. Reproduction of copyrighted numbers of the BULLETIN by photostat, photoprint, microfilm, or like process is forbidden, except by written permission, to be obtained from the Secretary of the Association, Charles Steinhorn, ASL, Box 742, Vassar College, 124 Raymond Avenue, Poughkeepsie, NY 12604, USA.

The paper used in this BULLETIN is acid-free and falls within the guidelines established to ensure permanence and durability.

This BULLETIN has been registered with the Copyright Clearance Center, Inc. The appearance of a code at the bottom of the first page of an article indicates the copyright owner's consent for copying beyond that permitted by Sections 107 or 108 of the U. S. Copyright Law, provided that the per-copy fee stated in the code is paid directly to Copyright Clearance Center, Inc., 222 Rosewood Drive, Danvers, MA 01923, USA. This consent does not extend to copying for general distribution, for advertising or promotion purposes, for creating new collective works, or for resale. Specific written permission for such copying must be obtained from the Association.

CONTENTS OF VOLUME 9

SHORE, RICHARD A. The Reviews	1
LONGO, G. and SCOTT, P. New programs and open problems in the foundation of mathematics	129

ARTICLES

SERÉNY, GYÖRGY. Gödel, Tarski, Church, and the Liar	3
GIRARD, JEAN-YVES. From foundations to ludics	131
CURIEN, P.-L. Symmetry and interactivity in programming	169
PARISI, GIORGIO. Two spaces looking for a geometer	181
MACINTYRE, ANGUS. Model theory: Geometrical and set-theoretic aspects and prospects	197
LAWVERE, F. WILLIAM. Foundations and applications: axiomatization and education	213
KOCK, ANDERS. Differential calculus and nilpotent real numbers	225
KANAMORI, AKIHIRO. The empty set, the singleton, and the ordered pair	273
STOLTENBERG-HANSEN, VIGGO and TUCKER, JOHN V. Computable and continuous partial homomorphisms on metric partial algebras	299
JACKSON, STEVE and MAULDIN, R. DANIEL. Survey of the Steinhaus tiling problem	335
YANOFSKY, NOSON S. A universal approach to self-referential paradoxes, incompleteness and fixed points	362
ATTEN, MARK VAN and KENNEDY, JULIETTE. On the philosophical development of Kurt Gödel	425
DOŠEN. KOSTA. Identity of proofs based on normalization and generality	477

COMMUNICATIONS

KJOS-HANSEN, BJØRN. Local initial segments of the Turing degrees	26
HODKINSON, IAN and OTTO, MARTIN. Finite conformal hypergraph covers and Gaifman cliques in finite structures	387

REVIEWS

H. Andréka, S. Givant, and I. Németi, <i>Decision problems for equational theories of relation algebras</i> . Reviewed by Roger D. Maddux	37
C. McGinn, <i>Logical properties: identity, existence, predication, necessity, truth</i> . Reviewed by Matthew McKeon	39
S. Tupailo, <i>Realization of analysis into explicit mathematics</i> . Reviewed by Thomas Strahm	42
F. A. Muller, <i>Sets, classes, and categories</i> . Reviewed by Colin McLarty	43

A. Beckmann, <i>Proving consistency of equational theories in bounded arithmetic</i> . Reviewed by Chris Pollett	44
J. Avigad, <i>Update procedures and the 1-consistency of arithmetic</i> . Reviewed by Toshiyasu Arai	45
U. Berger, W. Buchholz, and H. Schwichtenberg, <i>Refined program extraction from classical proofs</i> . Reviewed by N. Danner	47
A. Bès, <i>Decidability and definability results related to the elementary theory of ordinal multiplication</i> . Reviewed by John E. Doner	49
J. M. Dunn and G. Hardegree, <i>Algebraic methods in philosophical logic</i> . Reviewed by Janusz Czelakowski	231
M. Zeman, <i>Inner models and large cardinals</i> . Reviewed by Ernest Schimmerling	234
Two papers of B. Löwe and P. Welch. Reviewed by Volker Halbach	235
Moti Gitik's recent papers on the Singular Cardinals Problem. Reviewed by Akihiro Kanamori	237
H. B. Enderton, <i>A Mathematical Introduction to Logic</i> . Reviewed by Natasha Dobrinen	406
P. B. Andrews, <i>An introduction to mathematical logic and type theory: to truth through proof</i> . Reviewed by Mitsuru Yasuhara	408
D. Marker, <i>Model Theory: An Introduction</i> . Reviewed by Bradd Hart	408
Articles in <i>Paraconsistency: the logical way to the inconsistent</i> . Reviewed by Casey N. McGinnis	410
P. Bernhard, <i>Euler-Diagramme</i> . Reviewed by Michael Beaney	412
Y. Rogozhin, <i>Small universal Turing machines</i> . Reviewed by Maurice Margenstern	414
W. Mitchell, E. Schimmerling, and J. Steel, <i>The covering lemma up to a Woodin cardinal</i> . Reviewed by Itay Neeman	414
J. R. Brown <i>Philosophy of mathematics, an introduction to the world of proofs and pictures</i> . Reviewed by Janet Folina	504
I. Hacking, <i>An introduction to probability and inductive logic</i> . Reviewed by Branden Fitelson	506
E. Menzler-Trott, <i>Gentzens Problem</i> . Reviewed by Volker Peckhaus	508
G. Gerla, <i>Fuzzy logic — Mathematical tools for approximate reasoning</i> . Reviewed by Petr Hájek	510
D. Jacquette, <i>Philosophy of logic, An anthology</i> . Reviewed by William H. Hanson	511
R. Hirsh and I. Hodkinson, <i>Relation algebras by games</i> . Reviewed by Roger D. Maddux	515
G. S. Boolos, J. P. Burgess, and R. C. Jeffrey, <i>Computability and Logic</i> , 4th ed. Reviewed by Richard Zach	520
K. Lambert, <i>Free logic: Selected essays</i> . Reviewed by David DeVidi	521

IN MEMORIAM

In memoriam: Walter Felscher, 1931–2000. By MICHAEL RICHTER	417
---	-----

MEETINGS OF THE ASSOCIATION FOR SYMBOLIC LOGIC

2002 Annual Meeting of the Association for Symbolic Logic, University of Nevada, Las Vegas, Las Vegas, Nevada, June 1–4, 2002	51
2002 European Summer Meeting of the Association for Symbolic Logic, Logic Colloquium '02, Münster, Germany, August 3–9, 2002	71
2002–2003 Winter Meeting of the Association for Symbolic Logic, Philadelphia Marriott Hotel, Philadelphia, Pennsylvania, December 27–30, 2002	242
2002–2003 Winter Meeting of the Association for Symbolic Logic, Baltimore Convention Center, Baltimore, Maryland, January 17–18, 2003	250

MEETINGS SPONSORED BY THE ASSOCIATION FOR SYMBOLIC LOGIC

9th Workshop on Logic, Language, Information and Computation (WoLLIC '2002), Rio de Janeiro, Brazil, July 30–August 2, 2002	121
Eighth Asian Logic Conference, South-West Normal University, Chongqing, China, August 29 – September 2, 2002	256
2002 Annual Conference of the Australasian Association for Logic, Canberra, Australia, November 30–December 2, 2002	257
Notices	123, 266, 419, 581
Officers and Committees of the Association for Symbolic Logic	524
Members of the Association	528