BULLETIN

CSHPM   SCHPM

WHAT'S INSIDE

ABOUT THE SOCIETY

Founded in 1974, the Canadian Society for History and Philosophy of Mathematics/Société canadienne d'histoire et philosophie des mathématiques (CSHPM/SCHPM) promotes research and teaching in the history and philosophy of mathematics. Officers of the Society are:

President: **Nicolas Fillion**, Simon Fraser University, Burnaby, BC CV5A 1S6, CAN `nfillion@sfu.ca`
Vice-President: **Robert Bradley**, Adelphi University, Garden City, NY 11530, USA, `bradley@adelphi.edu`
Secretary: **Patricia Allaire**, 14818 60th Ave., Flushing, NY 11355, USA, `PatAllaire@gmail.com`
Treasurer: **David Orenstein**, 26 Wolfrey Ave., Toronto ON, M4K 1K8, CAN, `david.orenstein@alumni.utoronto.ca`
Past-President: **Craig Fraser**, University of Toronto, Toronto, ON, M5S 1K7, CAN, `craig.fraser@utoronto.ca`

Members of Council

Marion (Wendy) Alexander, Houston Community Colleges, TX 77002 , USA, `marion.alexander@hccs.edu`
Jemma Lorenat, Pitzer College, Claremont, CA 91711, USA, `Jemma_Lorenat@pitzer.edu`
Jean-Pierre Marquis, Université de Montréal, Montréal, QC, H3T 1J4, CAN, `jean-pierre.marquis@umontreal.ca`
Amy Shell-Gellash, Eastern Michigan University, Ypsilanti, MI 48197, USA, `ashellge@emich.edu`

Volunteer Positions

The Society's Web Page (`www.cshpm.org`) is maintained by **Eisso Atzema**, University of Maine, Orono, ME 04469, USA, `eisso.atzema@maine.edu`. The Proceedings of the Annual Meeting are edited by **Maria Zack** and **David Waszek**. The Society's Archives are managed by **Eisso Atzema**, University of Maine, Orono, ME 04469, USA, `eisso.atzema@maine.edu`. **Hardy Grant**, `hardygrant@yahoo.com`, and **Amy Ackerberg-Hastings**, `aackerbe@verizon.net`, edit the *CSHPM Notes* column for *Notes* of the Canadian Mathematical Society. **Maritza Branker**, Niagara University, Lewiston, NY 14109, USA, `mbranker@niagara.edu`, serves as CMS Liaison.

New Members are most cordially welcome; please contact the Secretary.

President's Message

The diversity of perspectives explored by members makes the CSHPM stand out among other mathematical, philosophical, and historical societies. Our association's activities provide a forum for eclectic scholars who defy traditional disciplinary boundaries but who are united in a love of mathematics, its theories, traditions, foundations, practices, and practitioners. This year's CSHPM Annual Meeting will celebrate this breadth. This meeting takes place at York University in Toronto as part of Congress of the Humanities and Social Sciences on 28-30 May 2023. The highlight of this year's programme is a Special Session on Underrepresented Mathematics (in the History and Philosophy of Mathematics). Lead session organizer, Amy Ackerberg-Hastings, has designed this session to address the growing need identified throughout the past years of inviting greater diversity among people who create mathematics as well as those who use it. While historians and philosophers of mathematics seek to encourage diversity in the scope of their studies as well as to recruit from diverse backgrounds into their field, many stories remain to be discovered and voices heard. Those in a position to contribute to our understanding and appreciation of underrepresented mathematics are therefore strongly encouraged to come forward with proposals. The Call for Papers for the CSHPM Annual Meeting appears later in this issue.

Graduate students are particularly encouraged to participate in our CSHPM annual meeting. Our Society benefits from the contributions of members spanning a wide range. I fondly recall my first presentation at the CSHPM which took place at the 2008 Annual Meeting at University of British Columbia in Vancouver. This was among my earliest academic presentations. I recall exploring the Western part of North America while meeting many interesting young scholars with whom I have developed lasting friendships. Senior scholars provided valuable feedback in a friendly environment. Our meetings continue to offer congenial grounds for original thinking about mathematics.

Interesting discussions about mathematics extend be-

yond this yearly event in our ongoing online colloquium series. Running for two years now, it is my hope to keep this series of monthly talks going so long as engagement of members and speakers sustains it.

CSHPM's many activities include close interactions with the Canadian Mathematical Society (CMS), the Canadian Society for the History and Philosophy of Science (CSHPS), the History of Mathematics and Philosophy of Mathematics Special Interest Groups of the Mathematical Association of America (HOM-SIGMAA and POM-SIGMAA), as well as with the American Mathematical Society (AMS). Membership in CSHPM grants access to many beneficial scholarly activities. As the CSHPM continues to offer membership at a very affordable rate please encourage colleagues and students to join.

Nicolas Fillion

Announcements

Peace to the memories of Chandler Davis (1926–2022), long-time member and 2006 May Lecturer; Brian J. Parshall (1945–2022), mathematician and spouse of long-time member Karen Hunger Parshall; Jeremy Kilpatrick (1935–2022), historian of mathematics education; and Harry Lucas, Jr. (1932–2022), founder of the Educational Advancement Foundation and supporter of the HSS Forum on the History of Mathematical Sciences and the Archives of American Mathematics.

A virtual conference, "How Ed Did It," is being organized for February 17–18, 2023, to honor long-time member Ed Sandifer. Additional details will be made available later.

The CSHPM Colloquium welcomed speakers Ximena Catepillán, "Ethnomathematics and Kinship Systems," on July 22; and Teresa Kouri, "Stebbing and Common Sense," on September 23.

CSHPM Notes columns may always be found at `notes.math.ca` and the CSHPM site.[1] Entries published in 2022 include: David Bellhouse, "William Playfair's Statistical Graphs;" David Zitarelli, "Profiles of Early Canadian Mathematicians;" Jeffrey Oaks, "Arabic Arithmetic in Context: al-Hawārī's *Essential Commentary*;" Michael Molinsky, "Original Sources of Some Common Quotations;" and Thomas Drucker, "Why Everyone Loves History of Mathemat-

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[1]See `cshpm.org/archives/cmsnotescolumn.php`

ics . . . But Philosophy of Mathematics is an Acquired Taste."

Submissions for CSHPM's 2023 volume of *Annals* may be sent to `mzack@pointloma.edu` at any time, but no later than October 1, 2023. Authors must be members of CSHPM, and the paper must be about the history of mathematics, the philosophy of mathematics, or the use of either history or philosophy in the teaching of mathematics. The 2021 *Annals* is expected to appear by the end of 2022.

Jerry P. Becker (1937–2022), Southern Illinois University mathematics education professor and long-time manager of multiple elists for distributing information about mathematics education, died on April 16. See the obituary at `www.crainsonline.com/obituaries/Dr-Jerry-P-Becker/`. Cheng-Yao Lin has assumed responsibility for Jerry's listserv.

William Tobin, an expert on the French scientist Léon Foucault, died on July 7, 2022. Review his work at `tobin.fr/foucault.html`.

HOM SIGMAA News: The winners of the 2022 Student Paper Contest were Rye Ledford (UMKC; first place) and Sarah Szafranski (Redlands; second place). Judges included Amy Shell-Gellasch, Joel Haack, Pam Peters, and Fred Kucamarski. Submissions for the 2023 Contest are due to Amy Shell-Gellasch by April 30, 2023. A new Student Paper Contest, named for Al-Khwarizmi, will debut in Fall 2023.

The first presentation in the HOM SIGMAA Virtual Speaker Series for 2022–2023 featured Andrés Navas (USACH), who spoke on "Khajuraho's magic square is a hypercube." The 2022 guest lecture at MathFest, "Singing Along with Math: The Mathematical Work of the Opera Singer Jerome Hines," was delivered by T. Christine Stevens (St. Louis). She is looking for a collaborator with expertise in logic or analysis for her long-term research project on Hines; please contact her at *stevensc@slu.edu*.

Historians of mathematics who won section teaching awards in 2022 include Paul Pasles (Villanova; EPaDel Section) and Abe Edwards (Michigan State; Michigan Section). Historians of mathematics who received awards for expository writing from the MAA include William Dunham, "Euler and the Cubic Basel Problem" and Dominic Klyve and Erik R. Tou, "A Prime Testing Algorithm from Leonhard Euler" (Paul R. Halmos-Lester R. Ford Award);

Ezra (Bud) Brown and Adrian Rice, "Why Hamilton Couldn't Multiply Triples" (George Pólya Award); William Dunham, "The Early (and Peculiar) History of the Möbius Function" and Ezra (Bud) Brown and Matthew Crawford, "Five Families Around a Well: A New Look at an Old Problem" (Chauvenet Prize).

BSHM News: Proposals to present in the annual "Research in Progress" meeting that showcases early-career scholars each February are due November 30. Kim Plofker will be keynote speaker for the online Annual General Meeting and Christmas Meeting on December 3. See more news and events at `www.bshm.ac.uk/`.

HSS News: History and philosophy of mathematics on the program of the History of Science Society Annual Meeting to be held in Chicago, November 17–20, includes sessions on Productive Disputes in the History of Science and Mathematics, organized by Madeline Muntersbjorn; Mathematics, Measurements, and the Making of Standards, with contributed papers by Rebekah Higgitt, Oliver Lucier, and Aline de Oliveira Coelho; and Transmissions and Traditions of Mathematics, organized by Elizabeth A. Hunter and sponsored by the Forum on the History of Mathematical Sciences. The Forum will also hold its annual business meeting. Historian of women in science Margaret W. Rossiter will be awarded the Society's 2022 Sarton Medal.

Conferences, Talks, & Workshops

Catherine Goldstein and Jemma Lorenat organized a special session on History of Mathematics Beyond Case-Studies at the AMS-SMF-EMS Joint International Meeting at Université de Grenoble-Alpes, July 18–22. Speakers on the program included: Catherine Goldstein, "Revisiting the Unity of Mathematics;" Joseph Bennett, "Henry Smith and the Arithmetical Theory of Quadratic Forms;" Caroline Ehrhardt, "A Stillborn Theory for Lasting Mathematical Knowledge: Some Questions Tactics Raises for the History of Mathematics (1860–1900);" François Lê, "From the Introduction of the Genus by Clebsch to a History of Classifications of Algebraic Curves;" Ralf Krömer, "Writing the History of Duality in Mathematics, Beyond Geometry;" Michael Barany, "The First Theory Born Global? Distributions, Idiosyncrasies, and the Places and Relationships of Modern Mathematics;" Tinne Hoff Kjeldsen, "The Art of Invention, World War II, and the 'Power of a Superman' in the

Development of Convexity, Operations Research and Mathematical Biology in 20th-century Mathematics;" Jemma Lorenat, "Between Biography and Prosopography: The Research School as a Unit of Analysis for Considering the History of Women in Mathematics;" Gatien Ricotier, "Bourbaki, Ordinary Singularities and a Singular Collective;" and Laura Turner, "Sexism in Mathematics During the 1970s, 1980s, and 1990s: On a Professional Society as a Framework for Moving 'Beyond Case Studies'."

The ORESME Reading Group resumed September 16–17 with a focus on three chapters from *Rings With Minimum Condition* (1946) by Emil Artin, Cecil J. Nesbitt, and Robert M. Thrall. Contact Danny Otero, *otero@xavier.edu* for information on future sessions.

After being twice delayed by the COVID-19 pandemic, the 48th Annual Conference on History of Mathematics at Miami University (Ohio) was held September 23–24. Featured speakers were Glen Van Brummelen and Dave Richeson.

The Canadian Philosophical Association invites submissions of papers, abstracts, and symposium proposals for the 2023 Congress, May 29–June 1, 2023, by November 30. See `www.acpcpa.ca/cpages/submit`.

"Studying Written Artefacts: Challenges and Perspectives" will be held September 27–29, 2023 in Hamburg. See `www.csmc.uni-hamburg.de/uwa2023.html`.

The After Hours program series of the Linda Hall Library will feature Adrian Johns unpacking the convoluted story of Edmund Halley's 1712 *Historiae Coelestis Libri Duo* on November 10. LHL is also piloting online courses for adult learners that explore the intersection of science, history, and the world. Find more information at `www.lindahall.org/experience/learning/adult-learners`.

The Consortium for the History of Science, Technology, and Medicine has added a working group for "Women, Gender and Sexuality in the History of Science, Technology and Medicine." More information is available at `chstm.org`.

Publications

MAA Press, an imprint of AMS, has issued volume 2 of *A History of Mathematics in the United States and Canada: 1900–1941*, by David E. Zitarelli, Della Dumbaugh, and Stephen F. Kennedy.

Lukas M. Verburgt and David E. Dunning are editing a special issue on John Venn and the History of Logic

for *History and Philosophy of Logic*.

TRIUMPHS reminds instructors that more than 80 Primary Source Projects are freely available for the full range of undergraduate mathematics courses, including history of mathematics and capstones for pre-service secondary teachers. See `blogs.ursinus.edu/triumphs`.

CSHPS's *Communiqué* considers short essays related to each issue's theme as well as announcements and other contributions. See `www.yorku.ca/cshps1/communique.html`.

The TPS Collective considers submissions about teaching with primary sources for its three blog series. See `tpscollective.org/notes-from-the-field`.

Perspectives on Science has prepared a special issue on the Untold Stories of Renaissance Mathematics. See `direct.mit.edu/posc/issue/30/3`.

Recent articles available open access from *European Journal of Philosophy of Science* include Mark Young, "From Epistemology to Policy: Reorienting Philosophy Courses for Science Students," and Till Grüne-Yanoff, "Overcoming Frege's Curse: Heuristic Reasoning as the Basis for Teaching Philosophy of Science to Scientists." See Volume 12, Issues 1 and 2 at `link.springer.com/journal/13194/volumes-and-issues`.

Princeton University Press has issued *The Sky Is for Everyone: Women Astronomers in Their Own Words*, edited by V. Trimble and D.A. Weintraub.

Donald Forsdyke has completed the second edition of *"Treasure Your Exceptions": The Science and Life of William Bateson*, with four additional chapters. It is available as an ebook from Springer.

The *Philosophy of Mathematics Education Journal* is now available online at `education.exeter.ac.uk/research/centres/stem/publications/pmej`. Submissions are welcomed on topics related to research methodologies, the history of philosophies of mathematics education—see, for example, the September 2021 issue—instructional techniques and methodologies, and more.

The Spring 2022 issue of the *Science Museum Group Journal* is available at `journal.sciencemuseum.ac.uk/issues/spring-2022/`.

Funding Opportunities

Applications for fellowships at the Smithsonian Institution are due November 1 each year. Look for the Smithsonian Institution Fellowship Program (SIFP) at `fellowships.si.edu/fellowship-programs`.

Commitment is required by December 1 for participation in the 2023–2024 cohort of the Nurturing Mathematical Discourse by Teaching with Primary Sources, coordinated by Abe Edwards. See `sites.google.com/msu.edu/edwards/nurturing-discourse`.

Abstracts are due on December 15 for the IUHPST Essay Prize in History and Philosophy of Science, with full submissions due January 15, 2023. See `iuhpst.org` for more information.

Applications for small grants of up to £750 from the Scientific Instrument Society for research on the history of scientific instruments are due January 6, 2023. See `scientificinstrumentsociety.org/grants/`.

Submissions for the 7th *Notes and Records* Essay Award are due February 28, 2023.[2]

The Commission on Women and Gender Studies in History of Science, Technology, and Medicine offers research travel fellowships to scholars in early stages of their careers. The deadline is July 2023. For more information, see `agnodike.org/scholar-resources/agnodike-travel-research-fellowship/`.

In Memoriam: Saul Kripke

Saul Kripke died on 15 September 2022. Kripke may be the most influential philosopher in the United States amoung the post-Quine generation. Those interested in a general summary of his contributions can find the information in a number of places online and elsewhere.

Kripke was the son of a rabbi. Eighty-one at his time of death, he had made contributions to modal logic and metaphysics for more than six decades. His record includes the delivery of innumerable talks and many published papers, although much of his lengthier work remains unpublished. His manuscripts are stored in an archive at the City University of New York. Jeff Buechner, custodian of the archive, will now oversee publication of this material.

Naming and Necessity, Kripke's most influential work, contributed to the connections between reference and metaphysics. Not always inclined to document his sources in detail, Quentin Smith accused Kripke of having plagiarized the work of Ruth Barcan Marcus, leading to something of a cause célèbre. The event

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[2]See `royalsocietypublishing.org/rsnr/essay-award`.

resulted in more open acknowledgement of a debt of influence he owed to Marcus.

Kripke's work on Wittgenstein and other predecessors generated much discussion over the decades. He taught at Rockefeller University from 1968 to 1976 moving to Princeton afterwards until 1998.

Kripke's thought cast influence on modal logic, intuitionistic logic and set theory. His first article dealing with the completeness of modal logic was published in the Journal of Symbolic Logic when he was a freshman at Harvard. He had the unlikely distinction of only receiving honorary degrees beyond his undergraduate study. Reflecting on his lifetime contributions, his influence on the philosophy of mathematics was less important overall than his legacy in other areas.

Tom Drucker

Homer Vincent Craig (1900–1981)

For the November 2020 *Bulletin*, I wrote an appreciation of Homer Vincent Craig's *Vector and Tensor Analysis* (1943). The textbook will be 80 years old in 2023. It is "only" 448 pages long and deals with an aspect of mathematics with great application to physics. It is also an obvious extension from introductory calculus or analysis.

In this essay, I examine the life and work of the author, who was Professor of Applied Mathematics and Astronomy at the University of Texas in Austin. Born on August 26, 1900, we lost him 41 years ago this month, on November 30, 1981.

Personal

Craig was born in Denver, Colorado, to Clarence Henry Craig (1863–1947) and Louisa Harvey Craig (1868–1947). He was the fourth of five children, his siblings being a balanced set of two sisters and two brothers. Craig studied at Colorado Preparatory School in Boulder before advancing to the University of Colorado in 1918. There, he received his BA in Mathematics in 1924, the year of the International Mathematics Congress at another U of T, the University of Toronto.

At U of C, Craig met Jane Cecile Moore, a master's student in mathematics. This acquaintance became a courtship, and then became a marriage on August 27, 1925. They moved to the University of Wisconsin in 1926, where Craig earned a PhD (with a major in mathematics and minor in physics) in 1929 while working as an assistant for one year and an instructor for two years.

Craig was then hired by U of T—the University of Texas; he would remain in Austin until his retirement in 1971. Once he was established, Homer and Jane spent most summers in Colorado, where he ran the Sunshine and Timberline Mines. One he owned, and the other was a claim on government land, which he had to effectively claim by steadily extending and shoring up tunnels as well as bagging ore for assay.

In Colorado, the couple lived in a rental cabin near the high point on the highway through the Red Mountain Pass between Ouray and Silverton. Visitors from Austin were always welcome. Homer and Jane kept going to their Colorado mining properties until the early 1970s, when Jane's health deteriorated to the point that she could no longer rough it in the mountains. She died in 1977. Homer, though, spent at least short sojourns there every summer until his death in 1981 at the Del Rio, Texas, home of their daughter, Mrs. Jane Homer Williamson.

Professional

Craig began in U of T's Department of Applied Mathematics and Astronomy in 1929 as an Adjunct Professor. He was promoted to Assistant Professor and reached the rank of Full Professor in 1942. *Vector and Tensor Analysis* appeared one year later. The Department merged with Pure Mathematics in 1953. In 1960 Astronomy became a stand-alone department.

Craig was a successful teacher at both the undergraduate and graduate levels. For example, the University of Texas Student Association recognised his Teaching Excellence in 1964. He supervised nineteen Master's students and half a dozen Doctoral students. On the other hand, although Craig served on many committees and once as Department Head, he was neither passionate nor gifted as an administrator. He tended to be very deliberate about taking decisions, slowing down processes.

He had a clear concept of an ideal department. Professors should desire to contribute to educational development, but not necessarily in the same way. One could concentrate on researching a special field, or specialise in teaching a certain field and helping students with their difficulties, or mix teaching and research. And, over a long career, a professor might change from one mode to another.

Of course, Craig organised a senior-level "Vector and Tensor Analysis" course, which he continued to teach for many years. He started the course before he published his textbook and wrote everything on the blackboards. A serious student could then copy out a complete manuscript textbook.

Even though he still found time for mining in the Colorado mountains, Craig worked in Seattle on the research staff of the Boeing Airplane Company for the four consecutive summers between 1958 and 1961.

Scholarship

Craig's first paper, "On the Solution of the Euler Equation for Their Highest Derivatives," appeared in 1930 in the *Bulletin of the American Mathematics Society*. In 1937 Craig developed the concept of the Extensor in an paper for the *American Journal of Mathematics* titled "On Tensors Relative to the Extended Point Transformation." Half of his approximately forty papers would deal with Extensors.

His next paper on extensors appeared in 1939, also in the *American Journal of Mathematics*: "On Extensors and a Euclidean Basis for Higher Order Spaces." Then came a four-year break from publishing, while he prepared *Vector and Tensor Analysis*, which came out during the middle of the US war effort.

Craig maintained his scholarly publication until the year of his passing. Two more papers on Extensors appeared in the Japan-based journal *Tensor* in 1980. In 1981, at age eighty-one, he published "On the Production of Two-Parameter Extensors from Second Order Tensors by Parameter Differentiation," written in honour of Kazuo Kondo for his 70th birthday, in the *International Journal of Engineering Science*.

How typical was Craig's text or any treatment of tensors? On a recent trip to the U of T (University of Toronto) Science Library, I came across two more *Vector and Tensor Analysis* books, one by Louis Brand of the University of Cincinnati that came out in 1947 and another by the University of Michigan's Nathaniel Coburn from 1955. Coburn's textbook was reissued by Dover in 1970. Coburn included Craig among his "Reference Books," but Brand did not list any other books at all.

According to the catalogue, three more authors wrote books with the same title: Harry Lass in 1950, George Edward Hay three years later, and finally Eutiquio C. Young in 1978 (updated 1993). There are also seven longer titles that include the phrase "Vector and Ten-

sor Analysis."

Tensor's Community

In the 1950s, Craig started publishing in the journal *Tensor*. His first paper in the New Series of the journal appeared in the very first (1951) volume: "On Extensors and the Hamiltonian Equations," co-authored with C. W. Horton, also from U of T in Texas. Indeed, he appeared repeatedly in Volumes 1–4 (1951–1954), which I have at hand. For example, Craig is listed on the title page of Volume 1 as one of 10 assistant editors supporting editor Akitsugu Kawaguchi. He edited, refereed, and contributed articles until his death in 1981. On page 157, among the "New Members," the reader finds: "Craig, H.V. Prof., Univ. Of Texas; 3104 Grandview St., AUSTIN, Texas (U.S.A.)." And, on the last page of the volume, prospective members are directed to pay "2 US dollars or 15 shillings" annual membership fee to "Prof. H.V. Craig" at the above address, or in Asia to "Prof. A Kawaguchi, The Tensor Society, c/o Faculty of Science, Hokkaido University, Sapporo, (Japan)," or in Europe to "S. Austen Stigant, 7 Courtlands Avenue, Hayes, Kent (England-Great Britain)."

Craig wrote two papers in these volumes: "On Multiple Parameter Jacobian Extensors" (2:27–35) and "On Certain Linear Extensor Equations" (4:40–50). His 1939 "On extensors and Euclidean basis for higher order spaces" was cited by Yoshie Katsurada in "On the Non-Holonomic Connection of Extensors" in Volume 1, and his 1937 "On tensors relative to the extended point transformation" was cited by Michiaki Kawaguchi, Jr., in "A Generalization of the Extensor" in Volume 2.

In 1966 Craig joined 54 friends and colleagues in honouring Václav Hlavatý on his 70th birthday with a Festschrift, *Perspectives in Geometry and Relativity: Essays in Honor of Václav Hlavatý*. His essay, "On Certain Exspaces and Their Relation to Riemannian Geometry," is the 8th of 47. The contributions are organized alphabetically by author, so Craig's appears between H. S. M. (Donald) Coxeter, University of Toronto ("Reflected Light Signals") and E. T. Davies, University of Southampton ("Some Applications of the Theory of Parallel Distributions").

Two years ago, I noted that "[Craig] applauds Hlavatý . . . on differential geometry and tensor analysis" in the Preface to *Vector and Tensor Analysis*. It's worth noting that by April 1952 Václav Hlavatý had joined

Craig on the Editorial Board of *Tensor*. The mathematical community surrounding the journal could be well worth studying. But, as they say, that's another story.

David Orenstein

Selected Craig Bibliography

(1930) "On the Solution of the Euler Equation for Their Highest Derivatives." *Bulletin of the American Mathematics Society*, 36:558–562.

(1937) "On Tensors Relative to the Extended Point Transformation." *American Journal of Mathematics*, 59:764–774.

(1939) "On Extensors and a Euclidean Basis for Higher Order Spaces." *American Journal of Mathematics*, 61:791–808.

(1943) *Vector and Tensor Analysis*. McGraw-Hill, New York.

(1951) with C. W. Horton, "On Extensors and the Hamiltonian Equations." *Tensor*, 1:47–52.

(1952) "On Multiple Parameter Jacobian Extensors." *Tensor*, 2: 27–35.

(1954) "On Certain Linear Extensor Equations." *Tensor*, 4: 40–50.

(1966) "On Certain Exspaces and Their Relation to Riemannian Geometry," pp. 71–79 in (Hoffman 1966).

(1981) "On the Production of Two-Parameter Extensors from Second Order Tensors by Parameter Differentiation," in honour of Kazuo Kondo for his 70th birthday. *International Journal of Engineering Science*, 19:1789–1797.

References

Louis Brand (1947) *Vector and Tensor Analysis*. John Wiley & Sons, New York.

Nathaniel Coburn (1955, re-issued 1970) *Vector and Tensor Analysis*. Dover.

Robert E. Greenwood et al. (n.d.) "In Memoriam: Homer Vincent Craig." University of Texas, Austin, Texas. 16 unnumbered pp., incl. 5 pp. biblio., 2 pp. list M.Sc and Ph.D. students. www.ma.utexas.edu/people/in-memoriam.

Banesh Hoffman (ed.) (1966) *Perspectives in Geometry and Relativity: Essays in Honor of Václav Hlavatý*. Indiana University Press, Bloomington, Indiana.

Michiaki Kawaguchi, Jr. (1952) "A generalization of the extensor." *Tensor*, 2: 59–66.

Yoshie Katsurada (1951) "On the Non-Holonomic Connection of Extensors." Tensor, 1:60–66.

Report on the 2022 International Congress of Mathematics

The first day of the Congress I attended the remarkable Fields Medal Award Lecture delivered by Maryna Viazovska. You can access her lecture here, virtualicm2022.opade.digital.
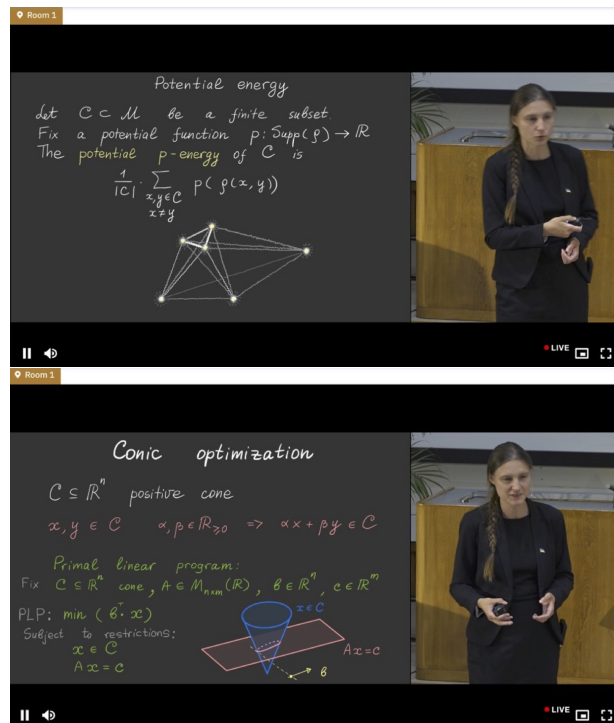

Figure 1: Maryna Viazovska

I also attended three Sectional Lectures in the History of Mathematics that may be of interest to CSHPM members. You can access their lectures on the same site.

Krishnamurthi Ramasubramanian of the Indian Institute of Technology in Bombay, a historian of Indian Sciences in Mathematics and Astronomy, Sanskrit Guru, Vedic Teacher and Indian Philosopher gave a talk entitled The History and Historiography of the Discovery of Calculus in India. In this talk the poetic verses of Sanskrit language and its connection to the history of mathematics in India provides fertile ground for researching the evolution of mathematical thinking. During the talk, starting with snippets from the work of Āryabhaṭa (c. 499 CE), how certain breakthroughs lead to the pioneering contribution of Mādhava (c. 1340) of the Kerala School is presented,

including the bearing of these discoveries on the history of calculus. Towards the end some of interesting facets in the historiography pertaining to the development of calculus in India are explored.
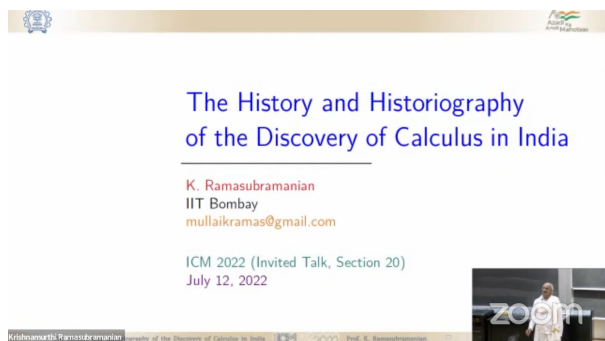

Figure 2: Krishnamurthi Ramasubramanian

June Barrow-Green of The Open University and chair of the International Commission on the History of Mathematics presented the talk George Birkhoff's forgotten manuscript and his programme for dynamics. At the end of the 1920s, George Birkhoff began to draw up a programme of research on unsolved problems in dynamics, and in 1941 he presented his ideas at the 50th anniversary celebration of the University of Chicago. Soon afterwards a summary of his lecture was published. At the time of his death in 1944, he left an unfinished manuscript of a revised and extended version of his lecture. In this talk Birkhoff's work leading up to this manuscript are presented before discussing the contents of the manuscript itself.
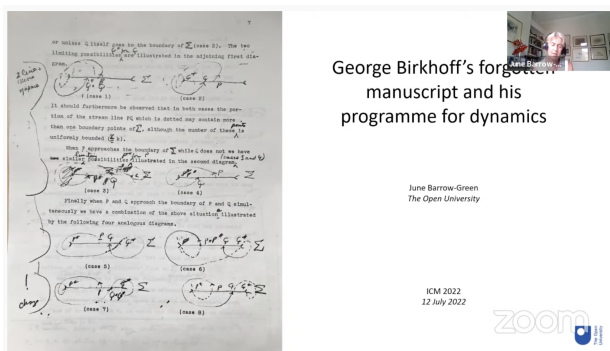

Figure 3: June Barrow-Green

Annette Imhausen of the Goethe University Frankfurt is a historian of mathematics known for her work on Ancient Egyptian mathematics. In this talk, Some uses and associations of mathematics, as seen from a distant historical perspective, the evolution of math-

ematics and its various uses in ancient Egypt were presented.
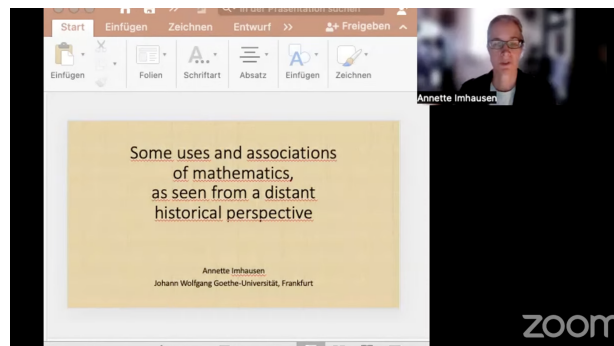
Ximena Catepillán

Figure 4: Annette Imhausen

CSHPM/SCHPM Executive Council Meeting

The meeting of the Executive Council of CSHPM-SCHPM took place on 10 May, 2022, being held virtually via Zoom and called to order by Craig Fraser, President at 1:05 pm EDT. The following members were present: Amy Ackerberg-Hastings, Patricia Allaire, Nicolas Fillion, Craig Fraser, Duncan Melville, Mike Molinsky, David Orenstein, Andrew Perry, Amy Shell-Gellasch, Richard Zach, and Maria Zack.

The Agenda for the meeting was approved, and minutes from the 2021 Executive Council meeting were accepted as printed in the November 2021 *Bulletin*.

Treasurer's Report: David Orenstein presented the 2021 financial statements of the society covering the calendar and fiscal year 2021. The 2021 financial statements were published in the May 2021 issue of the *Bulletin*. David made the following comments. The Society maintains three accounts. A TD Canada Trust account for Canadian funds (CDN), a TD Canada Trust account for American funds (USD), and a PayPal account. The two bank accounts are used to deposit income or pay expenses in the appropriate currency. For example, journal subscriptions are paid in US dollars. Memberships paid by cheque can be deposited in their currency, CDN or USD. The PayPal account is used to collect membership dues and journal subscriptions via the Internet. The PayPal account is kept in

CALL FOR PAPERS / APPEL DE COMMUNICATIONS

Canadian Society for History and Philosophy of Mathematics
Société canadienne d'histoire et de philosophie des mathématiques

Annual Meeting / Colloque annuel
York University
May 28–30, 2023 / 28-30 mai 2023

Special Session / Séance Spéciale
Underrepresented Mathematics /
Mathématiques sous-représentées

Kenneth May Lecturer / Conférence Kenneth May
To Be Announced / À déterminer

The CSHPM will be holding its 2023 Annual Meeting at York University in Toronto in conjunction with the 2023 Congress of the Humanities and Social Sciences. The meeting will be held Sunday through Tuesday, May 28–30, 2023.

Members are invited to present papers on any subject relating to the history of mathematics, its use in the teaching of mathematics, the philosophy of mathematics, or a related topic. Talks in either English or French are welcome, as are presentations about work in progress. Graduate students are especially welcome to present their work. All graduate students who present are eligible for the CSHPM Student Award.

Please send your title and abstract (200 words or less) in Word, (non-scanned) PDF, or in the body of an email by February 1, 2023, to:

La SCHPM organise son colloque annuel de 2023 à l'Université de York dans Toronto, dans le cadre du Congrès des sciences humaines et sociales 2023. Le colloque aura lieu du dimanche 28 mai au jeudi 30 mai 2023.

Les membres sont invités à faire une présentation sur n'importe quel sujet de l'histoire des mathématiques, son utilisation dans l'enseignement des mathématiques, de la philosophie des mathématiques, ou tout autre sujet connexe. Les présentations en anglais ou en français sont bienvenues, comme le sont les présentations sur des travaux en cours. Les doctorants, en particulier, sont invités à présenter leur recherche. Tout doctorant qui fait une présentation est admissible au Prix des Étudiants de la SCHPM.

Veuillez envoyer le titre de votre comunication, ainsi qu'un bref résumé de 200 mots ou moins en format Word, PDF (non-scanné) ou à l'intérieur d'un courriel avant le 1 février 2023 à:

GENERAL SESSION / SÉANCE GÉNÉRALE:

Andrew Perry
Department of Mathematics, Physics and Computer
    Science
Springfield College
Springfield, MA 01109, United States
aperry@springfieldcollege.edu

SPECIAL SESSION / SÉANCE SPÉCIALE:

Amy Ackerberg-Hastings
5908 Halsey Rd
Rockville, MD 20851, United States
aackerbe@verizon.net

Canadian dollars. The balance in the PayPal account is $9600. Council suggested David move these funds out of PayPal in view of a past difficulty. David noted he will follow up with Elsevier following delivery issues with paper copies of the February issue of *Historia Mathematica*. Andrew and Amy have a speaker who plans to withdraw from the annual meeting because he cannot afford the conference registration fee. It was agreed the Society would offer to pay half of the speaker's fee up to a maximum of $75.

Secretary's Report: Patricia Allaire presented comparative membership data for 2021 and 2022. This table reflects the state of 2022 Society memberships as of 26 April 2022.

	2021	**2022**
Total Members	164	161
Members By Address or Organization		
Can	41	35
US	94	94
Other	29	32
BSHM	25	26
CSHPS	9	3
Complimentary	0	0
Members By Status		
Active	68	71
Retiree	48	48
Student	6	9
Developing Nations	4	2
Student Associate	1	0
Unknown	33	29
Members by Pay Method		
Online	115	121
Snail Mail	14	11
Reciprocal Members	34	29
Complimentary	1	0
New Members	38	19
Reciprocal Memberships		
To BSHM	53	47
To CSHPS	25	21
Journal Subscriptions		
Historia (paper)	33	36
Historia (electronic)	9	8
Philosophia	12	13
SCIAMVS	3	3
Proceedings/Annals		
Federation	1	1

Hardcover	8	7
Paperback	11	10
Electronic	15	16
Bulletin		
Paper	36	26
Donations		
No. Donors	29	25
Amount	$2067 CAN $101.47 US	$953 CAN $0.00 US

Pat noted that the number of new members was greater last year because of the interest in membership generated by the introduction of our online colloquia series. The donation total was much greater last year because of one very large donation. The number of members opting to receive only the on-line *Bulletin* continues to increase.

***Bulletin* Editor's Report:** Sylvia Nickerson, while not present at the meeting, informed Craig the *Bulletin* arrived late because of the difficulty of preparing it during a busy time in the academic year. After some discussion it was agreed the May issue requires the current publication schedule because it contains timely information about the Annual Meeting. An assistant for Sylvia will be sought.

CSHPM Notes Editors' Report: On behalf of co-editor, Hardy Grant, Amy Ackerberg-Hastings reported that CSHPM once again provided columns for all six issues of Notes of the Canadian Mathematical Society in 2021. Along with Education Notes, *CSHPM Notes* continues to be one of the most-read sections of CMS's newsletter. The Communications Officer for CMS has turned over again, a working relationship with the new contact has been established.

Forty-seven columns have appeared, supplied by thirty-six authors, including seven jointly authored submissions. Four members have provided four individual or collaborative columns, one has written three pieces, and seven members have each prepared two columns. Eleven of the thirty-six authors are women, and six of the thirty-six were students at the time of their first submission. The ratio between philosophical and historical topics remains around one to three. The first posthumous column appeared in March/April 2022. It was based on David Zitarelli's *A History of Mathematics in the United States and Canada.*

CSHPM Notes will reach the milestone of having had fifty columns published this fall. Members of the so-

ciety who may wish to help structure and produce a collected volume from these columns are welcomed to contact the editors. Springer was suggested as one possible publisher for such a volume. Maria said Springer had previously been lukewarm about the idea, but now a robust collection of material is ready, their interest is increasing.

Members are invited to contact the editors with submission ideas, whether they plan to write the pieces themselves or want to recommend a potential author. At least one author of submissions must be a current member of CSHPM. Submissions should be aimed at a general audience of mathematicians. Topics typically provide an intriguing taste of a larger research project or raise a methodological point and put it in an accessible context. Submissions can also take the form of a discussion on the current state of historiography in a particular subfield or suggest a classroom application for a story from the history or philosophy of mathematics. We prefer that contributions remain within the range of 1200–1800 words and we ask for a brief biographical note. It is helpful if authors suggest possible images given the visual nature of the *CMS Notes* online format. It typically takes about three to four rounds of suggested changes before satisfaction about the final product is achieved. These exchanges can unfold over a few days or several weeks, depending on the availability of the author and the proximity of the deadline. The editors enjoy working with emerging scholars and students wishing to broaden their CVs.

***Annals* Editors' Report:** On behalf of co-editor David Waszek, Maria Zack reported the 2019/2020 edition of the *Annals* is complete and soon to be printed. Production of the volume was delayed due to COVID-19. David Waszek has joined Maria as co-editor for the *Annals*. He helped proofread the latest volume and has taken up full editorial duties for the forthcoming volume. Maria said David's work has been most valuable with the papers on philosophy especially. Final edits on papers included in the 2021 *Annals* are due back from the authors on 1 June and the volume will enter production over the summer. Maria explained six to seven months is required from paper submissions until the beginning of the production process.

Deadline for author submissions to the 2022 *Annals* is 1 October 2022. This year is the last one in the *Annals* current publication contract with Birkhäuser.

Maria does not anticipate problems with extending the contract since download rates on chapters in the *Annals* are good. David Orenstein asked if information on the downloads of papers in the *Annals* was available. Maria responded that this information is not disclosed by the publisher.

Webmaster's Report: A search for a new webmaster began in 2019. Mike Molinsky agreed to continue in the role for the next several years providing more time to find a new volunteer, but unfortunately no volunteer came forward. Mike announced his departure as of 30 June 2022, expressing gratitude for his experience serving the Society in this role for seventeen years.

Mike's personal web hosting account will be shut down on 1 November 2022. This necessitates the CSHPM website find a home, ideally well in advance of that date. The two CSHPM listservs (Council and Announcements) are currently hosted in Mike's Google account as Google Groups. These listservs can be moved to a new location, or new permissions can be set up allowing one or more Executive Council members to manage the groups without moving them from Mike's account. Mike also agreed to provide access to the CSHPM Twitter and Facebook accounts to others willing to maintain them. Amy suggested, and Council agreed, an ad hoc committee bet set up to deal with the search for a new Webmaster. Maria and Mike will serve on the committee in addition to a possible volunteer found at the Annual General Meeting.

Archivist's Report: Eisso Atzema reported that no requests for materials were made this year. The archives' inventory was updated to include the most recent *CMS Notes*.

CMS Liaison: No report received from Maritza Branker.

Future Meetings: Craig Fraser reported that usually CSHPM meets as part of Congress with the Federation for the Humanities and Social Sciences. The location for the 2023 Congress meeting is York University, Toronto, with the meeting to be expected to take place in person. Amy suggested should Congress go virtual the Society conduct its own meeting independently.

In keeping with Congress's theme, Reckonings and Re-imaginings, it was determined the CSHPM theme would be Underrepresented Mathematics. David Orenstein agreed to be local organizer, Andrew will

organize the General Sessions, and Amy will organize the Special Session. An effort will be made to coordinate with CSHPS and the CPA with regards to overlapping meeting dates. It was noted that both CMS and the Federation will be meeting in Saskatchewan in 2024. That year will be the fiftieth anniversary of the founding of CSHPM.

Other Business: Maritza will continue as CMS Liaison. David suggested the Society encourage Congress attendees to participate in the two scheduled social hours. Nic will circulate the link to the AGM which will be held (virtually) on 15 May 2021 at 4:00 pm EDT. The meeting was adjourned at approximately 2:58 pm EDT.

Patricia Allaire, Secretary

In Memoriam: Ed Sandifer

The CSHPM community lost a beloved friend with the passing of Charles Edward (Ed) Sandifer on 31 August 2022. Ed was a scholar of Leonhard Euler, an enthusiastic speaker and prolific writer who encouraged mathematicians take up the study of the history of their subject. CSHPM members will remember him from his presence at annual meetings during the early 2000s and his Kenneth O. May Lecture in 2007, "Five Pearls of Euler." He died of pneumonia following a lengthy illness.

Ed was born on 6 December 1951. Originally from Ottumwa, Iowa, he grew up in Oklahoma, Minnesota, and New Jersey, where he graduated from high school in 1969. He studied mathematics at Dartmouth College, graduating in 1973, and received his Ph.D. in 1980 from the University of Massachusetts, Amherst. He wrote his dissertation, Finiteness in Noetherian Rings of Invariants, under the direction of John Fogarty. Prof. Rick Cleary of Babson College, Ed's close friend at Amherst, reports that "his fellow graduate students from that era were not surprised that Ed became a historian of mathematics, because he was always attracted to people and their stories, especially how their work fit into a larger narrative."

Ed held faculty positions at Western New England University from 1979 to 1985 and Western Connecticut State University, from 1985 until his retirement in 2012. Ed's interest in the history of mathematics blossomed during his time at WCSU. He was an enthusiastic participant in the NSF-funded Institute for the Use of History in the Teaching of Mathematics in the 1990s. His research focused on the work of Leonhard Euler. During this period Ed was an evangelist for Euler studies, speaking at colleges and universities and encouraging mathematicians and historians to study the works of Euler and his contemporaries. He promoted the English translation of Euler's many works. Subsequently Ed became founding secretary of the Euler Society, guiding the group from its inception through the celebration of the Euler tercentenary in 2007 and beyond.

Among Ed's publications were three books in the MAA Spectrum series, *The Early Mathematics of Leonhard Euler* (2007), *How Euler Did It* (2007) and *How Euler Did Even More* (2015). He was also co-editor of two collected volumes of papers, *Leonhard Euler: Life, Work and Legacy* and *Euler at 300*, both published in 2007. He co-authored an English translation of Cauchy's *Cours d'analyse* (2009) and had just begun work on a translation of l'Hôpital's *Analyse des infiniment petits* when he suffered a serious stroke in 2009.

Ed is survived by his wife Theresa, née Morgan, a mathematician who was also a graduate student at Amherst, and his daughters, Elizabeth and Victoria.

Rob Bradley

Bulletin Editor Sought

A volunteer for the role of content editor of the CSHPM *Bulletin* is sought. The current content editor seeks a replacement. Duties include soliciting contributions for each issue via our Society email list, notifying members of Council when they have Society reports due, collecting and compiling announcements from other organizations involved in supporting the study of history and philosophy of mathematics, soliciting obituaries of members and friends of CSHPM, compiling content and proofreading draft layouts, submitting corrections to the Layout Editor, and arranging for electronic and print distributions with the Production Editor and Webmaster. Interested members are asked to contact Sylvia Nickerson at `s.nickerson@utoronto.ca`.

AGM of CSHPM/SCHPM

The Annual General Meeting of the Canadian Society for History and Philosophy of Mathematics took place via Zoom, on May 15, 2022. The meeting was called

to order at 4:05 pm EDT by Craig Fraser, President, with 23 members in attendance.

Agenda for the General Meeting

1. Approval of agenda
2. Approval of minutes of 2021 AGM
3. Treasurer's report
4. Secretary's report
5. *Bulletin* Editor's report
6. *CSHPM Notes* Editor's report
7. *Annals* Editor's report
8. CSHPM virtual colloquia report
9. Webmaster's report
10. Archivist's report
11. Election results
12. CMS Liaison report
13. Future meetings
14. Other business and adjournment

1. The agenda for the general meeting was approved.

2. Minutes from the 2021 AGM were accepted as printed in the November 2021 *Bulletin*.

3. The 2021 financial statements appeared in the May 2022 *Bulletin*. David Orenstein noted that he has transferred a substantial portion of the funds in our PayPal account to the CAD bank account.

4. Patricia Allaire presented comparative membership data for 2021 and 2022. Please refer to the CSHPM Executive Council Minutes in this issue of the *Bulletin* for the data.

5. Please refer to the CSHPM Executive Council Minutes in this issue of the *Bulletin* for Sylvia Nickerson's report. Tom Drucker gave an example of the value of our newsletter by noting that a member wrote to him saying that he knew of the death of Greg Moore only because he read the memorial by Tom. Tom, Amy Ackerberg-Hastings, and Hardy Grant encouraged all members to send to Sylvia any information that might possibly be of interest. She can then decide what to publish. Amy pointed out that the editor should have privileges on the CSHPM Twitter and Facebook accounts (this was accomplished later in the summer).

David O. spoke of the difficulty of publishing the May issue because of the editor's academic schedule. It was agreed that we need the issue in May in order to provide information about our annual conference. However, it was also agreed that Sylvia needs some assistance. Ximena Catepillán offered to provide material from HOM SIGMAA.

6. Please refer to the CSHPM Executive Council Minutes in this issue of the *Bulletin* for the report from Amy and Hardy.

7. Please refer to the CSHPM Executive Council Minutes in this issue of the *Bulletin* for the report from Maria Zack and David Waszek. Maria reminded members that the name of the publication was changed from *Proceedings* to *Annals* to make publishing there more useful to early-career members, and she praised David W.'s work as a co-editor for the philosophy papers.

8. Nic Fillion expressed concern that the number of colloquium talks is tilted toward philosophy. Tom remarked that there are many other options for history talks, such as HOM SIGMAA and PASHoM. A member asked whether the talks are recorded; Nic responded that recording was not possible for several reasons, such as image permissions and speakers wanting to use their talks in the future.

9. Please refer to the CSHPM Executive Council Minutes in this issue of the *Bulletin* for the report from Mike Molinsky. Pat thanked Mike for his many years of invaluable service, much of it behind the scenes. Eisso Atzema said he would be interested in volunteering to serve as webmaster. Rob Bradley noted that he has been advancing the domain registration fee of US$22 each year. At the Executive Council meeting, a committee was formed to search for a new webmaster. Maria and Mike are on the committee, and Eisso will now be added. Rob volunteered to join if needed.

10. Please refer to the CSHPM Executive Council Minutes in this issue of the *Bulletin* for the report from Eisso Atzema.

11. The slate as proposed by the Nominating Committee was elected:
Nicolas Fillion, President
Robert Bradley, Vice President
Patricia Allaire, Secretary
David Orenstein, Treasurer
Marion (Wendy) Alexander, Council
Amy Shell-Gellasch, Council
Jemma Lorenat, Council
Jean-Pierre Marquis, Council

12. Maritza Branker reported that the May 2022 *Bulletin* contained a write-up of the December 2021 meeting by Craig. David O. noted that CMS meetings are good for networking.

13. Our default is to meet as part of Congress with the Federation. The 2023 Congress will be at York University, Toronto, from May 27 to June 2. We will request May 28–30 and try to coordinate with CSHPS and CPA to have some overlap in dates. At this time, it is expected that Congress will be in person. Amy suggested that, if Congress goes virtual, then we should conduct our meeting independently. In keeping with Congress's theme, Reckonings and Re-imaginings, it was decided that our theme will be Underrepresented Mathematics. Andrew Perry will organize the General Sessions, Amy will organize the Special Session, and after the meeting Alex Manafu agreed to serve as local arrangements coordinator. David O. will assist with other local needs.

CMS and the Federation will both meet in Saskatchewan in 2024. That year will be the 50th anniversary of CSHPM's founding.

14. A report on the Phil Math Preprint Archive was received after the meeting and is published separately in this *Bulletin*.

The meeting was adjourned at 5:26 pm EDT.

Patricia Allaire, Secretary

Joint Math Meetings in Boston

A number of events in history and philosophy of mathematics have been planned for the Joint Mathematics Meetings, to be held in Boston, Massachusetts, January 4–7, 2023. More information can be found on the conference website: `jointmathematicsmeetings.org`.

Wednesday, January 4

- 8:00–12:00: AMS Special Session on Current Directions in the Philosophy of Mathematics, I, organized by Bonnie Gold and Kevin Iga.
- 8:00–12:00: AMS Special Session on The Scholarship of Teaching and Learning: Past, Present, and Future, I, organized by Jacqueline M. Dewar, Thomas F. Banchoff, Curtis D. Bennett, Brian P. Katz, Lewis D. Ludwig, and Larissa Schroeder.
- 8:00–12:00: AWM Special Session on Celebrating the Mathematical Contributions of the AWM, I, organized by Michelle Ann Manes, Kathryn E. Leonard, Donatella Danielli, and Ami Radunskaya.
- 8:00–13:00: Black Mathematicians Edit-A-Thon, organized by Edray Goins.
- 10:30–12:00: Mathematicians + *Wikipedia* – a training edit-a-thon to reduce the "Wikipedia gen-

der gap" in the Mathematical Sciences, organized by Xavier Ramos Olive and Francesca Bernardi.
- 13:00–18:00: AMS Special Session on Current Directions in the Philosophy of Mathematics, II.
- 13:00–18:00: AMS Special Session on The Scholarship of Teaching and Learning: Past, Present, and Future, II.

Thursday, January 5

- 8:00–12:00: AMS Special Session on Current Directions in the Philosophy of Mathematics, III.
- 8:00–12:00: AMS Special Session on The Scholarship of Teaching and Learning: Past, Present, and Future, III.
- 13:00–17:00: AMS Special Session on Current Directions in the Philosophy of Mathematics, IV.
- 18:00–19:00: Uniform Convergence: A One-Woman Play [on Sofia Kovalevskaya], written and performed by Corrine Yap.

Friday, January 6

- 8:00–12:00: AMS Special Session on The History of Mathematics, I, organized by Jemma Lorenat, Adrian Rice, Deborah Kent, and Daniel E. Otero.
- 8:00–12:00: AWM Special Session on Celebrating the Mathematical Contributions of the AWM, II.
- 13:00–18:00: AMS Special Session on The History of Mathematics, II.
- 18:00–19:30: POM SIGMAA Guest Lecture and Discussion, "A Philosophical Account of Mathematics That Won't Make You Hate Philosophers," by Russell Marcus.
- 19:45–20:45: NAM Cox Talbot Address, "Histories of African Americans Connecting Mathematics and Society," by Nathan N. Alexander.

Saturday, January 7

- 8:00–12:00: AMS-MAA Special Session on History of Mathematics, III.
- 8:00–9:30: JMM Panel: Hidden Figures Revealed: Reflections from Research on Black Mathematicians, organized by Ranthony A C Edmonds and David Goldberg.
- 13:00–18:00: AMS-MAA Special Session on History of Mathematics, IV.

Quotations in Context

In most of my past columns, I have started with a single mathematical quotation commonly circulated without a provided source. The genesis of this partic-

ular column was the discovery that all the frequently unsourced quotations I could find for a particular mathematician came from the same specific work.

Edward Charles Titchmarsh, born in 1899, was a British mathematician who gained a high reputation for his work in analysis, the only subject which he ever taught. Despite being unwilling to lecture on geometry, Titchmarsh occupied the position of Savilian Professor of Geometry at Oxford from 1931 until his death in 1963. Some of his most important works include *The Theory of Functions* in 1932, and *The Zeta-Function of Riemann*, first published in 1930 with an updated version published in 1951 as *The Theory of the Riemann Zeta-Function.*

In 1948, Titchmarsh published the book *Mathematics for the General Reader*, which provides an introduction to numbers (including irrational and complex numbers), arithmetic, trigonometry, and calculus. While the book does occasionally touch on topics in algebra and geometry, the overall emphasis of the book is focused on analysis, which is no great surprise given Titchmarsh's interests. The author also explored topics from the history and philosophy of mathematics throughout the book.

The third chapter begins with a discussion of the problem of finding the difference between the squares of two successive integers. Having explored the topic by looking at specific examples such as $2^2 - 1^2$ and $5^2 - 4^2$, the problem is illustrated using algebraic notation to show that the difference will always be an odd number. The importance of algebra and its ability to summarize an infinite number of arithmetical examples is given in the following statement (which some modern sources misquote, replacing "root" with "heart"):

> The algebra goes to the root of the matter, and ignores the casual oddities of particular cases [Titchmarsh, p. 27].

In the chapter on infinite series, Titchmarsh walks the reader through a proof that the harmonic series $1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \ldots$ is divergent. At the end of the proof, he observes:

> This proof has some useful lessons for the beginner in mathematics. It shows, what the reader may by this time be ready to grant anyhow, that the truths of mathematics are often not obvious ones. We are constantly coming

upon questions which are quite easy to put, but not at all easy to answer. It often requires a very ingenious argument to decide what the truth is. In this lies much of the fascination of mathematics. It is like an endless game against a skilled opponent. If we can think of the right move, we win. Once we have made the right move, we gain some definite piece of knowledge which is never afterwards in doubt.

> How to think of the right move is another question. It is largely a matter of experience. Mathematical technique consists of the accumulated bright ideas of thousands of years [Titchmarsh, p. 78].

A few chapters later, Titchmarsh formally introduces the complex number system, including the definitions of arithmetic for those numbers using ordered pair notation; that is, using (a, b) instead of $a + bi$. In particular, he argues that the axiomatic definition of complex number arithmetic on ordered pairs had the advantage of avoiding the explicit appearance of $i = \sqrt{-1}$:

> I met a man recently who told me that, so far from believing in the square root of minus one, he did not even believe in minus one. This is at any rate a consistent attitude.

> There are certainly many people who regard $\sqrt{2}$ as something perfectly obvious, but jib at $\sqrt{-1}$. This is because they think they can visualize the former as something in physical space, but not the latter. Actually $\sqrt{-1}$ is a much simpler concept [Titchmarsh, p. 99].

In the final chapter, "Aftermath," Titchmarsh admits that the book contains only a tiny fraction of known mathematics, and that modern mathematicians continue to be active in expanding our knowledge. He points out that these modern achievements are built on the foundation laid out by past mathematicians:

> Perhaps the most surprising thing about mathematics is that it is so surprising. The rules which we make up at the beginning seem ordinary and inevitable, but it is impossible to foresee their consequences. These have only been found out by long study, extending over many centuries. Much of our knowledge is due

to a comparatively few great mathematicians such as Newton, Euler, Gauss, or Riemann; few careers can have been more satisfying than theirs. They have contributed something to human thought even more lasting than great literature, since it is independent of language [Titchmarsh, p. 158].

Near the end of the chapter, Titchmarsh briefly addresses the question of why mathematicians study the subjects that they do. He argues that, while the utility of mathematics to real-world applications is certainly one reason to study mathematics, so-called "pure" mathematicians are motivated more by an urge to explore and conquer the unknown:

> It can be of no practical use to know that π is irrational, but if we can know, it surely would be intolerable not to know [Titchmarsh, p. 159].

In conclusion, I'd like to include one last quotation from the book that appears in the context of a discussion of the nature of numbers. While I won't make any claims about the accuracy of the following assessment, it seems particularly relevant to the membership of the CSHPM:

> It has been said that mathematicians are happy only when they agree, and philosophers only when they disagree [Titchmarsh, p. 9].

Mike Molinsky

References

Titchmarsh, E. C. *Mathematics for the General Reader*, Hutchinson's University Library: London, 1948.

Report on the CSHPM Annual Meeting

Emmylou Haffner began with a talk about the role of drafts in mathematics and the history of mathematics, and how temporary states of writing are initmately tied to mathematical concepts in process of development. Using these drafts, which represent a private space for mathematical creation, we can examine the mechanisms of creation in mathematics. She examined the working processes of mathematicians including Leibniz and Newton, Riemann, Dedekind, Hilbert, Käthe Jerosch (Hilbert's wife), and E. Cartan.

Mario Bacelar Valente gave a talk on Greek mathematical proofs and meta-reasoning including a look at how meta-reasoning ensures the correctness of mathematical proof. Craig Fraser delivered a talk about original sources and Hamilton-Jacobi theory. Julia Tomasson from Columbia University talked about the making and unmaking of the Arabic Euclid.

Emily Hamilton gave a talk reflecting on current controversies around the ban of certain K-8 math textbooks in the United States. Valerie Lynn Therrien gave a talk on several prior versions of Cantor's diagonalization proof before the canonical proof was published in 1891. This included a particularly interesting discussion of how one of Cantor's papers from 1878 proved the reals can be put in one-to-one correspondence with any n-dimensional continuous manifold using a dove-tailing argument.

Cynthia Huffman gave an interesting talk about the life and work of Émilie du Châtelet through the imagery present in the mathematical and philosophical works to which she contributed. Glen Van Brummelen spoke about manuscript culture and how the manuscript of Bianchini was used to present Bianchini's work on the tangent function and spherical trigonometry. The social component ended the day with Craig Fraser and David Orenstein sharing certain significant historical mathematical books they own and a discussion about their favorite tea mugs depicting twentieth century philosophers.

Saturday began with Jorge Nuno Silva speaking about how division and multiplication of large numbers proceeded from the first century to the first millennium of the common era. David Dunning then gave a presentation about Mary Everest Boole's pedagogical philosophy that promoted student centered learning and prepared children for thinking about science and mathematics. David Orenstein gave a talk about themes emerging from the 1992 International Congress on Mathematical Education.

We were treated to a philosophical section of the meeting on Saturday afternoon, with Jean-Charles Pelland offering some thoughts on how to think about constraints and processes through which we can understand mathematical progress. José Antonio Pérez Escobar examined Wittgenstein as a forerunner to Lakatos in the development of the philosophy of mathematical practice. Nicolas Fillion gave a talk about the structure of teaching undergraduate logic courses,

and redesigning the progression of this pedagogy for eliminating circular reasoning in the presentation of set theory, logic, and the philosophical foundations of mathematics. Patricia Marino closed out the session on the use of different tools from mathematics in economics. Sunday morning started with Greg de Young talking about recent discoveries in what we know about translations of Euclid's *Elements* in medieval history. Amy Ackerberg-Hastings talked about professional associations that supported and nurtured women's participation in STEM in American history of mathematics. David Bellhouse talked about how statistics was practiced and what notable statisticians lived and worked in twentieth century Manitoba. The Sunday early day session concluded with a talk by Dirk Schlimm and David Waszek on John Venn's views on equivalence and pluralism in logical form.

Sunday afternoon concluded with J.J. Tattersall and S.L. McMurran on the contribution to mathematics made by members of Cambridge Women's Research Club. Paul Xu discussed Hugh MacColl and counter possibilities. Christopher Baltus talked about Jacob Steiner's contributions to projective geometry. While preference may have been to resume the interpersonal aspects of in-person Society meetings of the past, this virtual Annual Meeting nevertheless proved very valuable and enriching thanks to the commitment and contribution of its organizers, speakers and attendees.

Sylvia Nickerson

Phil Math Preprint Archive 2022 Report

On the morning of Thursday, May 11, 2017, the PhilMath-Archive section of philsci-archive went live. It was a new section of the archive whose goals match those of philsci-archive, but it is dedicated to philosophy of mathematics and is curated by philosophers of mathematics. Coordination and moderation of the section is carried out by Elaine Landry, who initially proposed addition of the section. Sponsors of the mathematics section are:

- International Association for the Philosophy of Mathematics (PMA)
- Canadian Society for History and Philosophy of Mathematics (CSHPM)
- British Society for the History of Mathematics (BSHM)
- Association for the Philosophy of Mathematical

Practice (APMP)
- Philosophy of Mathematics Special Interest Group Mathematical Association of America (POM SIG-MAA)

The use of the mathematics section is healthy. The table and graph below show the growth of entries under "Mathematics." The opening of PhilMath-Archive had a marked effect on the number of postings. Prior to its opening, the section attracted roughly 20 preprints in one year. Since its opening, it has attracted three to four times that many.
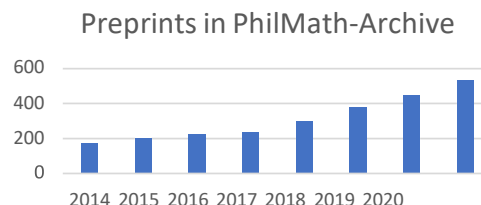

Figure 5: Cumulative Growth

Date	Math Entries	Increment
5/2015	206	33
5/2016	225	19
5/2017	234	9
5/2018	299	65
5/2019	383	84
5/2020	449	66
5/2021	535	86
12/2021	608	73

Coordinator Elaine Landry reports smooth operation over the past year. Perhaps because of the technical character of the scholarship, there has been much less need for moderation of the postings. Coordinating with the moderation in the PhilSci-Archive has also continued to proceed smoothly. One danger is a fringe author posting to both archives. Currently, coordination between the two archives is done through email, by the two moderators 'manually' checking with one another when a possible fringe case arises. Although this is somewhat cumbersome, the number of cases is sufficiently low that implementing an automated system remains unnecessary.

Elaine Landry

MAA Convergence Historical Course Materials

Since 2004, *MAA Convergence* has been both an online journal on the history of mathematics and its use in teaching, and an ever-expanding collection of online resources to help its readers teach mathematics using its history. Here, we highlight some of our newest articles and features.

Figure 6: Hieroglyphs for 1,333,330.

Our Classroom Resources Index, a finding aid for locating materials organized by course, can be accessed via *Convergence*'s home page, `www.maa.org/press/periodicals/convergence`. Cynthia J. Huffman shares photos from an MAA Study Tour to Egypt and offers suggestions for using the images to teach numeration systems in "An Ancient Egyptian Mathematical Photo Album – Hieroglyph Numerals and More." In "Kepler and the Rhombic Dodecahedron," Roberto Cardil develops Kepler's writings about this polyhedron into activities related to nature, technology, and art that are suitable for secondary school students. Ximena Catepillán translated into Spanish the 2015 article by Frank J. Swetz, "El Gabinete de Maravillas Matemáticas de Pantas: Imágenes e Historia de las Matemáticas."

Figure 7: Andean khipu.

Several of our ongoing article series have been aug-mented. *Convergence*'s newest series, "Keys to Mathematical Treasure Chests," which points readers to online databases of mathematical objects that can be mined to unlock images and information for use in research and teaching, has added a guide to "Andean Khipus" by Manuel Medrano. Recent reprints from NCTM's *Mathematics Teacher* include "The High School Mathematics Curriculum—What Can We Learn from History?" by Robert Reys and Barbara Reys and "Do Teachers Need to Incorporate the History of Mathematics in Their Teaching?" by Po-Hung Liu. And, the winning papers from the 2022 HOM SIGMAA undergraduate paper contest are available in that series.

Meanwhile, the TRIUMPHS team has added two more mini-Primary Source Projects (mini-PSPs) to the "Series of Mini-projects from **TR**ansforming **I**nstruction in **U**ndergraduate **M**athematics via **P**rimary **H**istorical **S**ources":

- "How to Calculate π : Buffon's Needle – A Mini-Primary Source Project on Geometric Probability for Calculus 2 Students, Pre-service Teachers and Others," by Dominic Klyve;
- "Solving Linear Higher Order Differential Equations with Euler and Johann Bernoulli: A Mini-Primary Source Project for Differential Equations Students," by Adam E. Parker.
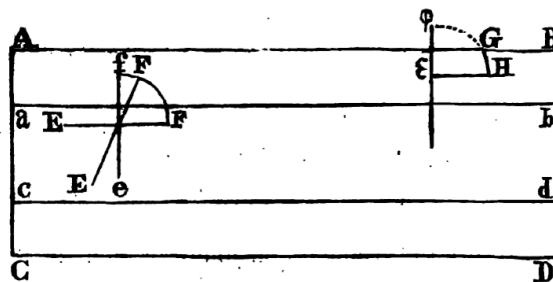

Figure 8: Buffon's Needle Problem.

Convergence publishes expository articles on the history of topics in the grades 8–16 mathematics curriculum; translations of primary sources; classroom activities, projects, or modules for using history to teach mathematics; and classroom testimonials after applications of such activities, projects, or modules. Interested in contributing? We'd love to hear from you at `convergence@maa.org`! Guidelines for Authors may be found on the journal's website, linked above.

Janet Heine Barnett & Amy Ackerberg-Hastings

In Memoriam: Abe Shenitzer

Prominent member of our Society, Abe Shenitzer, passed away peacefully at his home in Massachusetts on 6 June 2022 at the age of 101. Shenitzer was for many years a pillar of the mathematics department at York University in Toronto. A Holocaust survivor, he had emigrated to the United States after the war, earning his doctorate at NYU under Wilhelm Magnus. He taught at Rutgers and Adelphi before joining the Department of Mathematics and Statistics at York in 1969.

Shenitzer's teaching excellence was recognized by a prestigious province-wide award citing as remarkable his command of his subject, his communicative skill, and his concern for his students as people. He campaigned successfully within his department to adopt more history in its mathematics curriculum. He was internationally recognized as an historian of mathematics, particularly recognized for translations of important books in literature and mathematics he produced with the help of his wife Sarah (a computer scientist and linguist).

He had passion outside mathematics for music (particularly Bach), skiing, and woodwork. He had a generous character and enjoyed helping others, whether with handyman skills, material assistance, or advice. He possessed a lively energy, a practical optimism, and hard-won wisdom about life and human nature.

Anyone wishing to honour his memory can donate to HIAS, an organization supporting immigrants and refugees worldwide, https://www.hias.org.

In 1995 the York math department organized a small conference to celebrate Shenitzer. A record of this occasion can be found at `scholarship.claremont.edu/hmnj/vol1/iss15/5`.

Hardy Grant

New Members

Congratulations to the following new members who have joined the Society since our last Bulletin. We look forward to your contributions.

Rosalind Carson
Calgary, AB
Canada

Michael Hallett
Canada

Rye Ledford
Kansas City, MO
USA

Alexandru Manafu
East York, ON
Canada

Alma McKown
USA

Jean-Charles Pellard
Canada

Jeanette Shakalli
Panama City
Panama

Brigitte Stenhouse
Oxford
UK

Brian Szanfranski
Houston, TX
USA

Gerald Williams
Farmington, NM
USA

Alicia Zelenitsky Hill
Winnipeg, MB
Canada

From the Editor

Since the spring of 2020 our field has attempted to incorporate a greater diversity of voices and perspectives. Several recent issues of the *Bulletin* have responding to this call, from information about the Logic Supergroup's Day of Inclusive Logic (November 2020) to several articles discussing racist views of the statistical pioneer, Karl Pearson (November 2021). Mike Molinsky's quotation in context column about Karl Weierstrass (May 2021) was a reminder our mathematical heroes often act less than heroically. The history and philosophy of mathematics field continues to address race, diversity and inclusion in 2023 with special sessions at the next CSHPM annual meeting and the upcoming JMM responding to this desire for growth.

This issue of the *Bulletin* is my fifth issue as your editor. I have enjoyed serving in this role and in this time I have learned much about our society and its members. As the advertisement in this issue indicates, a new volunteer for the position of *Bulletin* editor is

sought. After the May 2023 issue, I will be departing from this role.

The *Bulletin* welcomes contributions from all members of the society be these news items of interest to historians and philosophers of mathematics or personal and professional announcements. We welcome suggestions for memorials, reports on conferences relevant to historians and philosophers of mathematics, book and web reviews, and informative or thought-provoking column-style articles. Ongoing column series include Models of Mathematics, Off the Shelf, and Mathematical Ephemera. New lines of investigation that members may wish the *Bulletin* take up can be created, especially from younger scholars pursuing new lines of research or re-evaluating well travelled paths in new ways. Contributions of opinion or editorial style articles offering arguments or particular perspectives on the state of the field are welcome. The contributions of philosophers are welcomed and they are encouraged to make this space their own.

Microsoft Word (please turn off its auto-formatting features such as "curly quotes") and LaTeX data files (not compiled PDFs) are easiest for the editors to deal with. We also prefer that image files be sent separately, rather than embedded into a Word or PDF document. Submissions may be sent to *s.nickerson@utoronto.ca*. The *Bulletin* reaches your hands or screen due to the continued labors of Eisso Atzema, Layout Editor and Webmaster; Maria Zack, Production Editor; and Pat Allaire, Secretary.

Sylvia Nickerson