

Meetings

The Society sponsors both general meetings and specialized conferences. It is the former that are under discussion here.

In the 1930s, the Annual Meeting, prescribed by the bylaws to take place between the 15th of December and the 15th of January of the following year, was in fact scheduled between Christmas and New Year's Day. It was held on a university campus, though accommodations may have been in hotels. Some of the meetings were in conjunction with the meetings of the American Association for the Advancement of Science. Papers in mathematics presented in Section A of AAAS were counted as presented to the Society, whether meetings were physically contiguous or not, and thus were included in the annual list, which gave references to the published paper when available. Attendance at an annual meeting was on the order of three hundred, much the same, as a percent of membership, as attendance more recently. The program consisted of the Gibbs Lecture, one or two invited addresses, perhaps a retiring presidential address or an address from Section A of AAAS, and contributed ten minute papers, numbering more than fifty. There were general sessions, with no competing events, and two or three simultaneous sections according to broad classifications of subject matter.

Summer Meetings were quite similar. They were held on university campuses with dormitory housing. They frequently followed Labor Day. The program featured the Colloquium Lectures. Some sort of expedition or picnic was a regular concomitant. There was a mandatory group photograph through 1948.

Sectional meetings were perhaps seven in number, very frequently in New York or Chicago.

Aside from the disruptions of World War II, this pattern continued, though meetings grew. The attendance at the Annual Meeting of December 1953 in Baltimore was about 600 and that of January 1960 in Washington, DC about 1300. The Annual Meeting in late January 1958 in Cincinnati signaled the

change from meetings between Christmas and New Year's Day. An amendment to the bylaws had been necessary to accommodate such a change, the allowed interval now extending from 15 December to 10 February.

The style of program was altered with the Annual Meeting of 24–27 January 1963 in Berkeley. There were five Special Sessions. Each was devoted to a single topic and consisted of twenty minute papers invited by an individual selected by the Program Committee. This feature of meetings spread to the Summer and regional meetings. The sessions grew in both size and popularity until at the Annual Meeting and Summer Meeting it sometimes became necessary to limit the number of special sessions, the number of sittings of a session, and the number of papers that could be accommodated in a single session.

The Council requested a richer fare at Annual Meetings, so that in 1971 in Atlantic City there were four hour addresses. In 1972 in Las Vegas, the number was eight and that number was the norm for many years. At the same time, hour addresses no longer were free from competition with other events.

The Las Vegas location met with mixed responses from the membership. The physical arrangements of meetings, such as space and visual aids, were excellent and prices were low. However, some found the ambience of gambling intrusive and oppressive (and a handful found it too tempting). At the Business Meeting the following resolution was offered by Saunders Mac Lane:

Whereas the circumstances in Las Vegas are not conducive to mathematical research and scholarship, be it resolved that the American Mathematical Society not meet again during this century in Las Vegas.

The secretary asked for permission not to put the resolution, if it were passed, into the public record. The motion passed by voice vote but there was a call for a count. In the meantime there was a request to make the decision public. Mac Lane withdrew the motion. It was ruled that this was not acceptable from a parliamentary standpoint. In some manner, whose parliamentary provenance is not clear, the matter was tabled. There is no record of this contretemps in the minutes of the Business Meeting.

As noted in the account of Colloquium Lectures, the number of sets of lectures in a year increased beginning in 1968.

The Annual and Summer Meetings had been five day meetings for many years, with six half days assigned to AMS and four to MAA, two days in the middle being interlaced. Beginning in 1984, four day meetings were tried, with each organization running for the entire four days and with some ground rules about choice of material in various time slots to reduce competition

of subject matter. An advantage of the four day meeting was that one's expenses were reduced by one day and night of subsistence. However, it was the opinion of some that the meeting program became too crowded. Whether to return to the five day meeting was an open question as this is being written. To ameliorate the situation and in recognition of the enrichment of meeting programs from other sources, the number of hour addresses is being reduced to six.

Beginning in the Summer of 1973 in Missoula, the Society, at the behest of the Committee on Employment and Educational Policy, began to offer a Short Course prior to Summer and Annual Meetings. The first was a Preceptorial Introduction to Computer Science for Mathematicians under the direction of Jacob T. Schwartz. Short Courses were designed for persons wishing to change field or employment. Initially they were given without charge and were open to all. It soon became necessary to institute a registration fee. In some cases, particularly when computer terminals were required, it was necessary to limit enrollment.

The largest meeting of the Society was the joint Annual Meeting of January 1969 in New Orleans, where there were 4811 registrants, including 3084 members of the Society. This was the time when there was a sudden increase in the number of new Ph.D.'s and the foment in the employment market as well as the pleasant location contributed to the size of this meeting.

Meetings in the Southeast were a subject of controversy in the late 1940s. A committee consisting of Ralph Palmer Agnew, chairman, Edwin F. Beckenbach, Tomlinson Fort, G. A. Hedlund, and T. Y. Thomas was charged to study their desirability. Objection had been raised that such meetings might lead to inferior papers. The generally favorable argument was that it would encourage mathematical activity. Beckenbach argued that one who presents an unworthy paper by title is less likely to have the facts brought to light than one who presents it in person. Thomas echoed the view of Raymond L. Moore that such meetings should not be held, "that, for mathematicians on the Puerto Rican and Texan fringes of the Southeast, a Southeastern meeting would be a terrible ordeal." The Committee voted four to one in favor of such meetings. The Council of 16 April 1948 passed the following resolution:

That the Council schedule annually southeastern meetings of the Society, the meetings to be held at whatever time may be judged most likely to encourage southeasterners to attend both southeastern and national (Summer, Christmas) meetings.

The actions of the Council to assure that the conduct of such meetings be free from racial discrimination is discussed in the section on political and social questions.

Expansion into other areas met with less controversy. At the Council of 2 September 1947 Arnold Dresden reported interest in a meeting at the University of British Columbia (UBC) in June 1948, immediately following the meeting of the Royal Society of Canada, and more generally biennial meetings of the Society in the Pacific Northwest. The invitation from UBC was accepted in principle and the general proposal was referred to Associate Secretary John Willie Green for the Far West. The Council of 30 December 1947 formally accepted the invitation from UBC and on Green's recommendation approved biennial meetings in the Pacific Northwest.

The Annual and Summer Meetings which are joint meetings with the Mathematical Association of America are not the only joint meetings of the Society. The early connection with American Association for the Advancement of Science (AAAS) has been noted but this ceased when the Annual Meeting was moved from late December to January. From time to time an Annual Meeting is joint with the Institute of Mathematical Statistics or the Association for Symbolic Logic. Other organizations meet concurrently with cooperation in arranging schedules to avoid conflicts. These include the National Council of Teachers of Mathematics, Pi Mu Epsilon, and the Association for Women in Mathematics. Sometimes regional meetings are joint meetings with a section of MAA.

COLLOQUIUM LECTURES

The Colloquium Lectures date almost from the beginnings of the Society. These started as sets of lectures by Maxime Bôcher and by James Pierpont in 1896 at the third Summer Meeting in Buffalo and by William Fogg Osgood and by A. G. Webster at the fifth Summer Meeting in Cambridge. These two sets were separate from but contiguous to the Summer Meetings. The Colloquium Lectures became an established feature of Summer Meetings with the third set by O. Bolza and by E. W. Brown in Ithaca in 1901. Publication began with the fourth set of lectures by H. S. White, F. S. Woods, and E. B. van Vleck in Cambridge in 1903.

Colloquium Lectures were continued at irregular intervals of several years until 1927, when they became an annual event. The history [A] by Archibald gives a more extensive account of the origins of the Colloquium Lectures followed by a list with details about the lectures and bibliographic references in Ch VI, pp. 66–73.

There were no Colloquium Lectures in 1938, when the special program of the Semi-centennial Celebration was held, with many invited addresses.

At the Summer Meeting of 1939 in New York, there were two Colloquium Lecturers, A. A. Albert, who spoke on "Structure of Algebras," and Marshall Harvey Stone, whose title was "Convex Bodies."

The Colloquium Lectures of 1945 were held not at the Summer Meeting but at the Annual Meeting, which was held at an unusually early time in late November.

Lectures proceeded on an annual basis at Summer Meetings, excepting 1950, 1954, 1958, 1962, and 1966, when there was no Summer Meeting on account of the International Congresses.

It became apparent to the Council that the bulk of good mathematics and the number of worthy candidates to give Colloquium Lectures were increasing to the point that one set of lectures per year was insufficient to honor the speakers and cover the subject. There was a secondary phenomenon in the publication of Colloquium Lectures. Perhaps it was an acceleration of mathematical careers or of mathematical publication and perhaps the fact that candidates were being invited later in their careers, but some of the speakers had already written a definitive research monograph that, in earlier times, would have been a natural book in the Colloquium Series. In any event, the Council in 1967 decided to have two sets of Colloquium Lectures at the Summer Meeting, beginning in 1968. There was only a single set in 1970, when there was a Summer Meeting despite the almost simultaneous occurrence of the International Congress in Nice. In 1973, there were three sets of lectures, one having been added to the program of the Annual Meeting. There were two sets at the Annual Meeting of 1974, a year of no Summer Meeting because of the International Congress. The year 1975 was another year of three sets of lectures. From that point on, there has been one set of lectures at the Annual Meeting and one at the Summer Meeting, the latter usually not held in ICM years.

Here is the continuation of the list of Colloquium speakers in [A]. There were four lectures to a set except where specifically noted. When lectures were published, usually in an expanded or revised form in the series Colloquium Publications, that fact is noted. Some, such as those of Bing and Jacobson, were published long after the lectures and contain substantial subsequent developments. Otherwise the lectures are “unpublished” in the sense that substantive material appears in papers before and after the lectures but not in the Colloquium Publications. The list begins with the Twenty-first Colloquium but the numbering system fell into disuse.

Madison, University of Wisconsin, 5–8 September 1939

A. A. Albert, “Structure of Algebras.”

Published as *Structure of algebras*, 1939, revised 1961.

M. H. Stone, “Convex Bodies” (3 lect.).

Hanover, Dartmouth College, 10–12 September 1940

G. T. Whyburn, “Analytic Topology.”

Published as *Analytic topology*, 1941.

- Chicago, University of Chicago, 2–6 September 1941
 Øystein Ore, “Mathematical Relations and Structures” (3 lect.)
- Poughkeepsie, Vassar College, 8–10 September 1942
 R. L. Wilder, “Topology of Manifolds.”
 Published as *Topology of Manifolds*, 1949, revised 1963.
- New Brunswick, Rutgers University, 12–13 September 1943
 E. J. McShane, “Existence Theorems in the Calculus of Variations”
 (3 lect.).
- Wellesley, Wellesley College, 13–14 August 1944
 Einar Hille, “Selected Topics in the Theory of Semi-groups.”
 Published as *Functional analysis and semigroups* by E. Hille and Richard
 S. Phillips, 1948, revised 1957.
- Chicago, Museum of Science and Industry, 23–24 November 1945
 Tibor Radó, “Length and Area”.
 Published as *Length and Area*, 1948.
- Ithaca, Cornell University, 20–23 August 1946
 Hassler Whitney, “Topology of Smooth Manifolds.”
- New Haven, Yale University, 2–5 September 1947
 Oscar Zariski, “Abstract Algebraic Geometry.”
- Madison, University of Wisconsin, 7–10 September 1948
 Richard Brauer, “Representations of Groups and Rings.”
- Boulder, University of Colorado, 30 August–2 September 1949
 G. A. Hedlund, “Topological Dynamics.”
 Published as *Topological dynamics* by W. H. Gottschalk and G. A. Hed-
 lund, 1955.
- Minneapolis, University of Minnesota, 4–7 September 1951
 Deane Montgomery, “Topological Transformation Groups.”
- East Lansing, Michigan State University, 2–5 September 1952
 Alfred Tarski, “Arithmetical Classes and Types of Algebraic Systems.” But
 see *Some notions and methods on the borderline of algebra and meta-*
mathematics, Proceedings of the International Congress of Mathemati-
 cians, 1950.
- Kingston, Ontario, Queen’s University and Royal Military College, 31 August–
 5 September 1953
 Antoni Zygmund, “On the Existence and Properties of Certain Singular
 Integrals.”
- Ann Arbor, University of Michigan, 30 August–2 September 1955
 Nathan Jacobson, “Jordan Algebras.”

- Published as *Structure and representation of Jordan algebras*, 1968.
- Seattle, University of Washington, 21–24 August 1956
Salomon Bochner, “Harmonic Analysis and Probability.”
- University Park, Pennsylvania State University, 27–30 August 1957
N. E. Steenrod, “Cohomology Operations.”
- Salt Lake City, University of Utah, 1–4 September 1959
J. L. Doob, “The First Boundary Value Problem.”
- East Lansing, Michigan State University, 30 August–2 September 1960
S. S. Chern, “Geometrical Structures on Manifolds.”
- Stillwater, University of Oklahoma, 29 August–1 September 1961
George W. Mackey, “Infinite Dimensional Group Representatives.”
- Boulder, University of Colorado, 27–30 August 1963
Saunders Mac Lane, “Categorical Algebra.”
- Amherst, University of Massachusetts, 25–28 August 1964
Charles Bradford Morrey, Jr., “Multiple Integrals in the Calculus of Variations.”
- Ithaca, Cornell University, 31 August–3 September 1965
Alberto P. Calderón, “Singular Integrals.”
- Toronto, Ontario, University of Toronto, 29 August–1 September 1967
Samuel Eilenberg, “Universal Algebras and the Theory of Automata.”
- Madison, University of Wisconsin, 27–30 August 1968
Donald C. Spencer, “Overdetermined Systems of Partial Differential Equations.”
- Eugene, University of Oregon, 26–29 August 1969
Raoul H. Bott, “On the Periodicity Theorem of the Classical Groups and its Applications.”
Harish-Chandra, “Harmonic Analysis on Semisimple Lie Groups.”
- Laramie, University of Wyoming, 25–28 August 1970
R H Bing, “Topology of 3-manifolds.”
Published as *The geometric topology of 3-manifolds*, 1983
- University Park, Pennsylvania State University, 31 August–3 September 1971
Lipman Bers, “Uniformization, Moduli and Kleinian Groups.”
Armand Borel, “Algebraic Groups and Arithmetic Groups.”
- Hanover, Dartmouth College, 29 August–1 September 1972
Stephen Smale, “Applications of Global Analysis to Biology, Economics, Electrical Circuits, and Celestial Mechanics.”
John T. Tate, “The Arithmetic of Elliptic Curves.”

- Dallas, Fairmont Hotel, 25–28 January 1973
Michael F. Atiyah, “The Index of Elliptic Operators.”
- Missoula, University of Montana, 21–24 August 1973
Felix E. Browder, “Nonlinear Functional Analysis, and its Applications to Nonlinear Partial Differential and Integral Equations.”
Erret A. Bishop, “Schizophrenia in Contemporary Mathematics.”
- San Francisco, San Francisco Hilton Hotel, 15–18 January 1974
Louis Nirenberg, “Selected Topics in Partial Differential Equations.”
John G. Thompson, “Finite Simple Groups.”
- Washington, Shoreham Hotel, 23–26 January 1975
H. Jerome Keisler, “New Directions in Model Theory.”
- Kalamazoo, Western Michigan University, 18–22 August 1975
Ellis R. Kolchin, “Differential Algebraic Groups.”
Elias M. Stein, “Singular Integrals, Old and New.”
- San Antonio, San Antonio Convention Center, 22–25 January 1976
I. M. Singer, “Connections between Analysis, Geometry, and Topology.”
- Toronto, Ontario, University of Toronto, 24–27 August 1976
Jürgen K. Moser, “Recent Progress in Dynamical Systems.”
- St. Louis, Chase-Park Plaza Hotel, 26–30 January 1977
William Browder, “Differential Topology of Higher Dimensional Manifolds.”
- Seattle, University of Washington, 15–18 August 1977
Herbert Federer, “Geometric Measure Theory.”
- Atlanta, Hyatt Regency Atlanta, 3–7 January 1978
Hyman Bass, “Algebraic K -Theory.”
- Biloxi, Convention Center, 24–27 January 1979
Philip A. Griffiths, “Complex Analysis and Algebraic Geometry.”
- Duluth, University of Minnesota, 22–25 August 1979
George Daniel Mostow, “Discrete Subgroups of Lie Groups.”
- San Antonio, San Antonio Convention Center, 3–6 January 1980
Wolfgang M. Schmidt, “Various Methods in Number Theory.”
- Ann Arbor, University of Michigan, 19–22 August 1980
Julia Bowman Robinson, “Between Logic and Arithmetic.”
- San Francisco, San Francisco Hilton and Tower, 7–10 January 1981
Mark Kac, “Some Mathematics Problems Suggested by Questions in Physics.”
- Pittsburgh, University of Pittsburgh, 18–21 August 1981
Serge Lang, “Units and Class Numbers in Algebraic Geometry and Number Theory.”

- Cincinnati, Cincinnati Convention-Exposition Center, 13–16 January 1982
Dennis Sullivan, “Geometry, Iteration, and Group Theory.”
- Toronto, Ontario, University of Toronto, 23–26 August 1982
Morris W. Hirsch, “Convergence in Ordinary and Partial Differential Equations.”
- Denver, Denver Convention Complex, 5–8 January 1983
Charles L. Fefferman, “The Uncertainty Principle.”
- Albany, State University of New York, 8–11 August 1983
Bertram Kostant, “On the Coxeter Element and the Structure of the Exceptional Lie Groups.”
- Louisville, Commonwealth Convention Center, 25–28 January 1984
Barry Mazur, “On the Arithmetic of Curves.”
- Eugene, University of Oregon, 16–19 August 1984
Paul H. Rabinowitz, “Minimax Methods in Critical Point Theory and Applications to Differential Equations.”
- Anaheim, Anaheim Convention Center, 9–13 January 1985
Daniel Gorenstein, “The Classification of the Finite Simple Groups.”
- Laramie, University of Wyoming, 12–15 August 1985
Karen K. Uhlenbeck, “Mathematical Gauge Field Theory.”
- New Orleans, Hyatt Regency New Orleans, 7–11 January 1986
Shing-Tung Yau, “Nonlinear Analysis.”
- San Antonio, San Antonio Convention Center, 21–24 January 1987
Peter David Lax, “Uses of the Non-Euclidean Wave Equation.”
- Salt Lake City, University of Utah, 5–8 August 1987
Edward Witten, “Mathematical Applications of Quantum Field Theory.”
- Atlanta, Hyatt Regency Atlanta, 6–9 January 1988
Victor W. Guillemin, “Spectral Properties of Riemannian Manifolds.”

COLLOQUIUM PUBLICATIONS

Although the Colloquium Publications were set up as a vehicle for publication of Colloquium Lectures, not only have many lectures not appeared there but also the series has been open to monographs that were contributed. These include the following in addition to those noted in [A].

- G. Szegő, *Orthogonal polynomials*, 1939, fourth edition 1975.
Garrett Birkhoff, *Lattice Theory*, 1940, third edition 1967.
N. Levinson, *Gap and density theorems*, 1940.
Solomon Lefschetz, *Algebraic topology*, 1942.

A. Weil, *Foundations of algebraic geometry*, 1946, revised 1962.

Joseph F. Ritt, *Differential algebra*, 1950.

Joseph Leonard Walsh, *The location of critical points of analytic and harmonic functions*, 1950.

A. C. Schaeffer and D. C. Spencer, *Coefficients of Schlicht functions*, with a chapter on "The region of values of the derivative of a Schlicht function" by A. Grad, 1950.

N. Jacobson, *Structure of rings*, 1956, revised 1964.

Ø. Ore, *Theory of graphs*, 1962.

Alfred Tarski and Steven Givant, *A formalization of set theory without variables*, 1987.

Major revisions have been noted but not reprintings, which sometimes include corrections or minor revisions.

GIBBS LECTURES

The founding of the Josiah Willard Gibbs Lectureship in 1923 is described in [A]. The lectures are a regular feature of the annual meeting, with a few omissions. They are intended to reach those members of the intellectual community with some knowledge of mathematics and interest in it and are advertised outside of the mathematical community as well as within it. When the Annual Meeting was associated with a meeting of AAAS, this effort was more effective than in recent times. The lectures are usually in some area of application of mathematics. Lecturers are frequently chosen alternately from applied mathematicians and from persons not primarily mathematicians who use mathematics.

Publication of a version of the lectures is encouraged. The lecturer has had the right to publish in the *Bulletin*. This is apparently the only such right in Society publications, though the *Bulletin* for many years appeared to accept invited addresses without refereeing. The Council of 1 September 1949 on the recommendation of R. E. Langer, speaking for the Editorial Committee of the *Bulletin*, voted that the invitation to give the Gibbs Lecture not contain assurance that the lecture would be published and that the *Bulletin* was required to publish the lecture. At the meeting of 25 April 1952 on the motion of M. H. Heins, a member of the Council by virtue of election to the Executive Committee, the Council voted that the invitation to lecture carry with it the invitation to submit a manuscript and that it not be refereed. The reasons for these changes in policy do not appear in the minutes. The lectures for 1950, 1951, and 1952 appear not to have been published.

In [A], the first fourteen lectures with place of presentation and of publication of the lectures are listed. Here is the list from that time to the present.

15. December 1939, Columbus, Ohio; Professor Theodore von Kármán, California Institute of Technology; *The engineer grapples with nonlinear problems*, Bulletin of the American Mathematical Society, v. 46 (1940), no. 8, pp. 615–683.
16. September 1941, Chicago, Illinois; Professor Sewall Wright, University of Chicago; *Statistical genetics and evolution*, Bulletin of the American Mathematical Society, v. 48 (1942), no. 4, pp. 233–246.
17. November 1943, Chicago, Illinois; Professor Harry Bateman, California Institute of Technology; *The control of elastic fluids*, Bulletin of the American Mathematical Society, v. 51 (1945), no. 9, pp. 601–646.
18. November 1944, Chicago, Illinois; Professor John von Neumann, Institute for Advanced Study; *The ergodic theorem and statistical mechanics*.
19. November 1945, Chicago, Illinois; Professor J. C. Slater, Massachusetts Institute of Technology; *Physics and the wave equation*, Bulletin of the American Mathematical Society, v. 52 (1946), no. 5, part 1, pp. 392–400.
20. November 1946, Swarthmore, Pennsylvania; Professor Subrahmanyan Chandrasekhar, University of Chicago; *The transfer of radiation in stellar atmosphere*, Bulletin of the American Mathematical Society, v. 53 (1947), no. 7, pp. 641–711.
21. December 1947, Athens, Georgia; Professor P. M. Morse, Massachusetts Institute of Technology; *Mathematical problems in operations research*, Bulletin of the American Mathematical Society, v. 54 (1948), no. 7, pp. 602–621.
22. December 1948, Columbus, Ohio; Professor Herman Weyl, Institute for Advanced Study; *Ramifications, old and new of the eigenvalue problem*, Bulletin of the American Mathematical Society, v. 56 (1950), no. 2, pp. 115–139.
23. December 1949, New York City; Professor Norbert Wiener, Massachusetts Institute of Technology; *Problems of sensory prosthesis*, Bulletin of the American Mathematical Society, v. 57 (1951), no. 1, pp. 27–35.
24. December 1950, Gainesville, Florida; Professor G. E. Uhlenbeck, University of Michigan; *Some basic problems of statistical mechanics*.
25. December 1951, Providence, Rhode Island; Professor Kurt Gödel, Institute for Advanced Study; *Some basic theorems on the foundations of mathematics and their philosophical implications*.
26. December 1952, St. Louis, Missouri; Professor Marston Morse, Institute for Advanced Study; *Topology and geometrical analysis*.
27. December 1953, Baltimore, Maryland; Professor Wassily Leontief, Harvard University; *Mathematics in economics*, Bulletin of the American Mathematical Society, v. 60 (1954), no. 3, pp. 215–233.

28. December 1954, Pittsburgh, Pennsylvania; Professor Kurt O. Friedrichs, Institute of Mathematical Sciences, New York University; *Asymptotic phenomena in mathematical physics*, Bulletin of the American Mathematical Society, v. 61 (1955), no. 6, pp. 485–504.

29. December 1955, Houston, Texas; Professor Joseph E. Meyer, University of Chicago; *The structure of simple fields*, Bulletin of the American Mathematical Society, v. 62 (1956), no. 4, pp. 332–346.

30. December 1956, Rochester, New York; Professor Marshall H. Stone, University of Chicago; *Mathematics and the future of science*, Bulletin of the American Mathematical Society, v. 63 (1957), no. 2, pp. 61–76.

31. January 1958, Cincinnati, Ohio; Professor H. J. Muller, Department of Zoology, Indiana University; *Evolution by mutation*, Bulletin of the American Mathematical Society, v. 64 (1958), no. 4, pp. 137–160.

32. January 1959, Philadelphia, Pennsylvania; Professor J. M. Burgers, University of Maryland; *On the emergence of patterns of order*, Bulletin of the American Mathematical Society, v. 69 (1963), no. 1, pp. 1–25.

33. January 1960, Chicago, Illinois; Professor Julian Schwinger, Harvard University; *Quantum field theory*.

34. January 1961, Washington, D.C.; Professor J. J. Stoker, Institute of Mathematical Sciences, New York University; *Some nonlinear problems in elasticity*, Bulletin of the American Mathematical Society, v. 68 (1962), no. 4, pp. 239–278. Published under the title *Some observations on continuum mechanics with emphasis on elasticity*.

35. January 1962, Cincinnati, Ohio; Professor C. N. Yang, Institute for Advanced Study; *Symmetry principles in modern physics*.

36. January 1963, Berkeley, California; Professor Claude E. Shannon, Massachusetts Institute of Technology; *Information theory*.

37. January 1964, Miami, Florida; Professor Lars Onsager, Yale University; *Mathematical problems of cooperative phenomena*.

38. January 1965, Denver, Colorado; Professor D. H. Lehmer, University of California, Berkeley; *Mechanical mathematics*, Bulletin of the American Mathematical Society, v. 72 (1966), no. 5, pp. 739–750.

39. January 1966, Chicago, Illinois; Professor Martin Schwarzschild, Princeton University; *Stellar evolution*.

40. January 1967, Houston, Texas; Professor Mark Kac, Rockefeller University; *Some mathematical problems in the theory of phase transitions*.

41. January 1968, San Francisco, California; Professor Eugene P. Wigner, Princeton University; *Problems of symmetry in old and new physics*, Bulletin of the American Mathematical Society, v. 74 (1968), no. 5, pp. 793–815.

42. January 1969, New Orleans, Louisiana; Professor Raymond L. Wilder, University of Michigan; *Trends and social implications of research*, Bulletin of the American Mathematical Society, v. 75 (1969), no. 5, pp. 891–906.

43. January 1970, San Antonio, Texas; Professor Walter H. Munk, Institute of Geophysics and Planetary Physics and the Scripps Institution of Oceanography, University of California, San Diego; *Tides and time*.

44. January 1971, Atlantic City, New Jersey; Professor Eberhard F. F. Hopf, Indiana University; *Ergodic theory and the geodesic flow on surfaces of constant negative curvature*, Bulletin of the American Mathematical Society, v. 77 (1971), no. 6, pp. 863–877.

45. January 1972, Las Vegas, Nevada; Professor Freeman J. Dyson, Institute for Advanced Study; *Missed opportunities*, Bulletin of the American Mathematical Society, v. 78 (1972), no. 5, pp. 635–652.

46. January 1973, Dallas, Texas; Professor Jürgen Moser, Courant Institute of Mathematical Sciences, New York University; *The stability concept in dynamical systems*.

47. January 1974, San Francisco, California; Professor Paul A. Samuelson, Massachusetts Institute of Technology, *Economics and mathematical analysis*.

48. January 1975, Washington, D.C.; Professor Fritz John, Courant Institute of Mathematical Sciences, New York University; *A priori estimates, geometric effects, and asymptotic behavior*, Bulletin of the American Mathematical Society, v. 81 (1975), no. 6, pp. 1013–1023.

49. January 1976, San Antonio, Texas; Professor Arthur S. Wightman, Princeton University; *Nonlinear functional analysis and some of its applications in quantum field theory*.

50. January 1977, St. Louis, Missouri; Professor Joseph B. Keller, Courant Institute of Mathematical Sciences, New York University; *Rays, waves, and asymptotics*, Bulletin of the American Mathematical Society, v. 84 (1978), no. 5, pp. 727–750.

51. January 1978, Atlanta, Georgia; Professor Donald E. Knuth, Stanford University; *Mathematical typography*, Bulletin of the American Mathematical Society (N.S.), v. 1 (1979), no. 2, pp. 337–372.

52. January 1979, Biloxi, Mississippi; Professor Martin Kruskal, Princeton University; “*What are solitons and inverse scattering anyway, and why should I care?*”

53. January 1980, San Antonio, Texas; Professor Kenneth Wilson, Cornell University; *The statistical continuum limit*.

54. January 1981, San Francisco, California; Professor Cathleen S. Morawetz, Courant Institute of Mathematical Sciences, New York University; *The*

mathematical approach to the sound barrier, Bulletin of the American Mathematical Society (N.S.), v. 6 (1982), no. 2, pp. 127–145. Published under the title *The mathematical approach to the sonic barrier*.

55. January 1982, Cincinnati, Ohio; Professor Elliott W. Montroll, Institute for Physical Science and Technology, University of Maryland, College Park, Maryland; Published under the title *On the dynamics and evolution of some sociotechnical systems* (edited by Bruce J. West), Bulletin of the American Mathematical Society (N.S.), v. 16 (1987), no. 1, pp. 1–46.

56. January 1983, Denver, Colorado; Professor Samuel Karlin, Stanford University, Stanford, California; *Mathematical models, problems, and controversies of evolutionary theory*, AMS Bulletin (N.S.) v. 11 (1987), No. 2, pp. 247–262.

57. January 1984, Louisville, Kentucky; Professor Herbert A. Simon, Carnegie-Mellon University, Pittsburgh, Pennsylvania; *Computer modeling of the processes of scientific and mathematical discovery*.

58. January 1985, Anaheim, California; Professor Michael O. Rabin, Harvard University, Cambridge Massachusetts and Hebrew University, Jerusalem, Israel; *Randomization in mathematics and computer science*.

59. January 1986, New Orleans, Louisiana; Professor L. E. Scriven, University of Minnesota; *The third leg. Mathematics and computation in applicable science and high technology*.

60. January 1987, San Antonio, Texas; Professor Thomas C. Spencer, Courant Institute of Mathematical Sciences, New York University; *Schrödinger operators and dynamical systems*.

61. January 1988, Pheonix; Professor David P. Ruelle, Institute des Hautes Études Scientifiques, Paris, France; *How natural is our mathematics? The example of equilibrium statistical mechanics*

The Gibbs Lecturer receives an honorarium and expenses. This was not always the case. The Trustees of 27 September 1941 agreed that in 1943 and thereafter the Gibbs Lecturer should be reimbursed for rail travel including pullman.

PRIZES

The prizes of the Society are nominally awarded by the Council. In fact, for each prize there is a small selection committee. Formerly, the committee brought a single recommendation to the Council, which approved the award. In 1962 many recurring Council duties were delegated to the Executive Committee, approval of nominations for prizes among them.

The Executive Committee became dissatisfied with this procedure. In November 1984 a subcommittee consisting of P. R. Halmos and Melvin

Hochster made a recommendation that was forwarded and approved by the Council in November. An abbreviated version of the report follows:

Certain of the Council's decisions (the selection of the Colloquium and Gibbs lecturers and the selection of the recipients of the Society's prizes) have traditionally been delegated to special committees and then routinely approved by the EC. The procedure has not been totally satisfactory. In most cases the EC gave rubber stamp approval, sometimes on lamentably inadequate evidence.

As a compromise between, in effect, doing the work of the special committees (undesirable interference) and merely being informed of their decisions (insufficient supervision), the subcommittee recommends that the EC in the future use a system of combined input and pre-approval, as follows.

The special committees should submit to the EC their semifinal short list of choices (ordinarily two or three names for each slot), together with a one-page summary of the documentation justifying each name on the list, and to do so before receiving preliminary acceptance from the suggested nominees. The system should not be inflexible: if, for instance, the special committee feels strongly that there is a single obvious choice, it will suffice that that fact be communicated to the EC.

The EC should then comment on each name ("acceptable", "unacceptable", "excellent"), and possibly even suggest another name or two for the special committee's consideration. The final choice is to be left to the special committee. The EC is to be informed of it, but need no longer approve it.

The new procedure has appeared to work well. The documentation coming to the Executive Committee is much more complete. It is sometimes clear initially what choice the committee will make. The Executive Committee has occasionally expressed some preferences among submitted names.

The writer is aware of no instances of the award of prizes in which recommendations were rejected and very few in which there was any dissatisfaction voiced. On the other hand, this is not the sort of question that would be documented. There have been years in which a prize was scheduled but none was awarded in that the selection committee stated that it was unable to find a suitable candidate. This was particularly true of the Steele Prizes under the earlier set of rules that governed their award.

Prizes have been a substantial feature of Annual and Summer Meetings. However the custom that a recipient lecture briefly on the work for which the prize was awarded has fallen into disuse. Responses have become expressions

of thanks. Since 1979, there has been an extensive write-up of each award in the Notices, including usually a response by the recipient.

BÔCHER PRIZE

The first prize offered by the Society was the Bôcher Prize in analysis, established through contributions amounting initially in January 1921 to \$1161.79. The prize, initially of \$100, was to be awarded every five years for a notable research memoir published in the *Transactions* during the previous five years by a resident of the United States or Canada. Moreover, the recipient was not to be over 40 years of age at the time of publication.

The rules have been successively modified with this and other prizes. The place of publication was changed in 1929 to any journal on which the AMS was officially represented at the time of publication and in 1935 to any recognized journal published in the United States or Canada. In 1929 the recipient was to be a member of the Society of age no more than 50 but in 1971 conditions were liberalized so that either the recipient is a member or the memoir is published in a recognized journal published in the United States or Canada. Also in 1971 the age restriction was removed. The field was restricted to analysis in 1929.

The first four awards are detailed in [A]. Here are the subsequent recipients.

Fifth award, 1938: To John von Neumann for his memoir, *Almost periodic functions and groups*. I, II, *Transactions of the American Mathematical Society*, volume 36 (1934), pp. 445–492, and volume 37 (1935), pp. 21–50.

Sixth award, 1943: To Jesse Douglas for his memoirs, *Green's function and the problem of Plateau*, *American Journal of Mathematics*, volume 61 (1939), pp. 545–589; *The most general form of the problem of Plateau*, *American Journal of Mathematics*, volume 61 (1939), pp. 590–608; and *Solution of the inverse problem of the calculus of variations*, *Proceedings of the National Academy of Sciences*, volume 25 (1939), pp. 631–637.

Seventh award, 1948: To A. C. Schaeffer and D. C. Spencer for their memoir, *Coefficients of schlicht functions*. I, II, III, IV, *Duke Mathematical Journal*, volume 10 (1943), pp. 611–635, volume 12 (1945), pp. 107–125, and the *Proceedings of the National Academy of Sciences*, volume 32 (1946), pp. 111–116, volume 35 (1949), pp. 143–150.

Eighth award, 1953: To Norman Levinson for his contributions to the theory of linear, nonlinear, ordinary, and partial differential equations contained in his papers of recent years.

Ninth award, 1959: To Louis Nirenberg for his work in partial differential equations.

Tenth award, 1964: To Paul J. Cohen for his paper, *On a conjecture of Littlewood and idempotent measures*, American Journal of Mathematics, volume 82 (1960), pp. 191–212.

Eleventh award, 1969: To I. M. Singer in recognition of his work on the index problem, especially his share in two joint papers with Michael F. Atiyah, *The index of elliptic operators*, I, III, Annals of Mathematics, Series 2, volume 87 (1968), pp. 484–530, 546–604.

Twelfth award, 1974: To Donald S. Ornstein in recognition of his paper, *Bernoulli shifts with the same entropy are isomorphic*, Advances in Mathematics, volume 4 (1970), pp. 337–352.

Thirteenth award, 1979: To Alberto P. Calderón in recognition of his fundamental work on the theory of singular integrals and partial differential equations, and in particular for his paper *Cauchy integrals on Lipschitz curves and related operators*, Proceedings of the National Academy of Sciences, USA, volume 74 (1977), pp. 1324–1327.

Fourteenth award, 1984: To Luis A. Caffarelli for his deep and fundamental work in nonlinear partial differential equations, in particular his work on free boundary problems, vortex theory and regularity theory.

Fifteenth award, 1984: To Richard B. Melrose for his solution of several outstanding problems in diffraction theory and scattering theory and for developing the analytical tools needed for their resolution.

COLE PRIZES

The Cole Prizes were established initially by a gift from Frank Nelson Cole. When he retired as secretary in 1920, he was honored with a gift of \$472.88 accumulated through small contributions. He in turn made this over to the Society, which decided to use it as the beginning of a prize fund. Funds accumulated and were augmented by a gift from C. A. Cole, the son of Frank Nelson Cole.

The two prizes are the Cole Prize in the Theory of Numbers and the Cole Prize in Algebra, awarded alternately every five years. The terms, except for field, are the same as those of the Bôcher Prize. The first, in algebra, was awarded to Leonard Eugene Dickson in 1928 and the second, in number theory, to H. S. Vandiver in 1931. See [A] for a more complete account.

Here are the subsequent recipients of Cole Prizes.

Third award, 1939: To A. Adrian Albert for his papers on the construction of Riemann matrices published in the Annals of Mathematics, Series 2, volume 35 (1934) and volume 36 (1935).

Fourth award, 1941: To Claude Chevalley for his paper, *La théorie du corps de classes*, Annals of Mathematics, Series 2, volume 41 (1940), pp. 394–418.

Fifth award, 1944: To Oscar Zariski for four papers on algebraic varieties published in the *American Journal of Mathematics*, volumes 61 (1939) and 62 (1940), and in the *Annals of Mathematics, Series 2*, volumes 40 (1939) and 41 (1940).

Sixth award, 1946: To H. B. Mann for his paper, *A proof of the fundamental theorem on the density of sums of sets of positive integers*, *Annals of Mathematics, Series 2*, volume 43 (1942), pp. 523–527.

Seventh award, 1949: To Richard Brauer for his paper, *On Artin's L-series with general group characters*, *Annals of Mathematics, Series 2*, volume 48 (1947), pp. 502–514.

Eighth award, 1951: To Paul Erdős for his many papers in the theory of numbers, and in particular for his paper, *On a new method in elementary number theory which leads to an elementary proof of the prime number theorem*, *Proceedings of the National Academy of Sciences*, volume 35 (1949), pp. 374–385.

Ninth award, 1954: To Harish-Chandra for his papers on representations of semisimple Lie algebras and groups, and particularly for his paper, *On some applications of the universal enveloping algebra of a semisimple Lie algebra*, *Transactions of the American Mathematical Society*, volume 70 (1951), pp. 28–96.

Tenth award, 1956: To John T. Tate for his paper, *The higher dimensional cohomology groups of class field theory*, *Annals of Mathematics, Series 2*, volume 56 (1952), pp. 294–297.

Eleventh award, 1960: To Serge Lang for his paper, *Unramified class field theory over function fields in several variables*, *Annals of Mathematics, Series 2*, volume 64 (1956), pp. 285–325; and to Maxwell A. Rosenlicht for his papers, *Generalized Jacobian varieties*, *Annals of Mathematics, Series 2*, volume 59 (1954), pp. 505–530, and *A universal mapping property of generalized Jacobians*, *Annals of Mathematics, Series 2*, volume 66 (1957), pp. 80–88.

Twelfth award, 1962: To Kenkichi Iwasawa for his paper, *Gamma extensions of number fields*, *Bulletin of the American Mathematical Society*, volume 65 (1959), pp. 183–226; and to Bernard M. Dwork for his paper, *On the rationality of the zeta function of an algebraic variety*, *American Journal of Mathematics*, volume 82 (1960), pp. 631–648.

Thirteenth award, 1965: To Walter Feit and John G. Thompson for their joint paper, *Solvability of groups of odd order*, *Pacific Journal of Mathematics*, volume 13 (1963), pp. 775–1029.

Fourteenth award, 1967: To James B. Ax and Simon B. Kochen for a series of three joint papers, *Diophantine problems over local fields*, I, II, III,

American Journal of Mathematics, volume 87 (1965), pp. 605–630, 631–648, and Annals of Mathematics, Series 2, volume 83 (1966), pp. 437–456.

Fifteenth award, 1970: To John R. Stallings for his paper, *On torsion-free groups with infinitely many ends*, Annals of Mathematics, Series 2, volume 88 (1968), pp. 312–334; and to Richard G. Swan for his paper, *Groups of cohomological dimension one*, Journal of Algebra, volume 12 (1969), pp. 585–610.

Sixteenth award, 1972: To Wolfgang M. Schmidt for the following papers: *On simultaneous approximation of two algebraic numbers by rationals*, Acta Mathematica (Uppsala), volume 119 (1967), pp. 27–50; *T-numbers do exist*, Symposia Mathematica, volume IV, Academic Press, 1970, pp. 1–26; *Simultaneous approximation to algebraic numbers by rationals*, Acta Mathematica (Uppsala), volume 125 (1970), pp. 189–201; *On Mahler's T-numbers*, Proceedings of Symposia in Pure Mathematics, volume 20, American Mathematical Society, 1971, pp. 275–286.

Seventeenth award, 1975: To Hyman Bass for his paper, *Unitary algebraic K-theory*, Springer Lecture Notes in Mathematics, volume 343, 1973; and to Daniel G. Quillen for his paper, *Higher algebraic K-theories*, Springer Lecture Notes in Mathematics, volume 341, 1973.

Eighteenth award, 1977: To Goro Shimura for his two papers, *Class fields over real quadratic fields and Hecke operators*, Annals of Mathematics, Series 2, volume 95 (1972), pp. 130–190; and *On modular forms of half integral weight*, Annals of Mathematics, Series 2, volume 97 (1973), pp. 440–481.

Nineteenth award, 1980: To Michael Aschbacher for his paper, *A characterization of Chevalley groups over fields of odd order*, Annals of Mathematics, Series 2, volume 106 (1977), pp. 353–398; and to Melvin Hochster for his paper *Topics in the homological theory of commutative rings*, CBMS Regional Conference Series in Mathematics, Number 24, American Mathematical Society, 1975.

Twentieth award, 1982: To Robert P. Langlands for pioneering work on automorphic forms, Eisenstein series and product formulas, particularly for his paper *Base change for $GL(2)$* , Annals of Mathematics Studies, volume 96, Princeton University Press, 1980; and to Barry Mazur for outstanding work on elliptic curves and Abelian varieties, especially on rational points of finite order, and his paper *Modular curves and the Eisenstein ideal*, Publications Mathématiques de l'Institut des Hautes Études Scientifiques, volume 47 (1977), pp. 33–186.

Twenty-First award, 1985: To George Lusztig for his fundamental work on the representation theory of finite groups of Lie type. In particular for his contributions to the classification of the irreducible representations in characteristic zero of the groups of rational points of reductive groups over finite

fields, appearing in *Characters of Reductive Groups Over Finite Fields*, Annals of Mathematics Studies, volume 107, Princeton University Press, 1984.

Twenty-Second award, 1987: To Dorian M. Goldfeld for his paper, *Gauss's class number problem for imaginary quadratic fields*, Bulletin of the American Mathematical Society, volume 13, (1985), pp. 23–37; and to Benedict H. Gross and Don B. Zagier for their paper, *Heegner points and derivatives of L-series*, Inventiones Mathematicae, volume 84 (1986), pp. 225–320.

VEBLEN PRIZE

The Oswald Veblen Prize in Geometry was instituted through contributions from former students and colleagues augmented by a gift from his widow that brought the fund to \$2000. It is specified that the award shall be made in geometry or topology under the same conditions as those set for the Bôcher Prize. After the prize was in place it was awarded every five years.

Here is the list of winners.

First award, 1964: To C. D. Papakyriakopoulos for his papers, *On solid tori*, Annals of Mathematics, Series 2, volume 66 (1957), pp. 1–26, and *On Dehn's lemma and the asphericity of knots*, Proceedings of the National Academy of Sciences, volume 43 (1957), pp. 169–172

Second award, 1964: To Raoul Bott for his papers, *The space of loops on a Lie group*, Michigan Mathematical Journal, volume 5 (1958), pp. 35–61, and *The stable homotopy of the classical groups*, Annals of Mathematics, Series 2, volume 70 (1959), pp. 313–337.

Third award, 1966: To Stephen Smale for his contributions to various aspects of differential topology.

Fourth award, 1966: To Morton Brown and Barry Mazur for their work on the generalized Schoenflies theorem.

Fifth award, 1971: To Robion C. Kirby for his paper, *Stable homeomorphisms and the annulus conjecture*, Annals of Mathematics, Series 2, volume 89 (1969), pp. 575–582.

Sixth award, 1971: To Dennis P. Sullivan for his work on the Hauptvermutung summarized in the paper, *On the Hauptvermutung for manifolds*, Bulletin of the American Mathematical Society, volume 73 (1967), pp. 598–600.

Seventh award, 1976: To William P. Thurston for his work on foliations.

Eighth award, 1976: To James Simons for his work on minimal varieties and characteristic forms.

Ninth award, 1981: To Mikhael Gromov for his work relating topological and geometric properties of Riemannian manifolds.

Tenth award, 1981: To Shing-Tung Yau for his work in nonlinear partial differential equations, his contributions to the topology of differentiable manifolds, and for his work on the complex Monge-Ampère equation on compact complex manifolds.

Eleventh award, 1986: To Michael H. Freedman for his work in differential geometry and, in particular, the solution of the four-dimensional Poincaré conjecture.

BIRKHOFF PRIZE AND WIENER PRIZE

The George David Birkhoff Prize in Applied Mathematics and the Norbert Wiener Prize in Applied Mathematics were established at the same time. The initial contribution for the former came from the Birkhoff family and for the latter from the Department of Mathematics of the Massachusetts Institute of Technology. Each is to be awarded for an outstanding contribution to “applied mathematics in the highest and broadest sense.” Whereas the Bôcher, Cole, and Veblen prizes are for a specific memoir, it is recognized that work in applied mathematics is sometimes developmental and accumulative, so that the award is for a line of distinguished work rather than a pinpointed paper.

These two prizes are awarded jointly by AMS and SIAM. The recipient must be a member of one of the two societies and a resident of the United States, Canada, or Mexico. Ordinarily the Birkhoff Prize is awarded at an AMS meeting and the Wiener Prize at a SIAM meeting.

Here are the recipients of the Birkhoff Prize.

First award, 1968: To Jürgen K. Moser for his contributions to the theory of Hamiltonian dynamical systems, especially his proof of the stability of periodic solutions of Hamiltonian systems having two degrees of freedom and his specific applications of the ideas in connection with this work.

Second award, 1973: To Fritz John for his outstanding work in partial differential equations, in numerical analysis, and, particularly, in nonlinear elasticity theory; the latter work has led to his study of quasi-isometric mappings as well as functions of bounded mean oscillation, which have had impact in other areas of analysis.

Third award, 1973: To James N. Serrin for his fundamental contributions to the theory of nonlinear partial differential equations, especially his work on existence and regularity theory for nonlinear elliptic equations, and applications of his work to the theory of minimal surfaces in higher dimensions.

Fourth award, 1978: To Garrett Birkhoff for bringing the methods of algebra and the highest standards of mathematics to scientific applications.

Fifth award, 1978: To Mark Kac for his important contributions to statistical mechanics and to probability theory and its applications.

Sixth award, 1978: To Clifford A. Truesdell for his outstanding contributions to our understanding of the subjects of rational mechanics and non-linear materials, for his efforts to give precise mathematical formulation to these classical subjects, for his many contributions to applied mathematics in the fields of acoustic theory, kinetic theory, and nonlinear elastic theory, and the thermodynamics of mixtures, and for his major work in the history of mechanics.

Seventh award, 1983: To Paul R. Garabedian for his important contributions to partial differential equations, to the mathematical analysis of problems of transonic flow and airfoil design by the method of complexification, and to the development and application of scientific computing to problems of fluid dynamics and plasma physics.

The winners of the Wiener Prize have been the following:

First award, 1970: To Richard E. Bellman for his pioneering work in the area of dynamic programming, and for his related work on control, stability, and differential-delay equations.

Second award, 1975: To Peter D. Lax for his broad contributions to applied mathematics, in particular, for his work on numerical and theoretical aspects of partial differential equations and on scattering theory.

Third award, 1980: To Tosio Kato for his distinguished work in the perturbation theory of quantum mechanics.

Fourth award, 1980: To Gerald B. Whitham for his broad contributions to the understanding of fluid dynamical phenomena and his innovative contributions to the methodology through which that understanding can be constructed.

Fifth award, 1985: To Clifford S. Gardner for his contributions to applied mathematics in the areas of supersonic aerodynamics, plasma physics and hydromagnetics, and especially for his contributions to the truly remarkable development of inverse scattering theory for the solution of nonlinear partial differential equations.

STEELE PRIZES

The will of Leroy P. Steele bequeathed the residue of his estate to the Society. The capital value turned out to be about \$145,000 and there were some items of income for a few years in addition. The income from the fund was to be used for "a prize or prizes for outstanding published mathematical research at such intervals and for such types of mathematical research as the Council of the Society shall in its sole discretion determine." It was further suggested but not required that prizes be named in memory of George D. Birkhoff, William Fogg Osgood, and William Caspar Graustein. The Council did in fact name the prizes the Leroy P. Steele Prizes in honor of the three

named mathematicians. The names of Birkhoff, Osgood, and Graustein are regularly mentioned in the announcements.

The existence of the bequest and its approximate value were known some time before the money became available. The Council in 1967–1968 was considering the establishment of a research expository journal, which in fact did not materialize. As an interim measure, which in fact became “permanent,” the publication of research expository papers in the *Bulletin* was encouraged. With the prospect of the Steele Fund, the Council authorized the president to appoint a Steele Prize Committee to examine unsolicited articles for the *Bulletin* with the view of awarding prizes and publishing the articles. There was some question whether this plan would meet the requirements of the Steele bequest.

The committee consisted of F. Browder, S. S. Chern, M. Gerstenhaber, Edwin Hewitt, N. Jacobson, S. Lang, J. Milnor, and A. Seidenberg. Gerstenhaber, who was editor of the *Bulletin* for expository addresses, was chairman. The plan as they developed it differed somewhat from the initial proposal. It was adopted by the Council, which agreed to award prizes for outstanding mathematical research, with most favorable consideration given to papers distinguished for their exposition and covering broad areas of mathematics. Beyond the first award to Solomon Lefschetz in 1970, there were several prizes a year.

The result was not completely satisfactory as evidenced by the fact that there were no awards in 1973, 1974, 1976, 1977, and 1978. At the same time that it recommended in August 1975 that no prize be awarded in 1976, the Steele Prize Committee proposed a change in the prize. The committee expressed the view that the then current plan for the prizes did not emphasize research to the degree stipulated in the Steele will and was not effective in promoting high quality exposition. The committee recommended replacing the current procedure by a plan formulated by P. R. Halmos calling for “a large prize for a spectacular piece of research to be given on the rare occasions... when such a piece of research comes to light.” Although the committee supported the proposal by a vote of 6-1, it failed in the Council.

In 1976, Hans Weinberger, chairman of the Steele Prize Committee, moved to study the Halmos plan and related questions but the Council voted simply to have an ad hoc committee to consider the future of the Steele Prize. The Committee on Prizes, consisting of James B. Serrin, Chairman, Walter Feit, Phillip A. Griffiths, P. Halmos, Victor L. Klee, P. Lax, and J. Milnor, made recommendations that were approved in the following form by the Council of 16 April 1977. There should be three prizes awarded annually in the following categories:

- (1) for the cumulative influence of the total mathematical work of the recipient, high level of research over a period of time, particular influence

on the development of a field, and influence on mathematics through Ph.D. students;

(2) for a book or substantial survey or expository-research paper;

(3) for a paper, whether recent or not, which has proved to be of fundamental or lasting importance in its field, or a model of important research.

The first prizes under the new formulation were awarded in January 1979.

Here are the Steele Prize awards.

August 1970: To Solomon Lefschetz for his paper, *A page of mathematical autobiography*, Bulletin of the American Mathematical Society, volume 74 (1968), pp. 854–879.

August 1971: To James B. Carrell for his paper, written jointly with Jean A. Dieudonné, *Invariant theory, old and new*, Advances in Mathematics, volume 4 (1970), pp. 1–80.

August 1971: To Jean A. Dieudonné for his paper, *Algebraic geometry*, Advances in Mathematics, volume 3 (1969), pp. 223–321, and for his paper, written jointly with James B. Carrell, *Invariant theory, old and new*, Advances in Mathematics, volume 4 (1970), pp. 1–80.

August 1971: To Phillip A. Griffiths for his paper, *Periods of integrals on algebraic manifolds*, Bulletin of the American Mathematical Society, volume 76 (1970), pp. 228–296.

August 1972: To Edward B. Curtis for his paper, *Simplicial homotopy theory*, Advances in Mathematics, volume 6 (1971), pp. 107–209.

August 1972: To William J. Ellison for his paper, *Waring's problem*, American Mathematical Monthly, volume 78 (1971), pp. 10–36.

August 1972: To Lawrence F. Payne for his paper, *Isoperimetric inequalities and their applications*, SIAM Review, volume 9 (1967), pp. 453–488.

August 1972: To Dana S. Scott for his paper, *A proof of the independence of the continuum hypothesis*, Mathematical Systems Theory, volume 1 (1967), pp. 89–111.

January 1975: To Lipman Bers for his paper, *Uniformization moduli, and Kleinian groups*, Bulletin of the London Mathematical Society, volume 4 (1972), pp. 257–300.

January 1975: To Martin D. Davis for his paper, *Hilbert's tenth problem is unsolvable*, American Mathematical Monthly, volume 80 (1973), pp. 233–269.

January 1975: To Joseph L. Taylor for his paper, *Measure algebras*, CBMS Regional Conference Series in Mathematics, Number 16, American Mathematical Society, 1972.

August 1975: To George W. Mackey for his paper, *Ergodic theory and its significance for statistical mechanics and probability theory*, *Advances in Mathematics*, volume 12 (1974), pp. 178–286.

August 1975: To H. Blaine Lawson for his paper, *Foliations*, *Bulletin of the American Mathematical Society*, volume 80 (1974), pp. 369–418.

1976, 1977, 1978: No awards were made.

January 1979: To Salomon Bochner for his cumulative influence on the fields of probability theory, Fourier analysis, several complex variables, and differential geometry.

January 1979: To Hans Levy for three fundamental papers: *On the local character of the solutions of an atypical linear differential equation in three variables and a related theorem for regular functions of two complex variables*, *Annals of Mathematics, Series 2*, volume 64 (1956), pp. 514–522; *An example of a smooth linear partial differential equation without solution*, *Annals of Mathematics, Series 2*, volume 66 (1957), pp. 155–158; *On hulls of holomorphy*, *Communications in Pure and Applied Mathematics*, volume 13 (1960), pp. 587–591.

August 1979: To Antoni Zygmund for his cumulative influence on the theory of Fourier series, real variables, and related areas of analysis.

August 1979: To Robin Hartshorne for his expository research article *Equivalence relations on algebraic cycles and subvarieties of small codimension*, *Proceedings of Symposia in Pure Mathematics*, volume 29, American Mathematical Society, 1975, pp. 129–164; and his book *Algebraic geometry*, Springer-Verlag, Berlin and New York, 1977.

August 1979: To Joseph J. Kohn for his fundamental paper: *Harmonic integrals on strongly convex domains*, I, II, *Annals of Mathematics, Series 2*, volume 78 (1963), pp. 112–248 and volume 79 (1964), pp. 450–472.

August 1980: To André Weil for the total effect of his work on the general course of twentieth century mathematics, especially in the many areas in which he has made fundamental contributions.

August 1980: To Harold M. Edwards for mathematical exposition in his books *Riemann's zeta function*, *Pure and Applied Mathematics*, number 58, Academic Press, New York and London, 1974; and *Fermat's last theorem*, *Graduate Texts in Mathematics*, number 50, Springer-Verlag, New York and Berlin, 1977.

August 1980: To Gerhard P. Hochschild for his significant work in homological algebra and its applications.

August 1981: To Oscar Zariski for his work in algebraic geometry, especially his fundamental contributions to the algebraic foundations of this subject.

August 1981: To Eberhard Hopf for three papers of fundamental and lasting importance: *Abzweigung einer periodischen Lösung von einer stationären Lösung eines Differential systems*, Berichte über die Verhandlungen der Sächsischen Akademie der Wissenschaften zu Leipzig. Mathematisch-Naturwissenschaftliche Klasse, volume 95 (1943), pp. 3–22; *A mathematical example displaying features of turbulence*, Communications on Applied Mathematics, volume 1 (1948), pp. 303–322; and *The partial differential equation $u_t + uu_x = \mu u_{xx}$* , Communications on Pure and Applied Mathematics, volume 3 (1950), pp. 201–230.

August 1981: To Nelson Dunford and Jacob T. Schwartz for their expository book, *Linear operators*, Part I, *General theory*, 1958; Part II, *Spectral theory*, 1963; Part III, *Spectral operators*, 1971, Interscience Publishers, New York.

August 1982: To Lars V. Ahlfors for his expository work in *Complex analysis* (McGraw-Hill Book Company, New York, 1953), and in *Lectures on quasiconformal mappings* (D. Van Nostrand Co., Inc., New York, 1966) and *Conformal invariants* (McGraw-Hill Book Company, New York, 1973).

August 1982: To Tsit-Yuen Lam for his expository work in his book *Algebraic theory of quadratic forms* (1973), and four of his papers: *K_0 and K_1 —an introduction to algebraic K-theory* (1975), *Ten lectures on quadratic forms over fields* (1977), *Serre's conjecture* (1978), and *The theory of ordered fields* (1980).

August 1982: To John W. Milnor for a paper of fundamental and lasting importance, *On manifolds homeomorphic to the 7-sphere*, *Annals of Mathematics* (2) **64** (1956), pp. 399–405.

August 1982: To Fritz John for the cumulative influence of his total mathematical work, high level of research over a period of time, particular influence on the development of a field, and influence on mathematics through Ph.D. students.

August 1983: To Paul R. Halmos for his many graduate texts in mathematics and for his articles on how to write, talk and publish mathematics.

August 1983: To Steven C. Kleene for three important papers which formed the basis for later developments in generalized recursion theory and descriptive set theory: *Arithmetical predicates and function quantifiers*, *Transactions of the American Mathematical Society* **79** (1955), pp. 312–340; *On the forms of the predicates in the theory of constructive ordinals (second paper)*, *American Journal of Mathematics* **77** (1955), pp. 405–428; and *Hierarchies of number-theoretic predicates*, *Bulletin of the American Mathematical Society* **61** (1955), pp. 193–213.

August 1983: To Shiing-Shen Chern for the cumulative influence of his total mathematical work, high level of research over a period of time, particular influence on the development of the field of differential geometry, and influence on mathematics through Ph.D. students.

August 1984: To Elias M. Stein for his book, *Singular integrals and the differentiability properties of functions*, Princeton University Press (1970).

August 1984: To Lennart Carleson for his papers: *An interpolation problem for bounded analytic functions*, American Journal of Mathematics, volume 80 (1958), pp. 921–930; *Interpolation by bounded analytic functions and the Corona problem*, Annals of Mathematics (2), volume 76 (1962), pp. 547–559; and *On convergence and growth of partial sums of Fourier series*, Acta Mathematica volume 116 (1966), pp. 135–157.

August 1984: To Joseph L. Doob for his fundamental work in establishing probability as a branch of mathematics and for his continuing profound influence on its development.

August 1985: To Michael Spivak for his five-volume set, *A Comprehensive Introduction to Differential Geometry* (second edition, Publish or Perish, 1979).

August 1985: To Robert Steinberg for three papers on various aspects of the theory of algebraic groups: *Representations of algebraic groups*, Nagoya Mathematical Journal, volume 22 (1963), pp. 33–56; *Regular elements of semisimple algebraic groups*, Institut des Hautes Études Scientifiques, Publications Mathématiques, volume 25 (1965), pp. 49–80; and *Endomorphisms of linear algebraic groups*, Memoirs of the American Mathematical Society, volume 80 (1968).

August 1985: To Hassler Whitney for his fundamental work on geometric problems, particularly in the general theory of manifolds, in the study of differentiable functions on closed sets, in geometric integration theory, and in the geometry of the tangents to a singular analytic space.

January 1986: To Donald E. Knuth for his expository work, *The Art of Computer Programming*, 3 Volumes (1st Edition 1968, 2nd Edition, 1973).

January 1986: To Rudolf E. Kalman for his two fundamental papers: *A new approach to linear filtering and prediction problems*, Journal of Basic Engineering, volume 82, (1960), pp. 35–45; and *Mathematical description of linear dynamical systems*, SIAM Journal on Control and Optimization, volume 1 (1963), pp. 152–192; and for his contribution to a third paper, (with R. S. Bucy) *New results in linear filtering and prediction theory*, Journal of Basic Engineering, volume 83D (1961), pp. 95–108.

January 1986: To Saunders MacLane for his many contributions to algebra and algebraic topology, and in particular for his pioneering work in homological and categorical algebra.

August 1987: To Martin Gardner for his many books and articles on mathematics and particularly for his column “Mathematical games” in *Scientific American*.

August 1987: To Herbet Federer and Wendell Fleming for their pioneering paper, *Normal and integral currents*, *Annals of Mathematics*, volume 72 (1960), pp. 458–520.

August 1987: To Samuel Eilenberg for his fundamental contributions to topology and algebra, in particular for his classic papers on singular homology and his work on axiomatic homology theory which had a profound influence on the development of algebraic topology.

As has been noted, the Bôcher Prize was initially in the amount of \$100. All of the prizes of the Society were kept at the same level, which was increased to \$200 in 1954. With the advent of the Steele bequest the Steele Prize was initially \$1000. When the terms of the Steele Prize were revised, two changes were made concomitantly. Steele Prizes were set at \$1500 and it was agreed to augment each of the other prizes of the Society to a total of \$1500 using income from the Steele Prize Fund.

The Steele Prize Fund continued to accumulate faster than it was being disbursed and could be used only for prizes. The Council has always been reluctant to have too many prizes and to subdivide mathematics too finely. Thus the additional funds were used in two ways. Over an interval of about five years, roughly 1980 to 1984, two prizes rather than one were awarded in a field. Second, beginning in 1984 the amount of each prize was set at \$4000.

SECTIONAL MEETINGS

In addition to the Annual and Summer Meetings, the Society has conducted several one or two day meetings each year. The pattern of these has changed very little, consisting of invited hour addresses and contributed papers. The number of hour addresses has increased with time from one or two to three or four. When the concept of Special Sessions appeared, it was introduced at sectional meetings as well. Arrangements are made by the cognizant associate secretary, usually in cooperation with a local department. There is staff support through the Providence office but it does not extend to supplying personnel at the meeting.

CONTRIBUTED PAPERS

The purpose and use of contributed papers have changed. In the original model one did a piece of research, wrote a paper, and submitted it to a journal. At the same time one contributed the paper by speaking about it or offering it by title. The paper was reported by an abstract, ostensibly prepared by the secretary or associate secretary in the beginning but later written by the contributor. There was provision for the possibility that the work was not ready for submission to a journal in that the abstract might be labeled "preliminary report." When the paper appeared, the bibliographic information was printed in the *Bulletin* up to the point that *Mathematical Reviews* came into existence.

In fact, preliminary reports became a more prominent feature and were frequently not so tagged. Moreover, many abstracts appeared that corresponded to no future paper. There were two reasons. It came to pass that many institutions would pay at least part of the travel expenses to a meeting for one presenting a paper. The abstract became a ticket. The pressure to publish caused people to contribute papers. The abstract became a form of publication, albeit not refereed.

Although abstracts are not refereed, they are screened. The bylaw states:

Papers intended for presentation at any meeting of the Society shall be passed upon in advance by a program committee appointed by or under the authority of the Council; and only such papers shall be presented as shall have been approved by such committee.

The committee is the Program Committee in the case of national meetings and the appropriate Committee to Select Hour Speakers in the case of regional meetings. In fact, the cognizant associate secretary does the work, occasionally with the help of a referee or even less frequently by formal referral to the committee. There is occasional serious mathematics that is recognizably in error but an abstract of sixteen lines of eighty characters is usually too brief for an error to be evident. The problems are rare and usually consist of abstracts that are mathematically empty, either mathematical vocabulary without meaning or the promotion of a prejudice or a cause.

COSTS OF MEETINGS

The pattern of paying for the costs of meetings has changed. It was once the case that a major part of the cost was the unrecorded and unrecognized cost that fell on the host institution.

At the meeting of 24 April 1953, Secretary Edward Griffith Begle reported that "there are some institutions which are not able to make provisions for

certain [expenses incurred by host institutions], such as janitorial expenses, and consequently they are borne by the individual members of the host department. This has resulted in the Society's receiving fewer and less frequent invitations." He requested and the Council approved authorization to approve payments of bills for meeting expenses for janitorial fees, printing, etc. but not for entertainment, up to a maximum of \$25 for a one day meeting, \$50 for a two day meeting, and \$100 for a Summer or Annual Meeting, amounting to a maximum of \$600 per year. Experiments in producing programs by a less expensive method than letterpress suggested that the cost of programs could be decreased by at least \$600 per year, so that the total cost of meetings was expected not to increase.

More recently there has been no ceiling except prudence on expenditure for meetings. Registration fees were set with the intent of recovering costs. In fact the Annual Meeting sometimes has a surplus and the Summer Meeting usually has a deficit, the latter frequently larger than the former.

Cost of sectional meetings is not a problem unless one encounters rules requiring a substantial custodial and operating staff at overtime rates.

Book exhibits (and recently computer hardware and software exhibits) have been an increasing source of income at Summer and (especially) Annual Meetings, serving to offset some of the expenses. There has always been a rule that exhibits should be of interest to registrants as mathematicians. At the meeting of 24 April 1953, the Council acceded to a request from the MAA that a restriction on book exhibitors that they show only books at the graduate level or higher be lifted.

REGISTRATION FEES

In the early days of the Society, meetings were handled almost entirely by volunteer help, consisting of the officers, particularly the cognizant associate secretary, and representatives of the host institution. The host institution bore some costs, for example the loan of a department secretary, and supplied classrooms. When hotels were suggested there was no reservation service offered. In this ambience there was little need for registration fees. Meetings held in conjunction with AAAS had registration fees of \$1.00 in the 1920s and early 1930s. The first observed registration fee at a Society meeting was \$0.50 in September 1934 at Williams College. There was a registration fee of \$2.00 at the Semicentennial.

Several factors contributed to the institution and increase in registration fees. More services, such as the handling of room reservations in dormitories and hotels, were offered. Better service, such as preregistration, which obviated waiting in line, was provided. Universities turned to their facilities as a source of income and charged both rent for meeting rooms and conference

fees. Not only hotels but also convention centers were used as meeting sites and the latter had fees for service.

SUMMER MEETINGS

In 1984 the issue was raised by Susan J. Friedlander about whether to continue to hold Summer Meetings. Many arguments on both sides were presented. Summer Meetings lose money, which was a reason the problem was discussed. On the other hand the Summer and Annual Meetings together might break even. The fact that Summer Meetings are of interest to and positively desired by the Mathematical Association of America, with whom they are jointly held, is significant. They serve a different segment of membership from other meetings. They serve substantial scientific purposes, for example the Colloquium Lectures, which might otherwise be lost. On the other hand, the pattern of meetings in general has changed greatly with time, the increase in conferences being an important factor.

In 1986 it was decided to continue to hold Summer Meetings in the indefinite future. The cost sharing with the association had been done by a formula that at one time was fair but that through changing circumstances put the Society at a disadvantage. It was readjusted to equitable terms.

EMPLOYMENT REGISTER

The Council of 9 December 1953 considered a report from the Committee on the Employment Register, consisting of Leon W. Cohen, chairman, and J. A. Clarkson. The committee had consulted with the corresponding committee of the Mathematical Association of America, of which J. S. Frame was chairman. The recommendation was "that the Society undertake to establish a placement service for its members and, in cooperation with interested mathematical and statistical groups, for nonmembers concerned with mathematics and its applications." Various potential difficulties and experiences of related organizations were noted. "It is very likely that any placement agency sponsored by the Society would need to charge fees for its service." "One important consideration, in any feasibility study of the proposed placement service, is its value as an inducement for prospective sustaining [i.e., institutional] members. The schedule of placement fees could be made slightly lower for members... and thus serve to attract both individuals and organizations to seek membership in the Society."

It was the opinion of the Council that an employment register receiving applications from individuals would become a very large operation and thus the Council approved a register consisting only of a file of academic institutions, industrial firms, and government agencies, available at Summer, Annual, and April meetings. Contacts between applicants and employers

were then to be the responsibility of the former. The Trustees were initially insistent on going no further in order to control costs. The stricture did not hold.

A joint AMS-MAA Committee on Employment Opportunities was appointed to operate the register. It consisted of J. S. Frame, chairman, H. M. Bacon, T. R. Hollcroft, M. Ostrofsky, and J. A. Ward. This committee replaced ad hoc arrangements for supervision of the register.

In April 1955 the Council authorized the increase in the committee to seven, with two members representing the Society for Industrial and Applied Mathematics, namely G. W. Patterson and R. Berkowitz.

In August 1956 the Council authorized the committee to prepare a list of mathematicians about to retire. The intent was to alleviate the teacher shortage by effective placement of these persons.

At the Council of 28 January 1958, the committee was discharged with special thanks to Frame. This coincided with his resignation in order to take a leave. The operation of the register became a staff function of the Providence office for the three cooperating organizations. However, an Employment Register Supervisory Committee consisting initially of W. M. Hirsch, chairman and AMS representative, A. E. Taylor, MAA representative, and R. F. Rinehart, SIAM representative, was appointed to handle policy questions. Expenses of operating the register were to be divided.

At the Council of 23 January 1967, it was noted that positions available at institutions censured by the American Association of University Professors had occasionally been listed. After study of the problem the Council of 7 April 1967 agreed to continue with such listings but to footnote them, with the advance knowledge of the employer, as coming from censured administrations. Later the list of censured administrations was published regularly.

The journal *Employment Information for Mathematicians*, later called *Employment Information in the Mathematical Sciences*, was a separate venture that began publication in 1970. It regularly listed open positions. When the legal obligation to advertise positions to comply with legislation about nondiscrimination became apparent, the following policy statement was adopted:

The Council of the AMS adopts the principles that all positions in the mathematical sciences shall insofar as practicable be advertised, and that the standard place for advertisements to appear is in the publication *Employment Information for Mathematicians*.

The matching of applicants and employers to suit in substantial part the wishes of each in an effective scheduling of job interviews at the January meeting became a formidable problem as numbers increased and the system gained credibility. The Mathematical Sciences Employment Register apparently has a unique service. It is dependent on a matching program based on

an algorithm of Donald R. Morrison. See his paper “Matching Algorithms” in *Journal of Combinatorial Theory*, 6 (1969), 20–32. The program is successful in arranging an unusually large number of interviews. Initially the work at a meeting was carried out locally on IBM punched card equipment. Then for a time it was done on the General Electric time sharing system as a courtesy. Since 1979 it has been done on the DEC 2060 in the Providence Office of the Society.

The Employment Register operated at a deficit for many years. This was recovered from general funds of the Society and the Association with a relatively small contribution from SIAM.