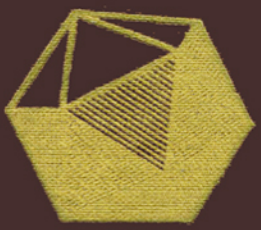
THE MATHEMATICAL ASSOCIATION OF AMERICA



ITS FIRST FIFTY YEARS

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THE MATHEMATICAL ASSOCIATION OF AMERICA: ITS FIRST FIFTY YEARS

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PREFACE

The fiftieth anniversary of the founding of the Mathematical Association of America was celebrated at the 1965 summer meeting at Cornell University [MONTHLY **72,** 1053–1059]. The invited addresses on that occasion dealing with the past, present, and future of the Association and of mathematics, were published in the fiftieth anniversary issue [MONTHLY **74**, Num. 1, Part II] under the editorship of Carl B. Allendoerfer. The historical addresses by A. A. Bennett, R. A. Rosenbaum, W. L. Duren, Jr., and P. S. Jones whetted appetites for a more complete story of the Association. Early in 1966, on a recommendation of the Committee on Publications, President R. L. Wilder appointed a Committee on the Preparation of a Fifty-Year History of the Association consisting of Carl B. Boyer, Kenneth O. May (Chairman), and Dirk J. Struik. An appropriation of one thousand dollars was set aside to meet incidental expenses.

The Committee began its work with very ambitious plans, hoping to get financial support for interviewing older members of the Association and the preparation of special studies on particular aspects of the Association's work. However, financial belt-tightening had already begun in Washington, and other projects appeared to have a higher priority. Accordingly the Committee fell back on methods that had proved effective since the time of Herodotus, namely the patient and inevitably slow collection of materials by a number of scholars. Richard W. Feldmann provided a manuscript on the early history of the MONTHLY and detailed notes gleaned from examining the entire back files of the AMERICAN MATHEMATICAL MONTHLY. Harriet F. Montague and Kenneth O. May examined the files of the Association at the University of Buffalo. Robert E. Horton and Winifred Wisan supplied information about the MATHEMATICS MAGAZINE. Many colleagues took time for conversations about the Association with editors or authors. Others made suggestions and helped track down information. With the cooperation of Lyle E. Mehlenbacher, chairman of the Committee on Sections, section officers were asked to supply local historical information. They responded magnificently and the chapter on the Sections was the first to be completed in September of 1968. The last manuscript to arrive came early in 1971. Gregory H. Moore prepared the appendices from examining the MONTHLY and materials supplied by the national office of the Association.

I hope that the patience of the Board of Governors and others anxious to see the history appear will be rewarded by the final result.

We realize, of course, that this is not a "complete history", something that can never be written in any case. Many interesting aspects of the development of mathematics in the United States and of the history of the Association are unmentioned or incompletely developed: the early history of American mathematics in the nineteenth century, foreign influences, the rapid development toward the end of the nineteenth century, the gradual attainment of independence by American centers, the motivations and differences of opinion concerning the founding of the Association (in reviewing the manuscript, Dirk Struik wrote "The whole early MONTHLY and MAA movement seems to have been strongly midwest. What was the reason? Eastern snootiness? Or just a fresh prairie wind blowing over the grassroots country?"), the reasons for and the degree of success of the attack on mathematics in the twenties, the consequences of that attack as they became evident in the early years of World War II, the influence of the refugees from Europe before World War II, and so on. We hope that scholars will be inspired to investigate these and other matters further and to communicate their findings in the pages of the Association journals or in booklength studies. The forthcoming eighty-year index of the MONTHLY will facilitate such researches.

KENNETH O. MAY, *Editor*

Note on citations: References to the AMERICAN MATHEMATICAL MONTHLY are given in square brackets in the form [MONTHLY, volume in bold face, pages]. Arabic numerals in square brackets refer to footnotes at the end of the chapters. When the footnote number is followed by a semi-colon and numerals, the latter give page references within the cited publication.

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CHAPTER I. HISTORICAL BACKGROUND AND FOUNDING OF THE ASSOCIATION

Phillip S. Jones

1. COLLEGIATE MATHEMATICS IN THE COLONIAL YEARS TO 1800.

Two colleges, Harvard (1636) and William and Mary (1693), were founded prior to 1700 in what was to become the United States. Eleven more were added by the time of the Revolutionary War, and seventeen more, for a total of thirty, had their beginnings prior to the nineteenth century [**31**; 738–743].

These colleges were small, often with fewer than 100 students, with a correspondingly small staff which had to teach all subjects. Their entrance requirements were limited by the background of their students, boys 15 and 16 years of age whose preparation for college often was tutoring in Latin and Greek by local ministers. College curricula were limited by their entrance requirements, the purposes of the colleges, and the background of their faculties.

The Boston Latin Grammar School was founded in 1635. By 1700 about thirty New England towns had such schools [**20**; 18]. These grammar schools had some public support, but tended to be modeled after English grammar schools and to be attended by children of wealthy families. They

taught chiefly Latin and literature with some attention to writing in preparation for college and careers in the ministry, medicine, or law. Later, some arithmetic was introduced into the grammar schools by public demand, but pre-college instruction in arithmetic was likely to have been received from private tutors, singly or in special classes. However, the number and quality of these schools were such that Cajori [8; 74] remarked in discussing the early history of Dartmouth College (founded in 1769) that "As in other localities, so in New Hampshire, the means of fitting for college were very imperfect and many of the college studies were inadequately pursued". In fact, three of Dartmouth's first class had attended the Indian Charity School in Lebanon, New Hampshire.

The need for training children to be merchants, artisans, surveyors, and navigators led to a decline in support for the grammar schools which was accelerated by the opposition to taxes associated with the Revolutionary War. A new type of secondary school began to develop rather slowly with the founding of the first academy by Benjamin Franklin in 1749–1751. The academies were more practical in their orientation and taught mathematics for three purposes: immediate use, college preparation, and mental discipline. The academies did not develop extensively until the latter half of the nineteenth century. Our present free public high schools also began to develop, largely in the North, after the Civil War.

The secondary school situation was reflected in college entrance requirements. The first mathematical entrance requirement was arithmetic, required at Yale in 1745, at Princeton in 1760, and at Harvard in 1807. In 1816 Harvard moved on to require "the whole of arithmetic", having asked only for the four fundamental operations, "reduction", and "the rule of three" in 1807. Algebra was added to Harvard's entrance requirements in 1820, but geometry was not required by colleges until after the Civil War.

The entrance requirements and the general low regard for mathematics were reflected in collegiate curricula. The early colleges had no electives. The only mathematics taught at Harvard in 1642 consisted of arithmetic and geometry taught on Mondays and Tuesdays from ten to eleven for three quarters to students in the third and final year of the curriculum. They studied astronomy in the fourth quarter. These subjects were taught by Henry Dunster, president of the college, in medieval style, reading from a text and expounding on the more difficult passages. He taught in English rather than Latin because mathematics was considered more practical than scholarly [19; 141, 209]! When Harvard instituted a four year program, mathematics was moved to the last year.

As late as 1726 the only mathematics taught at Yale was a smattering of arithmetic and surveying in the senior year. In 1748 Yale required some mathematics in the second and third years. A study of student manuscript

notebooks shows that algebra entered instruction as early as 1730 at Harvard, 1750 at Princeton, and 1788 at the University of Pennsylvania [**24**]. Something of conics and fluxions was taught as early as 1758.

The first commencement "theses" at Harvard were given in Latin in 1653. These were not theses in the sense of dissertations but in the sense of propositions to be proved — or disputed. They included "Prime Numbers are Indivisible by any Factor" and "In any triangle the greater side subtends the greater angle" [**19**; 589 ff]. There was a thesis on conics in 1711, on fluxions in 1719, and on algebra in 1721 [**11**; 347]. The thirty mathematical "theses" presented at the 1718 Yale commencement included 2 general, 4 arithmetic, 8 algebraic, 7 geometric, 2 logarithmic, 2 trigonometric, and 5 astronomical [**24**; 32].

The limited mathematical curriculum in these early colleges and their small student bodies suggest that their faculties contained no specialists in mathematics. For example, in its initial year, 1746, all the classes at Princeton University (then the College of New Jersey) were taught by its president, Jonathan Dickinson, and one tutor, Caleb Smith [**18**; 116]. The first person in the Colonies to bear the title of Professor of Mathematics was Reverend Tanaquil Lefevre, the son of a French diplomat, appointed at the College of William and Mary in 1711 [**21**]. Both he and Isaac Greenwood, appointed the first Hollis Professor of Mathematics and Natural Philosophy at Harvard in 1726, served short terms, Lefevre for only eight months, and were dismissed for what was considered misbehavior. When Lefevre later sought a position in divinity, philosophy, mathematics or grammar, he referred to the "hog drivers, authority and power" at William and Mary!

In 1729 there were six professors of mathematics in the colonies and all were graduates of Edinburgh, Oxford, or Cambridge [**21**]. Many of these were professors of mathematics and "natural philosphy" (Physics). Astronomy also was frequently associated with mathematics. For example, John Winthrop, Isaac Greenwood's successor at Harvard (1738) who introduced the study of fluxions there in 1751, was best known for his astronomical observations reported in the Philosophical Transactions of the British Royal Society. Associations with the ministry and combined teaching responsibilities recur frequently as one surveys the mathematics staffs of colleges before the nineteenth century — and even well into it. Some foreign study, or even foreign birth was not uncommon among these early professors. For example, Isaac Greenwood had visited and presumably studied in England; Walter Minto, Professor of Mathematics at Princeton from 1787–1796, was a Scotsman who was appointed upon the recommendation of the Earl of Buchan with whom he had written a biography of John Napier.

This discussion of professors, however, should not obscure the facts

about the number, nature, and role of "tutors" in the thirty colleges founded before 1800 as well as throughout most of the nineteenth century. Graduates of the colleges were frequently retained for the next one to three years as tutors, and often became professors after this period. Cajori in his discussion of Dartmouth College wrote, "The requirements for admission to American colleges in those days were low, and the system of choosing tutors, to whose care freshman and sophomore classes were entirely committed, was enough to destroy any chance of rectifying the errors of bad and insufficient preparation. Not infrequently a fresh graduate who had excelled in classics alone with very little taste for mathematics, would be chosen to fill a tutorial vacancy requiring him to teach mathematics, and vice versa" [**8**; 74].

An account of an early period in the history of Columbia College (then King's College) may furnish a good conclusion to this section by revealing something of the size, staff, vicissitudes, and curriculum of colleges near the end of the eighteenth century. In November of 1757 President Johnson of Columbia College retired with his family to Westchester because of a smallpox epidemic in New York. He left thirty pupils in three classes in charge of a tutor who "was unable to do them all justice". As a result the Governors appointed Mr. Daniel Treadwell, "a young gentleman of very excellent character, educated at Harvard College and recommended by Professor Winthrop as eminently qualified for that station, Professor of Mathematics and Natural History". He taught "the two senior classes in Mathematics and Natural Philosophy and the youngest class in the Latin and Greek Languages" for £ 100 per year! Treadwell was again left in charge in October 1759 as the president fled another smallpox epidemic. Treadwell died of consumption in the spring of 1760 [**15**; 22–25]!

A history of Columbia College remarks that its revised curriculum of 1763 was substantially a copy of that of Queens College, Oxford, but with more attention to mathematics and science than was customary in most English and American colleges. However, in this year Columbia deleted the admission requirement "for arithmetic as far as the rule of reduction" which had been set up in 1755. In 1789 the freshman class met two hours per week to study "roots as far as cubic equations". The sophomore class met 2 hours per week to study Euclid, plane trigonometry and mensuration, surveying and navigation. The junior class met once a day to study conics, projections of the sphere, spherical trigonometry and its application to astronomy, higher algebra, the applications of algebra to geometry, and fluxions. The senior class daily studied the properties of matter, mechanics, powers, optics, astronomy [**15**; 72, 205].

Initially, then, American higher education was patterned after that of Oxford and Cambridge except for the addition of Hebrew. As a result, prior

to the Civil War, American colleges graduated students whose educational status, in mathematics at least, would be only a little different from that of a modern high school graduate [**30**; 11].

2. MATHEMATICS OUTSIDE OF THE SCHOOLS AND COLLEGES

Although it is not a part of our major concern here, it would leave an incomplete view of early American mathematics if we did not mention that as much or more of the real mathematical vigor of the eighteenth century was to be found outside as inside the schools and colleges. We noted the existence of private instruction in arithmetic. Isaac Greenwood and others advertised private lectures and classes in fluxions, mechanics, optics astronomy, and other topics [**29**; 33].

Several of the most prominent persons in early American mathematics were self taught and not initally or primarily associated with colleges. These included Nathaniel Bowditch (1773–1838); David Rittenhouse (1732–1796), an astronomer, instrument maker, and director of the U. S. Mint; Benjamin Banneker (1731–1806), a black man who computed for almanacs; and Robert Adrain (1775–1843), who became vice-provost of the University of Pensylvania. Bowditch and Adrain were the first research mathematicians in the United States.

The interest in astronomy, geodesy, and navigation of these men was natural for the times. With the founding of technical schools and curricula in the nineteenth century American college, mathematics instruction tended to develop an extended concern for applied mathematics, while American research, when it began to develop near the end of the century, tended to be very "pure". Smith and Ginsburg note that of the 58 college instructors in 1833 more than half were also giving courses in natural philosophy [**29**; 45]. Benjamin Peirce (1809–1880) is today so identified with the very pure mathematics of his *Linear Associative Algebra* (1870) that people fail to note not only that its first version was published through Peirce's friends at the U. S. Coast and Geodetic Survey, which he headed from 1867–1874, but that he was at different times a professor of natural philosophy and astronomy as well as of mathematics. Although only about one quarter of Peirce's work was in pure mathematics, R. C. Archibald claims that mathematical research in American universities began with him [**2**; 8]. Peirce graduated from Harvard in 1829, became a tutor there in 1831, and was made professor in 1833. He had helped Bowditch with the proofs of his translation of Laplace's *Mécanique Céleste* while still an undergraduate.

There were no mathematical societies or continuing journals in America prior to the latter part of the nineteenth century, but mathematical interests were represented by several short-lived journals and by a number of members

of the American Philosophical Society and articles in its journal and those of other academies [29; 48 ff]. Problem columns were carried in the *New York Magazine and Literary Repository* (1790–1795) and other popular magazines of the time [29; 51].

3. NEW COLLEGES AND PROGRAMS OF THE EARLY NINETEENTH CENTURY

The nineteenth century brought immigration, western expansion, technological innovations, and rapid developments and interest in science. The growth of science and of technology and related industries such as railroads and mining were strongly reflected in the establishment of new colleges, new schools, and new curricula. The University of Pennsylvania under the influence of Benjamin Franklin and the University of Virginia (1818–1824) under the influence of Thomas Jefferson made early explicit plans for practical curricula and courses in science and mathematics as well as for the classical humanitarian studies. Separate technical schools such as the U. S. Military Academy at West Point (1802) and Rensselaer Polytechnic (1824) were established, and other colleges set up engineering, technical, or scientific schools (Harvard's Lawrence Scientific School (1847), Dartmouth's Chandler School of Science and the Arts (1851), Thayer School of Civil Engineering, New Hampshire College of Agriculture and the Scientific Arts (1866), Yale's Sheffield Scientific School (1860), the Massachusetts Institute of Technology (1861), Princeton's John C. Green School of Science (1873), Columbia's School of Mines (1901)). New degrees, often with a little less prestige than the classical bachelor of arts, were set up. Harvard awarded a bachelor of science degree in 1851, and in 1852 Yale introduced a bachelor of philosophy degree which originally had lower admission standards, required only three instead of four years, and admitted the new scientific subjects as part of the degree program.

The Military Academy was regarded as a center of mathematics during the first half of the nineteenth century, due, in part, to the influence of Thomas Jefferson upon the appointments to its staff [**8**; 84–85, 121. **23**; 228. **29**; 79]. It introduced subjects, texts, and teachers from abroad, especially from France. These included analytic trigonometry and descriptive geometry. The latter was brought by Claude Crozet, a graduate of L'Ecole Polytechnique who wrote a *Treatise on Descriptive Geometry for the use of the Cadets of the United States Military Academy*, published in 1821, probably the first publication on this subject in English. Lacking all printed material on this topic when he began to teach it in 1816, Crozet called in a carpenter and painter and introduced blackboard and chalk into the teaching of collegiate mathematics [**8**; 117].

Charles Davies, a West Point graduate in 1815, served as assistant

professor and professor there 1816–1837. He also wrote a descriptive geometry and translated a number of French texts. These included Bourdon's *Éléments d'Algèbre* and Legendre's *Éléments de Géométrie*, which were widely used for many years. The latter book exerted a strong influence upon American secondary school geometry well into the twentieth century [16]. John Farrar (1779–1853) introduced French mathematics at Harvard. These facts typify the varying foreign influences which have affected American mathematics. We have mentioned teachers from English and Scottish universities and the strong French influence in the early nineteenth century. Later, Americans went abroad for foreign study, especially to Germany. Foreign visitors such as J. J. Sylvester, A. Cayley, and F. Klein lectured and taught here during the latter years of the century. These influences, including foreign journals which published some articles by Americans, will be slighted in this account since they are elaborated elsewhere [8; 44–277, 25; 29; 75–83, 111–114].

4. THE DEVELOPING MATHEMATICS CURRICULUM — NINETEENTH CENTURY

It is difficult to obtain comparable data for the colleges of the last century but the striking similarities among a large sample of schools for which data are available leads us to believe that generalizations are fairly valid.

In 1829 Princeton University enrolled 12 resident graduate students (probably all teaching), 21 seniors, 36 juniors, 17 sophomores and 13 freshmen. For admission the students had been examined on arithmetic. The freshmen studied algebra for the 22 weeks of the winter term and the 19 weeks of the summer term. (Commencement in the last week of September was followed by a six week vacation. A five week spring vacation began in the middle of April.) The sophomores studied Playfair's *Geometry* in the winter term and combined this with plane trigonometry and astronomy in the summer. Juniors met the "applications of algebra to geometry", mensuration, surveying, conic sections and fluxions in the winter and spherical trigonometry "projections and the applications of spherics to astronomy", navigation and mechanics in the summer term. The only mathematical course for seniors was mechanics in the winter term.

Williams College was newer (1793), smaller, and more remote. In 1795 it had six seniors, ten juniors, 37 sophomores, 24 freshmen and 40 students in the associated academy.

An associated academy characterized many colleges throughout the nineteenth century. It was needed to provide the necessary background for students who wished to enter the college but for whom secondary school education was unavailable or inadequate. This typifies a problem which led the University of Michigan in 1870 and 1871, in lieu of establishing an

academy, to set up a system of accrediting and inspecting high schools. This in turn led to the development of regional accrediting associations, the first of which was the New England Association of Colleges and Secondary Schools (1885).

Like Princeton, Williams required arithmetic for admission until the middle of the century. However, Williams required only "vulgar", not decimal, arithmetic and taught arithmetic to freshman through 1836. This was done simultaneously with algebra during the second term. Algebra was continued through the third term. Sophomores studied Euclid for their first two terms with logarithms and trigonometry added during the second term. Juniors had two terms of mensuration, leveling, and navigation, and then a term of analytic geometry, plane and spherical trigonometry and conics.

A chart of course offerings for this century shows a pattern of slowly moving these courses into the earlier years of the curriculum. This movement was based on somewhat increased entrance requirements and accompanied by the introduction of a few new and more advanced courses. At Williams, analytic geometry had moved to the sophomore year by 1839. "Fluxions" had been introduced in the junior year in 1826 and in 1828 were made optional, the other choices being Hebrew or French! These mathematical offerings remained essentially the same until after 1875, with fluxions being renamed the differential and integral calculus some time after 1840 and being moved down into the sophomore year in 1861. At this time "algebra through simple equations" and "two books" of geometry were required for admission.

Near the end of the century the spread of the elective system, begun under President Charles William Eliot at Harvard in 1869, led to the introduction of some more advanced courses, but also to a diminishing of the amount of required mathematics.

By 1892 required mathematics at Williams ended with plane analytic geometry in the first term of the sophomore year, but elective courses in calculus extended through the senior year and were accompanied by elective courses in modern geometry, least squares, mechanics, astronomy. The astronomical emphasis in the curriculum was due to the influence of Truman Henry Safford, Professor of Astronomy, and formerly Professor of Mathematics. He had a Ph. D. in Astronomy from Harvard, continued some research and publication, and directed a doctoral program in this field at Williams. In 1891, Cyrus Morris Dodd, M. A., was Professor of Mathematics, and the Professor of Physics was also an Instructor in Mathematics.

Professor Safford published *Mathematical Teaching and Its Modern Methods* in 1888, one of the earliest "methods" books in the United States. This was used in the second and third terms of the "afternoon senior elective course" in mathematics. The catalogue said this course "will include

a short course of lectures with exercises expressly designed for teachers of Mathematics in the high schools, with especial reference to the history and methods of the several branches; or, at the option of the student, advanced exercises in Gauss' *Theoria Motus Corporum Coelestium*", [**9**; 34]!

The College of New Jersey (Princeton) Catalogue for 1891–92 stated that admission was by examination. The mathematical examinations were in arithmetic, including the metric system, algebra through quadratics and systems of equations in two unknowns, radicals, fractional and negative exponents, and plane geometry.

At Princeton in 1891–2 among the courses required in the freshman and sophomore years were algebra to include the theory of equations, plane and solid geometry, plane and spherical trigonometry, mensuration, navigation, and some analytic geometry. Elective undergraduate courses included differential and integral calculus, and geometry, including lectures on modern geometry, the "geometry of position", and conics. Graduate courses also available to seniors included differential equations, theory of functions, higher algebra, higher algebraic curves, and elliptic functions.

Princeton's John C. Green School of Sciences in its separate section of the catalogue required a little more geometry for admission and noted that admission examinations were given in ten cities as well as Princeton. Its undergraduate program called for two terms of a more extensive differential and integral calculus course to be completed by the end of the sophomore year, and noted that the graduate courses listed above could be elected.

This catalogue also noted that two courses in "pedagogics" were offered and listed three ways to earn an M. A.: (a) by completing three years after the bachelor's degree spent in a learned profession, including teaching, and submitting a satisfactory paper, (b) by devoting at least one of the two years after receiving a bachelor's degree exclusively to study in college under the direction of the faculty and passing examinations, (c) by taking at least one "university" [graduate] course each of two years and passing an examination.

These modes represent the shift from masters' degrees "in cursu" to degrees awarded "pro-meritis". The former could be awarded as a matter of course to holders of an A. B. who had stayed out of trouble and paid fees for three years. They were awarded from 1636 to the time of the Civil War and later. "Pro-meritis," or earned masters' degrees, today would often be regarded as at an A.B. level. Although the University of Virginia and Harvard had offered more substantial earned masters' degrees as early as 1831 and a few other schools made abortive attempts to provide continuing study, the first major university to rehabilitate the master's degree was the University of Michigan beginning in 1858. The first such degree was awarded there in 1859 [**30**; 12, 64].

The requirements for an M. A. at Williams were similar to those at

Princeton. In the first half of the century, many students at both schools stayed on as tutors after receiving an A. B., and, after 2 years, received an M. A. and were appointed professors.,

By 1900 Princeton had also instituted an M. S. degree, which could be completed in one year devoted entirely to the study of science in the college. The list of advanced mathematics courses in the "Mathematical Seminary" conducted by Professor H. B. Fine by this time also included Lie groups, partial differential equations, the theory of algebraic numbers, invariants, the theory of substitutions, Abelian functions, theory of errors and least squares, and historical readings.

Although advanced study and research are not major concerns of the Association or of this history, they should not go unmentioned here because of their effect on the academic atmosphere, the courses offered, and the teaching staff. The concept of research and advanced degrees had been brought back from Europe by persons such as George Ticknor and Edward Everett who in 1815 became the first Americans to attend a German university for the purpose of doing advanced scholarly work [**23**; 118]. In the middle and later years of the nineteenth century many graduates of American universities went abroad for graduate study in mathematics, especially to Göttingen, whose Felix Klein taught such later leaders of American mathematics as E. B. Van Vleck, F. S. Wood and W. F. Osgood. [**29**; 113]. The first Ph.D.'s awarded in the United States were granted by Yale in 1861. The first mathematical doctoral dissertation written in the United States was that of William Elwood Byerly written at Harvard in 1873 on the heat of the sun. There were nine dissertations at Harvard in the period 1873–1900, 32 at The Johns Hopkins University in 1878–1900, 18 at Yale University in 1875–1900, 8 at Columbia in 1880–1900, 12 at Clark University in 1889–1900, and 11 at the University of Chicago 1896–1900 [**29**; 150–153].

The nineteenth century saw a rapid growth of the middle and lower class segments of our population as a result of immigration and industrialization. This fact, together with compulsory school attendance laws (the first was passed in Massachusetts in 1852) produced significant changes in the number, background, and goals of the secondary school population. The demand for teachers and school administrators increased. Both educators and the lay public questioned the appropriateness of the high school curriculum. The colleges became increasingly concerned for the quality of their freshmen and with changes in their requirements and curriculum.

The first public normal school was established in 1839, but such schools did not become common for some years. Special courses for training teachers were begun at New York University in 1832, at Brown in 1850, and at the University of Michigan in 1860. Teachers College of New York, founded in 1888, became associated with Columbia University in 1898. As we

noted earlier in connection with Williams College and Princeton University, colleges and universities were beginning to give more attention to teacher training in both subject matter and pedagogy. Dartmouth taught courses in the teaching of mathematics in 1899 and set up its "Graduate Department of Pedagogy" in 1900–1901, "to give a year of training to men with a Bachelor's degree preparing for instruction or management in the schools". Although there were some summer courses for teachers at Harvard as early as 1871, the first summer mathematics courses were offered in 1891. Dartmouth held its first summer school for grammar school teachers in 1900. That summer the mathematics program included the "important principles and theorems of arithmetic, algebra, plane and solid geometry with some analytic geometry". In the summer of 1901 the program for teachers included "graphic algebra" and some calculus. In 1904 its annual summer conference for teachers was devoted to mathematics. Most of the early summer session programs, however, were private undertakings by one or two instructors, and the courses often did not satisfy degree requirements. The University of Chicago in 1903 was the first to embody in its constitution a provision for regular summer work taught by members of its permanent faculty. By 1904 eighteen universities, largely in the midwest, were teaching mathematics in summer sessions, and Professor H. E. Slaught of the University of Chicago observed that the ratio of men to women students in the summer schools grew as the larger universities and the state normal schools instituted programs for teachers [27].

The National Education Association was founded in 1870 and in the 1890's appointed several committees concerned with mathematics. The first of these was the Committee on Secondary School Studies, often called the Committee of Ten, which in turn appointed a subcommittee to hold a Conference on Mathematics. The conference was composed of ten men also, six mathematicians and 4 secondary school men, chiefly principals of private eastern preparatory schools. The mathematicians were Simon Newcomb (Johns Hopkins), W. E. Byerly (Harvard), Florian Cajori (Colorado College), H. B. Fine (Princeton), G. D. Olds (Amherst), and T. H. Safford (Williams). Although directed to the schools, their recommendations had an impact on the colleges by tending to give a general definition of college preparatory work to which the colleges could adjust their entrance requirements and their freshman courses. They declared that "up to the completion of the first year's work in algebra, the course should be the same whether the pupils are preparing for college, for scientific schools, or intend their systematic education to end with the high school.... Boys going to a scientific school might profitably spend a year on trigonometry and some of the higher parts of algebra, after completing the regular course in algebra and geometry" [3; 133].

In 1899 the N. E. A. received the Report of a Committee on College Entrance Requirements which based its mathematics section on the report of a committee of the Chicago Section of the American Mathematical Society. The only mathematician on the parent committee was H. B. Fine of Princeton, but the Chicago report was prepared by eight mathematicians, a secondary school teacher and a principal, six of whom, including J. W. A. Young, the Chairman, were from the midwest. This committee surveyed existing college entrance requirements to find that in 1896–7 of 432 institutions having a program leading to an A. B. degree, 346 specified arithmetic for entrance, 412 some algebra, 294 plane geometry, 93 solid geometry, 4 trigonometry, 2 conic sections. The Chicago committee's general recommendations were that in the secondary school the standard course in mathematics should be sufficient to admit to college, that this course should be required of all pupils, and that the instruction should be the same for all pupils.

Among their specific recommendations with reference to teaching methodology and course content was one that is reminiscent of present day debates on the role of calculus in the high school. They urged that the secondary school "avoid taking up any of the topics which are customarily treated in college algebra, but rather secure as thorough a mastery as possible of those topics which the college presupposes". The committee qualified this by saying that "these remarks relate solely to the work in algebra required of all pupils in the secondary school. It is not meant to discourage the offering of more advanced courses in algebra or trigonometry to such pupils as may wish to take them" [3; 201–202].

The parent committee recommended that mathematics be taught in each year of the secondary school and suggested an assignment of "units" to the various courses, e.g., elementary algebra $1\frac{1}{2}$ units, to count toward the requirements for admission to college.

These recommendations led to variable entrance requirements at the same college, varied freshman course programs, and the setting up of cooperative college entrance testing programs. For example, in 1901 Columbia University required three parts of the mathematics examinations (algebra, geometry, and problem solving) and made examinations in solid and spherical geometry, advanced algebra, and trigonometry and logarithms optional. Those who did not present advanced mathematics for admission were required to take a year of mathematics in the college. In 1907 Columbia specified that the entrance examinations would be those of the College Entrance Examination Board of the Middle States and Maryland, a forerunner of our present College Entrance Examination Board founded in 1911.

Similar requirements are to be found in other colleges. The entrance requirements and processes at Dartmouth evolved over the years 1890–1914 from examinations in arithmetic (dropped in 1897), algebra and geometry,

to Examinations I and II reaching through algebra beyond quadratics and trigonometry in 1898, to admission by either College Entrance Examination Board tests or a "credential" in 1908, to, in 1914, admission "in accord with the 1903 recommendations of the American Mathematical Society and identified with the College Entrance Examination Board". The influence of the Society and of the Board is clear. A year of mathematics was then required after admission to Dartmouth.

These concerns about admission and graduation requirements accompanied the growth of elective courses in both the high schools and colleges. The colleges began to schedule courses which freshmen with more background skipped, and to struggle with the need for different sections of the same course. In 1890 Dartmouth taught two different versions of their beginning course. In 1898 they replaced this with special courses or sections of the same course in which more exercises were done than in others.

In 1909 a "major" in mathematics at Dartmouth required six hours of course work in each of three groups; A. algebra, solid geometry, and trigonometry; B. spherical trigonometry, analytic geometry and calculus; C. differential equations, determinants, theory of equations, Fourier series, complex variables, or elliptic functions. Courses in probability, theory of errors, and projective geometry were also being offered in this interval.

However, this requirement and these course offerings should not be regarded as typical of the country as a whole even at the end of this period. Although doctoral programs were also growing at several universities, and research journals were developing in the 1876–1900 period, elective courses in determinants and quaternions were the "crowning pinnacle" of the mathematics courses in most of the colleges according to a survey by Cajori published 1890. Cajori questioned if this were their proper place [8; 29–31]. He felt that determinants should form a part of algebra but was uncertain of the place of quaternions. With the help of the United States Bureau of Education he had sent a questionnaire to the universities and colleges of the United States. The following is a partial list of questions and replies tabulated from 168 returns. They are interesting as showing the concerns and the status of instruction at that time as well as the sources and duration of some of today's problems [8; 296–352]:

> *Are students entering your institution thorough in the mathematics required for admission*? 78 out of 111 said no, only 14 yes. *What mathematical journals are taken*? 84 out of 136 said none; and 23 said either the *American Journal of Mathematics* or the *Annals of Mathematics*. *Are there any seminaries or clubs*? Only 9 said yes! *Is the percentage of students electing higher mathematics increasing or decreasing*? 81 out of 141 replied yes, and 27 reported no elective mathematics

courses. *How does analytical mathematics compare in disciplinary value with synthetical? What method of treating calculus do you favor, that of limits, the infinitesimal, or some other? Do scientific or classical students show greater aptitude for mathematics? Which sex? Do you favor memorizing rules in algebra? What reforms are needed in teaching the same?* The replies to the last questions were varied, as suggested by the following examples: "Rules and principles should be deduced from examples." "More practical examples should be given." "More of the spirit and reason and less mere mechanical solution." "The modern methods, as determinants, etc., should be introduced as soon as possible." At least one person wrote "We need no reforms"!

Cajori made a separate analysis of the 45 replies to a similar questionnaire sent to normal schools. Their mathematical courses were arithmetic, algebra, geometry, and a little trigonometry.

In this section we have seen the rise of technical and scientific education, the growth of an admissions problem involving the setting of both standards and examinations, the development of an elective system with the result that less mathematics was being required as more was being developed and offered, slowly rising qualifications for collegiate mathematics faculty, and some indication of a growing collegiate concern for training secondary school teachers. As an introduction to his report of the study cited above, Cajori wrote in 1890, "The mathematical teaching of the last ten years indicates a 'rupture' with antiquated traditional methods, and an 'alignment' with the march of modern thought". The 'rupture' is evident from the publication of such books as... [new texts in algebra, trigonometry, mensuration, and calculus]... Carll's Calculus of Variations; Hardy's Quaternions; Peck's and Hanus's Determinants; W. B. Smith's Co-ordinate Geometry (employing determinants); Craig's Linear Differential Equations". The period 1890–1920 was one of growing problems, need for cooperative activity, and national concern for requirements.

5. FORCES FOR CHANGE 1876–1900.

In 1904, T. S. Fiske in his retiring presidential address to the American Mathematical Society divided the history of American mathematics into three periods, the colonial, up to the founding of The Johns Hopkins University; the developmental period from 1876 to the nationalization of the New York Mathematical Society in 1891; and the period 1891–1904 [**14**; 238]. For our purposes we view 1876–1900 as a period of developing forces for change, and add 1900–1915 as the period leading directly to the founding of the Mathematical Association of America.

A long series of events marked 1876–1900 as the beginning of a new era

in American mathematics. These included: the founding of The Johns Hopkins University in 1876; the arrival of J. J. Sylvester to teach there and to share in the founding of *The American Journal of Mathematics* (1878); the founding of the New York Mathematical Society in 1888, its nationalization in 1891 by appealing for members outside of New York City to help support its new *Bulletin*, and its final re-incarnation as the American Mathematical Society in 1894; the founding of a graduate school at Harvard in 1890; the opening of the University of Chicago in 1891 and the organization of the Chicago Section of the American Mathematical Society in 1897; and the founding of the AMERICAN MATHEMATICAL MONTHLY in 1894.

In its early days, the American Mathematical Society was often concerned with educational problems. We have already cited its involvement, through the Chicago section, with the N. E. A. Committee on College Entrance Requirements in 1899. (Albeit, the record shows that the Society's Council was careful to state that its responsibility ended with the appointment of the committee requested by J. W. A. Young with the support of E. H. Moore.) In 1901 the Society appointed another committee on college entrance requirements which reported in 1903. In 1902 President Moore was empowered by the Council to appoint a committee "to consider the desirable relations of the Society to elementary mathematics". It reported and was discharged in 1904.

In 1892, the constitution of the New York Mathematical Society specified that its *Bulletin* was to be of a "critical and historical nature". Its full title was *Bulletin of the New York Mathematical Society: A Historical and Critical Review of Mathematical Science*, and its first volumes carried articles on the history of mathematics, on pedagogy, even in the secondary schools, reports of meetings, lists of new books, and translations such as that by M. W. Haskell of Klein's Erlangen program of 1872. However, as time passed and the *Bulletin* grew larger, it gave less space to pedagogical matters and reviews, and more to the publication of the papers read before the Society [1; 48–52].

The minutes of meetings show that on September 27–28, 1895 one-half of an afternoon session of the Society was devoted to a discussion of "the mathematical curriculum of the college and scientific school", aud at the meetings of June 28–29, 1900, a part of a session was devoted to a discussion of "What courses in mathematics should be offered to the student who desires to devote one-half, one-third, or one-fourth of his undergraduate time to preparation for graduate work in mathematics?" The discussion was preceded by papers by E. H. Moore, J. Harkness, W. F. Osgood, F. Morley, and J. W. A. Young who spoke on "Collegiate Preparation for the Teaching of Mathematics in Secondary Schools". As years passed, however, the programs of meetings were increasingly concerned with the reporting of

research, and even survey or expository papers such as presidential addresses made few contacts with the undergraduate program.

The retiring presidential address of E. H. Moore delivered on December 29, 1902, was a notable exception to this last remark. He devoted a major portion of it to a discussion of needed improvements in the teaching of mathematics, especially in the high schools but also in the junior colleges. H. E. Slaught wrote in 1920 that this "started a train of thought and action whose far reaching influence has extended through all these years to the present time", and attributes to it the expansion in 1903 of the Central Association of Physics Teachers to include science and mathematics [**26**; 447, 448]. This address has been reprinted frequently [**3**; 246]. Moore's status as a mathematician was unassailable [**10**; 10]. As the first chairman of the University of Chicago's Mathematics Department he brought together the "Chicago Group" and was largely responsible for the organization of the Society's Chicago Section [**1**; 74–84, 144–150]. Nevertheless, D. E. Smith recorded that "It was a fact apparent to all who heard it that the address was not favorably received by many of those present" [**20**; 175]. In 1902 Moore said "Do you not feel with me that the American Mathematical Society, as the organic representative of the highest interests of mathematics in this country, should be directly related with the movement for reform? And, to this end, that the Society enlarging its membership by the introduction of a large body of the strongest teachers of mathematics in the secondary schools, should give continuous attention to the question of the improvement of education in mathematics, in institutions of all grades?" [**26**; 449].

It may be unfortunate that the Society rejected this view. However, American mathematics can be thankful for E. H. Moore who not only himself accepted memberships on educational committees, but who supported and encouraged such protégés as H. E. Slaught and J. W. A. Young.

Herbert Ellsworth Slaught, after completing a bachelor's degree at Colgate University in 1883, taught mathematics at Peddie Institute in Hightstown, New Jersey. He married a fellow teacher in 1885, and became assistant principal and principal of the school for the years 1886–1892. Having decided to seek a university career, he was recommended to President W. R. Harper of the new University of Chicago by Fred T. Gates, a secretary for John D. Rockefeller whom Slaught had met while soliciting funds for Peddie. In 1892 Slaught became one of the first three fellows in the Department of Mathematics of the University of Chicago where he completed a Ph.D. in 1898 and remained until retirement in 1931.

Professor Slaught was an effective representative of the University in its work with secondary schools and teachers while also participating in the founding of the Chicago Section of the American Mathematical Society and later serving as its secretary. He was active in the founding of the Central

Association of Teachers of Science and Mathematics, the Chicago Men's Mathematics Club, and the National Council of Teachers of Mathematics [4; 7]. Slaught's connections with the MONTHLY and with the founding of the Association will be elaborated in the next section.

The Chicago Section of the A. M. S. included members from many colleges and universities of the midwest. One of these was Professor E. R. Hedrick who was at the University of Missouri from 1903 to 1920. His interests and talents embraced not only pure mathematics, but also mechanics and secondary school and engineering education. This latter, incidentally, was also an interest of the Chicago Section of the American Mathematical Society. It held joint meetings with engineers in 1907, 1910, and 1921. In 1910 the Section appointed a committee to study the question of mathematics in technical schools and colleges. During his time at the University of Missouri Hedrick became an editor of the MONTHLY and a founder and first president of the Association [1; 74–78, 223–228]. What a happy series of circumstances brought Benjamin Finkel and his AMERICAN MATHEMATICAL MONTHLY into the sphere of activity of the Chicago group! (See also Appendix 4a.)

6. ACTION AT THE TURN OF THE CENTURY AND THE FOUNDING OF THE ASSOCIATION: 1900–1915

The forces exerting pressure at the end of the nineteenth century continued into the twentieth century and accelerated changes in collegiate mathematics programs. One of these forces was the concern for college entrance requirements, and the development of regional and national testing programs with published syllabi. A second force was the development of options in the manner of meeting entrance requirements and corresponding adaptations in freshman curricula. For example, new college courses were designed for students not majoring in mathematics or science for whom a year of mathematics was a graduation requirement. At some schools this was required of only those students who did *not* present units in advanced high school mathematics for admission.

This situation illustrates two of the many pedagogical and expository interests which were much debated at the time. Should mathematics be required for graduation? If so, should the required mathematics be a "unified" or "integrated" course? At Dartmouth, for example, J. W. Young and F. M. Morgan wrote *Elementary Mathematical Analysis* used there in 1917. Later F. L. Griffin's *Mathematical Analysis* and then F. S. Wood's and F. H. Bailey's *Analytic Geometry and Calculus* were used in the freshman course [5; 18–22]. Other texts of this type were written in this period by C. S. Slichter (1914), and by L. C. Karpinski, J. W. Calhoun and H. Y. Benedict (1918).

Another activity which had begun in the previous century was the setting-up of specialized associations, conferences, committees and learned societies in many fields, nationally and internationally. The Fourth International Congress of Mathematicians (1908) appointed an International Commission on the Teaching of Mathematics which reported in 1912. The American Commissioners were D. E. Smith, W. F. Osgood, and J. W. A. Young. Their subcommittees prepared reports on undergraduate work, graduate work, technological schools and teacher training as well as on elementary and secondary education.

We have mentioned the founding of the National Education Association (1870) and the New York Mathematical Society (1888). These organizational activities seemed to accelerate near the turn of the century. For example the Central Association of Physics Teachers was founded in 1902 and converted to the Central Association of Science and Mathematics Teachers in 1903. This midwestern activity was closely followed by the founding of the Association of Teachers of Mathematics in New England (1903) [22] and the Association of Teachers of Mathematics in the Middle States and Maryland. In 1921 the journal of the latter Association, *The Mathematics Teacher*, became the official journal of the newly formed National Council of Teachers of Mathematics.

New societies, almost inevitably, lead to the setting-up of new journals. In the case of the Mathematical Association of America almost the reverse is true! In mathematics, prior to 1850, there had been six short-lived largely problem solving journals. There were also problem columns or sections in such general journals as the *Saturday Evening Post* [**8**; 94–97, 277–286. **13**; 20. **17**; 569 ff. **29**; 85–91]. However, the mathematical journals continuing from the nineteenth century to the present are the *American Journal of Mathematics* (1878), *Annals of Mathematics* (1884), *Bulletin of the New York Mathematical Society* (1891) (now the *Bulletin of the A. M. S.*), and THE AMERICAN MATHEMATICAL MONTHLY (1894). The first three are chiefly concerned with pure mathematical research. The story of the founding of the Association and of the support of collegiate mathematical instruction is largely involved with the fourth, the MONTHLY.

THE AMERICAN MATHEMATICAL MONTHLY still carries as a subtitle the statement that it was "founded in 1894 by Benjamin F. Finkel, (and) was published by him until 1913. From 1913 to 1916 it was owned and published by representatives of fourteen Universities and Colleges in the Middle West." Professor Finkel told a fascinating story of the early days of this journal in his article "The Human Aspect in the Early History of the American Mathematical Monthly" [**12**]. While teaching school in Ohio and Tennessee he became a countributor to the problem departments of several journals and began to write a *Mathematical Solution Book* "designed to aid in

improving the teaching of elementary mathematics in the rural schools, high schools, and academies." Becoming discouraged with the political aspects of secondary teaching in his area Professor Finkel took a position at the Kidder Institute, Kidder, Missouri and decided to publish a new journal also directed toward the improvement of teaching. He secured editorial assistance from John M. Colaw of Monterey, Virginia and solicited financial help from high school teachers and professors of mathematics. His first responses were from J. M. Greenwood, Superintendent of Schools for Kansas City, and G. B. Halsted, then at the University of Texas. Among the other mathematicians replying were E. H. Moore of Chicago and W. E. Byerly of Harvard, both of whose names recur in connection with committees and activities related to the improvement of collegiate mathematics. These men contributed articles and solicited further support for the MONTHLY. Its first issue contained an article by L. E. Dickson, then a nineteen year old graduate student of Halsted's.

While Professor Finkel moved to Drury College at Springfield, Missouri and then to graduate study at the University of Chicago, he continued, with help from his wife, to publish the MONTHLY in spite of printing and financial problems. Having met Dickson at Chicago, Finkel persuaded him to become an associate editor in 1902 at which time the University of Chicago contributed a subsidy of $50 per year. When Dickson resigned, Finkel, with the support of E. H. Moore, persuaded H. E. Slaught to replace him. With the support of E. J. Townsend of the University of Illinois, Slaught also secured $50 and the editorial assistance of G. A. Miller from that University. Drury College also provided a subsidy for a time.

In the summer of 1912 Finkel discussed with Slaught the probability that the printer, A. S. Dixon of Springfield, could not continue his personal and low cost services to the MONTHLY. As a result Slaught enlisted help from Florian Cajori at Colorado College and E. R. Hedrick of the University of Missouri. The Universities of Minnesota, Nebraska, Kansas, Indiana, and Iowa provided help and editorial representatives W. H. Bussey, W. C. Brenke, C. H. Ashton, R. D. Carmichael, and R. P. Baker beginning with volume 20 for 1913. Colorado, Michigan, Northwestern and Washington Universities and Oberlin College also cooperated.

H. E. Slaught, realizing that this type of support was a little uncertain and feeling that there was a need for more organized and continuing concern for collegiate mathematics, began a campaign to secure broader support. In April of 1914 the Chicago Section of the American Mathematical Society voted to set up a committee of five to report at its December meeting with reference to making recommendations to the Council of the Society on the relations of the Society to the field then covered by the AMERICAN MATHEMATICAL MONTHLY. This committee composed of Alexander Ziwet, G. A.

Miller, E. B. Van Vleck, E. R. Hedrick, and R. P. Baker proposed an Associate membership in the Society for persons with this interest.

In the meantime the minutes of the October 31, 1914 meeting of the Council of the Society noted that "A communication from Professor Slaught suggesting the appointment by the Council of a Committee to consider the general relation of the Society to the promotion of teaching, especially in the collegiate field, was laid over for consideration at the annual meeting." Upon authorization at the December 1914 meeting the president of the Society appointed Professors Fiske, Fine, Hedrick, Osgood, and Slaught as such a committee. At the April 1915 meeting of the Council Professor Fiske reported that this committee voted three to two that the Society should not undertake nor become responsible for publication of the MONTHLY. This report was accepted and adopted. However the Council went on to adopt the following resolution: "It is deemed unwise for the American Mathemattical Society to enter into the activities of the special field now covered by the AMERICAN MATHEMATICAL MONTHLY; but the Council desires to express its realization of the importance of the work in this field and its value to mathematical science, and to say that should an organization be formed to deal specifically with this work, the Society would entertain toward such an organization only feelings of hearty good will and encouragement."

Soon thereafter a committee solicited reactions to the idea of forming the Association. Correspondence brought forth support for organizing the Association from such persons as Professors E. B. Wilson and E. V. Huntington in the east and Arnold Dresden, then at Wisconsin, but opposition from others such as Professor Osgood of Harvard. Finally, Slaught, as Managing Editor of the MONTHLY, circulated a form letter asking the return of a postcard by those believing a new society with four stated functions should be founded. These functions were:

(1) To provide organized activity in the large field between the fields of secondary school mathematics and the field of pure research.

(2) To form a medium of communication and a forum for exchange of ideas between teachers and others interested in collegiate mathematics.

(3) To furnish a place for publication of scientific articles and papers adapted to this intermediate field.

(4) To publish historical articles, book reviews, notes and news, and indeed any matters of interest to the great body of men and women related to this field.

As a result the call to an organizational meeting was signed by 450 persons. This meeting was held at Ohio State University in Columbus, Ohio on December 30 and 31, 1915, at the time of an A. A. A. S. meeting. E. R. Hedrick presided with 104 people in attendance. W. D. Cairns of Oberlin College acted as temporary secretary. H. E. Slaught, representing

the Board of Editors of the AMERICAN MATHEMATICAL MONTHLY who called the meeting, made introductory remarks. All organizational matters except for a choice of name were settled in a three hour session as a committee of the whole. The name was referred to a committee of three who were to consider eighteen proposals. Independently each of the three selected "Mathematical Association of America" which was recommended to the next day's session and adopted.

The nominating committee chose E. R. Hedrick as president and E. V. Huntington of Harvard University as vice president. They were elected with an Executive Council of twelve members. It turned out that three of these were from the east, three from the far west and six from Ohio, Illinois, Kansas, Missouri, Michigan and Colorado.

An Editorial Board and a Committee on Publications were appointed, and a Committee to negotiate with the owners of the AMERICAN MATHEMATICAL MONTHLY to secure it as the official journal of the Association! Although no program had been planned, the committee on arrangements scheduled an illustrated lecture on "The Story of Algebra" by L. C. Karpinski to follow the Friday morning business session [6]. Another example of the vigor of the new society is the fact three of its sections (Kansas, Missouri, and Ohio) had met before the December 30–31 organizational meeting! (See Chapter 5.)

As A. A. Bennett so aptly phrased it in his address at the fiftieth anniversary meeting: "Our Association was founded under especially auspicious circumstances. The many favorable factors were not accidents, nor miracles, nor achieved through serendipity. Some were the end results of a chain of events, not always desired, nor always with the eventual outcome in view. But in large part they were secured through wise planning, tactful compromise, cajoling of the apathetic, courageous facing of pessimists in high places, and unremitting work" (MONTHLY, **74** (Num. 1, Part II), 1).

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CHAPTER II. THE FIRST TWENTY-FIVE YEARS

Carl B. Boyer

1. INCORPORATION AND EARLY PROJECTS

The Association had been organized and firmly established during the first World War, and by the end of that war the membership had reached 1100; but it was not until September 8, 1920 that the Mathematical Association of America was incorporated under the statutes of the State of Illinois. This move was taken in order to permit the Association to receive donations and bequests. (The American Mathematical Society, for similar reasons, was incorporated on May 3, 1923 in the District of Columbia.) As recorded in the Office of the Recorder of Deeds on September 10th, the affairs of the Association were placed in the hands of a Board of Trustees consisting of H. E. Slaught, E. R. Hedrick, and W. D. Cairns. In December of 1939, as we shall see, the Board of Trustees was replaced, shortly before World War II opened, by the now familiar Board of Governors. The offices of the Association remained, throughout the long interval between the wars, at Oberlin, the headquarters of the Secretary-Treasurer, Professor Cairns (see also Appendices 1 and 2).

One is inclined to think of wartime as a period of emphasis on immediately applicable aspects of mathematics. This had to some extent been evident

in the inclusion in the MONTHLY, during World War I, of a section on Collegiate Mathematics for War Service (see Appendix 4a. ii), and the keynote of the Association's third annual meeting at Chicago had been "Mathematics in War Perspective." Nevertheless, activities of the Association in general continued to stress the broader views of mathematics and to keep long-range goals in mind. The direction of the Association's activity toward the end of the war and during the early post-war years can be judged from five standing committees active in 1930: The National Committee on Mathematical Requirements; the Committee on the Library; the Committee on the Mathematics Dictionary; the Committee on the *Annals of Mathematics*; and the Committee on the Bureau of Information. The last-named committee seems not to have been active, and its work evidently was soon abandoned. The Committee on the *Annals* issued a call for more expository articles, for which the Association provided an annual subvention. The Committees on Library and the Dictionary remained active for a number of years, but they met with difficulties. The former committee, through R. C. Archibald, presented a strong case for "A Great Mathematical Library", and the latter committee tentatively proposed a two-volume Dictionary, to be sold at about $5.00 per volume, covering definitions of words which would be useful chiefly to college students. The Dictionary project appears to have met with more favorable response than that on the Library, and discussions generally recognized its desirability and feasibility. Suggested budgets, however, varied greatly in size — from $30,000 to $63,000. A special study of the projected financial needs of the Association included as the largest item the sum of $100,000 for a mathematics dictionary; and the project had the approval of the Council of the American Mathematical Society. Support on such a scale was not available, but the proposal for the Dictionary continued for many years to be regarded as definitely projected and simply awaiting funds, even though the Committee became inactive. (See also references in Appendix 3.)

The Library Committee had a longer life than the Committee on the Dictionary, yet it was scarcely more successful. The Committee had been named as early as May, 1916, when the Association had proposed "to organize a library as soon as possible." The Committee reported from time to time, and in 1921 the Trustees considered the appointment of a librarian. The Association evidently had a small collection of books at Oberlin, and at the winter meeting of the Association in 1922 L. C. Karpinski was named Librarian. However, he resigned a year later, to be succeeded by R. B. McClenon. In 1929 the Trustees approved an allotment of $400 for the printing of a catalogue of the library, but all efforts to build up a significant library seem to have failed. At the summer meeting in Providence in 1939 a Joint Committee on Funds was named by the Association and the

Society to report on needs and plans for raising funds. Among proposals of the Committee was one for a building to house the Society's Library, but shortly thereafter provision was made for the Society's Library in the Low Library of Columbia University. The Association's Library meanwhile languished, and in 1939 the Committee on Library was discharged. At the annual meeting at Columbus in 1939 it was reported that the volumes in the Association's Library duplicated those in the much larger Society Library. Members of the Association seldom availed themselves of the Association Library's loan service, and it was suggested that the Library should either be abandoned or its holdings be built up substantially. Among the actions of the Board of Governors at the 1941 summer meeting in Chicago was the appointment of a committee to study the Association's Library with a view to its discontinuance, inasmuch as its usefulness was very limited. Shortly thereafter the Library was abandoned and its holdings were dispersed.

Tales of Association committees in the early 1920's were not all so doleful. The National Committee on Mathematical Requirements, under J. W. Young as Chairman, had been organized in the summer of 1916, and it was promptly recognized by the federal government as playing an important role in education. The stated purpose of the Committee was to give "national expression to the movement for reform in the teaching of mathematics, which had gained considerable headway in various parts of the country, but which lacked the power that coordination and united effort alone could give." Composed at first of college and university men only, the Committee added to its membership so as to secure representation of secondary school interests. Attempts to secure financial support were unscucessful for two years, in part because of the War, but in 1919 and 1920 generous appropriations were made by the General Education Board of New York City. Office space and clerical staff were secured, and two members of the Committee were able to devote full time to the work of the Committee. With such support, the Committee gathered opinions and suggestions from almost a hundred organizations of teachers, as well as from many individuals. Preliminary reports of the Committee were published by the United States Bureau of Education in 1920 and 1921, and in *The Mathematics Teacher* in 1921. The final report, a volume of over 650 pages, was published by the Association in 1923 under the title, *The Reorganization of Mathematics in Secondary Education*: *A Report by the National Committee on Mathematical Requirements under the Auspices of The Mathematical Association of America, Inc.* The Report had been approved by the Trustees of the Association, who released the members of the Committee with thanks for their work.

The Report of the Committee emphatically recommended that the

seventh, eighth, and ninth years include the fundamental notions of arithmetic, algebra, intuitive geometry, numerical trigonometry, and at least an introduction to demonstrative geometry. Moreover, it urged that this body of material be required of all secondary school pupils. During the tenth, eleventh, and twelfth years increasing attention should be paid to the logical organization. If intuitive geometry and an introduction to demonstrative geometry were included, as recommended, in the earlier years, demonstrative geometry later might be covered in a single term, thus allowing for an additional elective. Algebra during the later years should include the solution of systems of equations involving two or three unknowns, logarithms, progressions, the binomial theorem, and some work in complex numbers. The Report suggested that in solid geometry there could be a shifting of emphasis away from the demonstrative aspects and toward the development of visualization of spatial relations and the solving of problems in mensuration. The course might be given by the beginning of the eleventh year, and it might even employ methods of the elementary calculus. The calculus course, which need not be offered in all high schools, should include limits, velocity, slope, maxima and minima, rates of change, sums, area, volume, and fluid pressure. No formal study of analytic geometry was suggested beyond the plotting of graphs.

A. R. Congdon, the reviewer of the Report for the MONTHLY [31, 91–96] waxed enthusiastic: "In its final form it far exceeds all expectations." He had good words in particular for Chapter VII on "The Function Concept in Secondary School Mathematics," the first draft of which had been prepared by E. R. Hedrick. This chapter emphasized the interrelations of quantities as a means of unifying aspects of algebra, geometry, and trigonometry with each other and with problems of everyday experience. It was not much more than a plea, on an elementary level, for the habit of functional thinking; but it may nevertheless be regarded as intermediary, in more than a mere time sense, between the stress on the concept by Felix Klein and the attention given to it today in the "modern mathematics" movement in secondary schools.

The material in the Report is divided into two parts, of which the first (Chapters I-VIII) contains recommendations such as those mentioned above, presented with some supporting detail. The second part (Chapters IX-XVI) is made up chiefly of reports by specialists on such topics as the status of disciplinary values, curricula in foreign countries, experimental courses, and the training of mathematics teachers. The last chapter contains a Bibliography of 569 items on the Teaching of Mathematics, 1911–1921. Seldom has a committee of the Association presented such an extensive report to so wide an audience as did the National Committee on Mathematical Requirements. (See also references in Appendix 3.)

In at least one respect the year 1920 was a very difficult one for the Association. At the fifth summer meeting, held that year in Chicago, it was announced that printing costs had increased by about 50% during the previous year, threatening to wipe out the Association's balance of about $2,000. Faced by such a threat, the Association dues were increased from $3.00 to $4.00. At this same summer meeting the presidential address by H. E. Slaught called attention to the important role the Association was playing by fostering "the beginnings of research by helping to supply some of the lower rungs which had been lacking in the research ladder." The speaker called attention to the fact that while the Association maintained a vital concern for teaching, it had not become a pedagogical debating society, as had been feared by some of the early opponents to the establishment of the Association.

At the December meeting of the Association, also held in Chicago, the affiliation of the Association with the American Association for the Advancement of Science became effective through a joint session of the Society, the Association, and Sections A and L of the A. A. A. S. Among the actions taken at a meeting of the Association that winter in 1920 was approval of a resolution, proposed by L. C. Karpinski — Resolved, that the Mathematical Association of America favors the national use of the meter-liter-gram system, and urges Congress to take the appropriate steps. The meeting also proposed the establishment of a Life Membership upon payment of $(100 − x) where x is the member's age. In 1939 the rates for life membership were placed by the Trustees on a more appropriate actuarial basis, a chart of rates being published in the MONTHLY [**46** (1939), 134]. On January 1, 1942 the By-Laws of the Association were amended to cancel provisions for life membership.

More important than the formal actions taken at the December meeting in 1920 was an announcement that was made there. Mrs. Mary Hegeler Carus, through the suggestion of H. E. Slaught, had agreed to pay to the Association $1200 annually for five years for the publication of a series of monographs on mathematical subjects. (In 1927 Mrs. Carus generously raised the sum to $2500 annually.) Moreover, it was her intention, if at the end of five years the project proved successful, to give the Association a permanent endowment fund to yield this sum annually. It was agreed that if at some future time the Association deemed it best to cease the publication of such monographs, the funds could be used to promote other mathematical publications. A letter covering these points, dated August 24, 1921 and addressed to Professor H. E. Slaught, was read at the following summer meeting at Wellesley on September 7, 1921. The resulting publication of the Carus Mathematical Monographs has been one of the conspicuously successful activities of the Association. A committee, consisting of Oswald

Veblen, H. E. Slaught, and W. D. Cairns, drew up provisions for the series of monographs, and, at the annual meeting in December of 1922, G. A. Bliss, D. R. Curtiss, and H. E. Slaught were constituted a committee to serve for five years in the selection of manuscripts and the management of the project. Professors Bliss and Curtiss were designated author-editors, with Professor Slaught serving as business manager. It was agreed that the level of the monographs should be such as would appeal to readers with a background including an introductory course in the calculus. Three years later, in 1925, the Carus Mathematical Mongraph series was inaugurated by the publication of G. A. Bliss: *The Calculus of Variations.* A year later the second monograph, D.R. Curtiss: *Functions of a Complex Variable*, appeared. These volumes were a success from the financial point of view, as well as in achieving their expository purpose. In 1927 the third Carus Monograph, H. L. Rietz: *Mathematical Statistics*, was published; but shortly thereafter the approaching depression led to delays in publication. The fourth monograph, J. W. Young: *Projective Geometry*, appeared in 1930, and the fifth, D. E. Smith and Jekuthiel Ginsburg: *A History of Mathematics in America Before 1900*, was published in 1934. By this time well over 10,000 copies of the monographs had been sold, about half to members of the Association, so that the goal of the original donor could be regarded as achieved.

The year 1921 marked not only the generous contribution of Mrs. Carus, but also an interesting bequest, ultimately to be used toward publication of the MONTHLY. W. L. Hardy bequeathed $2000 to the Trustees of Drury College, the income to be used for support of the journal which his friend B. F. Finkel had long edited. However, the Trustees resolved that the income should be used as an annuity for Finkel as long as he desired it, and then the fund should become the Benjamin F. Finkel Fund to be used toward the expenses of the MONTHLY as long as his name continued to appear on the title page as its founder. This Fund has since been important in the work of the Association. Another fund of some significance has been the "Jacob Houck Memorial Fund." Through the suggestions of W. D. Cairns, H. E. Slaught, and others, Miss Bessie Houck in 1924 made a will bequeathing her estate to the Association for the establishment of a fund in memory of her father. When Miss Houck died in April of 1936, the will was contested; but in 1939 the president of the Association, W. B. Carver, announced a settlement which brought the Association something over $7500 to be used, under the direction of the Trustees, "for the promotion of mathematical science or its teaching." It was income from this fund which was used to initiate the Slaught Memorial Papers, described on page 43.

2. THE UNDERGRADUATE CURRICULUM

It was at the Wellesley meeting of 1921 that the National Committee on Mathematical Requirements, whose work was described above, made its report. It is interesting that at this same meeting several papers considered the next stage in mathematical education — mathematics for the freshman year in college. One speaker reported that at that time there were essentially two types of colleges: (1) those teaching college algebra, solid geometry, and analytic geometry in the first year and (2) those teaching parts of trigonometry, analytic geometry, and calculus. W. F. Osgood urged that calculus be included in the freshman year. Discussion of mathematics for the freshman and sophomore years was continued at the annual meeting in Toronto the following December, and again at the summer meeting in 1922. It remained a favorite theme throughout the period between the World Wars. One of the recurring points of disagreement on mathematics for freshmen was the desirability of teaching the same course to future scientists and mathematicians as to other students. At the summer meeting in 1922 J. W. Young spoke on "College Courses in Mathematics for Freshmen", proposing a general one-year course to meet the needs both of those going on and of those not continuing. Some opposed a general integrated course, preferring courses in the separate disciplines.

A suggestion that the freshman course could be made more interesting to all students by assigning broader outside readings led the Trustees, at the winter meeting in Philadelphia in 1926, to ask the president of the Association to appoint a committee of three to draw up a list of suggested assignments in collateral reading in mathematics for freshman and sophomore students in American colleges. This committee, appointed in February 1927, and chaired by A. A. Bennett, submitted an extensive report in the following year. The report supported traditional instruction in mathematics for freshmen and sophomores (regular class exercises, with exposition, problem work, theory and demonstration), but it suggested that a certain amount of historical and philosophical background can provide additional mathematical contacts. A suggested list of readings, covering non-routine topics — historical, biographical, recreational, practical, philosophical, and aesthetic — was drawn up by the committee, with the suggestion that a brief portion of class time be devoted to student discussion, from a fresh point of view, of readings from this list. A modified proposal along these lines, "On Collateral Reading in Mathematics", by J. H. Kusner, was published a few years later [MONTHLY 37, 498–501].

The theme of "The Undergraduate Mathematical Curriculum in a Liberal Arts College" was pursued by F. L. Griffin at the thirteenth summer meeting of the Association at the University of Colorado in 1929. He urged

that the infiltration of mathematics into so many aspects of life made it important that freshman courses, where most students will have their last opportunity for formal study of mathematics, should include a thorough treatment of graphs, the elements of calculus, enough trigonometry to solve triangles and understand simple periodic oscillations, enough analytic geometry to see its power, some work in logarithms and the approximate solution of higher numerical equations, and the basic ideas of statistics, probability, and investments. The sophomore course, he argued, should be equally general, but should contain more drill and further applications. Specialized courses would be given in the last two years of college.

At the summer meeting of the Association at U. C. L. A. in 1932 the paper which led to most discussion was one on "Collegiate Mathematics Needed in the Social Sciences", a report, read by H. R. Tolley, of a committee of the Social Science Research Council. This report called for a course of two (or at most three) semesters which included logarithms, graphs, interpolation, equations and forms of curves, probability, elements of the calculus and curve-fitting. In discussion, those supporting the committee argued that this selection of material would shorten the time required for the completion of the usual courses through the calculus, but others thought the time allotment was inadequate to develop sufficient mathematical maturity to digest the essential concepts.

The discussion of freshman mathematics was resumed a few years later by J. I. Tracey at the annual meeting at Chapel Hill in 1936 in a paper entitled "Undergraduate Instruction in Mathematics." He called attention to the fact that during the preceding quarter of a century the level of instruction in mathematics had fallen, and that a requirement in mathematics had been eliminated at many colleges. He pointed out that most college students took only one year of mathematics—generally a freshman course with some trigonometry, analytic geometry, and calculus. Whether or not this material should be integrated, he said, will depend on the individual teacher, on the quality of textbooks available, and on the objectives of the course. One of the dangers in an integrated course, he warned, is that the logical and rigorous presentation of topics could give way to an intuitional description. "The critical problems of undergraduate instruction," he pointed out, "are in the freshman and sophomore years, and these should receive more serious consideration of our departments." At this same meeting W. B. Carver, in a paper on "Thinking versus Manipulation" noted that examination systems, in spite of all efforts to the contrary, seem to influence our teaching in the direction of formalism rather than insight [MONTHLY **44**, 359–363]. He closed with the following suggestion: "If you teach a boy to carry through, however accurately and correctly, certain processes which he does not understand, what have you accomplished?

Machines are built to do that kind of arithmetic and calculus. But you have done a far greater thing when you have helped the most stupid student you ever had in your classroom to think just a little."

3. THE "DEPRESSION IN MATHEMATICS"

It is difficult for those of us who teach today, when the importance of mathematics is so widely recognized, to realize that during the 1930s the subject was under constant attack, especially on the high school level, and that in many secondary schools the requirement of elementary algebra and geometry had been abandoned. W. L. Duren referred to the period 1915–1940 as a "twenty-five year depression" in mathematics [MONTHLY **74** (Num. 1, Part II), 23–37]. The vast extension of compulsory education had changed its purpose from preparation for college to "life adjustment." During these years there was a tendency to center education about the pupil instead of the subject, and to emphasize the direct and specific, in contrast to the older stress on general or disciplinary values. Enrollment in secondary schools had been increasing at an unprecedented rate, so that while the population in this country doubled between 1890 and 1930, high school enrollment increased 1300%. The result was that the demand for teachers attracted into the field persons without adequate training in mathematics and quite unable to cope with the new courses. Poor teaching, poor texts, and an excessive number of failures of improperly qualified students produced a mighty volume of protest against mathematics.

At the summer meeting of 1933, held in Chicago in conjunction with the World's Fair, the Trustees of the Association, in view of the increasing attacks on mathematics, appointed a Commission to Study the Place of Mathematics in Schools and Colleges. The Trustees also, having earlier in 1928 made overtures to the National Council of Teachers of Mathematics to hold meetings with the Association, again urged joint meetings of the organizations to consider common problems. Representatives of the Association and the National Council met in Cambridge at the 1933 annual meeting of the Association, but members of the Council hesitated to undertake closer affiliation with the Association in view of the need they felt to maintain active contact with administrative groups, such as the National Education Association. Representatives of the Association and the Council nevertheless discussed the strong movement against mathematics in the secondary schools. The attack upon the mathematics of the ninth grade seemed to be the heaviest, perhaps because there the emphasis on drill and technique was strong. On the other hand, a representative of the Council who at the time was editor-in-chief of *The Mathematics Teacher*, admitted that he himself did not favor the requirement of mathematics beyond the ninth grade. He expressed the hope that greater emphasis upon mathematics as a way of

thinking, rather than stress on memorizing, might make mathematics a less hated subject.

In his retiring presidential address at the December meeting of the Association at Pittsburgh in 1934, held in conjunction with the Society and with Section A of the A. A. A. S., Arnold Dresden spoke on "A Program for Mathematics." He expressed concern about the dissatisfaction with the teaching of mathematics in the schools, leading to the dropping of mathematics as a required subject in many parts of the country. The subject no longer held the sheltered position it once enjoyed; and yet mathematics wielded a powerful influence in reshaping our world, both through its content and its spirit. Dresden therefore suggested a three-part program for mathematicians: (1) To make clear the specific aspects through which mathematics contributes to the high purposes we see for it; (2) To determine the relation of these aspects to the rest of the subject matter; and (3) To devise ways in which these aspects can be made effective in the teaching of the subject at various levels. Urging that "the formulation of abstract concepts is the very essence of the subject of mathematics, its warp and woof, the source of its power and of its appeal for many of us", he suggested that perhaps we underestimate the ability of young students in arithmetic and algebra to appreciate abstract concepts. To introduce a program such as that suggested, he concluded, "is a challenge to the intelligence, the insight and the devotion of mathematicians." A joint session of the Association, and the National Council, held during the Pittsburgh meetings, was devoted to a symposium on "The Need for a Reorientation of Mathematics in the Secondary Schools." Here the papers made it clear that the views of the "educationists" differed from those of many teachers of mathematics, but it was agreed that, in view of increased attacks on mathematics over a period of some thirty years, there was urgent need for improved classroom methods and for closer cooperation between educationists and mathematicians in working out a satisfactory program.

The movement to abolish the requirement of algebra and geometry for entrance to college led the University of Wisconsin in 1935 to announce in the MONTHLY that it was introducing two forms of admission. If a student had algebra and geometry, as well as certain units in English and other fields, he was to be given "unrestricted" admission and would be free to pursue all courses and fields of study to which freshmen were eligible. If a student did not have algebra and geometry, he was to be granted only "restricted" admission, under which he could not major in agriculture, engineering, commerce, economics, mathematics, pharmacy, political science, pre-medicine, philosophy, psychology, sociology, or a natural science.

The place of mathematics in the secondary schools was discussed again

at the twentieth annual meeting of the Association in 1935 in a joint session with the National Council and Section A of the A. A. A. S. In seventeen states, it was pointed out, mathematics no longer was a required subject in high schools. It was suggested that the hostility toward the subject, which was not shared in other countries, seems to have resulted from factors in education in general, including (1) a confusion of objectives due to aimlessness resulting largely from Dewey's pragmatic philosophy, (2) doctrines of "progressive" education with emphasis on immediate experience and individual interests and on "felt needs", (3) continuous and incoherent curricular revision based on momentary interests, (4) the problem of mass education with attempts at adaptation to individual needs and interests, (5) a psychology of learning based on a mechanistic conception of mind, and (6) the inadequate training of secondary school teachers.

The seriousness of continuing attacks on high school mathematics was made evident when the Trustees, at the annual meeting in Richmond and Williamsburg in 1938, received a letter from G. C. Evans indicating that there was danger that algebra would be taken out of the ninth grade, not merely on the West Coast but over the country, and that this matter might come to a head at the meeting of the National Education Association in the following summer. The letter was referred to the joint Association and National Council Commission on the Place of Mathematics in Secondary Schools and Junior Colleges, established in 1933, to collect authoritative opinion and forceful arguments and to establish contact with members of the N. E. A. The Report of this Commission was published in 1940 as a Yearbook of the National Council of Teachers of Mathematics.

The brunt of the attack on mathematics in secondary schools was borne largely by algebra, but mathematicians of the time also discussed the high school course in geometry. At the ninth summer meeting of the Association, held at Cornell in 1925, it was urged that a special committee be named to report on the whole question of the teaching of geometry in secondary schools, but the Trustees postponed action on the matter because they felt that the recommendations of the National Committee on Mathematical Requirements, published shortly before, should be allowed to operate unhampered for a reasonable period. However, in 1928, at the thirteenth annual meeting held in Columbus, the Trustees authorized the president to appoint a committee to consider the desirability of a proposed one-year course in plane and solid geometry as an alternative to the high school course in plane geometry. This Committee on Geometry, with Dunham Jackson as Chairman, was appointed jointly in 1929 by the Association and the National Council and reported at the fifteenth annual meeting of the Association in the winter of 1930–1931. The Trustees voted to approve the report of the Committee without passing judgment on the merits of any

particular type of course. The report urged that the proposal to modify the traditional one-year high school course in plane geometry through the inclusion of the essentials of plane and solid geometry in a single year's work should be given all practicable support. Several school boards already had adopted the proposal or had taken steps toward its adoption, and more than half of the twenty-four colleges queried indicated favorable interest in it. It appeared likely, however, that a majority of high school teachers remained unconvinced. The Committee hoped that the College Entrance Examination Board would lend its influence toward accomplishment of the proposal. The Committee at the same time urged the Board to include in its geometry examinations really substantial "originals." The Committee made no recommendations as to specific parts of plane geometry to be omitted, or of parts of solid geometry to be included, but it assumed that there would be a second course, for those going on in mathematics, which would include those parts of both plane and solid geometry omitted in the first course and which would be coordinated with other branches of mathematics.

4. THE EMPLOYMENT PROBLEM

While discussions of the role of mathematics in the schools were in progress, a serious problem concerning the employment of Ph. D.'s in mathematics arose. After World War II the demand for Ph.D.'s, by government, industry and the academic world was to exceed the supply, but the situation during the later years of the great depression in the early 1930's was quite different. In 1932 the Association and the A. A. A. S. expressed concern that universities could not absorb all those earning the Ph.D. in mathematics (and in other fields as well).In view of this situation, the Trustees at the annual meeting at Atlantic City in 1932 discussed the possibility of adapting the training of candidates for the Ph. D. in mathematics to teaching positions in secondary schools and junior colleges. At the summer meeting in 1933, in connection with the Chicago World's Fair, the Trustees of the Association authorized the appointment of a Commission on the Training and Utilization of Advanced Students in Mathematics. This Commission, under the chairmanship of E. J. Moulton, made a progress report at the succeeding annual meeting in Cambridge of the same year. In view of the scarcity of openings in colleges and universities for teachers of mathematics, it appeared that many highly trained students in mathematics would have to look for positions in other areas, such as junior college or high school teaching. The Commission cautioned advanced students in mathematics who might become candidates for positions in secondary schools that they should prepare to meet the legal requirements, including credits in Educa-

tion and Practice Teaching, of the state in which they hoped to teach, and that they should carefully consider their whole program of study in preparation for such work.

In 1934 the Commission published a report giving specific details on one aspect of its problem, "The Unemployment Situation for Ph. D.'s in Mathematics" [MONTHLY **42**, 143–144]. There were 120 old Ph. D.'s in mathematics seeking positions for 1934–1935, and there were 60 new Ph. D.'s most of whom were seeking positions. Questionnaires were sent to the 180, and of these 149 replied. Only 14 were actually unemployed, but others had only makeshift positions. Roughly 40 or 50 Ph. D.'s in mathematics had not found appropriate employment; and it is possible that part of the burden of unemployment was passed on to graduate students who might normally have held instructorships but who were displaced by Ph. D.'s. In compiling statistics on the number of Ph. D. degrees granted, the Commission noted that five-year averages increased from 24 in 1910–1915, to 25 in 1915–1920, to 26 in 1920–1925, to 45 in 1925–1930, and to 75 in 1930–1935. The Commission anticipated, however, that the demand would exceed the supply of Ph. D.'s in the near future, in view of the fact that of 3488 mathematics teachers in the colleges of the United States and Canada, only 937 held doctorates. The forecast of the Commission was indeed correct, and the employment situation for Ph. D.'s in mathematics improved markedly in later years.

5. TEACHER TRAINING

The Commission meanwhile had formed a sub-committee to report on the Training of Teachers of Mathematics, and a report by this sub-committee was approved by the Trustees in December, 1934, at the annual meeting in Pittsburgh. [This important report was published in full in the MONTHLY **42**, 263–277.] Thinking primarily of college teaching, the report recommended three years of advanced study under a department of mathematics. With the facilities then available it was anticipated that this should produce about 100 teachers of mathematics at a level equivalent to the Ph. D., and normal replacement requirements were expected to be sufficient to absorb them into college teaching. The sub-committee noted, however, that the Ph. D. program placed emphasis on specialized training and research, yet studies showed that 80% of the Ph. D.'s in mathematics do no research beyond that for their degree. The sub-committee therefore questioned the desirability of demanding a research thesis for all Ph. D.'s. It suggested that a broader program, together with expository papers, could replace the thesis research requirement. The sub-committee proposed that there be two types of degree: Type I, based upon three years of study and research, and Type II, based upon three years of broad study. Some universities might offer only

Type I, but the sub-committee felt that no department of mathematics should offer Type II unless it was able to offer Type I as well. It was assumed that a final examination, perhaps both oral and written, would be required in all cases, and a major expository thesis might be required in Type II. For both types of program the sub-committee recommended observation and practice teaching and reading in the literature, all guided by a member of the department of mathematics. Whether a new name should be provided for a degree of Type II the sub-committee left undecided, feeling that such a degree could appropriately be called either a Doctor of Philosophy or a Doctor of Mathematics.

Assuming that the first year in the three-year program suggested above was broad in scope, the sub-committee felt that this year of training, together with a possible expository thesis, could serve as the basis for the Master's degree, whether for secondary school teaching or for other goals. More specifically, for the training of secondary school teachers of mathematics the sub-committee recommended a very substantial program of college training in mathematics and related fields, together with proficiency in English composition and cultural training in fields other than mathematics. In addition it recommended (a) a one-year course in methods of teaching and practice teaching in secondary mathematics and pertinent material in educational measurements and educational theory (10 semester hours), and (b) methods of teaching in a principal minor field selected by the student, and any additional material on history or psychology or administration of education as could be justified (not more than 5 semester hours).

A few years after the sub-committee had submitted the above report, the MONTHLY published a substantial article [**46**, 428–434], "On the Training of Teachers for Secondary Schools", by B. W. Jones, in which the author differed from the sub-committee on an important point. Jones suggested that the first year of a three-year program for the doctorate may *not* be the best preparation for a high school teacher, for the path leading to research generally is a narrow one, whereas the secondary school teacher needs breadth of outlook. A course in history of mathematics, for example, seldom is included in graduate programs, yet such a course would be highly useful for a teacher. A Master's degree for the prospective teacher should be stricter than the usual M. A. in thorough understanding, but not so strict in degree of advancement in courses. Standards, though different, should be equally strict.

6. THE DOCTOR'S DEGREE

The Commission on the Training and Utilization of Advanced Students in Mathematics presented a further report at the twentieth annual meeting

in St. Louis in 1935. This consisted of a study, presented by R. G. D. Richardson, of "The Ph. D. Degree and Mathematical Research." [MONTHLY, **43**, 199–215.] The Commission made a tabulation for the years 1890–1933 of papers read before the Society and subsequently published, as well as a record of all doctor's degrees in mathematics conferred through the year 1934. During the years 1862–1934 there had been 1286 doctorates in mathematics earned in the United States and Canada. Except for the interruption in World War I, the report suggested that the number of degrees had been increasing more or less exponentially. The report concluded that "The rapidity with which a mathematical school of high distinction has been built up in America is one of the most striking phenomena in the history of science." At first the country had owe a hedavy debt to Germany, but after 1914 the number of Americans taking degrees abroad had declined rapidly. The Commission found it disconcerting, however, to note that of those who had earned the Ph. D. degree in mathematics, not more than one-fifth had been consistently productive in research.

Even before there had been concern for unemployed Ph. D.'s, the Association in 1927 had announced a new form of service to its members through the maintenance of an office for supplying information with regard to men and women available for appointment to college positions in mathematics. Intended especially for candidates for a first appointment, the Information Bureau for Appointments, centered in Columbus, with H. W. Kuhn in charge, did not make recommendations or otherwise serve as a teachers' agency; it served merely as an information center. Later, under E. J. Moulton at Northwestern, the office became known as the Placement Bureau, but in the MONTHLY for 1937 it was announced that the Bureau had been discontinued. It was then felt that the greatest stress of unemployment had passed, and that candidates for positions would be able to secure aid more effectively through other agencies.

7. SELF-EVALUATION AND CHANGE

Self-evaluation is salutary in the best of organizations, and in this respect the Association has been no exception. Opportunity for retrospection and prospection occurred at the fifteenth annual meeting in Cleveland in the winter of 1930–1931 and at the fifteenth summer meeting at the University of Minnesota the following September. The first paper at the former meeting was by B. F. Finkel on "Early History of the American Mathematical Monthly." [MONTHLY **38**, 305–320.] Reminiscing about the years since 1894 when he had founded the MONTHLY, the speaker recalled that it had been the deplorable status of the teaching of mathematics in our high schools and academies that had led him to publish a journal suitable to the needs

of teachers of mathematics in these schools. However, when subscriptions were solicited for the new enterprise, so few came from high school teachers that it became clear that the journal would have to be devoted to the interests of college teachers of mathematics—a goal from which it had not seriously departed since its founding. Whereas the reminiscences of Finkel at the winter meeting had looked toward the past to a period before the Association had been founded and had taken over the publication of the MONTHLY, the retiring presidential address by J. W. Young at the succeeding summer meeting looked to the future. Under the title, "Functions of the Mathematical Association of America" [MONTHLY 39, 6–15], Young declared that "Everything that is worth doing for mathematics, other than research, is a function of the Association." Historical research in mathematics, he noted, is one such function, and he reported that the Association "is all set to revive the *Bibliotheca Mathematica* [the journal edited by Gustaf Enestrom from 1884–1915 — K.O.M.] — it is prevented only by a lack of the necessary funds." (Unfortunately such funds never were forthcoming.) The Association would like also, he said, to have funds to be able to send speakers and lecturers to less favored sections of the country where stimulation is needed. Young thought that, inasmuch as the MONTHLY appealed primarily to college teachers, whereas once it had appealed to college students as well, perhaps the Association should initiate and support a second periodical with particular appeal to college students—a project which might become self-supporting in time. Another function of the Association that was suggested was a popularization of mathematics in the sense of presenting "advanced mathematics from an elementary point of view." After all, Young said, most mathematicians have a faith that their subject is simple, and that "complexities are temporary blemishes which further insight will remove." The Association might also popularize mathematics in the sense that it would convince the man-in-the-street that mathematics is essential to our civilization—and here, too, a new periodical would be appropriate as a vehicle for articles on limited portions of this vast subject. It was pointed out that the Association needs a Committee on Publicity; and the country needs a form of competitive examination such as that given in Hungary for the Eötvös prizes.

Less than six months after he had made the above suggestions with respect to the functions of the Association, Professor Young died on February 17, 1932 at the early age of 52. He had served the Association diligently, not only as president, but as chairman of important committees. He had called attention to the difficulties of mathematicians in various parts of the country in keeping in touch with each other, emphasizing the importance of obtaining funds for publication on a large scale to support an ever increasing literature. In September of 1930, at the summer meeting in Providence, the

Association and the Society had formed a Joint Committee on Funds, with J. W. Young as Chairman, charged with the investigation of the financial needs of the two organizations and with the consideration of ways and means of satisfying them. In late 1931, however, Young was forced by illness to resign; and inasmuch as the general plans of the Committee were at a standstill, the Trustees voted that the chairmanship should remain vacant for the time being. The Committee, having lost its leader, seems not to have been reactivated.

In 1932 W. B. Carver became editor of the MONTHLY, succeeding W. H. Bussey, who had succeeded W. B. Ford five years earlier, and the new editor took the opportunity to restate the policy of the journal. He called attention to the fact that originally the MONTHLY had been "devoted to the interests of collegiate mathematics", but that more recently the journal had published results of mathematical research (subject to restrictions as to length and style of presentation). The incoming editor contemplated no sharp change of policy, but he emphasized that it was the desire of the editors of the MONTHLY that every number of the journal should contain a certain amount of material of interest to the undergraduate. Good expository papers were to continue to be especially acceptable.

Throughout the early years of the Association it had been customary to regard the presidency as an honor to which a man was elected for one year only. All presidents, from E. R. Hedrick in 1916 to Dunham Jackson in 1926, had served but a single year. At the Kansas City meeting in December of 1926 the Trustees voted to recommend changes in the By-Laws with respect to the election and role of the president. Instead of regarding the office as a means of honoring an outstanding member of the Association, it was felt that "the president should serve the Association, not that the Association should honor the president." Inasmuch as a man elected for two years will have greater opportunity to realize his goals for the Association, and is likely to take his duties more seriously, an amendment containing the provision for a two-year term was submitted by the Trustees to the membership, together with arguments for and against the proposal. The amendment was approved, and under the amended By-Laws W. B. Ford was elected to serve as president for two years.

Again in 1937 there was a change in the editor of the MONTHLY, when E. J. Moulton succeeded W. B. Carver after the latter had served a five-year term. In an admirable "Editorial Foreword" the incoming editor described anew the policy of the journal: "The material in the MONTHLY should, we believe, be of interest and service to one or more of the following groups — undergraduates, graduates, and teachers in colleges whose interests are mathematical. Furthermore, each number of the MONTHLY should contain something of interest to each of the groups." Although the MONTHLY has

included minor research papers, "the editors believe that the MONTHLY should not become a competitor of the research journals in the handling of these papers. Clarity of exposition based upon a more moderate mathematical background should characterize papers presented in the MONTHLY."

One of the features which appeared in the MONTHLY at about this time was a section with broad appeal entitled "Mathematical Education"; and among the early papers in this section was one by E. R. Hedrick [MONTHLY **45**, 448–455] on "The Function Concept in Elementary Teaching and in Advanced Mathematics." The purpose of this paper, by the first president of the Association, was "to show the persistence of the function idea through every stage of mathematical development." The author recalled the emphasis Felix Klein had placed on the concept as an integrating device in courses, as well as the prominent role the idea had played in the Report of the National Committee on Mathematical Requirements. He noted that relations between quantities abound in physics and all science and in the life of the world. If we stress the function concept, we can integrate the teaching of mathematics with life and with science. Setting up an equation involves functional thinking, while solving an equation is mechanical. In geometry and trigonometry, analytic geometry and the calculus, the concept of functional dependence ought to be emphasized as it is in more advanced courses.

By far the most extensive analysis of the structure and operations of the Association since its founding was made by the Committee to Review the Activities of the Association, authorized by the Trustees at the summer meeting of 1938, with R. E. Langer as Chairman. This Committee reported at the summer meeting at the University of Wisconsin in 1939 and at the succeeding annual meeting at Columbus in the same year, in both cases making substantial recommendations with respect both to the By-Laws and to the activities of the Association. At the latter meeting the report of the Committee [MONTHLY **47**, 64–84] was accepted by the Trustees, and the Committee was discharged with appreciation for its work. The proposed amendments to the By-Laws had been circulated among the membership in November, and were adopted at the annual meeting of 1939. The Committee expressed the general point of view that the officers, especially vice presidents, should be given greater responsibility for the affairs of the Association, and that relations between the Association and its sections were too tenuous. Turning to specific details, the Committee made five recommendations: (1) That the officers shall be a President, a First Vice President, a Second Vice President, an Editor-in-Chief of the official journal, a Secretary-Treasurer, and an Associate Secretary; (2) That there shall be a Board of Governors to consist of the officers, the ex-presidents for terms of six years after the expiration of their respective terms, and of additional elected governors; (3) That there shall be an Executive Committee consisting of the

President, the two Vice Presidents, the Editor-in-Chief, and the Secretary-Treasurer. This Executive Committee is to prepare the agenda for the Board, to advise the Board, and to review the policies and activities of the Association; (4) That there shall be a Finance Committee of three members, of whom one shall be the Secretary-Treasurer, to report at the annual business meetings of the Association. (In the form finally adopted, the Finance Committee was made responsible to the Board to Trustees.) And (5) that officers and some governors shall be elected by the membership at large and that a governor shall be elected biennially by Regions (of which some fourteen were initially suggested by the Committee). The structural changes described above having been approved by the membership, the Board of Governors, replacing the Trustees, met for the first time on December 30, 1939.

The Committee on Association Activities expressed the belief that the objectives of the Association were not in need of revision, but it added a warning and a number of positive suggestions. The warning concerned "a distinct concentration of ... activities and the associated expenditure of resources upon the field which borders closely upon that of mathematical research. The tendency, moreover, has been toward such concentrations rather than away from it, and this despite the fact that research is not one of the Association's objectives." (This tendency in the MONTHLY had been noted, as we have seen, by the editors some years before.) The Committee assumed that members of the Association who are interested in research express this through membership also in the Society. Hence "it is reasonable to assume that their membership in the Association is articulate, not of their research interests, but of their interests in those activities for which the Association more particularly stands."

The Committee called attention to the fact that the Association had exerted little influence on teachers in the junior colleges, and that there were hints that an independent organization of junior college mathematics personnel might be formed. The Committee warned the Association that it should promptly decide whether to cultivate and support the mathematical activities in the junior colleges or to allow itself to be displaced by another organization from a large part of its domain. The Committee recommended that the Association appoint a small committee to seek out the leaders of the junior college mathematics teaching personnel and to urge them to carry out their objectives under the membership of the Association. The Committee further suggested that space in the MONTHLY, facilities for the presentation of their programs, and representation on the Association's executive Committee be provided for the junior colleges. (This portion of the Committee's report was approved by the Trustees at the summer meeting of 1939.)

The Committee on Association Activities, pointing out that receipts had exceeded expenses for several years, proposed that the additional funds be used to extend the activities of the Association. It indicated that one direction in which this might be done was through the publication of expository pamphlets, midway between the length of an article and the length of a book, the pamphlets to be known as the Herbert Ellsworth Slaught Memorial Publications. The Committee recommended the creation of a standing Committee on Expository Writing to supervise this series of pamphlets, as well as three other standing committees: (1) a Committee on Collegiate Curricula to collect, review, and collate facts pertinent to mathematical instruction in the colleges; (2) a Committee on the Activities of Other Organizations to report items of interest to the Association or its sections and to transmit appropriate items to the MONTHLY; and (3) a Committee on Sectional Meetings to supervise such support as the Association might extend to its sections in the matter of lectures or speakers for their programs. At the annual meeting in 1939 the Trustees authorized committees (1) and (3) as suggested above. On the matter of the Slaught Memorial Papers, President Carver appointed a committee, chaired by C. V. Newsom, to consider the desirability of such a series. This last-mentioned committee sensed enthusiastic approval by college students and instructors in junior colleges and high schools of such further expository efforts, and hence it turned in a favorable report to the Board of Governors. Recommendations on the size, format, and other details were made, and the committee urged that the publication of the Herbert Ellsworth Slaught Memorial Publications be instituted in 1941. (See Appendix 4d.)

Recommendations of the Committee on Association Activities concerning the need to cultivate teachers of mathematics in the junior colleges seem to have borne some fruit, for at the twenty-first annual meeting at Baton Rouge in the winter of 1940–1941 a joint session of the Association and the National Council included a paper by Virginia Modesitt on "The Teaching of Mathematics in the Junior College" and another by D. R. Curtiss on "The Professional Interests of Mathematical Instructors in Junior Colleges." Dr. Modesitt pointed out that needs and interests of junior college students vary more widely than do those of students in four-year colleges. Moreover, many junior colleges require only one semester of mathematics, so that a more general approach than that in traditional courses may be appropriate. The paper by Curtiss was largely an outgrowth of an investigation by a committee appointed by the Association on the recommendation of the Committee on Association Activities. Curtiss reported that his committee had found that the teaching personnel of the junior colleges had been determined largely by affiliations with secondary schools, with the more experienced and capable high school teachers promoted to junior

college positions. Of the 767 mathematics teachers in junior colleges in 1938, only 55 had earned Ph. D. degrees, and many had majored in education rather than mathematics. Only a little over 10% of the junior college teachers were members of the Association, for many of the others felt that the Association represented research interests rather than their curricular and teaching concerns. For his committee, Curtiss suggested that instead of enlarging the MONTHLY to include more material of interest to junior college teachers, the Association might rather consider a second journal, with members of the Association being given a choice between the two publications.

8. PUTNAM COMPETITION

The years 1938 and 1939 were among the most significant in the life of the Association. Besides the remarkably successful results achieved by the Committee on Association Activities, there were two other events of importance in this period. One of these was the establishment of what J. W. Young had hoped for as early as 1931 — a competitive mathematical examination on the college level somewhat similar to that in Hungary. In the MONTHLY for 1938 [**45**, 64–66] it was announced that for a period of at least three years, beginning with the spring of 1938, an intercollegiate mathematics competition was to be held annually to stimulate a healthful rivalry in undergraduate work of mathematics departments in colleges and universities of the United States and Canada. This was made possible by the trustees of the William Lowell Putnam Intercollegiate Memorial Fund, through funds left by Mrs. Putnam in memory of her husband, a member of the Harvard class of 1882. The Association agreed to stand as sponsor to the plan, which was to be operated in its name. The background required for the competitive examination was described as about the equivalent of twelve semester hours of calculus, three each in higher algebra and differential equations, and six in analytic geometry. The original terms, approved by the Trustees on the last day of 1937, called for the president of the Association to appoint a committee of three, one of whom was to be a member of the Division of Mathematics at Harvard, who were to select two examiners to prepare the examination and a reader qualified to grade the examination books. The answer books, identified by number only, were to go to the Secretary-Treasurer of the Association or his delegate for forwarding to a reader. The examination, open only to undergraduates who have not received a bachelor's degree, was to be given on a Saturday from 9:00 to 12:00 A. M. and from 2:00 to 5:00 P. M. Institutions were invited to designate a team of three students from the school, and additional students might take the examination as individuals. Monetary awards were provided for the students

scoring highest, for members of the teams which ranked highest, and for institutions represented by the teams ranking highest. In addition, one of the top five individuals was to receive a $1000 scholarship to Harvard University.

The William Lowell Putnam Mathematical Competition aroused immediate interest among college students, and in the first competition, held in April of 1938, there were 163 individuals from 67 institutions, including 42 teams, and the numbers increased in later competitions. Inasmuch as the questions for the first contest were made up at Harvard, that institution did not enter a team. The top three teams, in order, were those of the University of Toronto, the University of California at Berkeley, and Columbia University. During the early years of the contest the winning school set the questions for the next year, and hence in 1939 the University of Toronto did not compete; and the three winners were Brooklyn College, M. I. T., and Mississippi Woman's College. In 1940 the top teams were from Toronto, Yale, Columbia, and Cooper Union Institute of Technology, the last two being tied for third place. In 1941 the leaders were Brooklyn College, the University of Pennsylvania, and M. I. T.

World War II did not prevent the holding of the fifth Putnam Competition, won by Toronto, Yale, M. I. T., and C. C. N. Y.; but the sixth Competition, which would have been held in March of 1943, was postponed, because of the war, until 1946. (See also Appendix 9d.)

9. MATHEMATICAL REVIEWS

Possibly the most important mathematical event in this country between the two World Wars was the announcement in 1939 that through the munificence of two American foundations it had become possible to found a new international mathematical abstracting journal, to be known as *Mathematical Reviews*, the first number of which was scheduled to appear in late 1939 or early 1940. Proposals for such an abstracting journal had been made as early as the thirteenth annual meeting of the Association in 1928, but a very strong impetus to action was given in the mid thirties by the anti-Semitic policies of the *Zentralblatt für Mathematik* under Nazi domination. Serious discussions of the feasibility of a new journal or of the acquisition from Springer Verlag of the *Zentralblatt für Mathematik* took place in 1938; but without generous support, such a project appeared unattainable. In 1939, with support at hand, definite plans could be made. The new journal, to appear about once a month, was planned to contain several thousand reviews annually, and the first editors were to be J. D. Tamarkin and Otto Neugebauer. The new enterprise was supported through a backlog of $ 60,000 appropriated by the Carnegie Corporation and a gift of $12,000 from the Rockefeller Foundation to cover some of the initial costs. Brown University

agreed to house the project and to aid in editorial work; and the Association and the Society provided subsidies of $1000 each for the first year. The general subscription price of the journal was set at $13 per volume, drastically below actual cost, and, under the original arrangement, members of the Association and the Society were able to subscribe to *Mathematical Reviews* for $6.50.

Partly with a view to aiding indirectly in the support of *Mathematical Reviews*, the Rockefeller Foundation made a handsome gift to Brown University for an experiment in the dissemination of mathematical publications through microfilm. On request from a subscriber to *Mathematical Reviews*, any article reviewed would be sent on film or as filmprint at a price not exceeding cost. At several subsequent meetings of the Association the importance of *Mathematical Reviews* and the microfilm service were emphasized. At the summer meeting of the Association at Dartmouth in 1940 the Board of Governors voted to support *Mathematical Reviews* through annual subventions of $500 for four years.

10. PROJECTS COMPLETE AND INCOMPLETE

It has been through the faithful effort of Association committees, officers, and members, that the organization has been so effective; but upon occasion, through inadequacy of funds or for other reasons, a committee has failed to achieve its objectives, and worthwhile projects have been allowed to lapse. We noted above the cases of the Committee on the Library and the Committee on the Mathematical Dictionary. A more striking instance of failure occurred in the case of the Committee on Standard Departments of Mathematics in Colleges, authorized at the annual meeting in Cincinnati in 1923. The Committee had been charged to "take under advisement the general problem as to how the Association can be of service to departments of mathematics — and in particular to formulate standards to which departments should conform." At the following annual meeting in Washington in 1924 the Committee presented a preliminary report in which it said that it was having trouble in determining what should be considered. How can one define a good college department of mathematics when some colleges emphasize instruction and larger institutions stress research? Equally difficult is an attempt to specify how many hours per week a college teacher of mathematics should teach. When such questions were asked, respondents often expressed extreme mistrust as to the wisdom of the Association in presuming to set a standard. R. D. Carmichael in 1926 resigned as chairman of the Committee on Standard Departments of Mathematics in Colleges, and he was replaced by Tomlinson Fort. But the Committee seems to have made no further progress, and at the annual meeting in

Philadelphia in December 1926, the Trustees decided to release the Committee and to let the work lapse.

Another instance of lack of success was represented by the earlier efforts to hold an international congress of mathematicians in this country. In 1920 an American Section of the International Mathematical Union had been organized by the Division of Physical Sciences of the National Research Council, and among the permanent members was a representative of the Association. During the six months preceding a quadrennial meeting of the Union an enlarged section included three further representatives of the Association. It had been hoped to have the 1924 International Congress of Mathematicians held in this country, but funds were not forthcoming and the Congress was held instead in Toronto. The Association continued to be represented in connection with plans for other international congresses, and in 1938 the Trustees of the Association approved participation in the international congress planned for 1940 at Cambridge, Mass. In December 1939, however, following the opening of hostilities in Europe, it was announced by the Emergency Executive Committee of the International Congress of Mathematicians that it had been decided definitely to postpone the Congress until a more favorable date.

The Association several times had considered proposals for an international journal for the history of mathematics. One of these occasions occurred at the summer meeting at Amherst in 1928, but the Trustees took no action. At the winter meeting at Columbus of the same year the possibility of reviving *Bibliotheca Mathematica*, to serve the interests of historians, was raised. A subscription list had been begun, but this turned out to be inadequate, and the project never reached fruition. Another proposal at this same meeting which remained unfulfilled was one for an English edition of the *Enzyklopädie der Mathematik*. Other less ambitious publication projects of the Association were very successful. One of these, the Carus Monographs, already has been mentioned. Another source of pride for the Association was the publication in 1927–1929 of the sumptuous and scholarly two-volume edition of the *Rhind Mathematical Papyrus*, made possible through the financial generosity and cultural persistence of Arnold Buffum Chace, Chancellor of Brown University. Chancellor Chace had secured permission of the British Museum to make a complete photographic reproduction of the papyrus, written about 1650 B. C. With the assistance of Mrs. Chace, Dr. L. S. Bull (associate director of the Egyptian Department of the Metropolitan Museum of Art), and Professor H. P. Manning of Brown University, the hieratic script of the papyrus was transcribed into hieroglyphic characters and accompanied by a literal English translation on facing pages in volume II. The first volume contains a free translation with commentary, together with an elaborate bibliography of Egyptian mathematics by

R C. Archibald covering the period from 3500 B. C. to 1000 A. D. For seventeen years Chancellor Chace had lavished time and money on the project, which he then entrusted to the Association for publication. On January 1, 1925 a Committee of the Association, with R. C. Archibald as Chairman, recommended the publication of the work, the expense of which was borne by the Chancellor, and in 1929, when Chace was eighty-four years old, the complete work appeared under the auspices of the Association. It had been agreed that 550 copies were to be turned over to the Association, and sale of these provided funds for the Arnold Buffum Chace Fund, to be used in furthering the work of the Association. The short-lived journal *Eudemus*, edited by R. C. Archibald and Otto Neugebauer and devoted to the history of mathematics and astronomy, was published in 1941 and supported in part by money from the Chace Fund; and it was from this Fund that $400 was appropriated to support, together with the Oriental Society, the publication in 1945 of O. Neugebauer and A. Sachs: *Mathematical Cuneiform Texts*. Another publication project of the Association, the reprinting of R. C. Archibald: *Outline of the History of Mathematics*, was approved by the Trustees at the eighteenth annual meeting in 1933.

Among the contributions of the Association toward mathematical publication should be included the subventions to other journals. Contributions to the support of the *Annals of Mathematics* and of the *Duke Mathematical Journal* were made throughout the period between the wars, the support to the *Annals* being increased to $300 per year by the Trustees in 1927. However, the Committee on Association Activities in 1939 recommended reappraisal of these grants, and the Board of Governors agreed that the subventions to the two journals should be discontinued at the end of 1942. At about this same time the Association made a grant of $400 to the *National Mathematics Magazine*.

11. THE CHAUVENET PRIZE

A continuing project of the Association in its effort to improve the quality of mathematical exposition has been the regular award of the Chauvenet Prize. The Chauvenet Prize Fund was initiated in 1925 through a contribution of $100 by J. L. Coolidge, then President of the Association. Subsequently gifts of $500 from W. B. Ford and $100 from Dunham Jackson made it possible to make the triennial award of the prize of $100 from the income of the fund. The prize is awarded for a noteworthy expository paper published during a three-year period by a member of the Association. The first award was made in December 1925, to G. A. Bliss for a paper in the *Annals* in 1924 on "Algebraic Functions and Their Divisors." By 1940

interest rates had fallen so low that income from the fund was insufficient to make the usual award of $100 every three years, and the Board of Governors determined that in the future the award should be reduced to $50. (A complete list of awards is given in Appendix 9a.)

12. MEETINGS

Of the multiform activities of the Association, probably none are more significant than meetings of the membership at which mathematicians exchange ideas, both through personal conversations and through formal papers, and establish friendships and professional relationships. Over the years, with very few exceptions, the Association has held two general meetings a year: the annual meeting, scheduled toward the end of December, and the summer meeting, held in early September. (For the very important Section meetings, see Chapter V.) Two summer meetings were cancelled: one in 1924, in view of the International Congress of Mathematicians held that summer in Toronto, and the other in 1938, in deference to the semicentennial celebration of the American Mathematical Society. Only one annual meeting, that in 1942, was cancelled, due to travel restrictions imposed by wartime conditions. Throughout most of our period the Association held at least one joint session with the Society at summer and winter meetings, and at annual winter meetings the Association frequently held a joint session with Section A or Section L of the A. A. A. S. or (after 1928) with the National Council of Teachers of Mathematics. It obviously is impractical here to describe the hundreds of papers presented at meetings from 1920 to 1940, but perhaps a few further comments, in addition to those above, can be made on activities at meetings of the Association. At the summer meeting at Vassar just after the earthquake that destroyed Yokahama and half of Tokyo in 1923, the Association voted an expression of sympathy to the Physico-Mathematical Society of Japan. At the annual meeting in 1926 the Trustees named R. C. Archibald and Florian Cajori to cooperate with the History of Science Society in arranging an exhibit and a program commemorating the bicentenary of the death of Newton. At the annual meeting in Nashville in 1927 there were several papers of very general interest: President Jackson of the Association gave an address on the human significance of mathematics, and Professor Arnold Dresden gave a paper on some philosophic aspects of mathematics. Incidentally, it was at this Nashville meeting that the Trustees of the Association, as an expression of loyalty to the Society and in view of the unique relationship between the Society and the Association, voted to apply for sustaining membership in the American Mathematical Society.

Occasionally distinguished vistors from abroad spoke at Association

meetings. At the thirteenth summer meeting in Boulder, Colorado in 1930, for example, Enrico Bompiani spoke on "Italian Contributions to Modern Mathematics" [MONTHLY **38**, 83–95], reminding his audience of the importance of contributions made by Italians, especially around the turn of the century. At the twentieth summer meeting, held in 1936 at Cambridge, Mass. in conjunction with the tercentenary celebration of Harvard University, G. H. Hardy brought greetings from Cambridge on the Cam to Cambridge on the Charles. He graciously remarked that "all mathematicians are agreed that for the past ten years or so America has been the first country in the world in mathematics." At a joint meeting of the Association and the Society, Hardy spoke on "The Indian Mathematician Ramanujan." At a joint session of the Association with the Society and The Institute of Mathematical Statistics, R. A. Fisher of the University of London spoke on "Uncertain Inference," showing how recent advances in statistics had resolved some doubts and confusions which had existed earlier.

Upon occasion at meetings of the Association the members were addressed by figures important in American political life. When the annual meeting was held in Washington in the winter of 1924—1925, joint sessions of mathematicians and scientists were addressed by Calvin Coolidge, President of the United States, and by Charles Evans Hughes, then Secretary of State. Two years later at the meeting in Philadelphia in December, 1926, Herbert Hoover, then Secretary of Commerce, gave what was described as a "most inspiring" address on "The Nation and Science." He was at the time Chairman of a Board of Trustees acting under the National Academy of Science to collect a national fund for the support of research in pure science — an adumbration of the present National Science Foundation.

Somewhat unusual as a summer meeting was that one held in Chicago in 1933 in conjunction with the Century of Progress Exposition. As part of the Chicago World's Fair there were exhibits of mathematical models and machines, including a "number theory machine" which D. H. Lehmer had devised and which he demonstrated as part of the mathematical exhibit in the Hall of Science. Essential details of the machine, a photo-electric number sieve, were presented in a paper at a session of the Association [MONTHLY **40**, 401–406]. Exhibited also in the Hall of Science and shown at a session of the Association were slides by L. C. Karpinski illustrating the history of mathematics. G. D. Birkhoff, in a paper on "Mathematics and Art," extended the theory he had presented earlier to the Association in 1925 — that the enjoyability of an object depends primarily on the density of certain elements of order in the aesthetic object. Incidentally, it was at this Chicago meeting that the Trustees authorized the Secretary-Treasurer to issue permits to members of the Association to wear a pin or button adopted as the official emblem of the Association.

The winter meeting of the Association at Cambridge in 1933 was notable for three papers of broad interest. George Sarton, then the leading historian of science, spoke on "The Study of the History of Mathematics." He insisted on the need for organizing the study and teaching of the history of mathematics more seriously than had been done. The purpose of courses in the history of mathematics, he said, is not to create historians, but to educate mathematicians. At the same session J. L. Coolidge gave a paper on "The Rise and Fall of Projective Geometry" in which he traced the subject from its "Early Period" (from the Greeks to 1800), through its "Great Period" (with the work of Poncelet, Chasles, Steiner, and von Staudt), to the period of "The Gradual Decline." The author expressed the opinion that "it would be a disaster to the whole geometric fabric if a time ever came when synthetic methods were completely abandoned." The third paper was by Kurt Gödel, a distinguished member of the Institute for Advanced Study, who spoke on "The Present Situation in the Foundations of Mathematics." At the winter meeting in the following year in Pittsburgh another distinguished member of the Institute for Advanced Study addressed a joint meeting of mathematicians and scientists. This was Albert Einstein, who delivered the Josiah Willard Gibbs lecture, his topic being, "An Elementary Proof of the Theorem Concerning the Equivalence of Mass and Energy." The lecture was given, by the express desire of the speaker, in a hall accommodating only 450 persons.

At the winter meeting in St. Louis in 1935 the Trustees and the membership of the Association, with one dissenting vote, adopted a resolution endorsing the twelve-month equal-quarters plan, known as the World Calendar, for the simplification of the calendar. Again at the summer meeting at Pennsylvania State College in 1937 the Trustees reaffirmed the endorsement of the World Calendar and respectfully requested the Department of State to have the United States represented at the League Conference on the reform of the calendar and to voice its approval of the League's efforts.

13. HERBERT E. SLAUGHT

On May 21, 1937 the Association suffered its greatest loss through the death of its effective founder, Herbert Ellsworth Slaught. Only a short time before, at the annual meeting in Cambridge in 1933, the Trustees and membership of the Association had voted unanimously to suspend the By-Laws and, in view of his long-continued and important contributions to the cause of American mathematics and to the activities of the Association, to elect Professor Slaught Honorary President for life. At the summer meeting in 1937 papers by G. A. Bliss and W. D. Cairns recalled H. E. Slaught as editor, organizer, teacher, and friend. Following the presentation of these

papers, the following resolution, proposed by the Trustees, was adopted unanimously: "With the death of Herbert Ellsworth Slaught on May 21, 1937 an irreparable loss has been sustained by this Association. He is recognized by all as the prime mover in the establishment of the Mathematical Association ... To him the Association owes, more than to any other, its existence and its success... We, the Mathematical Association of America, therefore now formally acknowledge our indebtedness to him and we do resolve to carry out in this Association, in so far as lies in our power, the ideals and the idealism which were his." The volume of the MONTHLY for 1938 was dedicated to the memory of Professor Slaught, who had served continuously as an editor for thirty years.

Among other papers at the Pennsylvania State meeting which sadly lamented the death of the Association's Honorary President was the presidential address by D. R. Curtiss on "Fashions in Mathematics." In this presentation the speaker compared the number of contributions to various branches of mathematics, using the *Jahrbuch über die Fortschritte der Mathematik* as his basis and focussing on three widely separated times — during 1869–1870 and in 1910 and again in 1930. His figures showed that algebra and the theory of numbers had gained somewhat in interest during the first interval (1869–1870 to 1910), but had declined in the second interval (1910 to 1930). Analysis had increased in popularity throughout both intervals, while interest in geometry had declined sharply. In 1869–1870 about 4% of the contributions to pure mathematics had been in projective geometry, but by 1910 the figure had fallen to 2%, and by 1930 such contributions had practically disappeared. Meanwhile, new branches of mathematics, such as mathematical logic and statistics, were growing in popularity. It is interesting to note that whereas in 1869–1870 there were but three papers listed in the *Jahrbuch* in analysis situs, in 1930 there were more than 120 papers in topology. Papers on integral equations began to appear by 1903, rose to a high-water mark in about 1910, and then began to decline; but in this case the subject was merged in the 1920's into functional analysis, and a new surge of popularity began. Such comparisons are a vivid reminder to mathematicians that their subject is far from a static monolithic structure.

14. THE END OF AN ERA

As early as in 1934, at the eighteenth summer meeting at Williamstown, Mass., Arnold Dresden, then President of the Association, had called attention to the distress which had fallen upon Germany, and to avoid the possibility of a similar tragedy in this country he urged his audience to adhere to their mathematical point of view. The situation in Germany steadily worsened in ensuing years, and on September 1, 1939 Europe became

engulfed in war. Repercussions immediately were felt in sessions of the Association. The Trustees within the month had authorized the president of the Association, in consultation with the president of the Society, to consider what measures might be appropriate for mathematicians in connection with the national defense. At the twenty-third summer meeting, held at Dartmouth in 1940, the second session was devoted to the problems in ballistics and aviation, as well as to a report of the War Preparedness Committee which had been set up jointly by the Association and the Society. The Committee's report, presented under the title "War Preparedness Among Mathematicians," emphasized three ways in which mathematicians could serve their country in time of war: (1) Through the solution of mathematical problems essential for military or naval science or for rearmament; (2) Through the preparation of mathematicians for research essential in connection with item (1); and (3) Through the strengthening of undergraduate mathematics education so that it affords adequate preparation in mathematics for military and naval service. At this meeting the War Preparedness Committee also recommended to the Board of Governors three resolutions which the Board adopted: (1) That students in secondary schools be urged to take the maximum amount of mathematics available at their institutions (the neglect of mathematics in the high schools was becoming evident in a shortage of qualified specialists in many areas); (2) That colleges make revisions in their undergraduate curricula through the addition of such courses as elements of mechanics, probability, surveying, navigation, and the essentials of military science; (3) That graduate schools extend courses in applied mathematics, such as dynamics, hydrodynamics, elasticity, aeronautics, ballistics, statistics, and that students be urged to become highly qualified in one or more fields of applied mathematics.

The War Preparedness Committee meanwhile had formed a Subcommittee on Education for Service, and this Subcommittee prepared an extensive report [MONTHLY **48**, 353–362] in which those interested in emergency problems of national defense were warned to guard against attaching too much importance to the most advanced mathematical aspects. Elementary and intermediate mathematics is of use in many directions. Nevertheless, even in an emergency situation it is well to recall that, in order for an individual to use effectively any particular body of technique, his school training should extend a reasonable distance beyond the level of difficulty at which he will apply the technique. The Subcommittee advised against violent attack on certain curricular trends in secondary education, but recommended increased emphasis on applications. College departments of mathematics were urged to avoid indiscriminate introduction of elementary courses in *war* mathematics, for the classical material is to be preferred to such emergency courses.

The year 1941 in a sense marked the end of an era for the Association.

At the twenty-fourth summer meeting in Chicago of that year it was announced that W. D. Cairns, who had served as Secretary-Treasurer of the Association ever since its organization in 1915, had asked to be allowed to retire at the end of 1941. Seldom has an organization owed so much to one member. He had seen the Association grow from a membership of about 850 to a total of over 2100 individual members and 100 institutional members. Moreover, his service had been so distinguished for conscientiousness and financial care that at the annual meeting in 1933 the Trustees had unanimously approved a resolution expressing their deep appreciation to him for the notable efficiency with which he had conducted the work of the Association, and more particularly the astute management of its financial affairs during the depression. The election of W. D. Cairns to Honorary Life Member in 1944 was recognition well deserved.

In a much deeper sense 1941 was the end of an era for all American mathematicians. On December 8, 1941, the day following the disaster at Pearl Harbor, the United States entered World War II. With the country on a war-time footing, the essential role of mathematics, from a practical point of view, was all too evident, and attacks on mathematics in the schools, such as those which had multiplied in the 1920's and 1930's, were at least temporarily silenced. However, the battle for the recognition of the part mathematics plays as an element of our general culture was to be joined again after World War II.

CHAPTER III. WORLD WAR II

Emory P. Starke

Upon the entry of the United States into World War II, and even before, a large number of mathematicians accepted assignments in war industries, in the government agencies involved in the conduct of the war, and in the armed services themselves. It is not easy to determine how many members of the Association were so involved. Items that appeared in the MONTHLY "News and Notices" serve to show something of the exodus from university mathematics faculties, even though most of the individuals who transferred to war work did not bother to notify the MONTHLY of their moves. A good many papers submitted at Association meetings and printed in the MONTHLY dealt with the applications of mathematics in the war effort, and many discussed the construction of courses suitable for the training of men going into the services.

With the introduction of the Navy V-12, the Army Specialized Training Program (ASTP), and others, much space in the MONTHLY was given to notes on the organization of these programs, outlines of courses, appropriate bibliographies, etc. The following statistics give an idea of the extent of these programs at their height, and of the drain they exerted upon the facilities of American universities [MONTHLY **51**, 174]:

ASTP	216 colleges	129,080 trainees
Airforce	151 colleges	66,512 trainees
Navy C	244 colleges	73,486 trainees
Navy Air	17 colleges	7,743 trainees

This totals 276,821 trainees at 440 colleges (duplicates removed). By February 1944, however, due to a shortage of combat troops, the Army suddenly reduced the ASTP program to about 35,000. At the same time an Army Specialized Training Reserve Program was instituted for young men just below draft age. By the end of 1942, there had been an enormous increase in enrollments in mathematics. G. B. Price noted [MONTHLY **50**, 31] increases of 30% as a rule, with a number of colleges and universities reporting several times that much. These increases occurred concurrently with and in spite of decreasing total enrollments in the universities.

This increasing demand for instruction, occurring at the same time as the loss of large numbers of faculty members to the armed services or war industries, created a tremendous and acute shortage of mathematics teachers. By March 1943, with the inauguration of the ASTP in over 200 colleges, the shortage in staff at many universities had reached crisis proportions. To attempt to fill the gap, average teaching loads were increased, non-essential courses were eliminated (however, many specialized courses were added, such as spherical trigonometry and navigation, dynamics, aeronautics, meteorology, ballistics, cryptanalysis), summer vacations were omitted, retired professors and retired Army officers were recalled, and faculty wives and others were pressed into service. Following an appeal from the National Research Council, the effort was made to fill vacancies in physics and mathematics by transfer and reassignment of persons in other fields who had acceptable mathematical training, or could be brought to a satisfactory level of competence by intensive refresher courses.

The situation in the nation's high schools was equally critical. While there were 1,700,000 fewer students in high schools in 1943 than in 1940, enrollments in physics and mathematics rose (at least 7% from 1942 to 1943). To quote the United States Office of Education: "Between the multiplying demand for instruction and the shrinking supply of instructors, there is a gap — a shortage potentially more serious than those in rubber, steel, and other strategic materials. The shortage of knowledge in mathematics and physics is a war emergency." Early in 1944, the Engineering, Science and Management War Training Program (ESMWT) undertook to offer free correspondence courses for those who might serve as high school teachers. The course in mathematics, offered cooperatively by 19 colleges and universities, included topics in arithmetic, experimental geometry, intermediate algebra, logarithms, plane trigonometry, and spherical trigonometry.

A warning that the shortage of mathematicians and physicists would remain with us long after the end of the war was issued by retiring President R. W. Brink at the annual meeting in 1943 [MONTHLY **51**, 61].

Graduate work in mathematics, on the other hand, fell off almost to the vanishing point due to the drafting of graduate students, the employment of graduate instructors on war research and for elementary instruction, and the use of graduate students themselves as instructors. Deferment from military duty was permitted to graduate students only if they were teaching at least 15 hours weekly. By 1944 graduate work in mathematics had virtually disappeared except for women students, men classified 4–F (deferred for physical disability) and men in war industries who registered for evening courses. In an attempt to provide some relief in this grim situation, the National Research Council, under a grant from the Rockefeller Foundation, announced a number of predoctoral fellowships in mathematics and the sciences. Actually 196 of these were granted during 1946. Only 18 of these were in mathematics, since apparently less than a tenth of those who applied were mathematics majors.

In February 1943 the War Preparedness Committee (see p. 53) was discharged and the Association and the American Mathematical Society formed a new committee, the War Policy Committee "to act for mathematicians in the many complex problems which will arise." The Committee consisted of the two presidents, M. H. Stone and W. D. Cairns, ex officio, and G. C. Evans, L. M. Graves, M. Morse, W. Weaver and G. T. Whyburn. The problems which were to be the chief concern of this committee were the deferment of mathematicians and the formulation of plans to alleviate the shortage of teachers of mathematics. The committee was aided by a grant of $2500 from the Rockefeller Foundation (see also Appendix 3).

A Subcommittee on Available Teachers in College Mathematics was promptly formed, consisting of W. D. Cairns, A. Dresden, and J. R. Kline. This subcommittee compiled and maintained a register of vacancies and of mathematicians available for service. The record shows some success — 149 persons were listed, of whom 57 obtained positions though not always at the institutions where the committee suggested their names. (It must be noted that 50 of the registrants had indicated restrictions such as summer only, or limited geographical location.)

In the early days of the War Policy Committee there were sharp debates as to the proper role of mathematicians in the war effort. There were some purists who argued that one who showed interest in applications, even in the war emergency, ceased thereby to be a mathematician. As time went on, the Committee as a whole and individual members were called upon to provide

many kinds of advice and information for Washington, for the colleges and universities, and for industry. Several mathematicians who received top appointments were nominated in the first instance by the Committee. Concern for the growing shortage of mathematicians and the realization that such a shortage would continue into the post-war years prompted discussions of the need for a national effort such as that which culminated in the formation of the National Science Foundation.

The War Policy Committee played a large part in obtaining deferments for students and teachers of mathematics under the Selective Service system. Not until July 1942 did mathematicians generally qualify for deferment. Before that, both graduate students and instructors could be classified 1–A (subject to immediate induction). After that date mathematicians were listed among those engaged in critical occupations. Graduate students were deferred if they were teaching 15 hours a week. Deferment, however, was not automatic and local boards often decided adversely. Then, in many cases, the Committee took up the matter of appeals. After April 1944, broad deferment ceased for almost all able-bodied mathematicians under age 26. However, members of the Committee went to work on praiseworthy cases and obtained a large number of deferments right through until regulations were again relaxed in the summer of 1946.

The War Policy Committee was also active in planning courses and selecting (often, preparing) the texts and examinations for the U. S. Armed Forces Institute (USAFI), and the Army and Navy war training programs. A report on Mathematics in the Navy V–12 Program was prepared by the Subcommittee on War Training Programs and was printed in the MONTHLY [51, 421]. Reports on the ASTP and the Air Forces program were issued in mimeograph form. The War Policy Committee's work came to an end with the submission of a Final Report in November 1945.

In many ways the conduct of the war hindered the Association's work. War travel restrictions created some hardships, but strong sentiment was expressed by President Cairns and others that Association meetings should be continued throughout the emergency. Except for the cancellation of the annual meeting scheduled for New York in 1942, and the Montreal summer meeting of 1945, annual and summer meetings were held as usual, continuing also the policy of joint meetings with the American Mathematical Society and occasionally with the Association for Symbolic Logic, the National Council of Teachers of Mathematics, or the Institute of Mathematical Statistics. Meetings of the sections also continued with few interruptions. The Putnam Prize Competition, started in 1938, was cancelled during 1943–1945. Teaching was hampered by "sudden and arbitrary changes, shortage of staff, irregular schedules, budgetary difficulties, and elusive academic standards," to quote R. W. Brink. MONTHLYS were restricted in

size and in quality of paper, and almost always they appeared late because of war priorities that the printers had to observe. (The restriction to 64 pages per issue was not, however, such a real handicap since there were times when mathematicians were too busy with their other duties to prepare papers for the MONTHLY. Indeed, once or twice, the Department of War Information was padded with relatively unimportant items to fill out an issue.) Censorship presented no problem except for a couple of papers on cryptography. On one occasion all copies of the MONTHLY destined for England were lost at sea, and a call was issued for members to contribute their own copies as replacements.

Throughout the years we have heard again and again that one of the obligations of the MONTHLY should be the publication of short expository papers. Starting in 1943 an interesting and significant series appeared including the following:

What is Dimension? Karl Menger [**50**, 2]
What is Area? Tibor Rado [**50**, 130]
What are Eigenvalues? R. E. Langer [**50**, 279]
What is a Matrix? C. C. MacDuffee [**50**, 360]
Curves and Surfaces. J. W. T. Youngs [**51**, 1]
Nature of Mathematical Proof. R. L. Wilder [**51**, 309]
Functions of Several Complex Variables. W. T. Martin [**52**, 17]
Nature of Mathematical Truth. C. G. Hempel [**52**, 543]
What is a Topological Group? D. Montgomery [**52**, 302]
What is a Laplace Transform? D. V. Widder [**52**, 419]
Mathematics and Logic. Hermann Weyl [**53**, 2]

Of at least equal significance was the inauguration of the Slaught Memorial Papers which had been recommended by the Committee to Review the Activities of the Association (see page 41) in 1939. The report of the Newsom Committee [MONTHLY **48**, 86] set down the arrangements for these papers and proposed that the first should appear during the year 1941. Due to war-time difficulties in printing, this was not to be. At the annual meeting in 1945, it was announced that the first issue would "soon be ready for publication." It actually appeared as Part II of the August-September 1947 issue of the MONTHLY. (See Appendix 4d.)

The Association's interest in other periodicals appears in subventions for *Mathematical Reviews* ($500 annually, reduced to $350 in 1945), the *Annals of Mathematics* and the *Duke Mathematical Journal* ($200 each per year, terminating in 1942), and the *National Mathematics Magazine* ($400 in 1943, $200 each in 1944 and 1945). On recommendation of a special committee the Association in November 1945 voted not to take over the responsibility of publishing the MATHEMATICS MAGAZINE. This in spite of the fact

that on several occasions [MONTHLY **39**, 6 and **48**, 224] our presidents and editors have strongly urged support of a second journal with particular appeal to the college student. It was not until 1961 that the Association decided to grant full support to the MAGAZINE. (See Appendix 4b.)

One of the most significant features of the MONTHLY during the war period was the Department of War Information edited by C. V. Newsom. It kept Association members informed as to government activities of interest to mathematicians, such as the Mathematics Tables project, Alien Book Republication, the G. I. Bill of educational benefits for returning veterans, pertinent laws before Congress, etc. Data were presented concerning the various war training programs (ASTP, V–12, ESMWT, USAFI, etc.) with statistics, descriptions of courses, texts, etc. Later there was information regarding the temporary American colleges in Europe (Shrivenham, Biarritz, Florence) set up for members of the Army of Occupation. Of greatest importance, probably, was the publication of the constantly changing official pronouncements concerning selective service rules and procedures for deferment. There was information about the National Roster of Scientific Personnel and its significance in connection with requests for deferment of mathematicians. This Department also served as the place for reports of the activities of the War Policy Committee and its subcommittees.

In the summer of 1945 the name of the Department was changed to General Information. It continued to give important information regarding the draft and procedures for deferment, and it was particularly helpful in reporting the problems of the returning veterans, their academic interests, numbers, shortage of instructors and other bottlenecks, and methods of coping. Also, there was advice to the colleges regarding credit for inservice training and experience, USAFI courses, etc. Of perhaps more than ordinary interest was the report of the bills before Congress in 1945 which led to the establishment of the National Science Foundation. The Department of General Information disappeared after the end of 1946.

During the war years, a number of significant changes in organization and procedures of the Association were inaugurated. Some of them are here noted. At the summer meeting 1941, a committee was appointed to "study the Association's Library with a view to its discontinuance inasmuch as its usefulness was very limited." A year later, as recommended by the committee, the Library was closed and its holdings disposed of. At the same time exchange relations between the MONTHLY and other publications were discontinued. These exchange relations, however, were reestablished in 1946. Life memberships in the Association were discontinued in 1942. In 1944 the By-Laws were again amended to discontinue Institutional Memberships. At the same meeting, the By-Laws were suspended to permit

the action which made W. D. Cairns Honorary President for Life, an honor that had been bestowed on H. E. Slaught eleven years before. With the appointment of the first official auditor in 1943, the business affairs of the Association were regularized. In 1945, the By-Laws were amended to do away with the former "Regions" and provide for the election of a Governor from each section of the Association.

CHAPTER IV. FROM 1946 TO 1965

R. A. Rosenbaum

1. PREAMBLE

The summer meeting of 1945 had been cancelled because of the war, and the first big post-war meeting was held in August of 1946 at Cornell, site also of the Fiftieth Anniversary Celebration in 1965. There were 277 MAA members in attendance at that 1946 meeting, and it is interesting to note some of the names and affiliations: W. D. Cairns of Oberlin; Newsom, also of Oberlin; Allendoerfer of Haverford (this being before Winger persuaded him to defect to the West); Agnew, Carver, Hurwitz, and Walker of Cornell; Feller, Jones, Kac, LeVeque, and Rosser, also of Cornell. It appears as though fewer than half of us stay put. But there were (and are) stalwarts like Gehman, of Buffalo; McShane, of Virginia; Meder, of Rutgers; Tucker, of Princeton.

The war was still with us in various ways: The Reverend J. T. O'Callahan, of the College of the Holy Cross, was awarded the Medal of Honor; the mathematics departments of several overseas colleges for servicemen were staffed by MAA members; the NRC offered fellowships to promising young people whose work had been interrupted by the war. The problems of rebuilding faculties and of allocating manpower were pressing, especially in the face of droves of veterans returning to college under the G. I. bill.

We were on the threshold of a new era, involving dramatic changes for the roles of mathematics in our culture and of mathematicians in our society, and it was immediately clear that the MAA was bound to be deeply affected, as indeed, it has been. Details can be found by referring to the AMERICAN MATHEMATICAL MONTHLY, where the sections entitled "News and Notices" and "Mathematical Association of America, Official Reports and Communications" provide a readily accessible running account of changes as they occur [1]. No attempt will be made to chronicle details in this chapter; rather it is the purpose here to sort out dominant features and trends.

Carlyle's "On Heroes and Hero-Worship" is not a bad model for historiography, considering that mathematics is, after all, made by mathematicians, and that the Association bears the imprint of their interests and enthusiasms, their devotion and hard work, their prudence and logic, their emotions and prejudices. In keeping with the decision to omit details, some names will be mentioned because they are exemplars; of necessity the equally important contributions of many others will be omitted.

Although he might not appear heroic in other subcultures, one of our heroes is the embodiment of our virtues: Paul Erdös, whose contributions to the MONTHLY and to Association meetings we appreciate along with his brilliant achievements in research. Erdös combines creativity and honesty with generosity and humility, extraordinary mathematical talent with exceptional human feeling. With unusual breadth in mathematics, he is able, and ready, to help anyone with a question. He can always find something good to say about the mathematics of a fellow human being, even though he may despise his politics.

It seems a long time since Erdös appeared at the Swarthmore meeting after Christmas of 1946, newly returned from the clothing store to which a group of friends had dragged him, attired in a brand new suit which somehow already looked slept in. There he stood, smiling gently at his friends' silly concern — he didn't resent the time which might have been wasted in buying the suit, for, in truth, no time had been wasted since he had thought about a mathematical problem throughout the merchandising transaction.

How different were our meetings twenty years later! Wandering into our Association meeting at the Denver Hilton, one might think it a convention of successful account executives. "These days mathematicians can *eat*," said a personnel officer of United Aircraft. And how well fed we were, and well groomed too.

But it is far from accurate to imply that our ideals had changed. Our Association still harbored innocents who wouldn't notice the sneer when asked, "Have *you* ever met a payroll?" We also had a considerable number who helped very substantially, one way or another, to meet some

impressive payrolls. It was amusing, at a meeting of the Association, to observe an employee of IBM in mathematical collaboration with an individual whose dress and general appearance would have caused Thomas J. Watson to shudder. The MAA may be unique among professional organizations in having an unusually *diverse* membership *unified* by some common interests.

Indeed, *unity in diversity* may best characterize our Association since the end of World War II. There are a number of traditional dichotomies which have become stock phrases:

(1) teaching vs. research
(2) pure vs. applied
(3) classical vs. modern
(4) intuition vs. rigor
(5) science vs. humanities
(6) elementary vs. advanced
(7) academic vs. relevant

Like most dichotomies, these are invalid oversimplifications. Just as the caricature of our members as being either absent-minded eccentrics or sleek Madison Avenue operators is fanciful, so likewise are the various polarizations listed above. In each of the categories we really have an entire *spectrum*.

In retrospect, it appears that during the past 20 years the Association has encouraged a dialectic, so that we are beginning to understand and appreciate each other's positions. It appears that we are achieving some reconciliations of diverse positions which will significantly enrich collegiate mathematics. We turn to a consideration of the Association's role in these matters.

2. TEACHING VS. RESEARCH

The rubric "teaching vs. research" is too brief to be clear; the debate should be called "(teaching *and* research) *vs.* (teaching *or* research)." The supporters of the first view have been eloquent. It is a perversion of our subject, they say, to separate teaching from research. Our students must be exposed to scholars excited about their own creative work, for otherwise those students are likely to think of mathematics as a completed subject. On the other hand, the research worker often finds that in seeking a presentation which is really effective pedagogically, even (or perhaps, especially?) at an elementary level, he is led to a point of view from which his own research is illuminated.

All well and good, say the opponents, if you can find enough such individuals. Unfortunately, Emil Artin is rare (if not, indeed, unique!). Often creative mathematicians are simply not good expositors; and moreover, those endowed with both gifts are unlikely to have the interest, energy, and time to develop both. We are better off if we exploit to the full the talents of master teachers — individuals who are conversant with a broad range of mathematics and with current developments, even if they do not

themselves contribute to research in the usual sense [2]. Such a person should hold the position of Chairman of Undergraduate Mathematics at a university, sharing responsibility with his research-oriented colleagues for the shaping of the curriculum, and giving careful supervision to young teachers, for enthusiasm for teaching is as communicable as for research. Further, instead of conscientiously turning out papers, these mathematicians can focus their attention on the work of researchers, analyzing, synthesizing and evaluating results — and writing enlightening articles for the MONTHLY and the MATHEMATICS MAGAZINE. Indeed, we should encourage the *development* of such useful mathematicians by offering an appropriate degree, rather than the Ph. D. where research is all important and teaching is ignored, or by broadening the concept of the Ph.D.

"Oh, no! let's not lower our standards; let's not debase the doctorate," respond the first group. Classifying college and university mathematicians as *either* teachers *or* researchers would be a most unfortunate divisive move. The teacher who is not also a researcher will not have the inspirational qualities, will not have the visceral understanding of what mathematics is all about, these being necessary for the kind of teaching we want. Note the experience of the MONTHLY, which tries to publish exactly the sort of article mentioned above — the thoughtful review of research which gives the non-expert reader a grasp of where our subject is going. Editors of the MONTHLY have always complained about the dearth of such articles, but we all remember some notable examples: one rich year (1947–1948) contained outstanding pieces by Coolidge, Gödel, Kac, and Polya. (Note our debt to Europe.) Well, these are the teachers *cum* researchers who couldn't have done their *teaching* so effectively without their researchers' understanding.

But look, answer our friends on the other side, you're hitting a cripple with his crutch. If our education tried more consciously to develop the analytic and synthetic powers of our young people, perhaps we would find more nonresearch mathematicians who could produce articles as profound as the ones cited. In any case, the need for talent *of all sorts* appears to be virtually limitless, and the Association has pointed the way toward our involvement in many activities for which we ourselves were not trained. Let us help some of our successors to acquire the necessary training.

And so the debate continues — fruitfully, one can hope. In 1961, a Joint Committee of the MAA and the AMS, under the chairmanship of E. E. Moise, recommended that American universities offer the Doctor of Arts degree in mathematics [3]. The problem is still with us, for the recommendation has not yet been effectively implemented. Our discussions may eventually lead to a doctorate with *increased* breadth and *no* loss in depth. We should be mindful of a study [4] which disclosed that a high percentage of the ablest American graduate students are bitterly disappointed with their

experience — graduate school has not provided the intellectual excitement which they had anticipated. Fortunately for us, the percentage of disappointed students in mathematics (and science) is low, as compared with the situation in the humanities and the social sciences, but we cannot be smug on that account. We have not yet made much progress toward resolving the teaching-research dichotomy, and, correspondingly, the mathematical future of the collegiate institution remains in doubt.

By 1965, when there were 5.5 million students in college, the problem for many of us was not the luxurious one of providing a top-notch teacher-researcher for each of our undergraduate classes, but the desperate one of finding *any* teacher for the job. It was at that time, for example, that a retired naval officer, who planned to spend several summers at institutes to prepare himself to teach high-school mathematics, dropped into the administration building of a college near his home, hoping to get a temporary job as assistant registrar or something similar, until he felt qualified to undertake high-school teaching. An hour later he emerged as acting chairman of the math department! The teacher shortage was so acute that it was felt essential to strike out in imaginative ways, utilizing new media (films, TV, programmed materials, computer-assisted instruction, ...) to obtain a more efficient use of manpower. It was also generally agreed that we should go to the heart of the matter by encouraging greater initiative and independence on the part of the student; then he would not be so demanding of faculty time. Our Committee on the Undergraduate Program and our Committee on Educational Media have attacked both aspects of the problem: the immediate one of getting classes "covered," and the deeper, longer-range one of giving students some contact with creative, research mathematicians [5]. (See also Appendix 3.) The Calculus Project of CEM, under the leadership of H. M. MacNeille, has produced a number of films on various topics, aimed at raising the level of instruction in calculus. A. N. Feldzamen, P. E. Miles, and R. G. Long successively directed a Film Project which, as successor of the MAA Committee on Production of Films, has recorded (and continues to record) on film some of our greatest contemporaries in action [6]. Brewster Gere directed a Programmed Learning Project, which produced experimental materials, a programmed textbook on calculus, and a critique of programmed learning in mathematics [7]. (See also Appendix 5.) The fourth project will be mentioned later (in Section 5).

Many of us believe that a spark can be struck in a brief encounter between an exciting mathematician and a receptive student, and the Program of Visiting Lecturers was designed to strike such sparks. As R. E. Gaskell, sometime chairman of the MAA Committee on Visiting Lecturers reported, "While the program is supported financially by the NSF, its work would not be possible without the cooperation of the home institutions of the 75 lec-

turers on our list, who generously grant them time for this work, or without the cooperation of the lecturers ..., who were given nominal honoraria for the work involved in perparation, travel, and in the visits themselves." All who have been involved in the affairs of this committee can join him in testifying to the hard work and effectiveness of our MAA lecturers. The program began operation in 1954 and has been widely imitated in the sciences. During the first several years our lecturers took leave from their universities and went on tour. People like G. B. Price learned of the concert artist's problems with transportation schedules and laundry — with no impresario to smooth the way. More recently the NSF has been willing to support only day-long visits (about 300–350 of them annually in recent years). Our lecturers must make provision for their absence from the campus, and somehow catch up on their return. The NSF and the mathematical community have got their money's worth, and then some, from this program [8].

There is still a fourth MAA activity aimed at a resolution of the teaching-research dichotomy: the summer institutes and conferences for college teachers. They began in 1953 with an institute directed by B. W. Jones, with principal lecturers Artin and Wilder — there's a pair to try to surpass! This program has given college teachers a chance to get back into the stream of current mathematical work. Under E. A. Cameron's direction, a "multiplier effect" has been incorporated into Summer Seminars: each participant is given released time to conduct a seminar for colleagues at his home institution during the academic year following the summer seminar.

A question related to the topic of this section appears to elicit no consensus: Just how rare is mathematical talent? Many observers believe that such talent is indeed rare and that we now come close to discovering all of it. According to them we cannot markedly increase the number of Ph.D.'s in mathematics if we wish to maintain traditional standards — the native ability just isn't there. Others (and R. L. Moore might be in this group) believe that many more people could create mathematics if they had the proper instruction. It would be pretty hard to devise a controlled experiment to answer this question.

In a limited sense the crisis aspect of collegiate mathematics teaching evaporated within a college generation after the fiftieth anniversary of the founding of the MAA, for, although the college population increased to 7 million, the percentage of those undergraduates taking mathematics tapered off at the same time that the number of those getting Ph.D.'s and entering the market as prospective faculty members increased substantially. (We have rarely enjoyed a "steady state" in the profession.) This abrupt change from a seller's to a buyer's market has had no effect on the fundamental problems sketched in this section, and vigorous efforts at solution continue.

3. PURE VS. APPLIED

We turn to the second item on the list, the relationship between pure and applied mathematics. Despite the attention which the Association has increasingly paid to it in recent years, the relationship is uneasy and unsatisfactory. Many mathematicians would agree with the statement of G. A. Bliss, which appeared in his autobiographical note in the MONTHLY in 1952: "After some careful consideration I concluded that it was really... mathematics which had the greatest attraction for me, and I decided to try for a Ph.D. in that subject rather than in astronomy. I have never regretted the decision, though it seems clear to me that one could find great satisfaction in any domain of applied mathematics."

If this were a general sentiment one might expect that there would be no such thing as a dichotomy between pure and applied mathematics, that we would all use problems of the real world to motivate the development of abstract mathematics, that we would then exhibit the "usefulness" of our mathematical results — in short, that we would weave together the pure with the applied to enjoy the fruits of that symbiotic relationship as did our masters Poincaré, Birkhoff, Weyl, and von Neumann. But the actual situation is very different from this utopian prospect. Note a few examples.

Item. One of the world's leading universities has four professorial chairs, two held by pure mathematicians, and two held by applied mathematicians. The four men are socially a congenial group, but professionally they divide into two pairs — in the obvious way — and mathematical interchange between the pairs is nonexistent. Is this not unfortunately all too common? But it's not universal — A. J. Kempner and C. A. Hutchinson of Colorado furnish a counter-example.

Item. The director of a National Laboratory has blasted the trend in undergraduate mathematical education, asserting that, in the hands of "purists," the needs of nonmathematicians are being ignored [9].

Item. A famous physicist is co-author of a new book to teach calculus quickly to freshmen, because he feels that the usual freshman mathematics course does not provide the material which physical scientists need [10].

It's not that we in the MAA are ignoring the problem. Our Committee on the Undergraduate Program in Mathematics has a number of panels, of which one is devoted to the Physical Sciences and Engineering, and another to the Biological, Management, and Social Sciences. As R. J. Walker has made clear, the push to introduce linear algebra very early in the undergraduate curriculum has come from the physicists and engineers, not from the "purists." CUPM publications include sets of computer-oriented problems and engineering problems, to "enrich" our freshman and sophomore mathematics courses [11]. Seminars, conferences, and institutes (some of

them year-long) have been held for social scientists and for faculty in business schools. In considerable measure these involve bringing "our" mathematics to nonmathematicians, but there is a substantial feed-back. Over 50 years ago the pioneering freshman book of F. L. Griffin introduced numerous examples from the social sciences and the life sciences, but this lead was not widely imitated until recently. Now we find in elementary textbooks not only the topics which Griffin's book contained (such as finite probability and statistics), but also the new tools of the decision maker — linear programming and game theory.

At a more advanced level our Association collaborated with the Society by publishing as a Slaught paper in 1954, *Special Topics in Applied Mathematics*, the proceedings of an AMS symposium whose purpose F. J. Weyl described in these terms: "... the emphasis was on diversity of topics, on highlighting some exciting developments of the day and doing it in a manner to induce broad understanding among the mathematically literate. What we wanted was a collection of significant examples, not brought as yet too often or accessibly to the attention of ... mathematicians, which would show just how varied and substantial the contributions of the genuinely secular mathematician (as distinct from the monastic one) can be in the interaction of his modes of thought and analysis with the scientific endeavors in other fields." (While Dr. Weyl's attempt to replace the adjectives "pure" and "applied" with more appropriate ones is to be applauded, one may wonder whether "monastic" and "secular" are accurately descriptive, when he observes, on the one hand, an academician in Washington resembling a frenetic lobbyist while chasing financial support for his "pure" project, and, on the other hand, an IBM employee sucking reflectively on the stem of his pipe in his "cell" at Yorktown Heights.) To return to the point: the 1953 Symposium on Special Topics in Applied Mathematics is but one of many examples of our Association's attempts to make us old conservatives see the light. Many would agree that, for the continued health of our subject, this aspect of our education will have to be intensified.

4. CLASSICAL VS. MODERN

In turning to those features of collegiate mathematics for which the catch phrases classical vs. modern, intuition vs. rigor, science vs. humanities have been chosen, we may begin by noting where we stood at the end of World War II. In a 1946 review in the MONTHLY of Murnaghan's *Analytic Geometry*, C. C. MacDuffee, the first post-war president of the MAA, quoted with approval a remark of the author of the book, "The demands of modern physics and engineering for a knowledge of the elements of calculus are so pressing that it is no longer practicable to postpone the teaching of calculus

to the sophomore year." How things have changed and how the pace of change has quickened! Just before World War II, Arnold Dresden, one of the most respected, and usually one of the most effective, leaders in both Association and Society affairs, persuaded some colleagues in colleges and universities to meet for a discussion of needed reforms in the undergraduate curriculum. The group met, came to general agreement — and there it ended. In 1940 the General Education Board subsidized a study, directed by F. L. Griffin of Reed College, to suggest an integrated mathematics curriculum for a small college. Twenty-five years later CUPM did something similar with its General Mathematics Curriculum, but how our subject had changed in this period!

After the war the atmosphere was different. In fairness to ourselves, it should be noted that our concerns did not stem from Sputnik — these concerns had been growing over a period of years, and their time had come. Of course, the Russian space shots accelerated our activities and facilitated our obtaining the funds necessary to implement our ideas. But we would have gone ahead anyhow. Indeed, support for experimentation, both by the MAA as an organization and by MAA members, came initially from private foundations rather than from the government, and the so-called private sector of our economy continued to give us vitally important help. Not only the large foundations, like Carnegie, Ford, Rockefeller, and Sloan, not only the giant corporations like U. S. Steel, IBM, and Bell Telephone, but also the smaller organizations like Research Corporation made grants. And we shouldn't forget the number of man-hours of MAA committee time, and the number of man-hours of individual MAA members' time, that have also been devoted to this striving for perfection, *without* any financial support.

The people who started CUPM did their initial work without subsidy. William Duren has been a faithful historian of CUPM [5] in all respects but one — he has underplayed the significance of his own efforts in making that committee the effective arm of the MAA which it is. All members of the Association are much in his debt.

In 1958 there were three MAA publications related to the topics under discussion: Elementary Mathematics of Sets with Applications; A Freshman Honors Course in Calculus and Analytic Geometry; and Universal Mathematics. Without too much forcing, these publications can be used as foci for elaboration.

The language of sets, and the theory of sets (whether elementary or advanced), have become synonymous with "modern" mathematics in some quarters. It is doubtlessly true that the notion of a set now plays an important role in collegiate mathematics; and that, whereas the word occurred infrequently in the MONTHLY in 1945, it is now sprinkled liberally through that journal's pages. Perhaps more startling is the situation with topology.

Mention of the subject in the MONTHLY was rare in 1945, but articles and problems involving topology are now common. In the undergraduate curriculum, number theory and geometries probably suffered as work in topology was introduced, either in courses on topology per se, or as adjuncts of courses in analysis. The MONTHLY and the MATHEMATICS MAGAZINE may offend some mathematicians by still devoting "too much" space to classical number theory and geometries, but they may serve an important balancing function through their conservatisms in this regard. Indeed, our Association seems to push the pendulum into a daring swing when it shows signs of slowing onto dead center, and to pull the pendulum back toward stability when the amplitude gets too large. For example, discussion of the proper roles in the undergraduate curriculum of various topics — geometry, computing, statistics, etc. — have often appeared on the programs of Association meetings in the past 20 years. They begin to look like perennials.

The Freshman Honors Course in Calculus and Analytic Geometry is an outline of what Emil Artin offered at Princeton. No course has received more attention than introductory calculus, perhaps in part because of the profit to be made from a successful textbook. Some texts seem to do no more than warm over cold and mediocre mathematics, but there have been many in the past 20 years which contain features of mathematical and pedagogical distinction. One of our dichotomies constitutes a source of apparently endless debate: intuition vs. rigor. We get agreement on the dictum, "The student should not be taught anything that he will have to unlearn later," but here agreement stops. In all likelihood we cannot expect a single approach to be successful with all students, and the constant debate may be useful as a reminder of this fact. Over the years the MONTHLY has published some helpful and provocative general articles on the subject (one by Walter Prenowitz is especially noteworthy for its sensible, judicious tone [12]), and also some papers on specific topics, like A. E. Taylor's on L'Hospital's rule [13] and E. J. McShane's on Moore-Smith limits [14], which have made direct contributions to improved textbooks and classroom presentations.

Mathematics may be universal in a nonpersonal sense, but whether it can appeal to all people and be understood by all people is another question. Nevertheless, most of us think that we have to try. Fortunately, some of us have been reasonably successful in this effort. Our hard-working Secretary, Henry Alder, reported not long ago on a course for nonscience majors [15]. J. Robert Oppenheimer is pessimistic about what can be accomplished in physics for nonscientists — he fears that the concepts are so difficult that life-long study of physics is necessary for real understanding [16]. Very likely he is right, in terms of the kind of understanding which is his ideal, but most of us are willing to settle for a much more modest goal — we just want the man in the street to know that balancing our checkbooks isn't part of our

professional lives [17]. So we applaud Henry Alder and the others who are trying to bring mathematics to nonscience undergraduates. *From the point of view of our society there is no more important teaching that we do.*

5. ELEMENTARY VS. ADVANCED

This is a dichotomy which we can approach with some pleasure, for we have taken remarkable steps toward a resolution since World War II. Collegiate mathematics stands in the middle, reaching out in one direction to graduate mathematics, the educational goal of others of our majors and the source of our faculty members, and reaching out in the other direction to pre-college mathematics, the professional goal of some of our majors and the source of our students. For many years we reached out much more eagerly in the direction of graduate mathematics than in the direction of pre-college mathematics. The advanced mathematics provided rewards of all sorts, from fun to recognition. The elementary mathematics was boring, grubby, frustrating, dominated by nincompoops, and riddled with politics. Besides, we didn't know anything about it. But we've learned! The willingness of Marshall Stone to undertake work in mathematical education because of his realization of its importance should be a lesson to us — and it has been. Think of our distinguished Association colleagues who have accepted chairs in mathematics *and education*. Think of our many Association colleagues who have worked on projects from the College Board Advanced Placement Program down to the first grade [18]. Think of the MAA High School Contest, enlisting over 250,000 participants per year. Think of the Association Program of Secondary School Lectures, reaching over 600 schools per year. After almost 10 years of Association sponsorship, the high school program in mathematics (like those in the sciences) is operated by state-level organizations, but our MAA Committee is continuing its concern for useful service. Think of the involvement with teacher education, as exemplified by the thoughtful and detailed suggestions of a CUPM panel which began auspiciously under John Kemeny's leadership and continued to prosper under the direction of E. E. Moise and G. S. Young, Jr. These suggestions have been taken up by a project initiated by Bernard Jacobson and then headed by C. B. Allendoerfer. Think, also, of the responsiveness of CUPM when needs are recognized — the growth of two-year colleges, for example, has resulted in the setting up of a CUPM Panel on Junior Colleges. Think, especially, of MAA cooperation with NCTM, an affiliation which goes back to 1928, which is reflected now in annual joint meetings, and which bore fruit in a 1948 Association vote to have the Board of Governors "study with NCTM and other groups, the problem of the maintenance of standards in the preparation of students for college, including the certification of teachers,

teacher-training programs, and curricular questions." Two outgrowths of this resolution have been notably significant. In 1948 the President of the MAA was authorized to appoint two committees to cooperate with the NCTM Committee on Institutes, Workshops, and Conferences, and with its Committee on Cooperation with Industry. The MAA Committee to Plan a Symposium on Teacher Education worked with the NCTM and the University of Wisconsin School of Education to set up a short symposium for 150 participants at the University of Wisconsin in the summer of 1952 with the purpose of "reviewing current practices in the collegiate training of secondary school teachers of mathematics toward the ends of discovering (a) possibilities for enriching the competence of the prospective teacher, (b) whether modern conditions call for reorientation of objectives in teacher training and means of accomplishing these, (c) whether new ideas and developments in mathematics can be broached to the secondary school teacher and the secondary school." The importance of these events is that, in due course, they led to the "new math" in the schools, and to many projects including the SMSG and the NSF Institutes [19].

The number of our members who are involved in this kind of work, their commitment, their willingness to accept criticism from experienced school teachers — all point to a growth toward unity over a spectrum of levels of mathematics which is a most hopeful sign for the future.

6. ACADEMIC VS. RELEVANT

The fiftieth anniversary of the MAA occurred just as a collegiate student revolution was achieving widespread recognition. Students expressed dissatisfaction with many aspects of their education, with "relevance" being the universal catchword. (The plea for relevance, devoid of any explanatory prepositional phrase, reminds one of the response of the man who was asked, "How's your wife?" He shot back, "Compared with what?") On the educational scene, the opposite of the desired relevant activities are those described as "academic," by implication always "merely academic." The fact that much of mathematics is, in fact, of use in contemporary society does not make the subject "relevant," in the opinion of some critics, for activities are appropriate in their view only when they help to replace our sick culture with a healthy one.

There is currently sharp debate over the "politicization" of institutions, especially of universities and professional organizations. Indeed, there is considerable discussion of the notion of professionalism itself [20]. The MAA has followed an uneasy course in trying to restrict official positions only to issues germane to the purposes of the Association. In 1946, for example, the Board of Governors approved a report, "Universal Military Service

in Peace Time" [21], prepared by a subcommittee chaired by W. L. Hart, of the War Policy Committee. In a foreword to the report, M. H. Stone, chairman of the Committee, wrote that the "report... is directed in the main at points upon which mathematicians as such are particularly qualified to express informed opinions." In 1951, the Board approved a resolution against discrimination as to race, creed, and color in the conduct of MAA meetings and social gatherings. It set up a committee to investigate a loyalty oath in Oklahoma and adopted a resolution on that oath in 1952 after the committee reported. In 1962 the Board reaffirmed support of a World Calendar. In the following years there was pressure not to hold meetings in cities where the political climate had resulted in actions considered offensive by some, and to have the Association take a position on the Vietnam war.

7. OTHER ACTIVITIES AND PROBLEMS

Quite a few aspects of the MAA have not yet been touched upon in this account.

During the postwar years the Association experienced a period of almost explosive growth, with leveling off soon after the fiftieth anniversary passed. With the growth came a marked increase in the complexity of the operation. H. M. Gehman, who was elected Secretary-Treasurer in 1948, was appointed Executive Director in 1960, and was joined in administration by Raoul Hailpern as Associate Secretary in 1963. A conference was held in Washington in 1958 to review the overall program of the Association and to formulate a plan of action [22]. Gehman, who was amazingly successful in keeping the administration simple, suggested, in 1961, the appointment of a committee to analyze the structure of the Association's government with a view to streamlining it. The committee reported promptly and its report was accepted during the same year.

The Association was, of course, an active member of the Conference Board of the Mathematical Sciences from the beginning, and in 1968 imitated CBMS and many professional societies by setting up its headquarters office in Washington, D. C.

The two MAA journals — the MONTHLY and the MATHEMATICS MAGAZINE [23] — were growing in size, too. An attractive feature of these magazines had been their small size — one could hold the journals comfortably and browse through their various departments, almost like the *Saturday Review*. But so many books were being published that the magazines threatened to get fat just to give adequate notice of new publications.

The Association offered an impressive list of prizes, including the Award for Distinguished Service, the Chauvenet Prize, the L. R. Ford Awards, and the Putnam Prize Competition [24].

In addition to those whose activities have been noted above, the Association has a number of hardworking and effective committees, such as those on finance, on advisement and personnel, on developing colleges, and on employment opportunities [25].

Besides the journals and the Slaught papers, mentioned earlier, the Association published the Carus monographs, the MAA Studies in Mathematics, a pamphlet entitled *Professional Opportunities in Mathematics*, a *Guidebook to Departments in the Mathematical Sciences*, and occasional pieces for special purposes [26]. Through collaboration with NCTM it helped a school-level publication, the *Mathematics Student Journal*, get started in 1953.

Many of the Association's publications are, naturally, concerned primarily with expository material. The same is true of the most prestigious of the Association's efforts at oral communication, the annual Hedrick lectures [27].

In many ways the MAA had grown into a worldly organization by its fiftieth birthday. We nonchalantly accepted millions of dollars from the NSF to support our major projects. But we were not really in the big leagues, thank goodness — we were not building linear accelerators. The Executive Producers and Advisory Panels of CEM saw to it that we made movies for a fraction of the cost of those of other scientific organizations. Harry Gehman made every nickel count and maintained an avuncular relationship to 17,000 nephews and nieces — often a sort of Dutch avuncular relationship, especially when he thought a committee was forgetting some of the virtues of a more austere era. Amazingly, we had preserved some of the *personal* qualities of the MAA which characterized its early days. We still enjoyed the participation of a tremendous number of our members in our affairs — on the Board of Governors, on Committees, in our Sections, and so forth. This was an impressive source of strength, and one hopes that the tradition will continue. For mathematics, after all, is made by mathematicians.

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2. See, for example, D. Christie and J. H. Wells, Alternatives to research, MONTHLY, **74** (1967) 1001–1004.

3. In my History of the MAA since World War II (MONTHLY, **74** (1967) Number 1, Part II, 15) I erroneously stated that the Joint Committee did *not* recommend the offering of the Doctor of Arts in mathematics. See Edwin Moise, The proposed Doctor of Arts Degree, NOTICES of the A.M.S., 8 (1961) (2), 112–115.

4. R. P. Cuzzort, The Superior Student in Graduate School: Résumé of the Experience of 101 Honors Students, The Superior Student, 7, 3 (May-June 1965) 3–13. (Newsletter of the Inter-University Committee on the Superior Student, Boulder, Colorado, obtainable from University Microfilms.)

5. The work of CUPM, from its beginning with the authorization of the formation of a committee in December 1952 until the summer of 1965, is ably summarized by W. L. Duren, Jr., in "CUPM, the history of an idea", MONTHLY, **74** (1967) Part II of Number 1, 23–37. CUPM activities have been reported in its Bulletin. A final report on the CEM, prepared by C. B. Allendoerfer with the help of others, was submitted to NSF by the MAA in late summer 1968.

6. These and the calculus films are available for rent or purchase from Modern Learning Aids.

7. B. Gere, et al., A Programmed Course in Calculus, Benjamin, New York, 1968; K. O. May, Programmed Learning and Mathematical Education, 1965.

8. Reports on the Program of Visiting Lecturers have been made annually to NSF, with summaries appearing in the MONTHLY.

9. A. Weinberg, But is the teacher also a citizen?, Science 149, No. 3684 (1965) 601–606. See also S. MacLane, "Future role of the federal government in mathematics," MONTHLY, **74**, (1967) 96, No. 1, Part II.

10. Daniel Kleppner and Norman Ramsey, Quick Calculus, Wiley, New York, 1965, 294 pp.

11. Ben Noble, Applications of Undergraduate Mathematics in Engineering, M.A.A., Macmillan, New York, 1967, xvii + 364 pp.

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14. E. J. McShane, Partial orderings and Moore-Smith limits, MONTHLY, **59** (1952) 1–11.

15. H. L. Alder, Mathematics for liberal arts students, MONTHLY, **72** (1965) 60–66.

16. J. R. Oppenheimer, Tradition and Discovery, American Council of Learned Societies Newsletter, October, 1959, 3–19.

17. P. R. Halmos, Mathematics as a creative art, American Scientist, **56** (1968) 375–389.

18. In 1952 the MAA representative on The School and College Study of Admission with Advanced Study was C. R. Phelps (then at Rutgers, later with NSF). H. Brinkmann of Swarthmore reported in 1953 as the chairman of the Subcommittee on Mathematics, suggesting a standard program for grades 10, 11, 12, in which the proposed 12th grade curriculum paralleled the freshman courses given in many colleges. Patrick Suppes of

Stanford has taken the lead in developing some interesting mathematical topics for introduction into the primary grades.

19. For an authoritative report on the NSF Institutes, see H. Krieghbaum, and H. Rawson, An Investment in Knowledge, New York University Press, 1969. This book, subtitled The First Dozen Years of the National Science Foundation's Summer Institute Programs to Improve Secondary School Science and Mathematics Teaching, 1954–1965, has material of particular interest to mathematicians on pp. 113–122 and pp. 127–140.

20. See, for example, Richard Ohmann, An informal and perhaps unreliable account of the Modern Language Association of America, The Antioch Review, 29 (1969) 329–347.

21. Universal military service in peace time, MONTHLY, 53 (1946) 49–58.

22. H. M. Gehman, The Washington conference, MONTHLY, **65** (1958) 575–586.

23. See the brief history of the MATHEMATICS MAGAZINE in Appendix 4.

24. See Appendix 9.

25. See Appendix 3.

26. For a complete list of Association publications, see Appendix 4.

27. See Appendix 6.

CHAPTER V. THE SECTIONS

Harriet F. Montague

INTRODUCTION

From 1915 to 1968 the number of sections of the Association has grown from three to twenty-eight. In the four years after the founding of the Association, seven in addition to the original three were approved. Seven more were added in the twenties, five in the thirties, three in the forties, two in the fifties and the last of the twenty-eight in 1967. In December of 1915, when the Council received applications from representatives of Kansas, Missouri and Ohio, a committee was formed to formulate terms under which sections could be approved in accordance with the Constitution of the Association. The Committee was given power to act on the first three petitions and any others which might be received before the next Association meeting [MONTHLY **23**, 94]. The current practice is for the Committee on Sections to receive applications and proposed by-laws. The Committee reviews the proposals and then makes recommendations of approval to the Board of Governors if all is in order.

Since some sections were informally organized and held meetings before formal approval by the Association, the date of founding may be in dispute. We have taken the year of approval as far as we could ascertain it. Thus

the Kansas Section date is given as 1915 whereas there was as early as 1905 a Kansas Association of Mathematics Teachers. Section officers and other members have been diligent and helpful in preparing histories for our use. We have summarized those histories submitted to us and included them in Section 3, pp. 84–103. There were a few sections unable to furnish historical material other than reports of meetings as recorded in the MONTHLY. In these cases we have used the MONTHLY for the summaries.

It seemed appropriate to review Professor Slaught's ten-year history of sections and also to present the relationships between the Association and the sections in addition to the individual section histories. The chapter has therefore been divided in three parts.

1. SLAUGHT'S TEN-YEAR HISTORY

A ten-year history of the sections was prepared by H. E. Slaught and appeared in the May 1927 issue of the MONTHLY [**34**, 225 ff.]. With characteristic thoroughness touched with humor, Professor Slaught combines a review of activities of the sections with evidence of their importance within the Association and in their relation to other professional organizations, particularly the National Council of Teachers of Mathematics. He felt that regional branches of the National Council and the MAA sections could cooperate in planning meetings, pointing out the success of the Louisiana-Mississippi Section in helping to form a branch of the National Council. The sectional meeting to which the secondary teachers were invited for this purpose was held in the mid-twenties at Shreveport and was addressed by Miss Marie Gugle, President of the National Council, and Professor W. D. Reeve, coeditor of the Mathematics Teacher.

Professor Slaught set a goal of "100 percent membership," i.e., "every person engaged in teaching mathematics in any collegiate institution within the territory of the section should be a member of the Association" (and, one would suppose, a faithful attendant at the meetings of his section). The record of present membership in the Association shows a many-fold increase over the 2000 total at the time of the Slaught history, but far short of the 100 percent goal.

One evidence of the importance of sectional organization was the total attendance at national meetings of the Association in a year (about 250) and at section meetings (about 400). Professor Slaught found that, whereas the total number of papers presented at the two national meetings was about 16, the total number of papers given at section meetings was over 100. This indicated to him that section meetings would increase in influence among collegiate teachers of mathematics to a higher degree than national meetings. In fact, he stated that "there is little prospect that the attendance at national

meetings will become much larger than at present owing to the great distances to such centers from the more remote parts of the country". On the other hand, he foresaw a doubling or tripling of section meeting attendance "especially in view of the fact that stone roads are rapidly spreading to all parts of the country so that more and more members may reach their sectional meeting places in their own conveyances or in public busses". Perhaps the rapid birth rate of sections over the ten years (from three sections in 1915 to seventeen at the time of his paper) was further evidence to Professor Slaught that his predictions would be fulfilled. Certainly sections have become a most important part of the activities of the Association, even though their development may have taken a form somewhat different from that seen in 1926.

One pattern of 1926 that has not changed is that of the sectional meeting itself, which is described as starting with a welcome from a president or a dean of the host institution. There is noted also the presence of visitors from allied departments and of students from the host institution. The "quite usual" (at that time) complimentary dinner or luncheon has been replaced today by the coffee hour. Slaught's analysis of the programs revealed discussion about state requirements in secondary mathematics, college admission requirements, and other educational matters together with expository papers and report on research.

Professor Slaught recalls for us the race between the Ohio and Missouri sections for the honor of securing the first section charter. Within an hour of the adoption of the Association constitution in December, 1915, each group had filed a petition for a charter. Ohio won the honor by a few minutes over Missouri.

2. THE ASSOCIATION AND ITS SECTIONS

Sections were provided for in the By-Laws adopted December 31, 1915. Article V on Sections read:

1. Any group of members of this Association may petition the Council for authority to organize a Section of the Association for the purpose of holding local meetings. The Council shall have power to specify the conditions under which such authority shall be granted.

2. The Association shall not be obligated to pay from its treasury any of the expenses of such sections.

The first change in the above provisions appeared in the December 1927 supplement of the MONTHLY. Item 1 was changed to read "Any group of not less than ten (10) members of this Association...". The second item was unchanged.

In August 1956 the Board instructed the Secretary-Treasurer to prepare amendments to the By-laws providing for "a more specific statement of the

control of the Association over its sections". The result was to add the following sentence to item 1: "The by-laws of each Section when organized and any subsequent changes in these by-laws must be approved by the Board. The Board shall maintain general supervision over the activities of all sections." Also item 2 was changed to read: "The Association shall not be obliged to pay from its treasury any of the expenses of such sections except as the Board shall provide."

The matter of financial support of section activities was discussed on many occasions by the Board. In 1944 the minutes show that it was voted to give support to sections for the purpose of securing outside speakers at their meetings, such support to be given "under certain circumstances and in restricted amounts." The 1944 provision with respect to support for outside speakers was made more firm in 1948 by adopting a $35 maximum per year to each section toward the expenses of its meeting, including travel expenses of an invited speaker. In 1960 the Board approved a change in appropriations to sections so that "each section will receive $60 per year plus an additional $10 per year for each 100 members or fraction thereof in excess of 200."

Through the years the Board has given financial support to special activities of sections. For example, in 1946 the Wisconsin Section was given an appropriation of not more than $50 to cover the expense of clerical help, postage, etc., in connection with a study of mathematical education in Wisconsin. In 1964 sections were advised of "the availability of an appropriation of $500 per year for worthwhile projects undertaken by sections of the Association." Proposals were invited, and the Committee on Sections was to decide on the appropriations. The Association has, however, retained control over the solicitation by sections for outside funds. If a section wishes to make such solicitation for any of its activities, it must ask for and receive approval from the Executive and Finance Committees.

A Committee on Sectional Meetings was created by the Board of Trustees in December 1939 as a result of the Langer Committee's report on Association activities. The purpose of the Committee was "to bring about closer coordination and mutual relations between the sections and the parent organization". As the work of the Committee on Sectional Meetings changed and broadened through the years, it was voted in 1950 to change the name of the Committee on Sections. The chairman of the Committee until 1963 was the Associate Secretary. Since 1963 the President has appointed the chairman. (See also Appendix 3.) Sectional Governors were created by an action of the Board in 1945 in recommending "amendments to various sections of the By-laws to do away with our present regions and provide for the election of a Governor from each Section of the Association." It was also suggested that since there were no sections in New England or in eastern Canada, special arrangements might be made to have Governors elected

from these areas. The proper amendments were prepared and approved at the annual meeting in December 1946. No change was made in Article V on Sections. The first Sectional Governors took office July 1, 1947 for terms 1947–50. The list of officers and members as of December 1947 shows the remaining regional Governors and newly-elected Sectional Governors from 9 Sections: Philadelphia, Maryland-D. C., Louisiana-Mississippi, Michigan, Illinois, Iowa, Minnesota, Texas, Southern California. In December 1949 the listing shows the existence of all three classes of Governors, the New England Section having elected a Governor to the 1949–52 class. The method of election of Sectional Governors was outlined in Board action in December 1948. The Secretary-Treasurer was to conduct a mail vote. The Committee on Sectional Meetings was authorized to determine the geographical boundaries of each section and to allocate members to sections for voting purposes.

The concern of the Association for the sections can be seen in the minutes. The Trustees in December 1926 discussed "the important question of having official delegates from the national body attend the meetings of the sections". Plans were proposed but "the whole matter was laid over for later consideration", presumably because of financial and transportation problems. Nevertheless national officers were often present at section meetings before 1963 when a plan was adopted for visits by the President of the Association at the expense of the national office. Since 1963 other national officers have also been official visitors at section meetings.

The summer meeting in 1948 marked the first meeting of section secretaries, attended by representatives from 21 of the 25 sections then in existence. Edith R. Schneckenburger, then Associate Secretary of the Association, served as chairman of the meeting. She sketched the history of the sections and there was discussion of the relations of the national office to the sections, including finances, procurement of speakers and the election of sectional governors. The meeting was the first of a continuing series which later included other sectional officers. In 1955 a recommendation of the Chairman of the Committee on Sections was approved whereby the meeting of section officers was held annually, preferably at the summer meeting.

The official reports of the meetings of sectional officers show that information has been freely transmitted between the national office and the sections. Special section activities sometimes led to Association-wide activities. One example is that of contests for high-school students. Another is the program of visiting lecturers to high schools. From time to time the Association officers have addressed the sections on the concern of the Association for sectional activities. For example, in 1948, Professor Hildebrandt urged the sections to provide a wide range of activities for teachers in the elementary and secondary schools. More recently President Bing was a participant in a

discussion on "Mutual Assistance between the Sections and the Board of Governors." The Board has also made suggestions to the section officers. Two recent recommendations (1967 and 1968) involved the possibility of offering free one-year memberships in the Association to participants in the Putnam Contest, and the possible selection of a Second Vice-Chairman for a section whose duty would be "to represent the two-year colleges on the Section Executive Committee, arrange the program for the two-year colleges and preside at these sessions." The latter recommendation is in line with the approved plan of the Pacific Northwest Section.

At meetings of the section officers the discussions about section activities have been replaced more and more by informational reports to help section officers disseminate information. The account of the 1962 meeting is fairly typical. At that time there were reports by the Committee on High School Contests, the Committee on Secondary School Lecturers, the Committee on Vistiting Lecturers, and CUPM.

MAA representatives in each department of mathematics were approved by the Board in 1963. It is their duty to solicit faculty and student members. It was suggested by the Board that the representatives in a section might meet together during section meetings. Representatives are selected by the sections and officially appointed by the Committee on Sections.

The Associate Secretary of the Association has been the national officer most directly concerned with the Sections. As early as 1949 a handbook of instructions for section secretaries was proposed and discussed. As an outgrowth of that proposal, a handbook for Section Officers was prepared by Associate Secretary Lloyd J. Montzingo, Jr. It is a comprehensive document listing all the sections with their geographical boundaries, duties of the section officers, suggestions and regulations for section meetings, financial matters, model section By-laws and suggestions for section projects. A summary version of the Handbook is contained in a Memorandum for Section Officers, a separate document. There is also a separate outline of the duties of the section secretary. All these papers are sent out to the sections by the Associate Secretary. Correspondence from sections is directed to the Associate Secretary who then sends pertinent material to the Chairman of the Committee on Sections for further study and action.

It is evident that sections and sectional meetings are a viable instrument of the Association. There is considerable interplay and exchange of ideas. There have been times when two or more sections held joint meetings, viz., during World War II. As the Association and its national meetings become unwieldy because of great numbers, it is conceivable that the former concept of regions might be revived and that regional meetings involving several sections might take place. A regional structure could also be devised, becoming an intermediate organization between the national office and the sections.

3. SECTION HISTORIES

1915 OHIO

On Thursday, December 30, 1915, the Ohio Teachers of Collegiate Mathematics voted in favor of forming themselves into the Ohio Section of the Mathematical Association of America. Professor R. B. Allen of Kenyon College was elected Temporary Secretary and was appointed a delegate to represent the group at the meeting of the Association on December 31. A special committee prepared a constitution which was adopted at Columbus, and Professor Allen was elected the first Chairman. Official notification of approval by the Association was dated March 1, 1916 and signed by E. R. Hedrick, President.

The first annual meeting of the Ohio Section was held on April 21–22, 1916, in connection with meetings of the Ohio College Association, the Ohio Academy of Science, the Ohio Society of College Teachers of Education and the Association of Ohio Teachers of Mathematics and Science. Forty persons were in attendance [MONTHLY **23**, 189–193]. Regular annual meetings have been held in the spring each year since 1916 with the exception of 1945. Special fall meetings have been held in a number of years. There is a complete record of Section Chairmen, with Daniel Finkbeiner of Kenyon College serving in 1967–68 and Arnold Ross to serve in 1968–69. There have been only three men elected to the office of Secretary-Treasurer: G. N. Armstrong 1915 to 1926, Rufus Crane from 1926 to 1947 and Foster Brooks from 1947 to the present.

Present membership in the Section is near 800. In recent years, by request, Cabell County in West Virginia has been included in the Ohio Section which otherwise includes only the state of Ohio.

1915 MISSOURI

The first meeting of this Section was held November 18, 1916 in St. Louis at the Central High School. Professor E. R. Hedrick, then of the University of Missouri, acted as temporary chairman until the formal election of officers after the constitution was presented and adopted. The election resulted in the following: Professor C. A. Waldo of Washington University, President, and Albert H. Huntington, Central High, St. Louis as Secretary-Treasurer. Papers at this meeting dealt with topics in mathematics and education at the high school and college level [MONTHLY **24**, 24–27].

There are several years in which the MONTHLY shows no reports from this section, but the meetings which have been recorded there show the usual pattern. Some meetings were held jointly with the Missouri Academy of Science. One might use the April 1949 meeting as typical. Professor Karl

Menger was the guest speaker on the subject of Convexity. Professors Maria Castellani, L. M. Blumenthal, and C. W. Mathews presented other mathematical papers and Professors Margaret Willerding and G. H. Jamison talked on curriculum changes in colleges and high schools.

The Missouri Section has cooperated in the high school contest. Another project of recent origin is the investigation of the test for placement and/or credit to be used by the colleges of the state.

1915 KANSAS

The Kansas Association of Mathematics Teachers, including high school and college teachers, was founded in 1904. In 1915 the Mathematical Association of Collegiate Teachers was organized to discuss matters of primary concern to college faculties. It was the latter organization which petitioned for Section approval from the Mathematical Association in 1915. The first meeting was held at the University of Kansas at Lawrence March 18, 1916 [MONTHLY **23**, 164]. The Kansas Section has met with the older Association of Mathematics Teachers through the years. The pattern of meetings has been quite constant, with joint meetings of the two groups in the morning and separate meetings in the afternoon. The Kansas Section files contain an almost complete set of programs of meetings from the first in 1916 (only the 13th and 14th annual meeting programs of 1927 and 1928 are missing from those sent for this history, and there was no meeting in 1945) until the most recent one. The place of meeting was the Topeka High School through 1936.

The main interest of the Kansas Section has been to make the teaching of calculus uniform in all colleges and universities throughout the state, to cooperate with high school teachers for the best teaching of mathematics, and to keep members informed of changes taking place in the teaching of mathematics throughout the country. The programs also provide opportunity for reports on research in mathematics.

The material from which this summary was prepared was compiled by W. H. Garrett, Professor Emeritus, Baker University, Charter Member of the MAA, the Kansas Section and the K. A. T. M., and by Guy W. Smith, Professor Emeritus, University of Kansas, a Charter Member of the MAA and present at the organization meeting in Columbus, December 1915.

1916 IOWA

In his "Early History of the Iowa Section" R. B. McClenon, then of Grinnell College, recalls that an evening conversation of six mathematicians in November 1915 led to a firm resolve to promote an organization of college teachers in Iowa. The six included Professors Smith, Baker and Reilly of the

State University, Professor Neff of Drake, Professor Wester of State Teachers and Professor McClenon. All had evidently been supporters of the State Teachers Association, as it was then named, but felt that the programs of that organization did not meet the special needs of college teachers. The formation of the MAA in December 1915 provided the medium for fulfilling the objectives of the Iowa men and they lost no time in applying for approval of an Iowa Section.

In April 1916 the Association members present at the meeting of the Iowa Academy of Science organized the proposed Section and elected their first officers, with Professor A. G. Smith of the State University as president. The first regular meeting of the Section took place April 28, 1917 at Grinnell College with attention concentrated on planning the freshman course [MONTHLY **24**, 281].

Original plans were to have two meetings each year, but that pattern has not been maintained. The programs have ranged from curriculum considerations, to preparation of teachers, to reports on research. One early program contained a paper by a student who presented his construction of a regular 17-gon.

1916 MARYLAND-VIRGINIA-DISTRICT OF COLUMBIA

The triple-named Section was authorized at the December 1916 meeting of the Association, and the organizational meeting was held March 3, 1917 at Johns Hopkins University. Twenty-three of the thirty-eight persons present were members of the Association. One of the two papers presented considered "The aims and possibilities of this local section." The other covered "A college or university course for teachers of secondary mathematics." One would infer that the new Section was to concern itself with education of mathematics teachers as well as the subject of mathematics itself. Professor Abraham Cohen of the host institution was elected the first President [MONTHLY **24**, 223–224].

The Section constitution provided for at least two meetings a year, in the fall and spring. In reviewing the records of these meetings, certain discussions command attention. For example, in December 1922 there was an exposition and criticism of the plan of reorganization of secondary school mathematics drawn up by the National Committee on Mathematical Requirements. The suggestion of calculus as a senior high school elective was approved but "with the accompanying expression of serious doubt of the likelihood of early adoption."

An unusual treat for the Section at its December 1931 meeting at the U. S. Naval Academy was a trip to the Library at St. John's College where an exhibit of some rare books on mathematics and related subjects had been

arranged. Some of the most noteworthy were Luca de Borgo Pacioli, *Divina Proportione* (Venice 1509), Colin Maclaurin, *Newton's Philosophical Discourses* (5th Ed., 1794), Robert Boyle, *Flame, Air and Explosives* (London 1712), and vol. 1 of Ozanom's *Mathematical Course* (London 1712).

The speakers at the Section meetings have included many persons from government bureaus, as would be expected. The papers tend to be more technical than in some other Sections.

1916 INDIANA

The Indiana State Teachers Association dates from 1891. College teachers in Indiana evidently attended meetings of that organization through the years until they finally decided in 1916 that a separate organization of their own would serve needs not entirely met in the older one. Thus the Indiana Section was formed with Professor S. C. Davison of Indiana University as Chairman and W. O. Mendenhall of Earlham College as Secretary-Treasurer. For several years these officers continued to be listed in the MONTHLY, but records of meetings are missing. A reorganization of the section took place in October, 1924 [MONTHLY **32**, 37]. The section has met regularly since then, sometimes once a year, sometimes twice. For some years a fall meeting was held in conjunction with the Mathematics Section of the Indiana Academy of Science.

In 1936 the section started the practice of awarding certificates of merit to students in Indiana colleges for excellence in work preparing them to teach in the secondary schools or in some advanced topic in mathematics. Awards were on the basis of performance on examinations prepared by a committee of the section. This activity was continued for a few years. Another project, started in 1951 and continued for several years, was the award of MAA medals to selected winners in the Indiana Science Talent Search who had prepared mathematics entries and also to winners in the Indiana State Mathematics Contest for Secondary Schools. The latter contest was conducted by Indiana University.

A Committee of the Section, at present active, has for its purpose maintaining and strengthening the cooperation between school and college teachers of mathematics and also with the State Department of Instruction. This committee originally was appointed by the Academy of Science. In collaboration with the state section of the Society of Actuaries, it conducts the National Mathematics Contest.

1916 MINNESOTA

The organizational meeting of the Minnesota Section was held December 1, 1916 at the University of Minnesota after Messrs. G. N. Bauer, R. M.

Barton and G. W. Hartwell sent out letters inviting all teachers of college mathematics in the state to consider the desirability of a section. Twenty-three persons responded by attending. A unanimous vote resulted in the formal organization with Dr. Bauer President and W. D. Reeve Secretary-Treasurer [MONTHLY **24**, 77–78]. Two meetings a year were planned. At the spring meeting in 1917 eight papers were presented including one on mathematics in French schools and another on the status of mathematics in the junior colleges of the state.

In the early 50's the Section decided to investigate the possibility of conducting high school contests and cooperating more closely with the Minnesota Council of Teachers of Mathematics. The By-laws were amended at this time to include North Dakota, Manitoba and Saskatchewan.

In 1959 the Section heard from P. C. Rosenbloom on the past and future plans for the Minnesota National Laboratory for the Improvement of Secondary School Mathematics.

1917 KENTUCKY

The teachers of higher mathematics in Kentucky had maintained a local state organization for many years before the section was organized. The older organization, founded in 1909, was called the Mathematics Section of Kentucky Colleges and Universities. The interest of its members helped to standardize the courses in mathematics in the colleges of the state and to strengthen and improve the teaching of mathematics in the high schools. These interests have been preserved by the section as evidenced in the programs of meetings. At the first meeting May 11–12, 1917 at Berea College there was a variety in the papers presented, some strictly mathematical, others pedagogical, and one titled "The best mathematical library for one hundred dollars" [MONTHLY **24**, 282–284].

The Section has met frequently with the Kentucky Academy of Science. At one of such joint meetings, in 1940, Professor W. B. Carver, President of the Association, gave a talk on "Mathematical puzzles as a stimulant." Joint meetings with the Kentucky Council of Mathematics Teachers have also taken place.

1917 ROCKY MOUNTAIN

The Rocky Mountain Section was organized to cover the states of Colorado and Wyoming. Dr. G. H. Light of the University of Colorado was the one who suggested the creation of this section. The report of the first meeting at the University of Colorado, April 7, 1917, states that "there were twenty-one present at the meeting, fifteen of whom are already

members of the Association and the others will join at once." The meeting was evidently a great success [MONTHLY **24**, 281–282].

During the years there have been joint meetings with organizations of high school teachers. At one of these meetings in 1940 there was a discussion of trends in the teaching of mathematics in the junior high school. At this same meeting suggestions were given for improving retention from high school to college. On at least one occasion a joint meeting has been held with the Rocky Mountain Section of the Society for Industrial and Applied Mathematics.

1917 ILLINOIS

Professor H. E. Slaught of the University of Chicago was responsible for bringing together in December 1917 twenty-one persons interested in forming an Illinois Section. This organizational meeting was held during the Association meetings at the University of Chicago. The first program meeting of the Section was held at the University of Illinois on November 22, 1919. Twenty-four Association members were present with a total attendance of 59 persons. Professor Slaught, then President of the Association, gave the principal address, sketching the history of organizations of mathematics teachers in this country. He gave his views on the need and opportunities for the new Section, appealing for the hearty cooperation of all college teachers of mathematics in Illinois. Other speakers discussed the training of mathematics teachers and freshman mathematics as related to varying admission requirements from the high schools. One other address was entitled "How Mathematicians Work." It is worth noting, in this day of expansion of the junior college concept, that the first chairman of the Section was J. A. Foberg of Crane Junior College [MONTHLY **27**, 112–113].

The Illinois Section has shown through its history a lively interest in contemporary events. In the early years a study was made of the educational needs of young men in military service. All through the years there has been discussion and action with respect to identifying and encouraging students of mathematics. In 1948 it was proposed that students in the Chicago schools be recognized through contests and awards. This first proposal was not implemented for lack of funds, but by 1953 the Section was engaged in promoting contests for high school students in Illinois. In 1957 the Section voted to have its contests become a part of the national program.

The adequate training of prospective teachers has received continued study by the Section. Cooperation with other state organizations and with the State Department of Education has been strong. Interest in special projects such as UICSM has been keen. Papers on the "Poorly Prepared Student," "Teaching Mathematics to Girls," "A Survey Course in Mathematics" show the range of concern for education in mathematics.

The Illinois Section has included some of the most distinguished mathematicians in the history of the Association. Among them are H. E. Slaught, President and later Honorary President of the Association, G. A. Bliss, author of the first Carus Monograph, Max Beberman, director of the UICSM, D. R. Curtiss, E. J. Moulton, Mayme I. Logsdon, Franz Hohn, R. D. Carmichael, and Lester R. Ford, Sr.

1920 TEXAS

The first meeting of the Texas Section was held November 25–26, 1921 in Bryan High School, Dallas, in conjunction with the annual meeting of the Mathematics Section of the Texas State Teachers Association [MONTHLY **29**, 3–6]. Joint meetings were continued until 1927. G. C. Evans was the first Chairman. The time of annual meetings was January or February until 1934, when it was decided that April or May would be better adapted to the Texas climate.

The Texas Section elected its Chairman and Secretary-treasurer for extensive terms. H. J. Ettlinger was Secretary-treasurer from 1922 to 1931. Nat Edmundson was elected his successor, and in 1935 Edmundson was elected Permanent Chairman which office he held until 1941 when meetings were suspended for the duration of the war. In 1947 C. R. Sherer was made Secretary-treasurer and he held the office until 1965. Ben T. Goldbeck, Jr., took over in 1965. H. J. Ettlinger later served as Chairman of the contest committee and coordinated the Section's work with that of the national committee.

When the Texas Section affiliated with the Texas Academy of Science in 1961 it was possible to have two meetings a year, the second one at the time of the Academy meeting. Attendance has increased to the extent that concurrent sessions are scheduled at the meetings. This is also necessitated by the fact that the Society has not had sectional meetings in Texas, and the Association section meetings have served as an outlet for research reports.

1922 SOUTHEASTERN

This section might have been placed at an earlier date of founding because original attempts at establishing a section were made in 1916. An organizational meeting was called for June of that year but too few could attend. A postponement until 1917 was announced, but then World War I called a halt to all plans until 1921 when an organizational meeting was announced for April 29, 1922 at the Georgia School of Technology in Atlanta. Sixty-three persons, including 15 Association members, were present. Professor Floyd Field was elected Chairman and W. W. Rankin Secretary-Treasurer. Five papers were presented on elementary mathematics,

the history of mathematics, college marking systems, the slide rule and relativity. A Constitution and By-Laws detailed the geographical area covered by the section, namely the states of Alabama, Florida, Georgia, North Carolina, South Carolina and Tennessee. The main interests were to be presentation and discussion of mathematical papers, improvement of the teaching of mathematics, the building up of mathematical libraries and cooperation with other organizations [MONTHLY **29**, 199–200].

Professor Rankin served as Secretary-Treasurer until 1933. H. A. Robinson was elected then and held office until 1959. Carl L. Seeback Jr. and Henry Sharp Jr. have served since then.

At the second meeting of the Section in 1923 it was decided to have mathematicians of national prominence as guest speakers. The first one was David Eugene Smith of Columbia who spoke on "Ten Great Epochs in the Human Development of Mathematics." Professor H. E. Slaught spoke at both the second and third annual meetings. In some years the Section has arranged its meeting to coincide with those of other science groups in order to cooperate in arranging for speakers. Thus, for example, Dr. A. H. Compton of Chicago spoke at the 1935 meeting on "Cosmic Rays" in cooperation with the Georgia Academy of Science, the South Eastern Section of the American Physical Society and the American Chemistry Society.

Student participation in meetings has been solicited since 1950. A special section for student papers was arranged at the 1967 meeting.

1923 MICHIGAN

The Mathematics Section of the Michigan Schoolmasters' Club was the vehicle for the formation of the Michigan Section. At a meeting of that Club on March 29, 1923 at the University of Michigan, Professor W. B. Ford proposed the organization of a Section of the Association. Professor T. H. Hildebrandt was made temporary chairman and then elected Chairman after a set of by-laws was adopted. Professor John P. Everett of Kalamazoo Normal was the first Secretary-Treasurer [MONTHLY **30**, 286–287].

The first meeting of the Section took place in April 1924 in conjunction with the Michigan Academy of Science, fifty-seven persons attending, thirty-six of them Association members. At that time it was reported that 50 members (out of a possible 74) of the Association had affiliated with the Section. A close relation with the Academy of Science was effected by creating a Mathematics Section of the Academy, providing that the Chairman of the Academy Section be the current Chairman of the Association Section and scheduling joint meetings whenever feasible. Joint meetings with the Michigan Schoolmaster's Club continued for a short time. It is worthy of

note that none of the papers presented at the first meeting was concerned with curricular problems or teacher training. Professor Karpinski's paper on "Early American Arithmetics" was the most nearly related to mathematics education.

At the 40th anniversary of the founding of the Michigan Section Professor Hildebrandt was invited to be a guest. He noted in a letter of regret at being unable to attend that the first Secretary-Treasurer, Professor Everett, was to make some remarks about the organization, and Hildebrandt graciously enclosed some of his own recollections for the occasion. He recalled that before the Section was formed the only existing state organization with which teachers of mathematics at any level could affiliate was the Schoolmaster's Club. The need for another group where teachers of mathematics in colleges and universities could "talk shop" (not Hildebrandt's words) was evident. He pays tribute to the Schoolmasters' Club for their willingness to cooperate in the formation of the new organization.

A major project of the Michigan Section has been the Michigan Mathematics Prize Competition inaugurated in March, 1958, with the first contest attracting 6100 students in 315 high schools. The examination, prepared and corrected by a committee of the Section, is in two parts. The first part is multiple choice to test the general background; the second part is of a character designed to measure the mathematical maturity of the student. Medals, certificates, prizes and scholarships are awarded to the highest scorers. Sponsoring organizations include colleges, universities, and industries. In 1965–66 tests were held in 579 high schools with 21,755 students participating. At the awards banquet held for the 110 top students, medals and scholarships amounting to $3,500 were given to the top 25 students.

1924 NEBRASKA

The first meeting was held March 14, 1924 at Lincoln [MONTHLY **31**, 370–371]. On May 2, 1924 the newly formed section met with the Mathematics-Physics Section of the Nebraska Academy of Science. This indicates that perhaps the Mathematics-Science Section of the Academy pre-dated the Section of the Association. There were seventeen charter members, with Professor W. C. Brenke of the State University serving as the first Chairman and Emma E. Hawthorn the Secretary-Treasurer.

Nine papers were given at this first meeting, eight of them on pure or applied mathematics with only one related to teaching, the title being "An Example of the Value of Diophantine Analysis to the Teacher in the Secondary School." It was presented by A. E. Campbell from Omaha Technical High.

The close tie with the Academy of Science until 1965 is revealed in the

original By-laws. Under the section on Meetings it is stated that "there shall be one regular annual meeting at the time of the meeting of the Nebraska Academy of Science, and such other meetings as may be arranged by the executive committee." In 1965 the section on meetings includes the provision for one annual meeting per year but no reference to the Academy.

The By-laws 1924–1965 restrict the membership to residents of Nebraska, eligible for membership in the Association, whereas the 1965 By-Laws extend the eligibility to those members of the Association who reside in territory not included in any Section and who notify the Section Secretary that they wish to be members of this Section. The section on Name and Purpose indicates that the extended territory is intended to be certain named counties in South Dakota.

1924 LOUISIANA-MISSISSIPPI

There is no account in the Monthly of the first meeting of this Section, but the second annual meeting is recorded as taking place in March 1925 at Hotel Edward in Jackson, with about 200 in attendance at the Friday evening session. The Chairman for 1924–25 was B. M. Walker, who was serving as President of Mississippi A and M College at the time of the meeting. The account does not specify the Friday evening speaker but the complete list of papers suggests that it might have been Professor F. R. Moulton of Chicago who gave an illustrated lecture on "Other worlds than ours," [MONTHLY **33**, 242–243].

During the years the Section has met with the Louisiana-Mississippi branch of the NCTM. There have been guest speakers from outside the Section from time to time. In March 1940 W. B. Carver gave two talks. President E. E. Moise was the guest lecturer in 1966.

1925 SOUTHERN CALIFORNIA

Professor Earle R. Hedrick, first President of the Association, on his move to California in 1924, immediately promoted the idea of a Section. The organization meeting took place in Los Angeles in November 1924, with Dr. Hedrick presiding as temporary chairman. Forty-one persons, 29 of them members of the Association, attended. Eight of the 29 were still living in 1967 and still members of the Association.

The first regular meeting was held February 28, 1925 in Los Angeles with 35 members of the Association present and a total attendance of 46. A proposed constitution had previously been submitted to the Association and approved. Professor Harry Bateman, California Institute of Technology, was elected Chairman and Professor Paul H. Daus Secretary-Treasurer [MONTHLY **32**, 271–272]. Daus served in that position for 33 years "in spite of presen-

tation of his resignation on several occasions" (as he put it in the short history he prepared for our use). Professor R. B. Herrera succeeded him in 1957, serving for 10 years. The present Secretary-Treasurer, Professor Donald Potts, elected in 1967, is prevented, Dr. Daus points out, from having to serve longer than 10 years by the new Association regulations.

Whereas many Sections have started out with just one meeting a year and then expanded to two meetings a year, the Southern California Section did the reverse, having two meetings a year until 1928–29 and then going to just one annual meeting because of overlap and attendance at Association and Society meetings.

In the first twenty years the membership of the Section grew very slowly, with only 80 members in 1945. By 1955 the membership was 330, reflecting rapid development of mathematical education in the area. With the great industrial growth and the development of the State Colleges in California in the next few years, the Section membership rose to 750 in 1962 and to 1100 in 1967. Attendance at Section meetings, for various reasons, has not increased proportionately. The largest attendance to date was in 1965 with total attendance at 205, including 169 members of the Association.

Distinguished members of the mathematical community in Southern California have given service in many ways to the Section, in matters of State educational policies, in the visiting lecture program to high schools, and in school contests.

1926 PHILADELPHIA

The Philadelphia Section was first to bear the name of a city instead of a state or geographical region. Professor Albert A. Bennett, in his reminiscences to the (retiring 1968) Secretary-Treasurer Voris V. Latshaw, recounts the negotiations with the Association with respect to the name. He says "At the organizational meeting... a request for establishing the Philadelphia Section of the MAA was forwarded to Secretary Cairns. His first reaction was that the name was ill-chosen, since all the other Sections were named for States, and to name a section after so small a political unit as a city, would break sound precedent. I wrote back that Pennsylvania had two natural cultural centers, one at the extreme east (Philadelphia), the other at the extreme west (Pittsburgh). One could not expect much of an attendance at either of these places, from residents near the other. Philadelphia should attract persons from Eastern Pennsylvania, Delaware and southern New Jersey. Setting a new precedent might encourage the later founding of a Pittsburgh Section, attracting mathematical instructors from West Virginia and Eastern Ohio as well as from western Pennsylvania. Cairns and Slaught were not obstinate, and in December, the Section was

admitted under its proposed name, subject of course to the usual provision for By-Laws, etc., and promises of good behavior." The first meeting was held November 27, 1926 at Lehigh University [MONTHLY **34**, 166–168].

Professor Bennett also recalls that Cairns and Slaught seemed to be concerned about the "seeming apathy or lethargy" (Bennett's words) of the mathematicians in the Atlantic States (there being only one section then in the East) and encouraged Bennett and others to consider another section. The existing one in the East was the Maryland-Virginia-D. C. Section. Professor J. B. Reynolds in 1925 had the idea of a Lehigh Valley Section, but this developed into the idea of the Philadelphia Section. Both Reynolds and Bennett were at Lehigh. Professor H. H. Mitchell of the University of Pennsylvania was the first Chairman, and Professor Bennett Vice-Chairman and Secretary-Treasurer. The Section was intended to serve the eastern part of Pennsylvania, southern New Jersey and Delaware. The New Jersey Section came later.

Papers at early meetings of the Section were mainly research and expository. In recent years the afternoon sessions have dealt with education in mathematics in its various phases. Undergraduate papers have also been presented in recent years. The membership of the Section in 1967 included 40 persons from Delaware and 586 from Pennsylvania.

Professor Latshaw has given us attendance records at section meetings through the years and also special features of some of the meetings. We list some of these special features to indicate a typical section's far-reaching interests:

1935 Survey of college curricula in Philadelphia area
1936 Undergraduate comprehensive examinations
1939 Mathematics clubs
1941 Promotion of science in secondary education
1954 Mathematics through television
1955 Integration of high school and college mathematics
1956 High school contest
1958 Mathematical training for industry
1962 Undergraduate mathematics and teacher training
1964 Freshman and sophomore mathematics in U. S. and Great Britain
1965 Teacher certification. CUPM general curriculum for colleges

1932 WISCONSIN

About thirty-five Association members met November 3, 1932 in Milwaukee to organize the Wisconsin Section. The first regular meeting was set for April 1933 at Beloit College, at which time G. A. Parkinson of the Wisconsin Extension Division was elected Chairman and H. P. Pettit,

Secretary. Plans for fall and spring meetings were approved. One of the papers at the first meeting was entitled "The lag of mathematics behind literature and art in the earlier centuries," given by H. E. Slaught [MONTHLY **40**, 64–65].

A report by Professor R. E. Langer of Wisconsin on the national reorganization of the Association was presented in 1940. He urged all section members to participate more actively in the affairs of the national organization. The Section has certainly done so through the years.

Meetings have been held with the Wisconsin Mathematics Council, where the two organizations have held separate sessions and then have come together for a joint session. The Section has been participating in the high school contest.

1933 ALLEGHENY MOUNTAIN

The Pittsburgh college and industrial center was the locale for a section, as hoped by A. A. Bennett when he promoted the section centered at Philadelphia. The Allegheny Section attracted interest from teachers of mathematics and mathematicians in industry from West Virginia and Eastern Ohio as well as Western Pennsylvania. At the first section meeting on February 10, 1934 at Carnegie Institute of Technology there were 71 in attendance from 23 institutions, with 34 members of the Association. In addition to technical papers at this meeting there was a round table discusssion on the topic "What can the colleges do for students without adequate training in high school mathematics?" [MONTHLY **42**, 191–193].

Professor C. S. Atchison was the first Chairman and Professor J. S. Taylor the Secretary. Arnold Dresden, then the Association President, was the principal speaker at the second meeting in May, 1934. For a few years three meetings of the section were held each year, then two a year, but more recently only one a year. Attendance at annual meetings now is more than double that of the first meeting. Eastern Ohio is now included in the Ohio Section, but most of West Virginia is in the Allegheny Section.

Since 1957 one of the most important activities of the Section has been its part in promoting the national high school contest. Recently 3500 students from 77 schools in West Virginia and 5331 students from 116 schools in Pennsylvania participated.

1933 OKLAHOMA (OKLAHOMA-ARKANSAS)

The college teachers in Oklahoma who had been attending meetings of the mathematics section of the Oklahoma Education Association began meeting in a separate group during the late 1920's. Before 1930 they had formed a college mathematics teachers section of the Oklahoma Teachers

Association. It was this group which initiated the formation of the Oklahoma Section of the MAA, whose first meeting was on February 9, 1934 in Oklahoma City [MONTHLY **41**, 469–470]. Professor N. A. Court served as the first Chairman. Ties with the OEA were not completely broken, however, since the section meetings continued to be held in the same city on the same day as those of the older organization, but at a different hour. This enabled members of each group to attend meetings of the other. When in the late 50's some of the University of Arkansas teachers started attending Oklahoma Section meetings, it was no longer feasible to have meetings coincide with those of OEA.

The Arkansas and Oklahoma teachers worked so closely together in the Oklahoma Section affairs that in 1966 the section became known officially as the Oklahoma-Arkansas Section.

1936 SOUTHWESTERN

Professor J. H. Butchart of Northern Arizona University has prepared a complete list of officers, dates and places of meetings from the first meeting in April 1937 [MONTHLY **44**, 429–432] to the spring meeting in 1967, with the exception of the years 1943–46 when meetings were suspended. C. V. Newsom is given credit for organizing the section. As is the custom with many sections, the vice-chairman generally becomes the chairman in the next year. P. K. Rees was the first Section Chairman with W. C. Risselman as Secretary-Treasurer. In this section there has been only one Secretary-Treasurer (H. D. Larsen) who served as long as five years. Professor Larsen then became Chairman in 1948. The By-Laws state that the term of office of the Secretary-Treasurer shall be for four years.

Attendance figures from 1955 to 1967 fluctuate. There is no steady growth. In fact the highest figure was in 1961 and the lowest in 1963 with total attendance in 1963 half that in 1961 and less than that in 1955. The membership of the section, as stated in the By-Laws of 1936, shall be the membership of the Association resident in Arizona and New Mexico. Other members of the Association in nearby areas may affiliate as individuals. Later the El Paso, Texas, group asked to come into the Section and this was approved.

During the years many of the speakers have been mathematicians from industries in New Mexico and Arizona and at least one Chairman was from industry. Several principal speakers have been from out of state also. Some of the special guests have been G. E. Forsythe of UCLA, P. H. Daus of UCLA, A. E. Taylor, UCLA, S. M. Ulam, Los Alamos Scientific Laboratory, J. Douglas, Rice, R. E. Bellman, Rand Corp.

Two special projects of the section deserve mention. Before the Association established its national program, the Southwestern Section elected one

of its own members each year as a traveling lecturer to colleges in the section. The only remuneration was payment of expenses by the section. The other project was the construction and administration of a comprehensive examination for high school students.

1939 NORTHERN CALIFORNIA

"From its inception the Northern California Section has evidenced concern with mathematics education at all levels." This statement is quoted from the brief history prepared by the section for our use. At the time of the section founding there was danger that algebra was to be removed from the ninth grade in the California schools and that the pattern for the immediate future would place the first course in algebra in the tenth grade, moving geometry to the 11th grade and the second course in algebra to the 12th grade. The section at its first meeting on January 28, 1939 at Galileo High School in San Francisco created a Committee on Mathematics Education charged with "considering problems of mathematics curricula; of teacher preparation; of credentialization; of accreditation; of articulation of high schools, junior colleges and four-year institutions in regard to mathematics." It is significant that the impetus for the formation of a section came primarily from University of California staff members, that the first meeting was held in a high school with several high school teachers in attendance and that the first Chairman was a junior college instructor, Professor A. L. McCarty of San Francisco Junior College [MONTHLY **46**, 314–315]. The ninth grade algebra problem was successfully solved with the help of the Section Committee: algebra was not moved to the tenth grade.

Professor H. M. Bacon of Stanford served as Secretary-Treasurer for the first seven years, which were trying times for the section because of World War II. Credit is given to several devoted members who helped to keep the section going during those years. Because of their efforts the section was able to pick up quickly after the war and resume its activity especially in matters of teacher training and certification. The section has close cooperation with the California Mathematics Council (an affiliate of NCTM). The rapid growth of the state college system in California has brought many state college faculty into the section. In fact Roy Dubisch (then of Fresno State College) was most influential in leading the section in organizing high school contests and visiting lectureships in the 50's before the Association programs were established. The first Northern California high school contest involved 2100 students from 72 schools. By the mid-sixties over 18,000 students from about 300 schools were participating. The section claims that in comparison with its population the section has provided by far the largest contribution to the national contest totals and ranks second only to the Metropolitan New York Section in scores each year.

A major revision of the By-Laws was made in 1960, incorporating provisions of election which insure continuity of leadership, indoctrination of new officers and rotation of responsibilities. The section is fortunate in having as section member the Secretary of the Association, Henry L. Alder. The names of many other section members could be listed as faithful and inspiring workers, and the list would include famous research mathematicians, high school teachers, junior college and four-year college staff as well as applied mathematicians. The membership is drawn from the States of Nevada and Hawaii as well as Northern California.

1940 UPPER NEW YORK STATE

It was in the fall of 1939 that Walter B. Carver, then President of the Association, sounded out Association members about the formation of a section in New York State outside the metropolitan area. For several years staff members from Syracuse, Hamilton and Colgate had been meeting regularly to talk about mathematics. It was natural, then, after favorable response to Professor Carver's inquiries, that an organizational meeting should be held at Colgate on May 11, 1940. Ninety-six persons attended, 43 of them members of the Association. Harry M. Gehman of the University of Buffalo was elected Chairman and C. W. Munshower of Colgate the Secretary-Treasurer [MONTHLY **47**, 503–505]. There were only two Secretary-Treasurers of this Section up until 1967. Professor Munshower served until 1950 and Professor N. G. Gunderson from then until 1967. The third meeting scheduled for 1942 at the University of Rochester was never held, and there was a five-year suspension of meetings until 1947, when Rochester finally acted as host to the Section.

At the first meeting Professor Gehman appointed several committees, each with many members, in order to promote wide member participation in the affairs of the section. During the years committee work and assignments have changed and new committees have been formed for new tasks. In 1949, for example, a Committee to Study the Relation of Secondary School and College Mathematics was appointed with M. F. Rosskopf of Syracuse as Chairman. This Committee was of great help in the formation in 1950 of the Association of Mathematics Teachers of New York State which has in its membership elementary, secondary, college and junior college teachers and is an affiliate of NCTM.

High school contests were started in the early 50's in the Buffalo public schools under the direction of Louis Scholl and then, after the Association began its national program in 1956, the section established a Committee to supervise the contest in Upper New York State under the general direction of Professor Nura Turner of Albany, who has continued as Chairman since

that time. Other committees have been concerned with Community Colleges, Certification Requirements, Strengthening Mathematics. A recent project has been an Undergraduate Paper Contest, with the winner presenting his paper at a section meeting.

Meetings were held just once a year in the spring until 1967–68 when an experiment with fall and spring meetings was started. Attendance at yearly meetings has run between 100 and 150, and places of meeting have been selected so as to attract those from the east, the west and the central parts of the state.

At the May 1968 meeting the Harry M. Gehman Invited Lecture Series was inaugurated in honor of the first Section Chairman and the retiring Executive Director and Treasurer of the Association. Professor and Mrs. Gehman have been in constant attendance at meetings and Professor Gehman has always been a valued counselor.

1941 METROPOLITAN NEW YORK

At the time of organization of the Upper New York State Section, there was discussion in metropolitan New York about the possible boundaries of a proposed Metropolitan Section. Two Queens College members, A. B. Brown and T. F. Cope, attended the Upper New York State organization meeting in 1940 (they both gave papers) and discussed the boundary problems with people there. It seemed clear, after these discussions, that a single section covering all of the state was impracticable because of the distances involved. It was decided by the metropolitan New York people that their section should include the state south of (and including) Poughkeepsie and the part of New Jersey east of New Brunswick. The first meeting was held at Queens College, Flushing, on April 11, 1941 [MONTHLY **48**, 581–583].

The objectives of the section were set forth as follows: (1) presentation at meetings of papers of interest and value to teachers in colleges and senior high schools, (2) consideration of problems of articulation between high school and college programs. To aid in obtaining the objectives it was decided that the Chairman should be a college teacher and the Vice-Chairman a high school teacher. The programs of the section indicate that the original objectives have been kept in mind by the membership.

The Metropolitan New York State Section pioneered in the high school contest field. A Committee on Contests was formed in 1949. The system developed by this Committee was adopted by other sections and finally became the pattern for the Association's National Contest. Three men should be cited for their work in the Contest program: Brother Alfred Welch of Manhattan College, Professor William Fagerstrom of the City College of New York and Professor Charles Salkind of Brooklyn Poly-

technic Institute. The National Contest now attracts students from schools throughout the world. Professors Fagerstrom and Salkind were made members of the MAA Committee because of their experience and continued interest.

1945 PACIFIC NORTHWEST

Before the formation of the Pacific Northwest Section there was in existence an informal organization known as the Pacific Northwest Mathematicians. This group was instrumental in the formation of the section. Professor M. S. Knebelman of State College of Washington was the first Chairman. Others succeeding him included R. M. Winger, A. F. Moursand, R. D. James, A. S. Merrill, to mention a few. F. S. Nowlan of the University of British Columbia was the first Secretary-Treasurer. Professor Griffin of Reed College was always a strong supporter of the Section.

At the first meeting on April 10–11, 1947 in Vancouver, fifteen papers were presented. In addition, an evening session was devoted to a discussion of mathematical instruction in the Pacific Northwest. At that time there were many problems in connection with increased registration [MONTHLY **55**, 53–56].

At the two-day meeting in June 1966 there were special junior and community college sessions. Two papers asked the questions "Is there a place for the two-year college in NCTM?" and "Is there a place for the two-year college in the MAA?" Donovan Johnson and R. D. James were the respondents. Points of view on mathematics in the two-year college were given by a panel.

The original By-Laws of the Section stated that the members of the Association in Oregon, Washington and British Columbia would be members of the Section. An amendment in 1949 enlarged the boundaries to include Idaho, Montana, Alaska and Alberta. The inclusion of Saskatchewan remained optional.

1955 NORTHEASTERN

Many organizations for secondary school teachers of mathematics existed in New England prior to 1955, but none specifically for college teachers. This situation led, as in so many other areas, to the formation of the Northeastern Section to include the territory previously included in the MAA New England Region. Howard Eves and D. A. Kearns of the University of Maine undertook arrangements for an organizational meeting at the University of New Hampshire, November 26, 1955 [MONTHLY **63**, 281–282]. Professor A. A. Bennett, then of Brown University, and an experienced section promoter, was in charge of the program. Eighty-three persons

attended, including 56 Association members, to hear a program of great variety with Ralph Beatley, Stanley Bezuszka, S. J., R. E. Johnson, R. A. Rosenbaum, D. J. Struik and Richard F. Clippinger of Raytheon as speakers. At the business meeting, chaired by Professor Bennett, Howard Eves was elected Chairman and R. E. Johnson Secretary-Treasurer. With the organization of this Section it could be said that the Association had finally achieved complete coverage of the United States (and Canada?) under sectional organizations.

Experiments have been carried out with times of meeting of the section, partly due to weather conditions. The present arrangement is for a November meeting in the southern portion of New England every year and a June meeting every other year in the northern portion, perhaps of two days' duration. About 75 percent of the session times have dealt with mathematical topics, the remainder with mathematical education. Several section members have been active in national duties in the Association. E. E. Moise of Harvard has been the Association President and A. B. Willcox is assuming the office of Executive Director.

The membership of the section, at present about 1200, is composed of representatives from all teaching levels. As stated in a report of the section, "Many of these members regard sectional meetings as the most accessible form of contact by which to maintain forward positions in mathematical education."

1956 NEW JERSEY

The Association members in New Jersey in the early 50's were under either the Metropolitan New York Section or the Philadelphia Section. There could be no clear identification for them when they wished to pursue matters of education in New Jersey with respect to mathematics. This was particularly clear to persons like Albert E. Meder, A. W. Tucker, and others. Dean Meder was Chairman of a Committee on Articulation between the high schools, private schools, and colleges and universities in New Jersey. Several New Jersey mathematicians were involved in College Entrance Examination Board activities. The necessity for an organization of New Jersey mathematics teachers prompted Meder to arrange a meeting of mathematicians and teachers of mathematics to discuss the matter. It was decided at this meeting that he should appoint a committee to investigate the possibility of forming a New Jersey Section. This was done and as a result an organizational meeting for the Section was held at Rutgers on November 3, 1956, with 51 members of the Association in attendance out of a total of 71 [MONTHLY **64**, 217–218]. Any member of the Association resident in New Jersey was to be a member of the new section unless he gave official

notice of another preference. Dean Meder of Rutgers was elected Chairman and I. L. Battin of Drew University, Secretary-Treasurer.

By-Laws were adopted in 1957 and revised in 1960. Some features of these By-Laws, which are more detailed than those of other sections, are also original, particularly on section officers. Professor Cyril A. Nelson of Douglass College, Rutgers, is given credit by Professor Battin for much of the excellent details of the By-Laws. The Chairman of the Section must have been a member of the Executive Committee in the year previous to his election as Chairman. He serves for only one year and cannot succeed himself. There is an Associate Secretary-Treasurer. The Secretary-Treasurer and Associate Secretary-Treasurer can succeed themselves only once for three-year terms, but the Associate Secretary-Treasurer may subsequently serve as Secretary-Treasurer.

For several years after the section was established Professor Battin sent notice of meetings to all high school and private secondary schools in the state. As a result many secondary teachers became members of the Association. Another result has been a close working relation between the section and the Association of Mathematics Teachers of New Jersey. Professor Barlaz of Rutgers has helped to strengthen this relation. Jointly sponsored meetings of the two organizations have taken place on several occasions.

1967 FLORIDA

In accordance with a petition submitted by 34 members of the Association residing in Florida and upon the recommendation of the Committee on Sections, the Board of Governors at its meeting in August, 1967, voted to authorize a Florida Section as of September 1, 1967. The exact territory covered by the section was not delineated at that time but was to be determined later. The first annual meeting of the section was held in March 1968.

CHAPTER VI. FINANCIAL HISTORY

Harry M. Gehman

The financial history of the first fifty years of MAA may be roughly summarized thus: The first five years were devoted to foundation and organization. The next ten years were noted for gifts and bequests. The following decade comprised the depression days of the thirties. The next fifteen years included the war and its aftermath. The last ten years were characterized by the receipt of grants from NSF and other foundations. (See also Appendix 10.)

When MAA was founded in the final days of December 1915, its assets were nearly zero. According to the Treasurer's Cash Book, thirteen members had paid him a total of $40 for dues at the meeting of 31 December, so that MAA did end the year 1915 with a cash balance of $40.

While its cash assets were small, the Association began its existence by assuming ownership of the AMERICAN MATHEMATICAL MONTHLY with its good-will, subscription list, stock of back numbers, and other assets. The transfer of ownership to the Association by the Editorial Board of the MONTHLY occurred on 31 December 1915. Early in 1916, B. F. Finkel, as Treasurer of the Editorial Board, transmitted to the Association $958, representing assets of the MONTHLY at the end of 1915.

At the organization meeting of the Association, the subject of finances naturally occupied much of the attention of the founding fathers. A standing Committee on Finances was established. Provision was made for bonding the Secretary-Treasurer in the amount of $2000. Dues for 1916 were set at $3, representing an increase of $1 over the former annual subscription rate of $2 for the MONTHLY. An initiation fee of $2 was instituted, but this was waived for all charter members, that is, for all who joined MAA before 1 April 1916. Annual dues of $5 were established for institutional members, which included two subscriptions to the MONTHLY.

Annual Treasurer's reports have been published in the MONTHLY each spring covering the preceding calendar year. Originally these reports contained sufficient detail to satisfy the most curious auditor. In recent years space has been conserved by printing merely a summary, with a more complete report available in mimeographed form for those interested.

The Treasurer's report for 1916 shows that MAA ended its first year with a net worth of $1,180 after taking into consideration all outstanding credits and debits. This balance was due largely to the amount turned over by the previous owners of the MONTHLY.

Since that first year, MAA has had a steady increase in its receipts, its expenditures, and its assets. Thus after fifty years, at the end of 1965, the balances in MAA funds were over $316,000, representing a net worth of about $275,000. At the same time, the Treasurer was also holding over $115,000 in funds advanced by NSF for payments on grants. These amounts do not take into consideration the value of the office furniture and equipment owned by MAA, nor the stock of books and periodicals held for future sale.

These assets have been accumulated largely by an economical operation of the affairs of the Association. Various gifts and bequests by members and friends have enabled MAA to undertake activities, which in turn have added to its financial stability.

The chief source of income has always been the annual dues of individual members. Set originally at $3, they had to be increased to $4 in 1921. Institutional dues were increased from $5 to $7 at the same time. These increases were needed because of a 50 per cent rise in the printing costs of the MONTHLY and the need to provide editorial and clerical assistance to the editor-in-chief. Individual dues remained at the $4 figure from 1921 to 1957. This was such a long period of time that L. R. Ford, when President of MAA, referred to the three famous mathematical constants: e, π and 4, the latter representing the annual dues of MAA. Increased operational and printing costs required increases in dues to $5 in 1957 and $6 in 1965.

In order that the Association might legally receive contributions and

bequests, it was incorporated in September 1920 in the state of Illinois as a not-for-profit corporation. The 1920's may be characterized in the financial history of MAA as a period of gifts and bequests, although such contributions have occurred during the entire life of the Association. These gifts have led to the establishment of various separate funds in the accounts of the Treasurer.

The first large gift and undoubtedly the most important one in the early history of the Association, came in 1921 from Mrs. Mary Hegeler Carus as trustee of the Edward C. Hegeler Trust Fund. This was a gift of $6000 payable over a five year period for the publication of a series of mathematical monographs. The terms of the gift were subsequently modified so that the Open Court Publishing Company, owned by the Carus family, undertook complete responsibility for the publication and distribution of the series known as the *Carus Mathematical Monographs*. Although it was the original intention of Mrs. Carus to endow the entire series of monographs, circumstances led to a modified plan under which Open Court financed only the first four volumes. Their sale enabled MAA to accumulate a revolving fund by which the series of monographs may be continued indefinitely. At the end of 1965, fourteen Carus Monographs had been published and the Carus Fund had a balance of almost $72,000.

Another generous contributor to MAA in its early days was Arnold Buffum Chace, Chancellor of Brown University. Besides several smaller contributions to the Association beginning in 1921, he provided funds during the period 1925–1930 for the publication of the *Rhind Mathematical Papyrus*. Over 500 sets of the Papyrus were made available to MAA to be sold to its members and others. The proceeds of these sales were used to establish the Arnold Buffum Chace Fund, whose principal and income have been used by MAA to finance the publication of "Professional Opportunities in Mathematics" and the *Slaught Memorial Papers*. The cost of supplying Slaught Papers as supplements to the MONTHLY has resulted in the gradual depletion of the Chace Fund, whose balance at the end of 1965 was about $6000.

The sum of $2000 was left by Wallace L. Hardy to Drury College as a permanent endowment trust fund, whose income was to be applied in aid of the publication of the MONTHLY. Since 1924, Drury College has paid the Association annually the income from the Hardy Fund. During the lifetime of B. F. Finkel, MAA paid this income to him. Since his death it has been used for publication and editorial expenses of the MONTHLY.

In 1925 the CHAUVENET Prize Fund was established by a gift of $100 from J. L. Coolidge. There were subsequent gifts of $500 from W. B. Ford and $100 from Dunham Jackson. The Association also transferred funds from its General Fund, and eventually the Chauvenet Fund was merged into the

Awards Fund. The Chauvenet Prize was intended to encourage expository contributions to mathematical journals. It was named for William Chauvenet (1820–1870), whose writings were considered excellent models of mathematical exposition.

In 1923, H. E. Slaught and C. C. Carter, a lawyer of Bluffs, Illinois, interested Miss Bessie Houck in establishing a fund for MAA in memory of her father. Miss Houck's will bequeathed her estate to the Association. Following her death in 1936, the will was contested. The settlement brought MAA over $7500 for the establishment of the *Jacob Houck Memorial Fund.* The principal of this fund is to be kept intact, while its income may be used for the promotion of mathematical science or its teaching. This income has been used for various MAA projects such as the publication in 1950 of the Index of Volumes 1–56 of the MONTHLY and from time to time for publication expenses of the MATHEMATICS MAGAZINE. At the end of 1965, the Houck Fund had a balance of almost $10,000 of which over $2000 represented accumulated income.

In 1951, MAA received a bequest of almost $16,000 from the estate of Otto Dunkel. Although no restriction was placed on the use that MAA might make of the principal or income of this bequest, it seemed appropriate to use it for publication purposes because of Dunkel's long editorial connection with the Problems Section of the MONTHLY. The first project financed by the Dunkel Fund was the publication in 1957 of the *Otto Dunkel Memorial Problem Book*, containing the Four Hundred "Best" Problems (1918–1950) from the MONTHLY. The Dunkel Fund has been also used to finance the publication of the series of *MAA Studies* and the *Guidebook to Departments in the Mathematical Sciences.* At the end of 1965, the balance in the Dunkel Fund was almost $33,000.

A gift of over $4000 from Lester R. Ford, Sr., in 1963 was used to establish what is now known as the *Lester R. Ford Fund of the Association.* By the end of 1965 this fund had increased to almost $5000. Later this fund was augmented by a second gift of over $5000 from Professor Ford, by gifts from his friends and relatives and by a bequest of $15,000 in his will. The capital of the Ford Fund will eventually be well over $25,000.

Mention should also be made here of the Greenwood Fund established in 1965 by an initial gift of $10,000 from a member of the Association who wishes to remain anonymous during his lifetime. Originally the fund was used to support certain aspects of the work of the Committee on Educational Media that could not be financed by NSF funds. At the end of 1965 there was a balance of over $8000 in the Greenwood Fund. Since then the fund has been supplemented by additional gifts by the donor. The fund may now be used by MAA without any restrictions on the purposes for which expenditures are made.

During the depression days of the 1930's, MAA encountered financial difficulties just as did its individual members. The 1932 report of the Secretary-Treasurer comments on the many members delinquent in the payment of dues. Following the bank holiday of February 1933, the funds of the Association were tied up in the Oberlin bank for a brief period, and some investments proved to be less safe than was previously assumed. Payments by the bank were gradually resumed but an uncollectable debt of slightly over $600 was finally written off the Association's books at the end of 1946.

The Association celebrated its twenty-fifth anniversary in December 1940 with a balance of over $25,000 in its current and endowment funds, and balances of about $8,000 in each of the Carus, Chace, and Houck Funds, representing a net worth of nearly $50,000.

Recommendations for fundamental changes in the financial and political philosophy of the Association were contained in the Report of the Committee to Review the Activities of the Association which appeared in the MONTHLY for February 1940, pp. 64–84. The chairman of this committee was Rudolph E. Langer, and its report is usually referred to as the Langer Report.

Some of the recommendations of the committee concerned MAA's publications. Others were that sections be subsidized so that they might pay expenses of speakers and that MAA make at least partial payment of travel expenses of its officers and members of the Board of Governors.

Like many other scientific and educational organizations, MAA began as a purely amateur organization with its officers serving without pay and for the most part without any repayment of travel or other expenses. After fifty years, as with other similar organizations, MAA has become more professional, paying its members at least in part for services rendered and repaying them for travel and other expenditures incurred on behalf of MAA.

Most of the recommendations of the Langer Report were put into effect by actions of the Board of Directors or by amendments to the By-Laws. Among its recommendations was that MAA establish a Finance Committee with authority to manage the financial affairs of the Association.

At the founding meeting of the Association, action was taken to institute a Standing Committee on Finances, to consist of the President (E. R. Hedrick), Secretary-Treasurer (W. D. Cairns) and the Managing Editor of the MONTHLY (H. E. Slaught). There is no record however that this committee took an active part in the affairs of the Association. In fact it was never listed among the standing committees of the Association.

The amendments to the MAA By-Laws of 1939–40, carrying out the recommendations of the Langer Report, provided for a Finance Committee consisting of the Secretary-Treasurer ex officio and two other members elected for four-year terms by the Board of Governors. When separate

offices of Secretary and Treasurer were created in 1958, both officers became members of the committee. Finally in 1962, the President was added to the Finance Committee so that it is now a committee of five. The two elected members of the Finance Committee were made ex officio members of the Board of Governors. Previously they were not members of the Board although they did attend its meetings.

The elected members of the Finance Committee since 1940 are:

R. E. Langer, D. R. Curtiss, H. M. Gehman, R. M. Foster, J. F. Randolph, W. B. Carver, E. A. Cameron, C. B. Allendoerfer, and G. B. Price.

The Finance Committee has become one of the most active committees of the Association. All members of this committee have spent many hours on the financial problems of MAA. The large number of grants from foundations received by the Association during the final years of its first half century, has complicated its financial affairs and has created a need for frequent consultations about the proper management of its finances. The Association owes much of its financial stability to the devotion and wisdom of the members of its Finance Committee.

A significant change in the direction of the Association occurred in 1954 when it received its first grant from the National Science Foundation, one of $15,000 for support of a program of Visiting Lecturers to Colleges. This program received grants from NSF of over $364,000 during the period 1954–65. The companion program of Secondary School Lecturers received grants from NSF during 1958–64 of over $373,000.

The first grant to the Committee on the Undergraduate Program in Mathematics was one of $2,500 in 1954 from the Social Science Research Council, followed in 1955 and 1957 by grants of $175,000 from the Ford Foundation. During the period 1960–65, NSF granted almost $2,560,000 for CUPM.

After various smaller grants to MAA for the production of films from 1957 to 1961 amounting to over $65,000, NSF granted over $1,500,000 in 1963 to the Committee on Educational Media. The Association appropriated $13,000 of its own funds during 1962–65 for the support of CEM, which also received support from the Greenwood Fund.

In 1958, MAA received a grant of $7,500 from NSF for a conference to review the program of the Association and to formulate a plan of action. The Washington Conference was held on 16–18 May 1958, and was reported in the MONTHLY for October 1958.

Smaller projects supported by NSF grants during this period were for a report on Non-Teaching Mathematical Employment, for conducting a Survey of European Mathematical Education, and for holding a series of Conferences for Lecturers at NSF Summer Institutes.

Finally, MAA received a series of grants for a total of over $300,000 dur-

ing 1963–65 for the support of the Cooperative Summer Seminars of 1964, 1965, and 1966. Grants were made by the International Business Machines Corporation, the Sloan Foundation, the Research Corporation, and the National Science Foundation.

The Association has also received support from other organizations for its High School Contest. Beginning with 1957 the Society of Actuaries has contributed about $50,000 and the Mu Alpha Theta fraternity has contributed $2,500 for this purpose.

In the above listing it should be noted that amounts granted have been given. In many cases expenditures were less than grants, and balances were eventually refunded to the granting body.

The presence of such grant funds in the hands of the MAA Treasurer means that his annual reports have tended to present a distorted picture of the actual financial state of the Association. Questions as to the amount to be allowed for indirect costs of projects conducted by MAA and supported by grants, have often taken years for their final arbitration. This situation was largely corrected by the establishment in 1963 and 1965 of separate bank accounts, called the Special Account and the Third Account, by which grant funds from NSF and contributions for the support of NSF projects were separated from regular MAA funds.

APPENDICES

1. CONSTITUTION, BY-LAWS, AND AMENDMENTS
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10. FINANCES

1. CONSTITUTION, BY-LAWS, AND AMENDMENTS

We give the original MAA Constitution and By-Laws, the 1920 By-Laws of incorporation, and the By-Laws as they read at the end of 1965. There is also a chronology of the amendments, which were published in the MONTHLY reports of national meetings and in the Register of Officers and Members.

ORIGINAL CONSTITUTION AND BY-LAWS (1916)

CONSTITUTION

ARTICLE I—NAME AND PURPOSE.

1. This organization shall be known as THE MATHEMATICAL ASSOCIATION OF AMERICA.

2. Its object shall be to assist in promoting the interests of mathematics in America, especially in the collegiate field.

ARTICLE II—MEMBERSHIP.

1. Any person who is interested in the field of collegiate mathematics shall be eligible for election to membership in the Association.

2. Any institution in which the Calculus is regularly taught shall be eligible for election to institutional membership in the Association; such an institution shall have the privilege of sending a voting delegate to the meetings of the Association.

ARTICLE III—OFFICERS.

1. The officers of this Association shall be a President, two Vice-Presidents, a Secretary-Treasurer and twelve additional members of an Executive Council, together with a Committee of three on Publications, who shall be *ex-officio* members of the Council.

2. The President, Vice-Presidents and Secretary-Treasurer shall be elected annually for a term of one year, and four members of the Council shall be elected annually for a term of three years. They shall be eligible for reelection, but not for more than two consecutive terms, except in the case of the Secretary-Treasurer, whose term may be extended indefinitely. The Committee on Publications, consisting of the Managing Editor and two other members, shall be appointed by the Council.

3. The Council shall transact the official business of the Association and shall report its actions at the annual meeting of the Association and in the official journal. Any proposed action of the Council which makes or alters a question of Policy shall be published in the official journal before final action has been taken, so that members of the Association may make known to the Council their individual views.

4. The Council shall have authority to fill vacancies *ad interim*.

ARTICLE IV—MEETINGS.

1. The annual meeting of the Association shall be held at such time and place as the Council may direct.

2. The Council shall have power to call other meetings of the Association whenever it may be deemed expedient.

ARTICLE V—SECTIONS.

1. Any group of members of this Association may petition the Council for authority to organize a Section of the Association for the purpose of holding local meetings. The Council shall have power to specify the conditions under which such authority shall be granted.

2. The Association shall not be obligated to pay from its treasury any of the expenses of such sections.

ARTICLE VI—OFFICIAL JOURNAL.

1. The Association shall publish an official journal, which shall be sent free to all members of the Association in accordance with Article VII.

2. The Council shall have power to conduct negotiations with respect to securing an official journal, and shall have full control of its publication and sale.

ARTICLE VII—DUES

1. An individual member of the Association shall pay an initiation fee of two dollars at the time of his election.

The initiation fee shall be waived in case of those who join the Association before April 1, 1916, and this clause shall be dropped after its provisions have been fulfilled.

2. The annual dues of an individual member shall be three dollars, including a subscription to the official journal.

3. The annual dues of an institutional member shall be five dollars, including two subscriptions to the official journal.

4. All dues shall be payable on the first of January of each year. Should the annual dues of any member remain unpaid beyond a reasonable time, his name shall be dropped from the list, after due notice.

5. New members entering the Association after April 1, of any year, shall have their dues prorated for the balance of the year, except when they desire to receive the full current volume of the official journal.

ARTICLE VIII—AMENDMENTS.

This Constitution may be amended at any annual meeting of the Association by a two-thirds vote of those present and voting, provided that such amendment shall have been printed in the official journal at least one month before the date of such meeting.

BY-LAWS.

1. *Election of Members.* Election to membership shall be by vote of the Council upon written application from the individual or institution seeking admission.

Those who shall be admitted to membership before April 1, 1916, shall constitute the list of charter members.

2. *Nomination and Election of Officers.* Two months before the date of the annual meeting, all members shall be given an opportunity to nominate by mail a candidate for each office for the ensuing year. One month before the annual meeting, the Council shall announce two candidates for each office, one being the person who received the highest vote in the nominations and the other being selected by the Council from among the several nominees next in order.

The election shall be by mail or in person and shall close on the day of the annual meeting.

Twelve members of the Council shall be elected at the first meeting of the Association,

and the secretary shall draw lots to determine which four of those elected shall serve for one, for two and for three years respectively. (This clause shall be dropped after its provisions have been fulfilled.)

3. *Committees.* The Committee on Publications shall have charge of the official journal and of all other publications of the Association, under the direction of the Council.

The Council may appoint any other committees and delegate to them such power as may, in its judgment, seem desirable.

4. *Price of Publications.* The Council shall fix the price of the official journal, and of any other publications of the Association to non-members, but in no case shall the journal be sold for less than the annual dues of individual members, as specified in Article VII of the Constitution.

This shall not be construed to affect existing contracts with any subscribers or news agencies for the year 1916, who may decline to readjust on the new basis. (This clause shall be dropped after its provisions have been fulfilled.)

5. *Amendments.* These By-Laws may be amended at any annual meeting under the same conditions as specified in Article VIII of the Constitution.

AMENDMENTS TO THE ORIGINAL CONSTITUTION AND BY-LAWS

1916

Article VII.1: The clause was dropped that those who joined the MAA before April 1, 1916 would not have to pay an initiation fee.

By-Law 2: The last clause, concerning election of Council members at the first meeting, was eliminated.

1917

By-Law 4: The clause, concerning subscribers to the official journal during 1916, was deleted.

1918

Article III.2: The Committee on Publications was now to consist of the Manager, the Editor, and one other member. The Secretary-Treasurer was to be appointed by the Council instead of being elected.

Article VI.2: The Council's power to conduct negotiations for an official journal was cancelled, as the MONTHLY had been acquired.

By-Law 1: "Those who shall be admitted to membership before April 1, 1916" was changed to "those who were admitted. . ."

By-Law 3: The first sentence was revised to have the Council appoint a Board of Associate Editors to assist the Committee on Publications with the MONTHLY.

1920

During the year the MAA was incorporated in Illinois. The Constitution and By-Laws were united and thereafter called simply the By-Laws. These have retained their basic form to the present.

BY-LAWS AT INCORPORATION (1920)

ARTICLE I—NAME, PURPOSE AND CORPORATE SEAL.

1. This organization shall be known as The Mathematical Association of America (incorporated).

2. Its object shall be to assist in promoting the interests of mathematics in America, especially in the collegiate field, by holding meetings in any part of the United States or Canada for the presentation and discussion of mathematical papers, by the publication of mathematical papers, journals, books, monographs and reports, by conducting investigations for the purpose of improving the teaching of mathematics, by accumulating a mathematical library and by cooperating with other organizations whenever this may be desirable for attaining these or other similar objects.

3. The Corporate Seal of the Association shall have inscribed thereon the name of the Association and the words "Corporate Seal—Illinois."

ARTICLE II—MEMBERSHIP.

1. Any person who is interested in the field of collegiate mathematics shall be eligible for election to membership in the Association.

2. Any institution in which the Calculus is regularly taught shall be eligible for election to institutional membership in the Association. Such an institution shall have the privilege of sending a voting delegate to the meetings of the Association.

3. Election to membership shall be by vote of the Board upon written application from the individual or institution seeking admission.

4. Those who were admitted to membership in The Mathematical Association of America (unincorporated) prior to October 1, 1920, and are in good standing as such are hereby admitted to membership in this Association.

ARTICLE III—BOARD OF TRUSTEES AND OFFICERS.

1. The control and management of the affairs and funds of the Association shall be vested in a Board of Trustees, who shall be members of the Association. The Board of Trustees, in the first instance, shall consist of the three (3) persons named in the Certificate of Organization. It is contemplated that such Board of Trustees shall, immediately after completing the organization of the Association, amend the Articles of Association, in the manner hereinafter prescribed, to provide for a Board of Trustees numbering nineteen (19). Such Board of nineteen (19) shall consist of a President, two (2) Vice-Presidents, a Secretary-Treasurer, three (3) members of the Committee on Publications and twelve (12) additional members.

2. For the terms set against their respective names, the following shall, upon amendment of the Articles of Association above mentioned, be the Officers and Trustees of the Association:

[Here was included a list of officers and trustees.]

3. The President and Vice-Presidents shall be elected by the Association's members annually for a term of one year, and four members of the Board shall be elected by the Association's members annually for a term of three years. They shall be eligible for reelection, but not for more than two (2) consecutive terms. The Secretary-Treasurer, and the Committee on Publications, consisting of the Manager, the Editor and one other member, shall be appointed by the Board. All Trustees and Officers shall hold over until their respective successors are elected and qualify.

4. The Board shall transact the official business of the Association and shall report its actions at the annual meeting of the Association and in the official journal. Any proposed action of the Board which makes or alters a question of policy shall be published in the official journal before final action has been taken, so that members of the Association may make known to the Board their individual views.

5. The Board shall have authority to fill vacancies *ad interim* in any office, including vacancies in the Board and in the Committee on Publications.

6. At all meetings of the Board of Trustees a quorum shall consist of not less than five (5) members and no business may be validly transacted at a meeting at which less than a quorum is present; *provided* that any meeting of the Board, whether or not a quorum be present, may be adjourned to a specified time and place by a majority of the members present without notice to the members at large other than announcement at such meeting. Informal action based on correspondence among the members of the Board, if ratified at a properly convened meeting of the Board, shall be as valid and effective as if originally authorized at such meeting.

7. Two months before the date of the annual meeting all members shall be given an opportunity to nominate by mail a candidate for each office to be elected by the members for the ensuing year. One month before the annual meeting the Board shall announce two candidates for each office to be filled by the members, one being the person who received the highest vote in the nominations and the other being selected by the Board from among the several nominees next in order. The election shall be by mail or in person and shall close on the day of the annual meeting.

8. The President shall be the executive Officer of the Association, shall preside at all meetings of the Board of Trustees and at the annual meeting of the Association. He shall have the usual duties pertaining to his office and such other duties as may from time to time be devolved upon him by the Board of Trustees.

9. The Vice-Presidents shall, in the absence of the President, have and exercise the powers of the President, their order being determined alphabetically. The Board of Trustees may devolve upon the Vice-Presidents such duties as may from time to time be determined.

10. The Secretary-Treasurer shall have the usual duties pertaining to the office of Secretary and of Treasurer, including the custody of the records of the Association and of its Corporate Seal, the keeping of minutes of the meetings of the Board of Trustees and of the annual meeting and special meetings of members, the giving of due notice of all regular and special meetings of the Association and of the Board of Trustees and the supervision and safe-keeping of the funds of the Association. The Secretary-Treasurer shall also have the duty of seeing that whenever Trustees are elected, including the election of Trustees to fill vacancies, a Certificate, under the Seal of the Association, giving the names of those elected and the term of their office, shall be recorded in the office of the Recorder of Deeds for Cook County, Illinois. Such Certificate shall be signed by the Secretary-Treasurer and verified by oath of the President.

11. The Committee on Publications shall have supervision, subject to the control of the Board of Trustees, of the official journal and of all other publications of the Association.

ARTICLE IV—MEETINGS.

1. A meeting of the Association shall be held annually, at such time and place as the Board may direct. Special meetings of the Association may be called from time to time by the Board of Trustees, or while the Board is not in session by the President of the Association, to be held at such time and place as may appear from the call. The first annual meeting of the Association shall be held in December, 1920 or January, 1921.

2. The outgoing Board of Trustees shall hold a meeting immediately preceding the annual meeting of the Association next succeeding their election, and the members of the new Board of Trustees shall hold a meeting and organize, by completing the Board, immediately succeeding the annual meeting of the Association at which the new members thereof were elected. Further meetings of the Board may be held from time to time at the call of the President or any three (3) members of the Board.

3. Notice of any meeting of members of the Association shall be given by the Secretary-Treasurer at least thirty (30) days prior to the date set for such meeting. Notice of all meetings of the Board of Trustees other than the regular meetings provided in Section 2 shall be given to each member of the Board at least fifteen (15) days prior to the date set therefor.

4. Any member of the Association or of the Board of Trustees may waive notice with the same effect as if due notice had been given him.

5. At all meetings of the Association a quorum shall consist of not less than twenty-five (25) members and no business may be validly transacted at a meeting at which less than a quorum is present; *provided* that any meeting of the Association, whether or not a quorum be present, may be adjourned to a specified time and place by a majority of the members present without notice to the members at large other than announcement at such meeting.

6. Members may take part and vote in person or by proxy at all meetings of the Association.

Article V—Sections.

1. Any group of members of this Association may petition the Board for authority to organize a Section of the Association for the purpose of holding local meetings. The Board shall have power to specify the conditions under which such authority shall be granted.

2. The Association shall not be obligated to pay from its treasury any of the expenses of such Sections.

Article VI—Official Organ.

1. The Association shall publish an official journal, which shall be sent free to all members of the Association in accordance with Article VII.

2. The Board shall have full control of the publication and sale of the official journal.

3. The official journal shall be under the general management of the Committee on Publications. There shall also be appointed by the Board a body of Associate Editors who shall give assistance in connection with the official journal and under the direction of the Committee on Publications. The Board may appoint any other committees and delegate to them such power as may, in its judgment, seem desirable.

4. The Board shall fix the price of the official journal and of any other publications of the Association to non-members, but in no case shall the journal be sold for less than the annual dues of individual members.

Article VII—Dues.

1. Individual members of the Association shall each pay an initiation fee of Two Dollars ($2) at the time of election.

2. The annual dues of each individual member shall be Four Dollars ($4), including a subscription to the official journal.

3. The annual dues of each institutional member shall be Seven Dollars ($7), including two (2) subscriptions to the official journal.

4. All dues shall be payable on the first of January of each year. Should the annual dues of any member remain unpaid beyond a reasonable time, his name shall be dropped from the list, after due notice.

5. New members entering the Association after April 1 of any year shall have their dues prorated for the balance of the year, except when they desire to receive the full current volume of the official journal.

ARTICLE VIII—AMENDMENTS TO THE ARTICLES OF ASSOCIATION AND BY-LAWS.

1. The Articles of Association may be changed to provide for a Board of nineteen (19) Trustees by vote of a majority of the three (3) Trustees named in the original Articles. Subsequent changes, amendments or modifications, of the Articles of Association and any amendments to the By-Laws may be made at any annual meeting of the Association, or at any adjourned session thereof, or at any special meeting of the Association called for such purpose, by a two-thirds (2/3) vote of those present and entitled to vote; *provided* that such amendment shall have been printed in the official journal at least one (1) month before the date of such meeting.

2. No change in the Articles of Association shall have legal effect until a Certificate thereof, verified by oath of the President and under Seal of the Association, attested by the Secretary-Treasurer, shall be filed in the office of the Secretary of State of the State of Illinois and recorded in the office of the Recorder of Deeds for Cook County, Illinois.

ARTICLE IX—INTERPRETATION.

1. "Board," wherever used in these By-Laws, shall be taken to mean a Board of Trustees consisting of the Officers, the Committee on Publications and the Trustees elected as such, as provided in Article III.

2. It being the intent that this Association continue as successor to the unincorporated The Mathematical Association of America, these By-Laws shall be construed liberally to that effect.

SUMMARY OF NEW PROVISIONS IN THE 1920 BY-LAWS

Article I.2: This section was made much more explicit with reference to meetings, publications, investigations, and the founding of a mathematical library.

I.3: This was added to mention the corporate seal.

Article II.3: This was section 1 of the old By-Laws.

II.4: This was added to continue as members those who belonged before incorporation.

Article III.1: This largely temporary section changed the name of the Council to Board of Trustees.

III.2: This explicitly named the present officers and trustees of the association. It was immediately amended to establish a board of nineteen trustees.

III.3, 4, 5: These were essentially the old articles *III.2*, *III.3*, and *III.4*.

III.6: This section specified a quorum of the Board.

III.7: This was section 2 of the old By-Laws.

III.8–10: These sections detailed the powers of the President, Vice Presidents, and Secretary-Treasurer respectively.

III.11: This was reworded from section 3 of the old By-Laws.

Article IV.1: The President was given the power to call special meetings when the Board was not in session.

IV.2–6: These were new sections which dealt with the holding of meetings and the number in a quorum.

Article VI.3,4: These were sections 3 and 4 of the old By-Laws.

AMENDMENTS TO THE 1920 BY-LAWS

1922

Membership applications of individuals would be endorsed by two members of the Association. The twelve additional members of the Board were no longer to be officers. The Board was increased from nineteen to twenty members. The Librarian became a member of the Board and had charge of the library and the exchange of publications. The minimum required to form a section of the Association was fixed at ten. The control of the MONTHLY would be in the hands of a Committee on an Official Journal instead of the Committee on Publications. Life membership was made available for an amount based on an annuity.

1926

The term of the President was increased to two years with no possibility of reelection.

1937

In honor of H. E. Slaught, the word Manager was removed from the description of the Committee on an Official Journal. There was to be only one official nominee for President instead of two as formerly.

1938

The life membership fee was changed to an annuity based on 3½% interest instead of 4%.

1940

From the list of Officers there were deleted a Librarian, two Vice Presidents, and three members of the Committee on an Official Journal, and there were added a First and Second Vice-President, an Editor-in-Chief, and an Associate Secretary. A Board of Governors was set up, consisting of Officers, Ex-Presidents, and elected Governors. The duties of the Board and of the Executive Committee were outlined. A Finance Committee of three members was established. Regions were established. Vice Presidents and regional Governors were to serve for two years, Governors for three years, the Editor, Secretary-Treasurer, and Associate Secretary for five years and members of the Finance Committee for four years. Vice Presidents would be elected in alternate years. Only the President, First Vice President, and Governors were to be chosen by the general membership; regional governors would be elected by their constituencies, all other officers by the Board. The Editor, Governors, and Vice-Presidents could be re-elected only after an interim. The Committee on an Official Journal was abolished.

1942

Two nominations would be made only for the Second Vice-President and members of the Finance Committee. No further life memberships were to be accepted.

1944

Institutional memberships were abolished.

1946

Some officers were to be elected partly in terms of the Sections of the MAA, instead of the Regions, which were then abolished. Governors of Sections were to be elected triennially instead of biennially. The President with the approval of the Board would appoint the Nominating Committee which would assume the nominating functions formerly held

by the Board. Nominations by members would take place six months, instead of two months, before the annual meeting. The Board would meet each year just before the Association's annual meeting. The possibility that the Board would pay some section expenses was included.

1949

The Board was allowed to dispense with an initiation fee for certain individuals or classes of individuals.

1956

For each Section the Board must approve the by-laws and their amendments. Dues were increased to five dollars. Dues of emeritus members who received the MONTHLY were increased to two dollars.

1959

The office of Secretary-Treasurer was split. In the absence of the President, the First Vice-President (and then the Second Vice-President) could assume his powers. The duties of the Treasurer would include collecting dues and supervising the Association's funds. The Secretary would give notice of proposed amendments to the by-laws.

1961

Ordinary and institutional (academic and corporate) memberships were established. If a Governor of a section had permanently moved from that section, he was considered to have ended his term of office. There was to be a paid Executive Director of the Association who would have charge of the MAA central office. He was to be chosen by the Board and responsible to it.

1962

There was to be elected a President-Elect who would become President the next year. Two years later he would become Past-President for a year. During all four years he would serve on the Executive Committee. The members of the Finance Committee were to serve on the Board of Governors. The Finance Committee was to have five members instead of four. The President would be Chairman of both the Executive Committee and the Finance Committee.

1964

The dues of ordinary members were increased to six dollars.

BY-LAWS (1965)

ARTICLE I—NAME, PURPOSE AND CORPORATE SEAL

1. This organization shall be known as

THE MATHEMATICAL ASSOCIATION OF AMERICA (INCORPORATED)

2. Its object shall be to assist in promoting the interests of mathematics in America, especially in the collegiate field, by holding meetings in any part of the United States or

Canada for the presentation and discussion of mathematical papers, by the publication of mathematical papers, journals, books, monographs, and reports, by conducting investigations for the purpose of improving the teaching of mathematics, by accumulating a mathematical library and by cooperating with other organizations whenever this may be desirable for attaining these or similar objects.

3. The Corporate Seal of the Association shall have inscribed thereon the name of the Association and the words "Corporate Seal—Illinois."

ARTICLE II—MEMBERSHIP

1. There shall be two classes of members, ordinary and institutional.

2. Any person interested in the field of collegiate mathematics shall be eligible for election to ordinary membership in the Association.

3. Any institution, academic or corporate, interested in the support of collegiate mathematics shall be eligible for election to institutional membership in the Association.

4. Election to membership shall be by vote of the Board upon written application from the individual or institution seeking admission. In the case of individuals the application shall be endorsed by two ordinary members of the Association.

5. Those who were admitted to membership in The Mathematical Association of America (unincorporated) prior to October 1, 1920, and were in good standing as such on that date, were thereby admitted to membership in this Association (Incorporated).

ARTICLE III—BOARD OF GOVERNORS AND OFFICERS

1. The officers of the Association shall be a President, a President-elect (only during a year immediately prior to the expiration of a President's term), a Past-President (only during a year immediately following the expiration of a President's term), a First Vice-President, a Second Vice-President, an Editor-in-Chief of the Official Journal (hereinafter called the "Editor"), a Secretary, a Treasurer, and an Associate Secretary.

2. There shall be a Board of Governors (hereinafter called "the Board"), to consist of the officers, the Ex-Presidents for terms of six years after the expiration of their respective presidential terms, the members of the Finance Committee, and of additional elected members (hereinafter called "Governors"). It shall be the function of the Board to supervise all scholarly and scientific activities of the Association, to administer and control these activities, and to authorize expenditures of funds of the Association, except that at the demand of ten or more members of the Board, or at the demand of forty or more members of the Association, any proposal to alter or initiate a matter of policy shall be referred to the general membership of the Association for its decision. All members of the Board shall hold over until their respective successors are selected or appointed and qualify.

3. There shall be an Executive Committee, advisory to the Board, and consisting of the President, the President-elect (only during a year immediately preceding the expiration of a President's term), the Past-President (only during a year immediately following the expiration of a President's term), the two Vice-Presidents, the Editor, the Secretary and the Treasurer. It shall be the function of this Committee to review continually the policies and activities of the Association, to plan and organize new activities, to formulate in broad outline the programs of meetings and of publications and in general to consider all matters of importance or of interest to the Association. This committee shall prepare the agenda for meetings of the Board, and shall analyze the implications and aspects of all matters which are to come before the Board for decision. It shall present to the Board the viewpoints suggested by such analyses, as well as all such facts as may seem pertinent, or as may in any way facilitate the Board's work.

4. A statement regarding any proposed action of the Board which makes or alters a question of policy shall be published in the official journal, or notice of such proposed action shall be mailed to each member, before final action has been taken, so that members of the Association may make known to the Board their individual views.

5. The Board shall have authority to fill vacancies *ad interim* in any office, including vacancies in the Board, and to make any other appointments necessary for the transaction of the business of the Association.

6. At all meetings of the Board of Governors a quorum shall consist of not less than five (5) members and no business may be validly transacted at a meeting at which less than a quorum is present; *provided* that any meeting of the Board, whether or not a quorum be present, may be adjourned to a specified time and place by a majority of the members present without notice to the members at large other than announcement at such meeting. Informal action based on a mail ballot by the members of the Board, if ratified at a properly convened meeting of the Board, shall be as valid and effective as if originally authorized at such meeting.

7. There shall be a Finance Committee responsible to the Board; at the direction of the Board it shall receive and administer the funds of the Association, control its properties and investments, make its contracts, and exercise such powers as may be delegated to it by the Board. This committee shall consist of five members, including the President, the Secretary, and the Treasurer.

8. (a) The Officers and Governors of the Association shall be elected in part by the Board, in part by the general membership, and in part by the membership in the Sections of the Association or by the membership in constituencies authorized by the Board for territory where Sections do not exist.

(b) The membership at large shall elect biennially a President-elect for a term of one year and a First Vice-President for a term of two years, and shall elect annually two Governors for terms of three years. The President-elect shall become President for a two-year term at the expiration of his one-year term as President-elect and shall become Past-President for a one-year term at the expiration of his term as President.

(c) The membership in each Section shall elect triennially a Governor for a term of three years. For these elections, at least two nominations shall be submitted to the members by a committee appointed for that purpose by the Chairman of the Section. A Governor who has moved permanently from the Section by which he was elected shall be considered to have ended his term of office on the Board. If the Governor has moved from the Section because he is no longer employed there, it shall be interpreted that he has moved permanently from the Section.

(d) The Board shall elect at appropriate times by ballot and for the terms stated: a Second Vice-President for two years; an Editor, a Secretary, a Treasurer, and an Associate Secretary, each for five years; and members of the Finance Committee (other than the President, the Secretary, and the Treasurer) for four years.

(e) The President shall be ineligible for re-election as President-elect or as President. The Vice-Presidents, the Editor, and the Governors shall be eligible for re-election only after an interim equal to their respective terms of office.

(f) Elections by the Board shall be made from nomination by the Executive Committee. At least two nominations shall be made for each office to be filled in the case of the Second Vice-President and the members of the Finance Committee, and the Board may in any case reject all nominations made and call for a new list.

(g) The names of members to be printed upon the ballots, together with blank spaces in the case of elections by the general membership, shall be determined by a Nominating Committee to be appointed annually for that purpose by the President with the approval

of the Board. Approximately six months before the date of the annual meeting all members shall be given an opportunity to nominate by mail a candidate for each office to be filled by the members for the ensuing year. Approximately one month before the annual meeting the Nominating Committee shall select a nominee for President-elect out of the three persons who received the most votes for this office in the nominations; the Nominating Committee shall furthermore select two candidates for each other office to be filled by the members, one being the person who received the highest vote in the nominations and the other being selected from among the several nominees next in order. The election shall be by mail or in person and shall close on the day of the annual meeting.

9. The President shall be the Executive Officer of the Association, shall preside at all meetings of the Board of Governors and at the annual meeting of the Association. He shall be Chairman of the Executive Committee and of the Finance Committee. He shall have the usual duties pertaining to his office and such other duties as may from time to time be assigned him by the Board of Governors.

10. In the absence of the President, the First Vice-President (or in his absence the Second Vice-President) shall have and exercise the powers of the President. The Board of Governors may assign to the Vice-Presidents such duties as may from time to time be determined.

11. The Secretary shall have the usual duties pertaining to his office, including the custody of the records of the Association and of its Corporate Seal, the keeping of minutes of the meetings of the Board of Governors and of the annual meeting and special meetings and the giving of due notice of all regular and special meetings of the Association and of the Board of Governors. The Secretary shall also have the duty of seeing that whenever Governors are elected, including the election of Governors to fill vacancies, a Certificate, under the Seal of the Association, giving the names of those elected and the term of their office, shall be recorded in the Office of the Recorder of Deeds for Cook County, Illinois. Such Certificates shall be signed by the Secretary and verified by oath of the President.

12. The Treasurer shall have the usual duties pertaining to his office including the collection of dues and the supervision and safekeeping of the funds of the Association.

13. (a) There shall be an Executive Director who shall be a paid employee of the Association. He shall have charge of the central office of the Association and shall carry out such other duties as may be assigned to him by the Board. He shall be responsible to the Board and shall attend meetings of the Board, the Executive Committee, and the Finance Committee, but he shall not be *ex officio* a member of these bodies.

(b) The Executive Director shall be elected by the Board under terms and conditions of employment fixed by the Finance Committee.

ARTICLE IV—MEETINGS

1. A meeting of the Association shall be held annually, at such time and place as the Board may direct. Special meetings of the Association may be called from time to time by the Board, or while the Board is not in session by the President of the Association, to be held at such time and place as may appear from the call.

2. The Board shall hold a meeting each year immediately preceding the annual meeting of the Association. Further meetings of the Board may be held from time to time at the call of the President or of any three (3) members of the Board.

3. Notice of any meeting of members of the Association shall be given by the Secretary at least thirty (30) days prior to the date set for each meeting. Notice of all meetings of the Board other than the regular meetings provided in Section 2 shall be given to each member of the Board at least fifteen (15) days prior to the date set therefor.

4. Any member of the Association or of the Board may waive notice with the same effect as if due notice had been given him.

5. At all meetings of the Association a quorum shall consist of not less than twenty-five (25) members and no business may be validly transacted at a meeting at which less than a quorum is present; *provided* that any meeting of the Association, whether or not a quorum be present, may be adjourned to a specified time and place by a majority of the members present without notice to the members at large other than the announcement at such meeting.

6. Members may take part and vote in person or by proxy at all meetings of the Association.

Article V—Sections

1. Any group of not less than ten (10) members of this Association may petition the Board for authority to organize a Section of the Association for the purpose of holding local meetings. The Board shall have power to specify the conditions under which such authority shall be granted. The by-laws of each Section when organized and any subsequent changes in these by-laws must be approved by the Board. The Board shall maintain general supervision over the activities of all Sections.

2. The Association shall not be obligated to pay from its treasury any of the expenses of such Sections except as the Board may provide.

Article VI—Official Publications

1. The Association shall publish an official journal, which shall be sent free to all members of the Association in accordance with Article VII.

2. The Board shall have full control of the publication and sale of the official journal and of all other official publications.

3. There shall be appointed by the Board a body of Associate Editors who shall give assistance in connection with the official journal.

4. The Board shall from time to time, as the need arises, make special provision for the management of any other official publications.

5. The Board shall fix the price of the official journal and of any other official publications of the Association, but in no case shall the journal be sold to nonmembers for less than the annual dues of ordinary members.

Article VII—Dues

1. Ordinary members of the Association shall pay an initiation fee of two dollars ($2) at the time of election. The Board of Governors may authorize the admission to ordinary membership of individuals and classes of applicants without payment of the initiation fee.

2. The annual dues of each ordinary member shall be six dollars ($6), including a subscription to the official journal.

3. The fees, dues and privileges of institutional members of the Association shall be established from time to time by the Board of Governors.

4. All dues shall be payable on the first of January of each year. Should the annual dues of any member remain unpaid beyond a reasonable time, that member shall be dropped from the list after due notice.

5. New members entering the Association after April 1 of any year shall have their dues prorated for the balance of the year, except when they desire to receive the full current volume of the official journal.

6. Any ordinary member who because of age is no longer in active service, who is in good standing at the time of his retirement and who has been a member of the Association for twenty years, may, upon notifying the Secretary of said retirement, be exempt from the payment of dues, with the privilege of obtaining the official journal at an annual cost of two dollars ($2).

ARTICLE VIII—AMENDMENTS TO THE ARTICLES OF ASSOCIATION AND BY-LAWS

1. Changes in the Articles of Association or amendments to the By-Laws may be made at any annual meeting of the Association, or at any adjourned session thereof, or at any special meeting of the Association called for such purpose, by a two-thirds (⅔) vote of those present and entitled to vote; *provided* that due notice concerning such amendment shall have been printed in the official journal, or mailed to each member, at least one (1) month before the date of such meeting. The Secretary shall give such due notice when so instructed by a vote of the Board of Governors or when so petitioned by at least forty members of the Association.

2. No changes in the Articles of Association shall have legal effect until a certificate thereof, verified by oath of the President and under Seal of the Association, attested by the Secretary, shall be filed in the office of the Secretary of State of the State of Illinois and recorded in the office of the Recorder of Deeds for Cook County, Illinois.

2. OFFICERS

The date listed before an officer's name indicates that his term of office began that year and ran until the next date mentioned or until 1966. In 1927 the term of the President was lengthened to two years, and similarly in 1941 for the term of both Vice-Presidents. First and Second Vice-Presidents are listed together in that order until 1942, when they were elected in alternate years, the former in even years and the latter in odd. In 1941 the First Vice-President served only one year while the Second held office two years. The Secretary-Treasurer was a single officer until 1960, when the two posts were separated.

(a) Presidents

1916	E. R. Hedrick	1925	J. L. Coolidge
1917	Florian Cajori	1926	Dunham Jackson
1918	E. V. Huntington	1927	W. B. Ford
1919	H. E. Slaught	1929	J. W. Young
1920	D. E. Smith	1931	E. T. Bell
1921	G. A. Miller	1933	Arnold Dresden
1922	R. C. Archibald	1935	D. R. Curtiss
1923	R. D. Carmichael	1937	A. J. Kempner
1924	H. L. Rietz	1939	W. B. Carver

1941	R. W. Brink
1943	W. D. Cairns
1945	C. C. MacDuffee
1947	L. R. Ford
1949	R. E. Langer
1951	Saunders MacLane
1953	E. J. McShane
1955	W. L. Duren, Jr.
1957	G. B. Price
1959	C. B. Allendoerfer
1961	A. W. Tucker
1963	R. H. Bing
1965	R. L. Wilder

(b) Vice-Presidents

1916	E. V. Huntington, G. A. Miller
1917	D. N. Lehmer, Oswald Veblen
1918	D. N. Lehmer, J. W. Young
1919	R. G. D. Richardson, H. L. Rietz
1920	Helen A. Merrill, E. J. Wilczynski
1921	R. C. Archibald, R. D. Carmichael
1922	R. D. Carmichael, B. F. Finkel
1923	A. B. Chace, L. P. Eisenhart
1924	J. L. Coolidge, Dunham Jackson
1925	A. A. Bennett, Dunham Jackson
1926	W. B. Ford, J. W. Young
1927	A. J. Kempner, Clara E. Smith
1928	A. J. Kempner, F. D. Murnaghan
1929	E. T. Bell, W. C. Graustein
1930	E. T. Bell, W. C. Graustein
1931	Arnold Dresden, C. N. Moore
1932	W. H. Bussey, G. C. Evans
1933	A. A. Bennett, E. B. Stouffer
1934	A. A. Bennett, E. P. Lane
1935	L. L. Dines, A. J. Kempner
1936	N. A. Court, T. C. Fry
1937	T. H. Hildebrandt, E. J. Moulton
1938	H. E. Buchanan, E. J. Moulton
1939	W. L. Hart, F. D. Murnaghan
1940	R. W. Brink, W. C. Graustein
1941	R. E. Langer, B. H. Brown
1942	Tomlinson Fort
1943	C. C. MacDuffee
1944	W. M. Whyburn
1945	W. F. Cheney, Jr.
1946	W. L. Ayres
1947	C. B. Allendoerfer
1948	Saunders MacLane
1949	N. H. McCoy
1950	L. M. Graves
1951	Jewell H. Bushey
1952	F. L. Griffin
1953	W. L. Duren, Jr.
1954	H. S. M. Coxeter
1955	G. B. Price
1956	R. V. Churchill
1957	B. W. Jones
1958	G. B. Thomas, Jr.

1959 Harley Flanders
1960 A. S. Householder
1961 R. A. Rosenbaum
1962 H. S. M. Coxeter
1963 Mina S. Rees
1964 E. E. Moise
1965 A. B. Willcox

(c) SECRETARY-TREASURERS

1916 W. D. Cairns
1943 W. B. Carver
1948 H. M. Gehman
1960 H. L. Alder (Secretary)
1960 H. M. Gehman (Treasurer)

3. COMMITTEES

The Association's Committees are listed here by the year in which they were first formed. For each committee the reader will find its birth and death date, chairmen, references to the MONTHLY (volume, pages), to the Register of Officers and Members (year), and, in some cases, to pages in this volume. When the date of formation or discharge of a committee is known only approximately, such is indicated. If no closing date is mentioned, the committee was in existence at the end of 1965.

1916

Committee on Bureau of Information: 1916–1922
J. B. Shaw **23**, 283–284; **25**, 62; W. B. Fite 1922, 4

Committee on Libraries: 1916–1937
W. B. Ford **23**, 361; **24**, 58–60, 368–376; **25**, 59–60; **26**, 225–233; 1933, 3; 1935, 3; **48**, 600–609; this volume, **25**.

National Committee on Mathematical Requirements: 1916–1924
J. W. Young **23**, 226, 283; **24**, 463–464; **25**, 56–59; **26**, 233–234, 279–280, 439–440, 462–463; **27**, 101–104, 145–146, 194, 341–342, 441–442; **28**, 357–358; **29**, 46; **32**, 157; this volume, 25–27, 30, 34. 41, 86.

Committee on Membership: 1916?–?
E. R. Hedrick **24**, 304

Committee on Publications: 1916–?
H. E. Slaught **23**,5
R. D. Carmichael **25**,44
R. C. Archibald **26**, 105
H. E. Slaught **28**,362

Committee on Relations with Annals of Mathematics: 1916–1930?
E. H. Moore **23**, 288; **25** 61–62

1917

Committee on Mathematical Dictionary: 1917–1937
E. R. Hedrick **24**, 445; **25**, 60–61; **26**, 381–384; **27**, 243; 1933, 3; 1935, 3

1921

Editorial Committee on Carus Monographs: 1921?–

H. E. Slaught **30**, 151–155; **32**, 157–158; 1933, 3; 1935, 3; 1937, 3

J. M. Thomas 1939, 3

Philip Franklin **58**, 730

N. H. McCoy **60**, 222; **61**, 222

Tibor Rado **62**, 214; **63**, 215; **64**, 221; **65**, 315; **66**, 358

R. P. Dilworth **67**, 619

Ivan Niven **69**, 335; **70**, 447; **71**, 467; **72**, 451

1923

Committee on Standard Departments of Mathematics: 1923–1926?

R. D. Carmichael **31**, 166; 1924, 4

Tomlinson Fort **33**, 492

1925

Chauvenet Prize Committee: 1925–

A. J. Kempner **32**, 439–440

E. B. Van Vleck **32**, 439–440

A. J. Kempner **36**, 298

W. B. Ford **40**, 134; **41**, 132, 139–140

Philip Franklin **51**, 115

R. P. Agnew **55**, 192

W. B. Carver **58**, 216

C. B. Allendoerfer **61**, 219

P. A. White **63**, 216

H. F. Bohnenblust **66**, 359

Walter Rudin **69**, 336

R. L. Wilder **70**, 478

P. J. Davis **71**, 467; **72**, 452

1927

Committee on Assigned Collateral Reading in Mathematics: 1927–1928?

A. A. Bennett **35**, 221–228

1928

Committee on the Arnold Buffum Chace Publication of the Rhind Papyrus: 1928–?1953

It was also called the *Committee on the Arnold Buffum Chace Fund.*

H. E. Slaught 1929, 3; 1931, 3; 1933, 3; 1935, 3; 1937, 3

W. R. Longley 1939, 3

R. C. Archibald 1949, 3; **58**, 730; **60**, 222

Committee on Biblioteca Mathematica: 1928?–?

H. E. Slaught **36**, 127

1929

Joint Committee of the Association and the National Council of Teachers of Mathematics on a One-Year Course in Plane and Solid Geometry: 1929?–1933?

Dunham Jackson 1929, 4; **37**, 460; **38**, 129, 241–245; 1931, 4, 1933, 4; this volume, 34.

1933

Commission on the Place of Mathematics in Secondary Schools and Junior Colleges: 1933–1940?

In 1935 this became a joint commission of the Association and the National Council of Teachers of Mathematics and was restricted to secondary schools.

K. P. Williams **44**, 612; 1937, 3; 1939, 3

Commission on the Training and Utilization of Advanced Students in Mathematics: 1933–1936?

E. J. Moulton **41**, 201; **42**, 143–144, 263–277, 472–476; **43**, 131

1936

Committee on Tests: 1936?–1939
E. W. Chittenden **46**, 529

1938

Committee to Review the Activities of the Mathematical Association of America: **1938–1939**
This was also known as the *Langer Committee*.
R. E. Langer **47**, 64–84

1939

Committee on the Slaught Memorial Papers: 1939–
C. V. Newsom **48**, 86–89
R. E. Langer **48**, 220
N. H. McCoy **51**, 549
W. T. Reid 1949, 3; **58**, 730
P. C. Rosenbloom **60**, 222; **61**, 222; **62**, 214
J. L. Kelley **63**, 215
R. D. Schafer **64**, 221; **65**, 315, 728
R. C. Buck **66**, 359; **67**, 619
I. I. Hirschman, Jr. **69**, 335; **70**, 477; **71**, 467; **72**, 451

1940

Finance Committee: 1940–
W .D. Cairns 1941, 3
W. B. Carver 1943, 4; 1945, 4
H. M. Gehman 1947, 4; 1949, 3; **58**, 730; **60**, 222; **61**, 222; **62**, 214; **63**, 215; **64**, 221; **65**, 315; **66**, 358
H. L. Alder **67**, 619; **68**, 409
A. W. Tucker **69**, 335; **70**, 474
R. H. Bing **70**, 476; **71**, 463, 466, 1070, 1071
R. L. Wilder **72**, 450, 1058

War Preparedness Committee: 1940?–1943
This was a joint committee of the Association and the American Mathematical Society.
Marston Morse **47**, 500–502; **48**, 221–222, 353–362, 492, 570; **49**, 76; **50**, 528, 593; **53**, 178; this volume, 53, 57.

1941

Conference Committee on Education: 1941?–1945
A. A. Bennett 1941, 4

1943

War Policy Committee: 1943–1945
M. H. Stone **50**, 138, 205, 466, 593; **51**, 112–115, 549; **52**, 115; **67**, 1056

1944

Nominating Committee: 1944?–
H. M. Gehman **51**, 549
L. L. Dines **54**, 193
C. C. MacDuffee **55**, 192
R. G. Sanger **56**, 206
R. M. Foster **57**, 211
W. L. Ayres **58**, 215
W. L. Duren, Jr. **59**, 206
W. T. Martin **60**, 215
A. L. Putnam **61**, 219
A. W. Tucker **62**, 206
Ivan Niven **63**, 211
H. W. Brinkmann **64**, 213, 222
Wallace Givens **65**, 309, 315
Mina S. Rees **66**, 353, 358
F. A. Ficken **67**, 405, 620
R. P. Boas **68**, 402, 409
J. C. Oxtoby **69**, 330, 337
J. L. Kelley **70**, 472, 479
R. D. Anderson **71**, 462, 469
C. W. Curtis **72**, 447
Ivan Niven **72**, 453

1945

Coordinating Committee: 1945–1954

C. V. Newsom **52**, 294 Mina S. Rees

Committee for the Coordination of Studies in Mathematical Education: 1945–1950

C. V. Newsom 1945, 4 C. C. MacDuffee 1947, 4; 1949, 3

1946

Committee on the Putnam Prize Competition: 1946?–

George Polya 1947, 4; 1949, 3
B. H. Brown **58**, 730
E. P. Starke **60**, 222
R. G. Sanger **61**, 222
A. M. Gleason **62**, 214
L. M. Kelly **63**, 215; **64**, 221
R. E. Greenwood **65**, 315
W. R. Scott **66**, 359
Richard E. Bellman **67**, 619
Ivan Niven **68**, 409
D. E. Richmond **69**, 336
J. M. H. Olmsted **70**, 478
Gian-Carlo Rota **71**, 467
H. S. M. Coxeter **72**, 452

1947

Committee on Places of Meetings 1947?–

In 1954 this became a joint committee.

C. B. Allendoerfer 1949, 3
R. W. Brink **58**, 730
Orrin Frink, Jr. **60**, 222
M. F. Smiley **61**, 222
E. R. Lorch **62**, 214
W. M. Whyburn **63**, 215
C. B. Morrey, Jr. **64**, 221
R. M. Thrall **65**, 315
R. D. Schafer **66**, 359
G. R. MacLane **67**, 620
G. L. Walker **68**, 409; **69**, 336; **70**, 479; **71**, 468; **72**, 452

1948

Mathematical Policy Committee: 1948–

This was a joint committee of the Association and the American Mathematical Society. In 1958 it developed into the Conference Organization of the Mathematical Sciences, later renamed the Conference Board of the Mathematical Sciences.

S. S. Wilks **53**, 178; **67**, 1056–1057; **70**, 118, 757, 1043

1949

Committee on Sections: 1949–

At the beginning this was known as the *Committee on Sectional Meetings.*

W. V. Parker 1949, 3
Fred Robertson **58**, 730
C. O. Oakley **60**, 222; **61**, 222
J. C. Polley **62**, 214; **63**, 215
C. H. Frick **64**, 221; **65**, 315
Roy Dubisch **66**, 359
L. J. Montzingo, Jr. **67**, 619; **68**, 408, 953; **69**, 336
P. B. Johnson **70**, 478; **71**, 467, 1071
L. E. Mehlenbacher **72**, 451

Committee on Cooperation with Industry: 1949–1952

This committee worked closely with one from the National Council of Teachers of Mathematics.

W. W. Rankin

1950

Committee on Professional Opportunities in Mathematics: 1950?–1951?

Mina S. Rees **58**, 1–24

1951

Committee on Earle Raymond Hedrick Lectures: 1951–

This was known during 1951 as the *Committee on Expository Lectures.*

G. B. Price **59**, 356; **60**, 215–216
R. J. Walker **61**, 222
Irving Kaplansky **62**, 214
Edwin Hewitt **63**, 215
Mark Kac **64**, 221
S. C. Kleene **65**, 315
R. P. Dilworth **66**, 359
L. H. Loomis **67**, 618
A. S. Householder **68**, 408
William Feller **69**, 335
Ivan Niven **70**, 477
R. H. Bing **71**, 466
A. M. Gleason **72**, 450

Committee on the Mathematical Training of Social Scientists: 1951?–?

William G. Madow **59**, 356–357

1952

Committee on the Undergraduate Program in Mathematics: 1952–

From 1963 to 1965 there were various panels of CUPM, each with its own chairman.

W. L. Duren, Jr. **61**, 218
E. J. McShane **62**, 392, 511–520; **63**, 215, 684–685; **64**, 214, 222; **65**, 315; **66**, 213–220
G. B. Price **66**, 359, 534; **67**, 405
R. C. Buck **67**, 619, 946, 982–991; **68**, 409, 949, 953, 957–958; **69**, 304–306, 328, 330, 336, 339–347, 515–522, 951, 976–979, 1028; **70**, 433–435, 473, 478, 604, 786–787, 870–877, 1041, 1042; **71**, 82, 463
W. L. Duren, Jr. **71**, 467, 910, 1068, 1070, 1117–1129; **72**, 452, 825–831, 1055, 1057, 1059

1953

Joint Committee of the American Society for Engineering Education and the Mathematical Association of America on Engineering Mathematics: 1953–1955?

G. B. Thomas, Jr. **62**, 385–392

1954

Committee on Mathematical Personnel and Education: 1954–1956

Tomlinson Fort **62**, 693; **63**, 215, 685

Committee on Visiting Lecturers: 1954–

B. W. Jones **61**, 733–734; **63**, 212–213, 216, 684; **64**, 137–139, 214, 222, 698; **65**, 140–141
R. A. Rosenbaum **65**, 315, 728; **66**, 168–171
Rothwell Stephens **66**, 359, 534–535, 841; **67**, 115–118, 318–319, 463–465, 619; **68**, 170–174
R. A. Rosenbaum **68**, 409; **69**, 336, 951, 1028–1029
Rothwell Stephens **70**, 478
R. E. Gaskell **71**, 468; **72**, 452

See also this volume, 66, 83.

1955

Committee on Films for Classroom Instruction: 1955–1959?

P. S. Jones **63**, 215; **64**, 221; **65**, 315, 403–416

Committee on High School Contests: 1955–

T. F. Cope **63**, 215
R. P. Bailey **63**, 685
W. H. Fagerstrom **64**, 221; **65**, 315
D. B. Lloyd **66**, 359; **67**, 618
C. T. Salkind **68**, 408, 690–691, 953; **69**, 335, 951; **70**, 237, 477; **71**, 467; **72**, 451

Committee to Study the Activities of the Association: 1955–1958?
G. B. Price **62**, 693; **63**, 212, 215, 685; **64**, 214, 222; **65**, 315

1956

Joint Committee on Employment Opportunities: 1955–1958
J. S. Frame **63**, 215, 685; **64**, 221, 698
A. E. Taylor **69**, 409
R. M. Thrall **69**, 336
J. W. Weihe **70**, 479; **71**, 468
M. L. Curtis **72**, 452

Committee to Prepare a Third Edition of "Professional Opportunities in Mathematics": 1956–1957
F. J. Weyl **64**, 221

1957

Committee on the National High School Contest: 1957?–1962?
W. H. Fagerstrom **67**, 619

1958

Committee to Confer with AMS: 1958?–1961
A. E. Meder **66**, 359; **67**, 619; **68**, 409

Committee on the Employment Register: 1958–
Beginning in 1961, this was called the *Joint Committee on Employment Opportunities.*
R. F. Rinehart **66**, 358, 935–936
A. E. Taylor **67**, 610, 619, 951–952; **68**, 409
R. M. Thrall **69**, 336
J. W. Weihe **70**, 479; **71**, 468
M. L. Curtis **72**, 452

Committee on Production of Films: 1958–1962
L. W. Cohen **66**, 354, 359; **67**, 618
George Springer **68**, 84–85, 408
Leon Henkin **69**, 335

Committee on Secondary School Lecturers: 1958–
J. R. Mayor **65**, 548; **66**, 354, 359; **67**, 619; **68**, 174–176
C. O. Oakley **68**, 408, 953; **69**, 336, 951; **70**, 478; **71**, 467
H. M. Gelder **72**, 451, 1058

Planning Committee for a Survey of European Mathematical Education: 1958–1962
H. F. Fehr **67**, 620; **68**, 409

Advisory Committee for a Survey of Non-Teaching Mathematical Employment: 1958–1963
Morris Ostrofsky **66**, 359; **67**, 618; **68**, 408; **69**, 231, 335, 826; **70**, 473

1959

Joint Committee to Consider the Setting of Winter Meetings: 1959?–1961?
G. A. Hedlund **67**, 620; **68**, 402–403

Committee on High School Teachers' Contest: 1959–1963
Harley Flanders **67**, 618; **68**, 408; **69**, 335

Committee on Institutes: 1959?–
E. A. Cameron, **67**, 618, 718–719; **68**, 33–38, 408; **69**, 335; **70**, 477; **71**, 467; **72**, 451

1960

Committee on the Award for Distinguished Service to Mathematics: 1960–
Wallace Givens **67**, 619; **68**, 409; **69**, 185–187, 331
R. J. Walker **69**, 336
G. B. Thomas, Jr. **70**, 478
Mina S. Rees **71**, 467
Ivan Niven **72**, 451

Joint Committee on the Doctor of Arts Degree: 1960–1963
E. E. Moise **68**, 402, 409, 589; **69**, 337; **70**, 473

Committee on Publications: 1960?–
In 1962 it acquired subcommittees on Carus Monographs, MAA Studies in Mathematics, Slaught Papers, and Expository Writing.
Roy Dubisch **67**, 618, 948
R. P. Dilworth **68**, 408; **69**, 335; **70**, 477; **71**, 467; **72**, 447
R. P. Boas **72**, 451

Committee on Undergraduate Research Participation in Mathematics: 1960?–1961?
D. W. Western **68**, 409

1961

Committee on Advisement and Personnel: 1961–
J. S. Frame **68**, 408, 838; **69**, 335; **70**, 477; **71**, 462, 464, 466, 826
A. B. Willcox **72**, 450, 814

Committee on Retention of High School Mathematics Teachers: 1961?–1963
Roy Dubisch **69**, 336

Committee on the Structure of the Government of the Association: 1961?–?
H. M. Gehman **68**, 952

1962

Committee on Educational Media: 1962–
It included subcommittees on films, programmed learning, and television.
H. M. MacNeille **69**, 330; **70**, 473, 477, 1042; **71**, 428
C. B. Allendoerfer **71**, 305, 466; **72**, 447, 450, 900–901, 1057, 1058

Executive Committee: 1962–
A. W. Tucker **69**, 334; **70**, 474
R. H. Bing **70**, 476; **71**, 463, 466, 1071
R. L. Wilder **72**, 450, 1058

Planning Committee for the Fiftieth Anniversary of the Association: 1962–1965
C. B. Allendoerfer **69**, 337; **70**, 479; **71**, 469; **72**, 453

1963

Committee on Cooperative Summer Seminars: 1963–1965
R. J. Wisner **71**, 466, 825, 1070; **72**, 1166

Joint Interim Central Coordinating Committee on Films and Television: 1963–1965
E. P. Vance **70**, 479; **71**, 468

Joint Committee on the Graduate Program in Mathematics: 1963–1965
C. E. Rickart **71**, 468; **72**, 453

Committee on Membership: 1963–1965
Roy Dubisch **70**, 477, 1042; **71**, 463, 467, 1071; **72**, 451

Joint Committee on a Public Relations Film: 1963–1965
B. W. Jones **70**, 479; **71**, 468

4. PUBLICATIONS

(a) American Mathematical Monthly

(i) Editors

The MONTHLY was founded in 1894 by B. F. Finkel. In 1913 it was reorganized under an editorial board consisting of B. F. Finkel and representatives from eleven supporting colleges. By 1914 the number of those institutions had grown to fourteen. Below are listed the boards of editors up to 1916, with the year they began serving. The entry for 1913 consists of the Editorial Committee. That same year H. E. Slaught became Managing Editor and continued to hold that position until 1918 when the post was renamed Editor-in-Chief. In 1916 the MONTHLY became the Association's official journal. From that date on, Editors-in-Chief are listed with the year they took office. They continued to serve until the next date or until 1966. (For a more detailed account see the MONTHLY 21, 1; 38, 305–320; 53, 582; Isis, 3, 490–491; and this volume, chapter 1, especially pp. 18–21.) An index of Volumes 1 through 56 was published as part II of Vol. 57, No. 1 in 1950.

Early Boards of Editors: 1894–1915

1894 B. F. Finkel, J. M. Colaw
1903 B. F. Finkel, Leonard E. Dickson
1904 B. F. Finkel, Leonard E. Dickson, Saul Epsteen
1905 B. F. Finkel, Leonard E. Dickson, Oliver E. Glenn
1907 B. F. Finkel, H. E. Slaught, Leonard E. Dickson
1909 B. F. Finkel, H. E. Slaught, G. A. Miller
1913 H. E. Slaught, E. R. Hedrick, G. A. Miller

Editors-in-Chief: 1916–1965

1916 H. E. Slaught
1918 R. D. Carmichael
1919 R. C. Archibald
1922 A. A. Bennett
1923 W. B. Ford
1927 W. H. Bussey
1932 W. B. Carver
1937 E. J. Moulton
1942 L. R. Ford
1947 C. V. Newsom
1952 C. B. Allendoerfer
1957 R. D. James
1962 F. A. Ficken

(ii) Departmental Editors of the Monthly: 1916–1965

For each department there is mentioned the editor and the year his term began. He continued to serve until the next date or 1966 unless otherwise indicated in the notes.

Book Reviews

From 1919 to 1923 there was no book review editor.

1916 W. H. Bussey
1924 D. C. Gillespie
1924 W. B. Carver
1928 R. A. Johnson
1937 W. R. Longley
1938 Tomlinson Fort
1939 Virgil Snyder
1944 Virgil Snyder, H. P. Evans
1945 H. P. Evans
1949 E. P. Vance
1957 R. V. Andree
1962 R. A. Rosenbaum
1963 R. A. Rosenbaum, K. O. May, E. P. Vance

Problems and Solutions

In 1947 this department split into "Elementary Problems and Solutions" and "Advanced Problems and Solutions." Hence from 1947 to 1963 the editors of the elementary section are listed first, then those of the advanced. In 1964 the two divisions were editorially reunited.

1916 B. F. Finkel, R. P. Baker
1917 B. F. Finkel
1919 B. F. Finkel, Otto Dunkel
1921 B. F. Finkel, Otto Dunkel, H. P. Manning
1923 B. F. Finkel, Otto Dunkel, N. H. Anning
1924 B. F. Finkel, Otto Dunkel, H. L. Olson
1932 B. F. Finkel, Otto Dunkel, H. L. Olson, W. F. Cheney, Jr.
1934 Otto Dunkel, H. L. Olson, W. F. Cheney, Jr.
1939 Otto Dunkel, H. L. Olson, H. S. M. Coxeter
1940 Otto Dunkel, Orrin Frink, Jr., H. S. M. Coxeter
1945 Otto Dunkel, Orrin Frink, Jr., Howard Eves
1947 Howard Eves, E. P. Starke
1963 Howard Eves, C. W. Dodge, E. P. Starke, L. Carlitz, H. S. M. Coxeter, A. Wilansky
1964 E. P. Starke, J. Barlaz, L. Carlitz, H. S. M. Coxeter, H. Eves, A. E. Livingston, A. Wilansky

Questions, Discussions, and Notes

At different times this department was called "Questions and Discussions;" "Questions, Discussions, and Notes;" and "Discussions and Notes." In 1947 it was split into "Mathematical Notes" and "Classroom Notes."

1916 U. G. Mitchell
1919 W. A. Hurwitz
1922 C. F. Gummer
1926 Tomlinson Fort
1926 Tomlinson Fort, H. E. Buchanan
1927 H. E. Buchanan
1930 R. E. Gilman
1939 R. J. Walker
1943 Marie J. Weiss
1946 E. F. Beckenbach

Mathematical Notes

1947 E. F. Beckenbach
1951 F. A. Ficken
1957 Ivan Niven
1958 Roy Dubisch
1962 M. H. Protter
1962 J. H. Curtiss

Classroom Notes

1947 C. B. Allendoerfer
1952 G. B. Thomas
1957 C. O. Oakley
1962 J. M. H. Olmsted
1963 J. M. H. Olmsted, A. L. Shields
1963 A. L. Shields
1964 Gertrude Ehrlich

Undergraduate Mathematics Clubs

Named first "Undergraduate Mathematics Clubs," then "Mathematics Clubs," and finally "Clubs and Allied Activities," this section was discontinued in 1954.

1918 R. C. Archibald
1919 U. G. Mitchell
1921 E. L. Dodd
1924 H. J. Ettlinger
1931 F. M. Weida
1935 F. W. Owens, H. B. Owens
1938 E. H. C. Hildebrandt
1942 E. H. C. Hildebrandt, J. S. Frame
1942 J. S. Frame
1947 L. F. Ollmann
1952 H. D. Larsen

Mathematical Education Notes

This department, originally known as "Mathematical Education," died in 1941, and was resurrected in 1958 under the above heading.

1938 C. A. Hutchinson
1958 J. R. Mayor, J. A. Brown
1965 J. R. Mayor, J. D. Baum, J. A. Brown

News and Notices

1916 D. A. Rothrock	1937 R. G. Sanger
1919 E. J. Moulton	1942 C. O. Oakley
1920 R. C. Archibald	1943 B. W. Jones
1921 H. P. Manning	1947 Harry Pollard
1922 R. W. Burgess	1947 Edith R. Schneckenburger
1925 H. W. Kuhn	1958 L. J. Montzingo, Jr.
1932 J. H. Weaver	1963 Raoul Hailpern

Collegiate Mathematics for War Service

This department flourished briefly during World Wars I and II. It died in 1919 and again in 1946. During the earlier period it was called "Collegiate Mathematics for War Service," during the latter, "War Information" (and after the hostilities ceased, "General Information"). See this volume, pp. 25 and 60.

1918 Henry Blumberg	1943 C. V. Newsom

(b) Mathematics Magazine

(i) A Brief History

In 1927 S. T. Sanders founded the Mathematics News Letter, a regional magazine devoted to undergraduate and secondary mathematics primarily in the deep South. In 1934 the journal was reorganized to serve a national rather than a regional audience. Renamed the National Mathematics Magazine, it was published by Louisiana State University with Sanders remaining as editor. Due to a financial conflict between Governor Huey Long and the University, the subsidy to the journal was drastically cut in 1942, despite the efforts of the Association. That same year the MAA provided the MAGAZINE with a subvention of $400 and gave $200 per annum in 1944 and 1945. However, the MAA Board of Governors voted in 1945 not to take over the MAGAZINE, which then ceased publication. Glenn James of the University of California at Los Angeles assumed the liabilities, assets, and subscription list of the journal, which resumed publication under his editorship during 1947. Retitled the MATHEMATICS MAGAZINE, it became international in scope. A Problems and Questions section was started. Although the journal now included more research papers, the primary emphasis remained on expository articles.

During 1959 negotiations were under way between the MAA and the Executive Committee of the MAGAZINE for the Association to have the

first choice in assuming permanent responsibility for the journal. On the recommendation of the MAA's Committee on Publications, the assumption of control was approved the following year and was effected in 1961. A new editor was named. It was decided that the level of the MAGAZINE should be between those of the MONTHLY and the Mathematics Teacher. Since 1961 the MATHEMATICS MAGAZINE has remained a journal of the Association. (The following references in the MONTHLY include additional details: **49**, 146, 581; **51**, 549; **53**, 178; **68**, 402, 524, 952; **69**, 330; **70**, 927, 1042.)

(ii) Editors

Here are mentioned the editor and the year his term began. Each editor served until the next date or until 1966. However, the MATHEMATICS MAGAZINE was not published during 1945 and 1946. S. T. Sanders was known as Editor and Manager, Glenn James as Managing Editor, and the others simply as Editor.

1927 S. T. Sanders	1962 Robert E. Horton
1947 Glenn James	1964 Roy Dubisch

(c) Carus Mathematical Monographs

In 1921 Mrs. Mary Hegeler Carus promised to donate to the Association $1200 per year for the next five years. Her wish was to make available at nominal cost a series of expository monographs of the best mathematical research. Although the monographs could deal with any field of pure or applied mathematics, including a historical treatment, they must be comprehensible not only to mathematicians but to scientific workers and others with a modest mathematical background. (For the early history of the monographs, see the MONTHLY **28**, 352–354; **30**, 151–155. See also this volume, pp. 28 ff. and 106.) The author, title, and first publication date are listed for each monograph.

1. G. A. Bliss, The Calculus of Variations, 1925.
2. D. R. Curtiss, Analytic Functions of a Complex Variable, 1926.
3. H. L. Rietz, Mathematical Statistics, 1927.
4. J. W. Young, Projective Geometry, 1930.
5. D. E. Smith and Jekuthiel Ginsburg, History of Mathematics in America before 1900, 1934.
6. Dunham Jackson, Fourier Series and Orthogonal Polynomials, 1941.
7. C. C. MacDuffee, Vectors and Matrices, 1943.

8. N. H. McCoy, Rings and Ideals, 1948.
9. Harry Pollard, The Theory of Algebraic Numbers, 1950.
10. B. W. Jones, The Arithmetic Theory of Quadratic Forms, 1950.
11. Ivan Niven, Irrational Numbers, 1956.
12. Mark Kac, Statistical Independence in Probability, Analysis, and Number Theory, 1959.
13. R. P. Boas, Jr., A Primer of Real Functions, 1960.
14. H. J. Ryser, Combinatorial Mathematics, 1963.

(d) Herbert Ellsworth Slaught Memorial Papers

In 1940 the Committee to Review the Activities of the MAA remarked the need for expository papers intermediate in length between MONTHLY articles and Carus monographs. Later that year the trustees of the Association appointed the Committee on the Slaught Memorial Papers to implement the idea. During 1941 the Board of Governors officially approved the establishment of the Slaught Papers, to be financed from interest on the Houck Fund. However, the first such paper did not appear until 1947. Below are listed the author, title, and first date of publication of each work. (For additional details see the MONTHLY **47**, 79–80; **48**, 86–89, 170, 578; and this volume, 29–43, 59, 69, 75, 106, 129, 133.)

1. R. E. Langer, Fourier Series; The Genesis and Evolution of a Theory, 1947. (MONTHLY **54**, Supplement)
2. R. C. Archibald, Outline of the History of Mathematics, 1949. (MONTHLY **56**, Supplement, Corrigenda **56**, 497)
3. Proceedings of the Symposium on Special Topics in Applied Mathematics, 1954.
4. Contributions to Geometry, 1955. (MONTHLY **62**, Supplement)
5. Walter B. Carver, The Conjugate Coordinate System for Plane Euclidean Geometry, 1956. (MONTHLY **63**, Supplement)
6. To Lester R. Ford on His Seventieth Birthday, 1957. (MONTHLY **64**, Supplement)
7. H. S. Vandiver and M. W. Weaver, Introduction to Arithmetic Factorization and Congruences from the Standpoint of Abstract Algebra, 1958. (MONTHLY **65**, Supplement)
8. R. H. Bing, Elementary Point Set Topology, 1960. (MONTHLY **67**, Supplement)
9. Walter Prenowitz, A Contemporary Approach to Classical Geometry, 1961. (MONTHLY **68**, Supplement)
10. Computers and Computing, 1965. (MONTHLY **72**, Supplement)

(e) MAA Studies in Mathematics

The volumes in this series contain expository articles at an undergraduate or higher level on recent mathematical results. The editor, title, and first publication date are listed.

1. R. C. Buck, Studies in Modern Analysis, 1962.
2. A. A. Albert, Studies in Modern Algebra, 1963.
3. I. I. Hirschman, Jr., Studies in Real and Complex Analysis, 1965.

(f) Publications of the Committee on the Undergraduate Program in Mathematics (CUPM)

Reports

1. Five Conferences on the Training of Mathematics Teachers.
2. Annual Report, July 1960–August 1961.
3. The Production of Mathematics Ph. D. 's in the United States, 1962.
4. A Catalogue Survey of College Mathematics Courses, 1962.
5. Recommendations on the Undergraduate Mathematics Program for Engineers and Physicists, 1962.
6. Annual Report, August 1961–August 1962.
7. Ten Conferences on the Training of Teachers of Elementary School Mathematics, 1963.
8. Annual Report, August 1962–August 1963.
9. Ten Conferences on the Training of Teachers of Elementary School Mathematics, Fall 1963.
10. Annual Report, August 1963–August 1964.

Other Publications

Recommendations for the Training of Teachers of Mathematics (A Summary).

Course Guides for the Training of Teachers of Junior High and High School Mathematics.

Course Guides for the Training of Teachers of Elementary School Mathematics (Preliminary Report).

Recommendations on the Undergraduate Mathematics Program for Engineers and Physicists.

Preliminary Recommendations for an Honors Program in Mathematics.

Recommendations on the Undergraduate Mathematics Program for Work in Computing.

Preliminary Recommendations for Pregraduate Preparation of Research Mathematicians.

Tentative Recommendations for the Undergraduate Mathematics Program for Students in the Biological, Management and Social Sciences.

Study No. 1–A Catalogue Survey of College Mathematics Courses.

Study No. 2–Mathematics Text Materials for the Undergraduate Preparation of Elementary School Teachers.

CUPM Basic Library List.

(g) Miscellaneous Publications

A. B. Chace, Rhind Mathematical Papyrus, 2 volumes, 1929.

R. C. Archibald, Outline of the History of Mathematics, 1934.

Professional Opportunities in Mathematics, 1951, with numerous revised editions.

Howard Eves and E. P. Starke, The Otto Dunkel Memorial Problem Book, 1957.

A Guidebook to Departments in the Mathematical Sciences, 1965, and later editions.

L. H. Loomis, Harmonic Analysis, 1965.

5. FILMS

The Committee on Production of Films made the first four films. All the others were produced by the Committee on Educational Media, except "Mathematics for Tomorrow," which was a joint venture of the Association and the National Council of Teachers of Mathematics. For each film there is listed its author-narrator, title, year of production, and a reference to the MONTHLY.

E. J. McShane, The Theory of Limits, 1959 (**66**, 840).

Leon Henkin, Mathematical Induction, 1960 (**67**, 947).

Edwin Hewitt, What Is an Integral?, 1962 (**69**, 460).

A. S. Besicovitch, The Kakeya Problem, 1962 (**69**, 950).

Mathematics for Tomorrow, 1964 (**71**, 1069).

David Blackwell, Predicting at Random, 1965 (**72**, 446).

Mark Kac, Listening for the Shape of a Drum, 1965 (**72**, 446).

Marston Morse, Pits, Peaks and Passes, 1965 (**72**, 446).

Leon Henkin, J. H. Hlavaty, and Frank Kocher, Mr. Simplex Saves the Aspidistra, 1965 (**72**, 446).

George Polya, What Is Teaching?, 1965 (**72**, 446).

R. L. Moore, Challenge in the Classroom: The Methods of R. L. Moore, 1965 (**72**, 446).

Solomon Lefschetz, Fixed Points, 1965 (**72**, 1056).

Richard Courant, Goettingen and New York — Reflections on a Life in Mathematics, 1965 (**72**, 1056).

H. M. MacNeille, CEM Animated Calculus Films, 1965 (**72**, 1056).

C. W. Curtis, The Classical Groups as a Source of Algebraic Problems, 1965 (**73**, 441).

6. Earle Raymond Hedrick lectures

In 1952 the Board of Governors of the Association established a series of three expository lectures in order to promote mathematical exposition. These lectures, to be given at each summer meeting of the Association, were named after the MAA's first president. Here are listed the year of the lecture, the speaker, and the title. (For additional details, see the Monthly **59**, 355–356; **66**, 446.)

1952 Tibor Rado, Derivatives and Jacobians.

1953 P. R. Halmos, Axiomatic Set Theory.

1954 L. H. Loomis, Convex Sets.

1955 Mark Kac, Familiar Things from an Unfamiliar Point of View.

1956 J. C. Oxtoby, Category and Measure.

1957 Leo Zippin, Topological Transformation Groups.

1958 A. S. Householder, Some Mathematical Problems Arising in Computations with Matrices.

1959 William Feller, Topics Connected with Ordinary Differential Operators.

1960 Ivan Niven, Some Aspects of Diophantine Approximation.

1961 R. H. Bing, Topology of 3-Space.

1962 A. M. Gleason, The Coordinate Problem.

1963 Hans Rademacher, Dedekind Sums.

1964 E. E. Floyd, Periodic Maps.

1965 J. W. Milnor, Differential Topology.

7. NATIONAL MEETINGS: 1915–1965

Dec. 30–31, 1915. Ohio State University, Columbus, Ohio (organizational meeting) (**23**, 1–6)
Sept. 1–2, 1916. Massachusetts Institute of Technology, Cambridge, Massachusetts (**23**, 273–288)
Dec. 28–30, 1916. Columbia University, New York City, New York (**24**, 48–64, 98–100)
Sept. 6–7, 1917. Western Reserve University and Case School of Applied Science, Cleveland, Ohio (**24**, 353–362)
Dec. 27–28, 1917. University of Chicago, Chicago, Illinois (**24**, 481–482; **25**, 45–66)
Sept. 6–7, 1918. Dartmouth College, Hanover, New Hampshire (**25**, 375–383)
Dec. 27, 1918. University of Chicago, Chicago, Illinois (**26**, 91–107)
Sept. 4–6, 1919. University of Michigan, Ann Arbor, Michigan (**26**, 373–387)
Jan. 1–2, 1920. Columbia University, New York City, New York (**27**, 93–112)
Sept. 6, 1920. University of Chicago, Chicago, Illinois (**27**, 385–398)
Dec. 28–29, 1920. University of Chicago, Chicago, Illinois (**27**, 99–110)
Sept. 6–8, 1921. Wellesley College, Wellesley, Massachusetts (**28**, 351–363)
Dec. 29–30, 1921. University of Toronto, Toronto, Ontario, Canada (**29**, 97–111)
Sept. 6–7, 1922. University of Rochester, Rochester, New York (**29**, 281–289)
Dec. 29–30, 1922. Harvard University, Cambridge, Massachusetts (**30**, 87–102)
Sept. 5–6, 1923. Vassar College, Poughkeepsie, New York (**30**, 407–413)
Dec. 27–28, 1923. University of Cincinnati, Cincinnati, Ohio (**31**, 153–168)

No summer meeting was held in 1924 because of the International Mathematical Congress in Toronto.

Dec. 31, 1924–Jan. 1, 1925. George Washington University, Washington, D.C. (**32**, 145–160)
Sept. 8–9, 1925. Cornell University, Ithaca, New York (**33**, 1–7)
Dec. 30–31, 1925. Junior College, Kansas City, Missouri (**33**, 169–180)
Sept. 7–8, 1926. Ohio State University, Columbus, Ohio (**33**, 485–492)
Dec. 30–31, 1926. University of Pennsylvania, Philadelphia, Pennsylvania (**34**, 105–121)
Sept. 5–6, 1927. University of Wisconsin, Madison, Wisconsin (**34**, 446–453)
Dec. 29–30, 1927. Nashville, Tennessee (**35**, 101–114)
Sept. 3–4, 1928. Amherst College, Amherst, Massachusetts (**35**, 451–458)

Dec. 28–29, 1928. Columbia University, New York City, New York (**36**, 119–131)

Aug. 26–27, 1929. University of Colorado, Boulder, Colorado (**36**, 455–460)

Dec. 31, 1929–Jan. 1, 1930. Des Moines, Iowa (**37**, 105–117)

Sept. 8–9, 1930. Brown University, Providence, Rhode Island (**37**, 453–460)

Dec. 31, 1930–Jan. 1, 1931. Cleveland, Ohio (**38**, 121–134)

Sept. 4, 7, 8, 1931. University of Minnesota, Minneapolis, Minnesota (**38**, 487–494)

Dec. 30–31, 1931. New Orleans, Louisiana (**39**, 123–134)

Aug. 29–30, 1932. University of California, Los Angeles, California (**39**, 501–506)

Dec. 27–28, 1932. Atlantic City, New Jersey (**40**, 125–139)

June 19, 1933. University of Chicago and Northwestern University, Chicago, Illinois (**40**, 441–451)

Dec. 29–30, 1933. Cambridge, Massachusetts (**41**, 123–137)

Sept. 3–4, 1934. Williams College, Williamstown, Massachusetts (**41**, 531–536)

Dec. 28, 1934– Jan. 1, 1935. Pittsburgh, Pennsylvania (**42**, 125–140)

Sept. 9–10, 1935. University of Michigan, Ann Arbor, Michigan (**42**, 527–535)

Dec. 30–31, 1935. St. Louis, Missouri (**43**, 123–145)

Aug. 31– Sept. 4, 1936. Harvard University, Cambridge, Massachusetts (**43**, 513–523)

Dec. 31, 1936– Jan. 1, 1937. Chapel Hill and Durham, North Carolina (**44**, 123–134)

Sept. 6–7, 1937. Pennsylvania State College, State College, Pennsylvania (**44**, 551–558)

Dec. 30–31, 1937. Indianapolis, Indiana (**45**, 129–143)

No summer meeting took place in 1938, in deference to the Semicentennial Celebration of the American Mathematical Society.

Dec. 28–31, 1938. Richmond and Williamsburg, Virginia (**46**, 123–134)

Sept. 4–5, 1939. University of Wisconsin, Madison, Wisconsin (**46**, 524–529)

Dec. 28–30, 1939. Columbus, Ohio (**47**, 123–137)

Sept. 9–10, 1940. Dartmouth College, Hanover, New Hampshire (**47**, 589–594)

Jan. 1–2, 1941. Baton Rouge, Louisiana (**48**, 163–175)

Sept. 1–4, 1941. University of Chicago, Chicago, Illinois (**48**, 571–578)

Dec. 31, 1941 – Jan. 1, 1942. Bethlehem, Pennsylvania (**49**, 139-152)

Sept. 7–9, 1942. Vassar College, Poughkeepsie, New York (**49**, 576–581)

The December 1942 meeting was cancelled at the request of the Office of Defense Transport. (**50**, 205–209)

Sept. 11–12, 1943. Rutgers University, New Brunswick, New Jersey (**50**, 588–594)
Nov. 27–28, 1943. Chicago, Illinois (**51**, 115–119)
Aug. 12, 1944. Wellesley College, Wellesley, Massachusetts (**51**, 545–549)
Nov. 25–26, 1944. Chicago, Illinois (**52**, 110–116)

The June 1945 meeting was cancelled by order of the Office of Defense Transport. (**52**, 296)

Nov. 24–25, 1945. Chicago, Illinois (**53**, 172–179)
Aug. 19–20, 1946. Cornell University, Ithaca, New York (**53**, 547–554)
Dec. 26–27, 1946. Swarthmore College, Swarthmore, Pennsylvania (**54**, 185–194)
Sept. 1–2, 1947. Yale University, New Haven, Connecticut (**54**, 608–613)
Jan. 1, 1948. University of Georgia, Athens, Georgia (**55**, 185–193)
Sept. 6–7, 1948. University of Wisconsin, Madison, Wisconsin (**55**, 605–611)
Dec. 31, 1948. Ohio State University, Columbus, Ohio (**56**, 200–207)
June 20–21, 1949. Rensselaer Polytechnic Institute, Troy, New York (**56**, 502–504)
Aug. 29–30, 1949. University of Colorado, Boulder, Colorado (**56**, 654–660) summer meeting
Dec. 30, 1949. Columbia University, New York City, New York (**57**, 206–213)

No summer meeting was held in 1950 because of the International Congress of Mathematicians.

Dec. 30, 1950. University of Florida, Gainesville, Florida (**58**, 213–217)
June 25–26, 1951. Michigan State College, East Lansing, Michigan (**58**, 515–517)
Sept. 3–4, 1951. University of Minnesota, Minneapolis, Minnesota (**58**, 659–663)
Dec. 29, 1951. Brown University, Providence, Rhode Island (**59**, 205–208)
Sept. 1–2, 1952. Michigan State College, East Lansing, Michigan (**59**, 664–668)
Dec. 30, 1952. Washington University, St. Louis, Missouri (**60**, 214–218)
Aug. 31– Sept. 1, 1953. Queen's University and the Royal Military College, Kingston, Ontario, Canada (**60**, 648–652)
Dec. 31, 1953. Johns Hopkins University, Baltimore, Maryland (**61**, 216–220)
Aug. 30–31, 1954. University of Wyoming, Laramie, Wyoming (**61**, 664–667)

Dec. 30, 1954. University of Pittsburgh, Pittsburgh, Pennsylvania (**62**, 204–208)

Aug. 29–30, 1955. University of Michigan, Ann Arbor, Michigan (**62**, 690–694)

Dec. 30, 1955. Rice Institute, Houston, Texas (**63**, 210–212)

Aug. 20–21, 1956. University of Washington, Seattle, Washington (**63**, 683–685)

Dec. 29, 1956. University of Rochester, Rochester, New York (**64**, 212–215)

Aug. 26–29, 1957. Pennsylvania State University, University Park, Pennsylvania (**64**, 697–699)

Jan. 30–31, 1958. University of Cincinnati, Cincinnati, Ohio (**65**, 308–310)

Aug. 25–28, 1958. Massachusetts Institute of Technology, Cambridge, Massachusetts, (**65**, 724–727)

Jan. 22–23, 1959. University of Pennsylvania, Philadelphia, Pennsylvania, (**66**, 353–355)

Aug. 31– Sept. 3, 1959. University of Utah, Salt Lake City, Utah (**66**, 839–842)

Jan. 28–30, 1960. Conrad Hilton Hotel, Chicago, Illinois (**67**, 404–406)

Aug. 29–31, 1960. Michigan State University, East Lansing, Michigan (**67**, 944–949)

Jan. 25–27, 1961. Willard Hotel, Washington, D. C. (**68**, 399–404)

Aug. 28–30, 1961. Oklahoma State University, Stillwater, Oklahoma (**68**, 948–954)

Jan. 24–26, 1962. Sheraton-Gibson Hotel, Cincinnati, Ohio (**69**, 327–332)

Aug. 27–29, 1962. University of British Columbia, Vancouver, British Columbia, Canada (**69**, 947–953)

Jan. 26–28, 1963. University of California, Berkeley, California (**70**, 469–475)

Aug. 26–28, 1963. University of Colorado, Boulder, Colorado (**70**, 1039–1044)

Jan. 25–27, 1964. University of Miami, Coral Gables, Florida (**71**, 459–464)

Aug. 24–26, 1964. University of Massachusetts, Amherst, Massachusetts (**71**, 1067–1072)

Jan. 28–30, 1965. Denver-Hilton Hotel, Denver, Colorado (**72**, 442–449)

Aug. 30– Sept. 3, 1965. Cornell University, Ithaca, New York (**72**, 1053–1059)

8. MEMBERSHIP

(a) Charter Members

The charter members of the Association were those who had joined by April 1916. However, eighteen of those who participated in the organizational meeting had not responded as of that date. All but one eventually did. Thus 1046 charter members are mentioned here while only 1045 figure in appendix 8(b) on membership growth. Below are listed by state and country the charter membership of the Association.

The first three columns refer to the number of individual members, first high school teachers, next college teachers, then the total individual membership. The fourth column indicates the number of institutional members. A list naming all the charter members can be found in the MONTHLY (**23**, 135–145).

	High School Teachers	*College Teachers*	*Total Persons*	*Institutions*
U.S.A.				
Alabama	1	7	8	0
Arizona	0	3	4	0
Arkansas	3	4	8	0
California	8	28	41	0
Colorado	7	13	21	2
Connecticut	1	14	16	1
Delaware	1	2	3	0
District of Columbia	2	3	15	0
Florida	0	3	4	0
Georgia	1	15	16	1
Idaho	0	2	2	0
Illinois	18	60	97	6
Indiana	1	25	29	2
Iowa	1	27	31	2
Kansas	4	33	37	2
Kentucky	0	7	7	1
Louisiana	1	5	6	0
Maine	4	8	14	1
Maryland	5	18	26	0
Massachusetts	13	49	70	1
Michigan	1	35	37	2

Minnesota	2	15	18	2
Mississippi	0	3	3	1
Missouri	14	30	52	3
Montana	0	2	3	1
Nebraska	1	11	15	1
Nevada	0	2	2	0
New Hampshire	2	8	10	0
New Jersey	5	14	23	1
New Mexico	1	2	3	0
New York	17	73	120	4
North Carolina	0	9	11	0
North Dakota	0	1	1	0
Ohio	1	66	72	7
Oklahoma	0	8	8	0
Oregon	1	3	7	0
Pennsylvania	13	46	67	4
Rhode Island	2	7	10	0
South Carolina	0	3	3	0
South Dakota	1	6	7	0
Tennessee	3	6	9	0
Texas	3	16	23	3
Utah	0	4	4	0
Vermont	0	4	5	1
Virginia	1	14	16	1
Washington	0	12	12	1
West Virginia	3	4	8	0
Wisconsin	1	17	18	0
Wyoming	0	3	3	0
Other Countries				
Canada	1	12	15	1
China	0	3	3	0
England	0	2	2	0
India	1	0	1	0
Totals	145	767	1046	52

(b) Membership Growth

Founded December 31, 1915, the Association's charter membership dates from April 1916. At that time both individual and institutional memberships were available. In 1945 institutional memberships were abolished but were reestablished during 1961 in two forms, academic and corporate. Except for 1916, all membership figures are tabulated from the end of the year.

Date	*Individual Membership*	*Institutional Membership*	*Date*	*Individual Membership*	*Institutional Membership*
April 1916	1045	52	1937	1971	104
1917	1108	78	1939	2125	100
1918	1056	84	1941	2253	109
1919	1100	87	1943	2320	109
1922	1382	94	1944	2440	107
1924	1712	110	1945	2511	Institutional
1925	1759	115			Membership
1927	1849	127			discontinued.
1929	1964	133	1947	2913	
1931	2014	132	1949	3844	
1933	1913	127	1950	4409	
1935	1893	116	1951	4564	
			1952	4975	

Date	*Individual Membership*		
1954	5549		
1955	6045		
1956	6491		
1957	7094		
1958	7612		
1959	8983	*Academic Membership*	*Corporate Membership*
1960	10,029		
1961	11,292	29	2
1962	12,792	111	3
1963	14,069	176	3
1964	15,598	208	2
1965	16,714	225	2

9. AWARDS AND COMPETITIONS

(a) Chauvenet Prize

Named after William Chauvenet, a mathematics professor at the U. S. Naval Academy, this award was for an outstanding expository article on a mathematical topic by a member of the Association. The Chauvenet Prize was originally endowed in 1925 through a gift of $100 from J. L. Coolidge, then the Association's president. Later, W. B. Ford contributed an additional $500 and Dunham Jackson $100. At first an award of $100 was to be given every five years, then every three years, and finally every year. In 1965 the award was increased to $500. Here are listed the year of the award, the recipient, his article, where it was published, and the year of publication. (For additional details see the MONTHLY **32**, 439–440; **66**, 446–447; **71**, 588–589, and this volume, 48, 74, 128.)

1925. G. A. Bliss, Algebraic Functions and Their Divisors, Annals of Mathematics (1924)

1929. T. H. Hildebrandt, The Borel Theorem and Its Generalizations, Bull. Amer. Math. Soc. (1926).

1932. G. H. Hardy, An Introduction to the Theory of Numbers, Bull. Amer. Math. Soc. (1929).

1935. Dunham Jackson, Series of Orthogonal Polynomials, Annals of Mathematics (1933), Orthogonal Trigonometric Sums, Annals of Mathematics (1933), and The Convergence of Fourier Series, MONTHLY (1934).

1938. G. T. Whyburn, On the Structure of Continua, Bull. Amer. Math. Soc. (1936).

1941. Saunders MacLane, Modular Fields, MONTHLY (1940), Some Recent Advances in Algebra, MONTHLY (1939).

1944. R. H. Cameron, Some Introductory Exercises in the Manipulation of Fourier Transforms, National Mathematics Magazine (1941).

1947. P. R. Halmos, The Foundations of Probability, MONTHLY (1944).

1950. Mark Kac, Random Walk and the Theory of Brownian Motion, MONTHLY (1947).

1953. E. J. McShane, Partial Orderings and Moore-Smith Limits, MONTHLY (1952).

1956. R. H. Bruck, Recent Advances in the Foundations of Euclidean Plane Geometry, MONTHLY (1955).

1960. Cornelius Lanczos, Linear Systems in Self-Adjoint Form, MONTHLY (1958).

1963. P. J. Davis, Leonhard Euler's Integral: A Historical Profile of the Gamma Function, MONTHLY (1959).

1964. Leon Henkin, Are Logic and Mathematics Identical? Science (1962).
1965. J. K. Hale and J. P. LaSalle, Differential Equations: Linearity vs. Nonlinearity, SIAM Review (1963).

(b) L. R. Ford Award

This award was established by the Board of Governors of the Association in 1965. Up to six awards of $100 each are given annually to authors of expository articles in the MONTHLY or MATHEMATICS MAGAZINE. Below are listed the year of publication of the articles, the author, title, and location. (For additional details, see the MONTHLY, **72**, 813–814 and **73**, 815.)

1964: R. H. Bing, Spheres in E^3, MONTHLY, **71**, 353–364.
Louis Brand, A Division Algebra for Sequences and its Associated Operational Calculus, MONTHLY, **71**, 719–728.
R. G. Kuller, Coin Tossing, Probability, and the Weierstrass Approximation Theorem, MATH. MAG., **37**, 262–265.
R. D. Luce, The Mathematics Used in Mathematical Psychology, MONTHLY, **71**, 364–378.
Hartley Rogers, Jr., Information Theory, MATH. MAG., **37**, 63–78.
Elmer Tolsted, An Elementary Derivation of the Cauchy, Hoelder, and Minkowski Inequalities from Young's Inequality, MATH. MAG., **37**, 2–12.
1965: C. B. Allendoerfer, Generalizations of Theorems About Triangles, MATH. MAG., **38**, 253–259.
P. D. Lax, Numerical Solution of Partial Differential Equations, MONTHLY, **72**, Part II, 74–84.
Marvin Marcus and Henryk Minc, Permanents, MONTHLY, **72**, 577–591.

(c) Award for Distinguished Service to Mathematics

In 1961 the Board of Governors established this annual award of $500 for outstanding contributions, other than research, to mathematics or mathematical education. Such contributions were to be on a national scale whether in the United States or elsewhere. Here are mentioned the year of the award, the recipient, and a further reference in the Monthly.

1962 Mina S. Rees (**69**, 185–187)
1963 George Polya (**70**, 1–2)
1964 E. J. McShane (**71**, 1–2)
1965 Richard Courant (**72**, 1–2)

(d) William Lowell Putnam Mathematical Competition

In 1938 the Putnam Competition was initiated as a result of a gift from the trustees of the Putnam estate and through the intervention of George David Birkhoff. Mr. Putnam had desired the money be used to emphasize

team competition as a way of spurring mathematical interest and achievement. The structure of the contest was also designed to encourage the participation of small colleges which might be able to field only individual contestants. From 1938 on, the competition was held annually, with two exceptions. Because of war, no contest took place from 1943 to 1945. In 1958 two contests were held.

Below is a list of the institutions whose teams won the Putnam contest, together with the number of times they placed. Only the first three teams were announced until 1942, when the fourth was mentioned. The fifth began to be noted in 1953. Also below is an annual table of the numbers of participating individuals and schools with further references to the MONTHLY. (For a detailed history of the Putnam Competition, see the MONTHLY, **45**, 64–66; **70**, 481–495; **72**, 469–483, and this volume, pp. 44–45.)

Institution	1st place	2nd place	3rd place	4th place	5th place
Brooklyn College	3	2	1	0	0
California Institute of Technology	3	1	2	2	1
Carnegie Institute of Technology	0	0	1	1	0
Case Institute of Technology	0	0	0	1	1
City College of New York	0	1	0	4	0
Columbia University	0	2	3	0	0
Cooper Union Institute of Technology	0	0	2	0	0
Cornell University	2	1	1	1	1
Dartmouth College	0	1	0	0	1
Harvard University	8	5	4	2	0
Kenyon College	0	0	0	1	0
Massachusetts Institute of Technology	0	5	4	2	1
McGill University	0	0	0	1	0
Michigan State University	2	0	0	1	0
Mississippi Women's College	0	0	1	0	0
New York University	0	0	1	0	0
Polytechnic Institute of Brooklyn	2	0	0	0	1
Princeton University	0	0	0	1	0
Queen's University	1	0	1	1	0
University of California, Berkeley	1	1	0	1	1
University of California, Los Angeles	0	0	0	0	1
University of Manitoba	0	0	0	1	0
University of Pennsylvania	0	1	1	1	0
University of Toronto	4	4	3	2	0
Yale University	0	3	1	0	0

Date	*No. Individuals*	*No. Colleges*	*Reference*
1938	163	67	**45,** 332, 399–400
1939	200	69	**46,** 248–250, 307–308
1940	208	68	**47,** 256–257, 331–332
1941	146	44	**48,** 346–350
1942	114	31	**49,** 348–351
1946	67	17	**53,** 482–485
1947	145	36	**54,** 400–403
1948	120	29	**55,** 630–633
1949	155	49	**56,** 448–452
1950	223	56	**57,** 467–470
1951	209	56	**58,** 479–482
1952	295	66	**59,** 538–542
1953	256	63	**60,** 539–542
1954	231	67	**61,** 542–549
1955	256	63	**62,** 558–564
1956	291	76	**64,** 21–27
1957	377	93	**64,** 486–488, 649–654
1958 (Feb.)	430	93	**65,** 515–516, **68,** 18–22
1958 (Nov.)	506	115	**66,** 570–572, **68,** 22–27
1959	633	135	**67,** 559–561, **68,** 27–33
1960	867	160	**68,** 629–637
1961	1094	192	**69,** 759–767
1962	1187	187	**70,** 712–717
1963	1260	199	**71,** 634–641
1964	1439	219	**72,** 732–739
1965	1596	235	**73,** 726–732

10. FINANCES

The following table gives the gross expenditures for each year with a reference to the financial statement in the MONTHLY. Note that the turnover remained nearly constant from 1923 to 1946 inclusive. The enormous growth beginning in the mid-fifties was spurred by grants from the National Science Foundation and other sources. (See also this volume, Chapter 6.)

Year	*Gross Expenditures*	*Reference*
1916	$ 3,712	**24,** 62
1917	3,393	**25,** 65–66
1918	4,540	**26,** 106–107
1919	4,317	**27,** 111–112
1920	6,786	**28,** 110
1921	7,446	**29,** 110–111
1922	5,587	**30,** 101–102
1923	11,028	**31,** 167–168
1924	8,565	**32,** 159–160
1925	11,806	**33,** 179–180
1926	10,829	**34,** 120–121
1927	18,153	**35,** 111–114
1928	11,420	**36,** 129–131
1929	15,064	**37,** 114–117
1930	18,753	**38,** 131–134
1931	11,813	**39,** 131–134
1932	11,125	**40,** 136–139
1933	15,086	**41,** 134–137
1934	11,901	**42,** 138–140
1935	15,490	**43,** 142–145
1936	17,626	**44,** 131–134
1937	15,993	**45,** 137–143
1938	13,055	**46,** 131–133
1939	15,726	**47,** 134–137
1940	16,851	**48,** 171–175
1941	16,582	**49,** 149–152
1942	18,474	**50,** 207–209
1943	15,820	**51,** 177–180
1944	15,473	**52,** 230–233
1945	19,207	**53,** 236–240
1946	16,553	**54,** 249–252
1947	26,909	**55,** 270–273
1948	29,751	**56,** 292–294
1949	28,285	**57,** 290–292
1950	36,924	**58,** 293–294
1951	28,404	**59,** 281–282
1952	35,288	**60,** 288–289
1953	36,875	**61,** 286–288
1954	58,474	**62,** 296–298
1955	52,996	**63,** 276–278

1956	99,290	**64,** 292
1957	179,647	**65,** 383
1958	248,463	**66,** 444
1959	408,490	**67,** 403
1960	497,122	**68,** 405–406
1961	623,472	**69,** 332–333
1962	695,158	**70,** 603
1963	723,743	**71,** 591
1964	1,541,862	**72,** 575
1965	1,594,938	**73,** 449

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Prepared by Charles V. Jones and Constance Moore Gardner. Alphabetization is word by word, not letter by letter. Bibliographies are not indexed.