

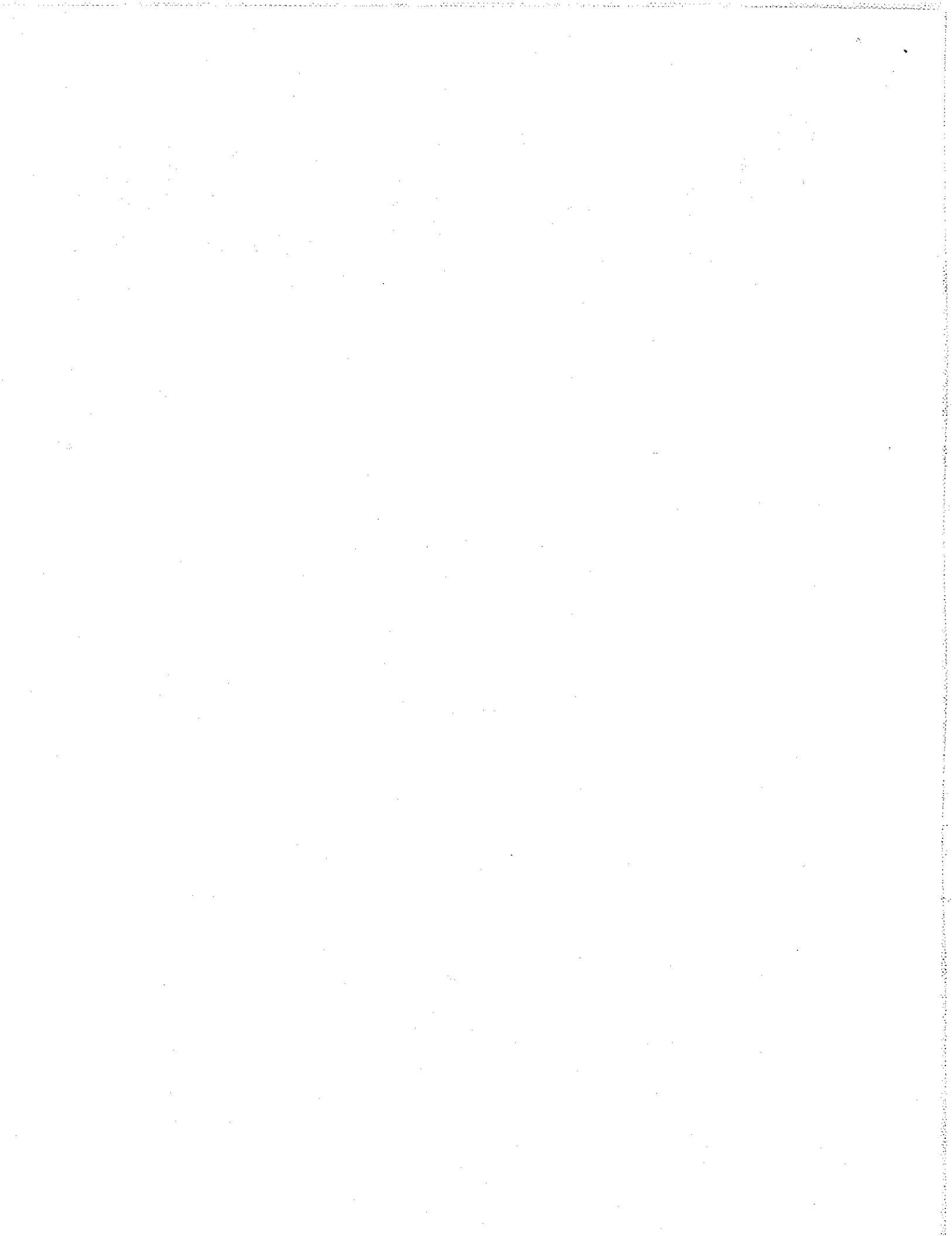
# Notices

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# Mathematics at Berkeley: A History

*Reviewed by Rob Kirby*

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**Mathematics at Berkeley: A History**

Calvin C. Moore

A K Peters, 2007

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Cal Moore has given us a work of admirable scholarship that belongs in the library of any mathematics historian and should be interesting to a range of other mathematicians, from those who spent part of their careers at Berkeley, to those who just want to see if they or their friends are mentioned (many are).

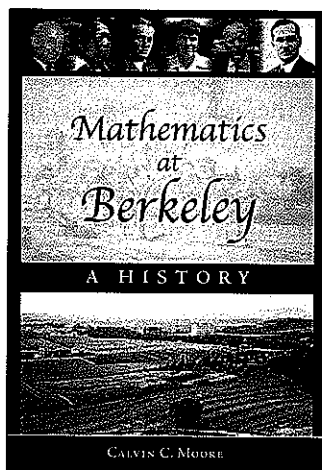
The book starts with the origins of the University of California, Berkeley, and concludes (except for some endnotes) in 1985 with the establishment of Berkeley's Mathematical Sciences Research Institute (due in great part to the work of Moore). I will outline some of the highlights and add a few stories and pictures.

UC Berkeley was created in 1868 as the offspring of two parents. One was the College of California, founded in 1855 and located on the current site of the Berkeley campus. The site (and eventual town) was named in 1866 after the Irish philosopher Bishop George Berkeley, a patron of education who also had a hand in founding Kings College (now Columbia University) and the College of Philadelphia (now University of Pennsylvania). The Bishop is also known in mathematics for his attack on fluxions, the basis of Newton's calculus.

The other parent was the Agricultural, Mining, and Mechanical Arts College, chartered by the California legislature under the Morrill Act,

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which funded this land-grant college. (It is interesting to note that Yale University was also a land-grant institution, receiving funds through its college of forestry.)

The former parent had land and the latter had money, and after a difficult courtship they united to form Berkeley. Yale graduates played a large role during these

years and it is speculated that the school colors, blue and gold, came from the school color of Yale and the gold of the Golden Gate, the golden hills, and the gold of California. However, all mathematics department chairs from 1882 to 1954 held Harvard degrees.

For a few decades Berkeley was undistinguished as a research university. Professors were paid US\$3,600 per year, or less, and taught five courses per term, mostly following the West Point curriculum. This was two years of what we would call pre-calculus and then a year of calculus. The college algebra text, by Davies, was not liked and a tradition began with a nighttime funeral procession through campus with a coffin containing the offending book, which was then "cremated" to song and oratory. The tradition grew to include other unpopular texts.

By the early 1930s the physics and chemistry departments at Berkeley had achieved considerable

renowned (think of Lawrence and Oppenheimer), and it had been realized that the math department had fallen far behind and something needed to be done. Griffith Evans, chair at Rice University, was the agreed-upon choice to revitalize the math department, but negotiations to bring him to Berkeley were lengthy. A primary issue was salary, and this being the Depression, a grand offer of US\$9,000 was made, but with the proviso that it would likely be subject to a 10% cut by the legislature, and possibly as much as a one-third cut. Since Evans was facing the same 10% cut at Rice, US\$8,100 was accepted after he was assured that it would be cut no further. (If the days of actual salary cuts seem impossible now, it should be remembered that faculty salaries did not nearly keep up with inflation during the 1970s, and one source claims that faculty lost 24% of their purchasing power during those years.)

Evans successfully recruited Charles Morrey, Hans Lewy, and Jerzy Neyman in the 1930s, and the department had taken a long step towards its future eminence. David Blackwell might have also come to Berkeley at that time (he did later in 1955), but an offer died due to the opposition of Evans' wife, who felt that "she could not invite a Negro to her house or attend a department function at which one was present."

In 1936 the math department still had no secretaries, but Evans was able to obtain a half-time position for Sarah Hallam, at the rate of US\$400 per half-year. Comparing her salary to Evans' US\$8,100 per year shows that in those days there was a bigger discrepancy between staff and professorial salaries than there is today. Sarah Hallam presided over considerable growth in the size of the staff and ran the department with an iron hand until she retired in 1972. She died in 1994, leaving US\$300,000 for graduate fellowships.

Under Evans the department grew slowly through World War II and then more quickly until Evans stepped down as chair in 1949, having added Alfred Tarski, Raphael Robinson, Derrick H. Lehmer, and John Kelley. In those days the standard teaching load was three courses per semester, and office space was scarce with four instructors to an office. (I recall Irving Kaplansky telling me that when he went to Harvard in 1940, professors did not have offices, but worked at home and held office hours and met students in a common room.)

The famous (loyalty) oath controversy began in 1949, died down in 1952, and in the words of Clark Kerr, "caused the single greatest confrontation between a faculty and its board of trustees in American history." The author devotes a chapter to giving a balanced account of the controversy, which I will summarize here.

The oath stated:

I do solemnly swear (or affirm) that I will support the Constitution of the United States and the Constitution of the State of California, and that I will faithfully discharge the duties of my office according to the best of my ability; that I am not a member of the Communist Party or under any oath, or a party to any agreement, or under any commitment that is in conflict with my obligation under this oath.

The part before the semicolon had always been required of public employees in California, but the Regents of UC added the latter part in June 1949.

Since 1940 it had been the policy of the regents to ban employment of members of the Communist Party, and since this had caused no furor, the addition to the oath was not expected to be a problem, but rather a form of implementation of the ban on members. However, it quickly became a power struggle between the faculty and the regents that came to dominate faculty life.

The issue was not the ban against membership in the Communist Party, for 79% of the faculty voted in favor of that, and some of the most distinguished opponents of the loyalty oath stated that they nonetheless favored the ban. Rather, the opposition was fueled by the fact that only university professors (among state employees) were required to sign an oath, amid growing disagreement over the degree of risk posed by Communists and sympathizers in the U.S.

Eventually, all but 36 professors signed the loyalty oath, and then the issue shifted to whether the faculty or the regents had the authority to determine the fitness of a person to be a member of the faculty. The Committee on Privilege and Tenure held hearings on the 36 non-signers and recommended against dismissal of 31 and for dismissal of the other 5. The committee found no evidence of disloyalty in any of the non-signers, but the 5 who declined to discuss the issues were those recommended for dismissal. The regents at first upheld the committee but then on a 12-10 vote decided to dismiss all 36.

After the regents' vote, 12 decided to sign, and 24 were dismissed, among them John Kelley, Hans Lewy, Stefan Peters, and Pauline Sperry; also, assistant professors Charles Stein and Paul Garabedian resigned before being required to sign the oath.

Legal battles were fought, and the California legislature passed a slightly stronger version of an oath, the Levering oath, which applied to all public employees, not just the UC faculty. In 1953, the Supreme Court ruled in favor of the faculty, but on a narrow ground that the Levering oath superseded the regents' oath. The non-signers were then offered reinstatement provided they signed

the Levering oath. Many accepted reinstatement, including Kelley and Lewy, but signed the Levering oath with great reluctance.

Looking back, the battle over the loyalty oath rested on the differing views of membership in the Communist Party and what that meant about fitness to be a member of the faculty. In extreme forms one side saw membership as just a form of progressive or leftist politics that should enjoy the traditional protections, but the other side saw membership as joining a group under the control of a foreign power that advocated the violent overthrow of our government. That the focus became a signature on a relatively worthless piece of paper is curious.

However, it could be argued that the most important outcome of the controversy was this: before 1950, tenure was a custom but it was not written in any regulations, but after the loyalty oath and the dismissals, considerable effort led, in 1958, to a formal regents' policy of tenure.

The controversy over the loyalty oath could have sent the math department into decline, but instead a significant expansion in quantity and quality began in the late 1950s under chair John Kelley and chancellor Clark Kerr. Kerr wrote in his memoirs that he had concluded "if a campus was to have one preeminent department in modern times, it should be mathematics." Berkeley had been weak in geometry/topology and algebra, but the additions of S.-S. Chern, Edwin Spanier, and Steve Smale in the former, and Gerhard Hochschild and Maxwell Rosenlicht in the latter, together with other notables, brought Berkeley to a high level by the time that the unrest of the late 1960s began.

California was full of optimism in the 1950s and early 1960s, with dams and freeways constructed, and three new UC campuses—Irvine, San Diego, and Santa Barbara—planned and built. The university switched from semesters to quarters in 1967, so as to have a summer term on an equal footing with the other quarters. This implied more faculty to teach the extra term. (The summer term died from lack of funds, and Berkeley switched back to semesters in 1983, but made such a hash of the switch that the other eight campuses refused to switch and are to this day on quarters.)

The math department grew from about 20 full-time employees in 1955 to 41 FTE in 1960, and plans were formed for further expansion and a new building, to be named after Griffith Evans. Plans included increasing the number of graduate students in all areas to over half the student body at Berkeley, with a concomitant increase in math graduate students and hence math faculty to 110 FTE.

The math department had long been in cramped quarters and was still spread over five buildings including T4, which was one of 12 temporary wood frame buildings constructed after WWII. These

were only gradually torn down, with T4 lasting into this century. I spent the summer of 1966 in T4 with a fine bunch of other young topologists including Dennis Sullivan, George Cooke, Greg Brumfiel, Anthony Phillips, and others; despite the aged building with its worn wooden floors, T4 had great atmosphere.

Plans for Evans increased through the 1960s until a contract for the present massive building was let in 1967. The cost was about US\$9 million dollars, and US\$2.4 million came from the federal government, which at that time (less than a decade after Sputnik) wished to subsidize infrastructure for graduate education (imagine getting money for a building now!).

Coincidentally, Ronald Reagan took over the governor's office in January 1967, and grand plans soon came to a grinding halt. The math department reached a maximum of nearly 80 FTE in 1972, but then 13 FTE disappeared that year via six retirements (including Morrey) and the loss of seven unfilled positions. Mathematics, in Berkeley and elsewhere, has never regained the heady days of the early, post-Sputnik 1960s. The 1970s brought years of around 800 new Ph.D.'s, around 200 retirements at U.S. institutions, and a serious job crunch. Berkeley went from entering graduate classes of about 100 in 1971 and 1972, to a more reasonable 60, until 1991 when it dropped to an average of about 35 new students per year. Graduate expectations changed also, for many arrived at Berkeley in the early 1970s without any promise of monetary support, whereas after 1990 it became normal to promise four to five years of support, which often meant six.

When Evans Hall was finished in 1971, it was seen as a "brutalist building" and "aesthetically challenged", and it was nicknamed Fort Evans. In keeping with the times, a self-generated group in the math department decided to paint some walls. John Rhodes organized a seminar titled "Fascism and Architecture" (with slides of Hitler waving to the crowds from the balconies of Berlin buildings) and afterwards handed out paintbrushes to all (including Sarah Hallam).

Thus began a series of murals on the interior walls, which many visitors to the Berkeley department have seen: "Death of Archimedes", "La Mort de Galois", a curve in the thrice-punctured plane painted by Dennis Sullivan and Bill Thurston, and a large painting of the Reeb foliation by Richard Bass. Despite some opposition from the administration, and some bills (never paid) for damages to the walls, most of the murals survived for decades and when deteriorated were photographed for posterity as art worth preserving. One appeared on the cover of the March 2003 *Notices* to accompany Lee Mosher's column "WHAT IS... a train track?"

The 1960s and early 1970s were a time of political turmoil in the U.S., and this was reflected

at Berkeley. The math department may have been the most active in opposing the Vietnam war and supporting the Free Speech Movement. One of Reagan's election planks was to "Clean up the mess in Berkeley", and the National Guard was called in to demonstrate, well, something. Sullivan recalls half-tracks stationed just off campus, and tear gas occasionally wafted in through open windows during seminars. The department ardently embraced affirmative action, overwhelmingly voted that it was the sense of the department not to accept Defense Department contracts, and supported the custodians who went on strike for two months. Enrollment dropped somewhat as some parents



thought Berkeley was not appropriate for their children, although the activism at Berkeley may have induced others to come. Faculty recruitment was not harmed.

On the lighter side, two faded photographs (not from the book) show the abilities of Doris Fredrickson, the chair's secretary (and now wife of the book's author), at designing and sewing costumes. In the first we see the chair, John Addison with crown and scepter, and Serge Lang in jester's garb, no doubt trying to induce the king to embrace one of his many causes.

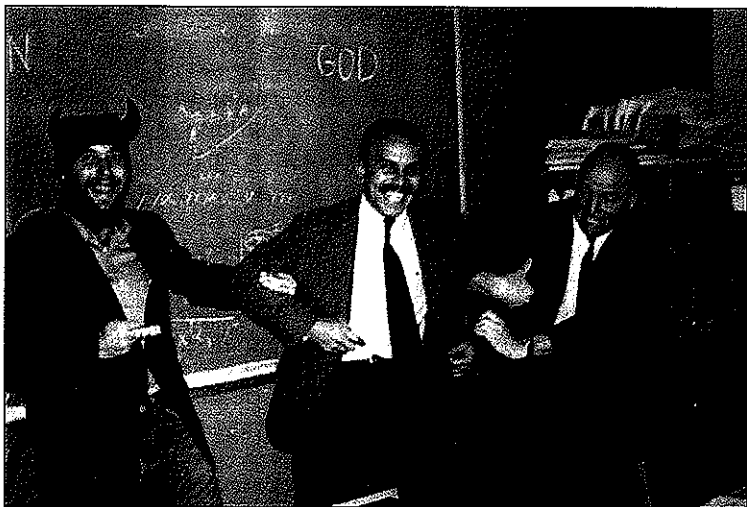
In the second, Jim Simons (under "Satan"), then chair at the State University of New York at Stony Brook, is trying, with a wad of money in his right hand, to lure the author to Stony Brook, while the Berkeley chair, again John Addison (under "God"), tries to retain Cal Moore.

Doris Frederickson also appears as the author of an interesting letter (photographed in the book) to the *Mother Functor*, an irreverent department publication, in which she gives the perspective of a secretary.

Life at Berkeley turned quiet in the last three decades, after some difficulties in the 1970s over money. During two years, no state employee got a raise, and these were days of considerable inflation, sometimes over 10%. And then in a third year, the legislature singled out only the employees of the university and did not give them a raise, with Jerry Brown, then governor, remarking that the profession offered psychic rewards that made up for the loss of income.

The establishment of MSRI, in which Moore played a central role, finishes out the book, save for a few notes on events after 1985. Throughout the book are biographical sketches—consisting of one, two, or more paragraphs—of each of the faculty hired from the beginning to 1985.

If you have connections to Berkeley or are merely interested in how a great math department came into being, then this thorough and well written book is at least worth a browse, and you may find the entire book as enjoyable as I did.



Top photo: John Addison in crown and scepter and Serge Lang in jester's hat. Below: left to right: John Simons, Cal Moore, and John Addison (see text). Photos courtesy of Doris Moore.