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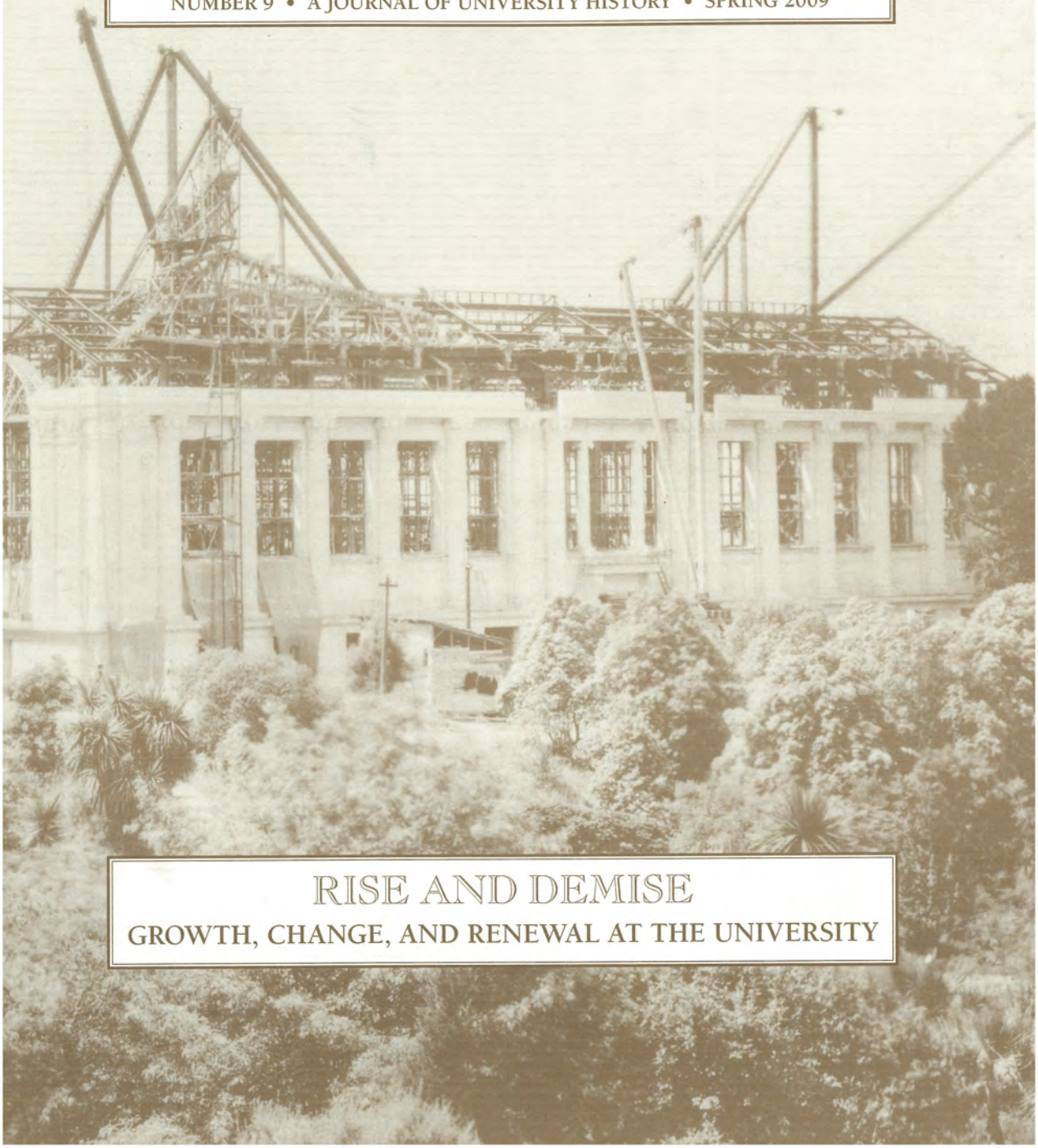

RISE AND DEMISE

GROWTH, CHANGE, AND RENEWAL AT THE UNIVERSITY

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A Journal of University History

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University Library block for Doe Library to be put in place, May 25, 1909. *University Archives (UARC PIC 9:3).*

The *Chronicle of the University of California* is published with the goal of presenting work on the history of the university to a scholarly and interested public. While the *Chronicle* welcomes unsolicited submissions, their acceptance is at the discretion of the editorial board. For further information or a copy of the *Chronicle*'s style sheet, please address:

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Cover: Construction of Doe Library, May 29, 1909. Back cover shows North Hall and South Hall to the far left. *University Archives, image #92, John Galen Howard Collection of Progress Photographs, f308x.H849pr.*

CHRONICLE
OF THE UNIVERSITY OF CALIFORNIA

Spring 2009

RISE AND DEMISE
GROWTH, CHANGE, AND RENEWAL

Edited by the Editorial Board

REVIEWS

Excavation and foundation of Doe Library, with California Hall in background, March 9, 1908. *University Archives (UARC PIC 9:2).*

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UNIVERSITY OF CALIFORNIA

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A WORD TO OUR READERS

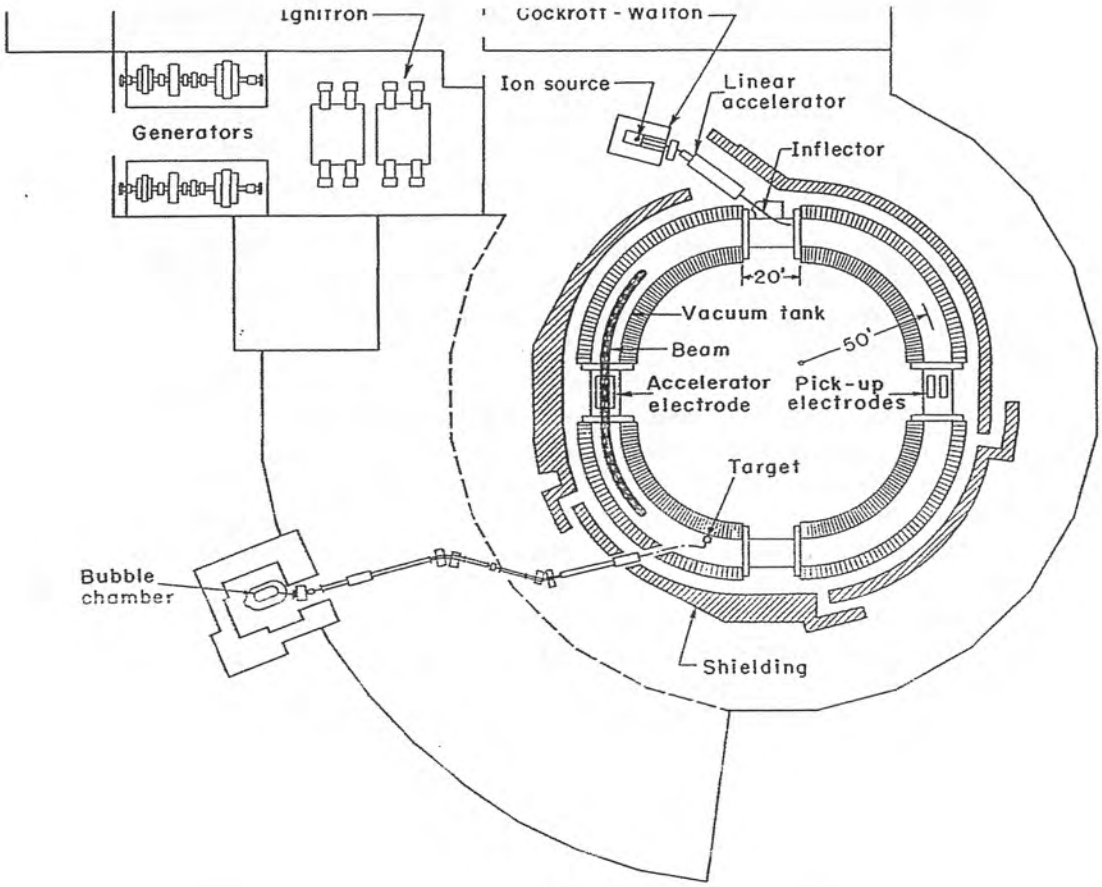
IN 1898 BERNARD MOSES, the university's first professor of history, established the *University Chronicle,* later known as the *University of California Chronicle.* He saw that "there were and would be public addresses at the University and documents relating to the affairs of the institution that ought to be preserved and made readily available," as he wrote in his unpublished autobiography. That *Chronicle,* appearing quarterly between 1898 and 1933, provided its readers with intelligent and entertaining accounts of contemporary events in the university's social, academic, and administrative life. Moreover, the *Chronicle* no doubt assisted in creating and fostering an identity, crucial not only for the campus community but also in mediating the university's dealings with the public.

Today, our institutional identity might appear to be firmly established, but institutional memory is ebbing. Every year thousands of new students (along with faculty members and staff) enter the university's campuses with little knowledge of the institution beyond its admissions requirements and perhaps its reputation for radicalism in the 1960s. And every year almost as many students leave knowing little more about their alma mater than when they entered. While institutional identity will and must evolve, it should maintain a self-consciousness of its direction by acknowledging its past. Without memory there is no identity; without identity the university is left as a mere collection of disparate buildings and people.

It is with this in mind that we, the Editorial Board, have revived the *University of California Chronicle,* in spirit if not in content. The new *Chronicle,* in contrast to the earlier publication, has an historical perspective. We are able to consider the current events of our predecessors in the context of ongoing changes within the university. Embracing this opportunity, our *Chronicle,* at least initially, is organized around single themes that present an inherently longitudinal view of the university's development. The first issue considered institutional responses to natural disasters and calamities. The second was on women at the university. The third issue was about the university and its involvement with the environment, both on the campuses and beyond. The fourth issue looked at different aspects of the university at the turn of the twentieth and twenty-first centuries. The next issue was on conflict and controversy the university has faced over the years.The sixth issue presented some of the arts and culture fostered by the university. The seventh issue focused on scholars here and abroad, and the eighth on agriculture and gastronomy.

It is with great pleasure that we now offer to our readers this current issue, *Rise and Demise: Growth, Change, and Renewal.*

The Editorial Board



Bevatron and Bubble Chamber, ca. 1960.

RISE AND DEMISE

GROWTH, CHANGE, AND RENEWAL

WHY THE RISE AND DEMISE OF ACADEMIC ENTITIES in universities? Why do departments, institutes, programs and even undergraduate majors come and go? The short answer is that they go out of fashion, but the more specific causes are as varied as the rise of a new and national discipline like sociology in the 1880s; enthusiasm for amelioration of a human scourge: crime begets criminology, or the coming of age of a social movement like feminism or disability rights creates fields of scholarly research. Once in awhile the whole story may hang on one personality, often an exceptional teacher, a scientist with breakthrough research, and a willing donor to support it; an ambitious administrator with a hobby horse, or just a tenacious toiler in an academic subfield whose dedication to investigating the history and manifestations of that field becomes a life work Or even, as the Strauss article on the Institute of Industrial Research in this issue suggests, geography (site) plays a part.

Other causes: as Calvin Moore sees mathematics, it was the struggle for distinction [against] outside adversaries, quite often Harvard. Martin Trow muses that "Changing faculty behavior has been compared to herding cats or sometimes moving a graveyard." But, in the end he saw change, happening rather quickly, describing the reorganization, drastic and complete, of the biological sciences. Our issue's alternate title, Rise and Demise was used by Carlos Noreña for what happened, for him tragically, to the college system at UC Santa Cruz. Call it a case of the broken dreams of Clark Kerr.

George Strauss's history of the founding (again with a dream of Clark Kerr's), the flourishing, then the dwindling, and later a hobbling recovery of the Institute of Industrial Research—whose myriad name changes over its half century of existence mirrors the ebb and flow of its champions in the unions, the legislature, its instructors, and the interest of the public and the students. The maiden pulled off the railroad track only at the very last moment.

Instances in this volume of continuous rise include the growth of the river restoration movement everywhere which added increasing lustre and budget to the programs of the dedicated specialists researching and teaching (as they say, against the current values of UC scientists), of courses investigating the local streams. The slow rise is illustrated by Judy Bolstad's story of the School of Public Health. A small enterprise teams up with a state bureaucracy and acquires a large, modern home on campus (but later loses it as the startling photos show). Another happy but wry ending is that of William Benemann's first "Portia" in the early law school.

Success unlimited of Berkeley dreams has two examples here: one heartwarming, the other frighteningly less so. One is Susan O'Hara's recounting of how the search for rights of disabled people began on the Berkeley campus and expanded across the city; the other is Tim Troy's story told by Edward Lofgren, another "father of the bomb," working alongside Robert Oppenheimer to produce the atomic bomb and to witness its first test at Los Alamos.

Other articles about struggle against decline are Roberta Park's "Destroying One of the Best"—about the unnecessary destruction of the Department of Physical Education; and Ray Colvig's title of "Pipe Dreams and Flopperoos" gives you some idea of what happened to cool ideas set before Chancellor Glenn Seaborg. But the dream of Ernest Lawrence to have his own atom smasher came true in spades. In Marjorie Dobkin's "celebration" story the original particle accelerator, Lawrence's cyclotron, too small and too slow, was succeeded by the Bevatron, many times upgraded, adorned with a bubble chamber, acclaimed most powerful in the world, producer of two Nobel prizes, enhanced with a Bevalac—more powerful even, but was closed in 1993—by budget shortfalls.

Amongst the many rise and demise Berkeley stories in this issue is John Torous's article on the life of Professor Clarence Cory who came in 1892 to the Department of Mechanical Arts when the problems of electrical engineering were those of the mystery of alternating current and the building of very long transmission lines from the hydroelectric sources to the cities. Cory led his department through the arrival of radio, the years of commercial success as the handmaiden of General Electric and the public utilities, to a final unlinking of the two components of the department, mechanical and electrical, in 1930 just as he became debilitated by age and disease. Cause? The invention of the vacuum tube while "most of the applications . . . have been made to machinery, particularly of the rotating type."

The most poignant decline of all is the review of *Teach Yourself Malkielese in 90 Minutes.* Malkielese is "now one of the lost languages of this earth, having been used by only one person until his death."

Doe Library completed with the Botanical Garden (planting first began in 1880) in the foreground. The garden was moved to its present site in Strawberry Canyon in 1926. *University Archives.*

PORTIA AGONISTES

CLARA FOLTZ CHANGES THE FACE OF LEGAL EDUCATION AT THE UNIVERSITY OF CALIFORNIA

William Benemann

> The first day [of law school] I had a bad cold and was forced to cough. To my astonishment every young man in the class was seized with a violent fit of coughing. You would have thought the whooping cough was a raging epidemic among the little fellows. If I turned a leaf in my note book, every student in the class did likewise. If I moved my chair—hitch went every chair in the room . . . [1]
>
> —*Clara Foltz*

CLARA SHORTRIDGE FOLTZ was an unlikely revolutionary. Born in Indiana in 1849, she received her formal education at Howes Seminary in Mt. Pleasant, Iowa, which she attended only from the age of eleven until she was fourteen. At fifteen, she eloped with the handsome, charming and feckless Jeremiah Foltz, and in the next five years had four children in quick succession. Clara had worked briefly as a school teacher but the demands of her ever-increasing family, and Jeremiah's chronic inability to sustain himself for very long at any means of employment, tied her to home, so she became a seamstress and took in boarders, anything to make ends meet. She later explained to a reporter for *San Francisco Magazine* that the "life of the child-wife was a troubled one. Upon an Iowa farm, the greater part of her time which could be spared from the cares of maternity was devoted to manual labor, necessitated by family needs."[2]

Clara, her husband, her four children, her parents, and her four brothers all came West in 1872, settling first in Portland, Oregon, and then in San Jose, California. There Jeremiah left her with a fifth child when he drifted back to Portland to live with his mistress. Faced with the prospect of being the sole breadwinner for her family, Clara Foltz realized that sewing dresses and cooking for boarders was not going to provide a sufficient livelihood. She had become active in California's nascent suffragist movement, and discovered she had a gift for public speaking and could think quickly on her feet. She would, she decided, become a lawyer. That decision would change forever the practice of law in the state and eventually entangle the newly established University of California in a contentious court case that resulted in a landmark Supreme Court opinion.

In 1875 there were no law schools in California. Most attorneys came to the state having already practiced elsewhere, and new men "read the law" in the office of someone who had already been admitted to the California bar. Foltz approached San Jose attorney Francis Spencer, a family friend, seeking permission to study under him. His response was polite and discouraging:

> My dear young friend,
>
> Excuse my delay in answering your letter asking permission to enter my law office as a student. My high regard for your parents, and for you, who

seem to have no right understanding of what you say you want to undertake, forbid encouraging you in so foolish a pursuit,—wherein you would invite nothing but ridicule if not contempt.

A woman's place is at home, unless it is as a teacher. If you would like a position in our public schools I will be glad to recommend you, for I think you are well-qualified.

Very respectfully,
Francis Spencer[3]

She eventually found a place in the office of another San Jose attorney, C.C. Stephens, and began her study of the law. But she quickly learned that even if she were to become an expert on the topic, her gender would exclude her from practicing in California since Section 275 of the Code of Civil Procedure restricted the profession to "white male citizen[s]." Undaunted, Foltz drafted an amendment to the code, changing the offending words to "any citizen or person," and then convinced State Senator Barney Murphy (Democrat, Santa Clara) to introduce the bill in the legislature.

Foltz traveled to Sacramento to lobby for what became known as the Woman Lawyer's Bill. SB 66 passed the senate with a vote of 22-11 and then moved to the assembly, where it met fervent opposition (the legislators were more concerned that it struck down the gender barrier than that it also removed the racial barrier) and was defeated by a close vote of 33-30. Foltz redoubled her lobbying efforts, and the next day the bill was reintroduced, this time passing by a slim margin of two votes. It was signed by the governor at the end of the legislative session. Foltz returned to her law studies in San Jose and eventually passed the oral examination for admission to the Twentieth District Court Bar. In September of 1878 she became the first woman lawyer ever admitted to practice in the state of California—under the provisions of the law she herself had drafted.

At the same time and only a few miles away, the University of California was undertaking an effort that would lead to a head-on collision with Clara Shortridge Foltz. That sultry summer the university held its commencement exercises under the oaks to the east of South Hall. The featured speaker was former California Chief Justice Serranus Clinton Hastings, who announced that the university would at long last be able to boast a Department of Law. Hastings had brokered an agreement whereby he would personally deposit $100,000 in gold coins into the state treasury; the state would in turn pay interest on the money, and the interest would be used to fund the operations of a law school for the University of California, a school to be known in perpetuity as Hastings College of the Law. The law college was to be located on the Berkeley campus, but until funds could be secured to build a suitable structure to house it, classes would be held in rented space in Pioneer Hall on McAllister Street, conveniently close to the courts and to San Francisco City Hall.

In his address under the oaks Justice Hastings promised the law school would be open to all who desired to learn the law, to "supply a substitute for the Inns of Court, the historic Inner Temple, a temple of the law, which shall extend its arms and draw within its portals all who shall be worthy to worship at its shrine, resulting in the coronation of its votaries, as a reward for application, industry and merit."[4] When Clara Foltz read in the newspaper that the University of California was offering law classes, she decided to become one of those votaries. While she was already enjoying a modest success as a new practicing attorney, she felt that a more formal legal education would make her a better lawyer. She borrowed money from friends and moved her practice to San Francisco in order to begin classes.

Clara Shortridge Foltz, date unknown, from Oscar T. Shuck, *History of the Bench and Bar of California,* 1901.

On January 9, 1879, Foltz climbed the steps of Pioneer Hall and attempted to pay the ten dollar registration fee. The registrar at first refused to accept her application and her money because she was a woman, but she argued with him until she wore him down. He capitulated, but gave her a receipt notifying her that the registration fee was being accepted only conditionally, and would be returned if the board of directors refused her application for admission. Satisfied, she took her seat—the sole woman in the class. Foltz had come to expect a negative reaction from her male peers in the legal profession, but she was surprised and disgusted by the juvenile antics of her law school classmates: when she coughed they coughed, when she rustled her papers they rustled theirs, when she scraped her chair, they scraped in unison. On the second day of classes she was joined by a sister suffragette, Laura De Force Gordon, and both women were subjected to the same type of harassment. While the young gentlemen were again coughing and scraping in the classroom next door, the Board of Directors of Hastings College of the Law were hurriedly called into session to address the alarming situation that had unexpectedly arisen on the previous day. By a unanimous vote they adopted the necessary response: "Resolved that women be not admitted to the Hastings College of the Law."[5] When Foltz and Gordon appeared for classes on the third day the registrar handed them the formal notification that, because of their sex, they were not welcome at the law college.

A reporter from the *San Francisco Chronicle* met with Foltz at her new law office in the Montgomery Block and asked her how she and Laura Gordon felt about the rejection:

> We were of course disappointed and dismayed, but we agreed that we would attend the lectures anyhow. I missed two in consequence of being called to Sacramento in the case of the Woman's Suffrage Association, but on my return we went over two or three times to the lectures, till one time all the students drew up around the entrance and stared us so out of countenance that we retreated. We went to the Professor [John Norton Pomeroy], feeling that we were not wanted there, and told him that the best legal minds had informed us we had a right to attend the college. He said, "You have no rights in the matter at all. If we have a mind to let you come you can, but

> you have no right to.["] I asked him if it was a private institution, and he said: "Oh, no; it was public, but we had no right to attend unless they had a mind to let us.["][6]

Foltz told the reporter she had spoken with a few members of the board, all of whom denied that there was ever a vote excluding women from the law college, and she suggested that it was Justice Hastings alone who was blocking the admission of female law students. The minutes of the board meeting record that a vote on the measure had indeed been taken and passed, and later events suggest that Justice Hastings was not adamantly opposed to the presence of women, but at the time Foltz suspected that he alone was her nemesis. Foltz and Gordon quickly exhausted their appeals to the officials of the college, and when their pleas fell on deaf ears, they naturally turned to the courts.

Gordon applied to the California Supreme Court for a writ of alternative mandamus, ordering the Hastings board of directors to admit women to the college. Foltz filed the same petition with the Fourth District Court. The Supreme Court remitted Gordon's petition to the district court so that it could be consolidated with Foltz's, and both petitions could be considered together. Judge R. F. Morrison granted Foltz's petition, and ordered the board of directors to show cause why she should not be admitted to the law school.

Because she was already a member of the bar, Foltz was able to argue her own case *in propria persona,* with Gordon as her assistant. The trial, held on February 24, 1879, was front-page news, though the press seemed more interested in the women's appearance than in their legal reasoning. "Mrs. Foltz was genteelly attired in a business suit of black silk, trimmed with velvet," the *San Francisco Chronicle* reported.

> A scarf or band of black lace was passed around the neck and crossed in front, over which peeped a standing collar of white linen of the Piccadilly pattern. Her wrists were ornamented with fringes of black silk, partially concealing hands not lacking in bone and muscle, and with bands of black velvet, fastened with gold butterflies. At her throat was a modest gold broach. Her profuse hair was done in braids, which fell backward from the crown of her head like an Alpine glacier lit by a setting sun. . . . Mrs. Gordon wore a stylish black silk dress, with some suggestions of masculinity in the make, white linen cuffs, simple gold jewelry, a straw hat with saucy feather and velvet surroundings, and curls enough to supply half the thin-haired ladies of San Francisco with respectable switches.[7]

After dispensing with a few preliminaries, the trial began in earnest. "Mrs. Foltz spread out a dozen or more ponderous volumes, raised her lithe figure to its full proportions, swept an eagle eye about the Court-room, bestowed one earnest glance on the shrinking Judge, and then plunged head foremost into the middle of her argument."[8] Foltz's argument was simple and straightforward. The Organic Act of 1868 that created the University of California contemplated the admission of women to all the departments of the university, including any affiliated colleges such as medicine or law. The only restrictions on admission were those of age and moral character. Nothing in the act establishing Hastings College of the Law added any additional restrictions to the admission standards already practiced by the university as a whole. The college was funded by interest paid by the state on the $100,000 deposited in the treasury by Justice Hastings—money collected from the taxpayers of California regardless of their gender. Foltz was a taxpaying citizen of California, of age and of good moral character, and she therefore should not be prohibited from enrolling.

Attorney Thomas B. Bishop then took his place, arguing on behalf of the law college. He stunned the courtroom by stating that the admissions practices of the university were irrelevant, since Hastings College was not a part of the University of California. Despite Justice Hastings' stirring oratory under the oaks east of South Hall, the intention always was that the law college would be an independently administered agency—hence, the appointment of a board of directors. Justice Hastings had not given his $100,000 to the regents of the University of California outright, but had sought a separate act of the legislature to provide funding for a law program. The university was free to accept or reject the program he offered to establish, but it was not free to impose arbitrary regulations now that the college had begun operations.

The University of California had every right to provide higher education for women if it chose to do so, but the board of directors of Hastings was not at all convinced that the university was providing a desirable service. Certainly when it came to encouraging women to enter the field of law, proponents were suggesting a very dubious—even dangerous—course of action. Here Bishop read excerpts from the opinion in the case of Lavina Goodell, who had recently sued to be admitted to the bar of Wisconsin.[9] In his decision in that case, Chief Justice Edward G. Ryan had asserted,

> The law of nature destines and qualifies the female sex for the bearing and nurture of the children of our race and for the custody of the homes of the world and their maintenance in love and honor. And all life-long callings of women, inconsistent with these radical and sacred duties of their sex, as is the profession of the law, are departures from the order of nature; and when voluntary, treason against it. . . . The peculiar qualities of womanhood, its gentle graces, its quick sensibility, its tender susceptibility, its purity, its delicacy, its emotional impulses, its subordination of hard reason to sympathetic feeling, are surely not qualifications for forensic strife. Nature has tempered woman as little for the juridical conflicts of the court room, as for the physical conflicts of the battle field. Womanhood is moulded for gentler and better things. And it is not the saints of the world who chiefly give employment to our profession. It has essentially and habitually to do with all that is selfish and malicious, knavish and criminal, coarse and brutal, repulsive and obscene, in human life. It would be revolting to all female sense of the innocence and sanctity of their sex, shocking to man's reverence for womanhood and faith in woman, on which hinge all the better affections and humanities of life, that woman should be permitted to mix professionally in all the nastiness of the world which finds its way into courts of justice; all the unclean issues, all the collateral questions of sodomy, incest, rape, seduction, fornication, adultery, pregnancy, bastardy, legitimacy, prostitution, lascivious cohabitation, abortion, infanticide, obscene publications, libel and slander of sex, impotence, divorce: all the nameless catalogue of indecencies, *la chronique scandaleuse* of all the vices and all the infirmities of all society, with which the profession has to deal, and which go towards filling judicial reports which must be read for accurate knowledge of the law. This is bad enough for men. . . . Reverence for all womanhood would suffer in the public spectacle of woman so instructed and so engaged.[10]

It was not to oppress women, Bishop insisted, but to protect them, that the law college insisted on its men-only admissions policy.

Attorney Delos Lake then rose, again to argue on behalf of Hastings College. He apologized to Clara Foltz if it seemed that anything he or his co-counsel were saying about women sounded at all ungracious. He complimented her on her grace and beauty, but then pointed out that therein lay the crux of the problem. Lady lawyers were dangerous to justice, in that it would be impossible to secure an impartial (male) jury when a lovely woman pleaded the defendant's case. Delos repeated the contention that the law college was not bound by the admissions policies of the university—but then took the argument one step further, denying that even the undergraduate program was required to admit women. He pointed out that the Organic Act of 1868 refers to students only in the masculine gender, and although it was now the practice to admit women, there was no legal requirement that the University of California be coeducational. In fact, not until 1874 (only five years earlier) had a bachelor's degree been awarded to a woman.[11] While the act creating Hastings College did not specify that the institution was to be men-only, it was passed at a time when women were not permitted to practice law in California. Clearly the board of directors did not intend to admit students who had no possibility of becoming attorneys, so it would have been superfluous at that time to specify gender. Satisfied with the unassailability of his argument, Lake yielded the floor.

THE LADY LAWYER.

The Hastings Law College Must Admit Mrs. Foltz.

In the Fourth District Court yesterday morning Judge Morrison granted a writ of mandate to Mrs. Clara S. Foltz to compel the Directors of the Hastings Law College to admit her as a student. In passing upon the petition of Mrs. Foltz, Judge Morrison said that she had been admitted to practice in several District Courts, including his, the Fourth District. She attended lectures of the Hastings Law College, but was excluded because she was a woman. The Directors of the College, in their return to the writ, deny her eligibility to admission under the State laws and also refuse her admission on the ground that it would not be wise or expedient, nor for the best interests of the College, to admit women as students. Judge Morrison said:

Two Acts are applicable to the question before the Court. The first is the Act to create and organize the University of California, approved March 23, 1868. This Act provides for the affiliation of a medical, law and other colleges with the University. The Act further provides that any resident of California of the age of 14 years and upwards, of approved moral character, has a right to enter the University as a student. The petitioner is over fourteen years of age and of good moral character. The Act provides that the Board of Regents may incorporate any incorporated college of medicine or law with the University. In case any college is brought into communication by affiliation, it shall be managed by the Directors, and as soon as the income will permit the University shall be free to all the residents of the State. The other Act is the Act of March, 1878, creating the Hastings College of Law. Judge Hastings donated to the State $100,000 to establish this college, and the State undertook to raise $7000 annually for its support, to remain in perpetuity. Section 2 of the Act says that the College shall affiliate with the University. Section 3 provides that the Faculty of the University shall grant diplomas to the graduating students of this College. There is nothing in the Act creating the College which prescribes the qualification of the student. The Law College is a department of the University, just as the Toland Medical College is a part of the University. In the Act establishing the University the only qualification necessary for a student is to be 14 years of age and of good moral character. . .

San Francisco Chronicle, March 6, 1879.

Foltz responded that she had supposed this question would be argued narrowly on its legal merits, but now realized that opposing counsel were determined to drag in a slew of irrelevant social issues. With a touch of sarcasm, she commiserated with them if they felt that higher education made a woman less womanly. "That is not the legitimate effect of knowledge of any kind. On the contrary, a knowledge of the law of our land will make women better mothers, better wives, and better citizens."[12] She then yielded to Laura De Force Gordon to make the closing argument.

Gordon began by agreeing that the case could and should be argued by a strict reading of the applicable law. The *Alta California* quoted her as saying that "if she had known the

learned counsel were going to make anti-woman's rights speeches, she would have prepared herself, and it was well known she was pretty good on woman's rights."[13] The courtroom appreciated that Gordon, a prominent suffragette, had many years of experience speaking on the topic. She then reiterated the arguments in the case, and in particular addressed the issue of the intention of the legislature. While it was true, as Lake had stated, that the bill creating Hastings had passed first, the bill giving women the right to practice law in California was *introduced* first. Both bills were passed by the same legislature, and it was doubtful that the law college would have been established without the votes of the supporters of the Woman Lawyer's Bill.

"Lake," the *Chronicle* reported, "made some gallant remark to the effect that if he was obliged to meet the fair ladies at the bar, we would rather have them as associates than as opponents."[14]

Judge Morrison took the case under advisement, and on March 6 delivered an opinion granting a writ of mandamus to Clara Foltz compelling the Board of Directors of Hastings College of the Law to admit her as a student. In his opinion he rejected the argument that Hastings had the legal right to establish its own admissions policies:

> There is nothing in the Act creating the College which prescribes the qualification of the student. The Law College is a department of the University, just as the Toland Medical College is a part of the University. In the Act establishing the University the only qualification necessary for a student is to be 14 years of age and of good moral character. All the facts show that the petitioner comes within the statutory provisions of the law. The only objection to her admission is that she is a woman. I find nothing in the law to justify such exclusion.[15]

It was clearly the intent of the legislature at the time that the college was established that it should be affiliated with the University of California and be governed by its laws. While the college retained the right to establish reasonable admissions requirements, that right was not absolute.

> If they can superadd qualifications, there is no limit to their power to prescribe qualifications. I admit that the Directors can make regulations for the welfare and permanent good of the institution, but when arbitrary regulations are made which are not for the good of the institution, the Court will not hold them to be valid.[16]

Judge Morrison noted that much of the argument in the case had concerned the extrajudicial issue of the proper role of women in society:

> A great deal has been said about the propriety of admitting women to the College, and on the argument the able opinion of Judge Ryan was read, to the effect that women ought not to be permitted to enter law colleges, as it would not be compatible with their domestic duties. He points out numerous reasons why women should not try cases in court. There are, perhaps, many things connected with cases which would disgust a woman, but the Court has nothing to do with that. It is sufficient for the Court that the Legislature authorizes women to practice law.[17]

As far as Serranus Clinton Hastings was concerned, Judge Morrison's decision closed the matter. Women could not be excluded from Hastings College of the Law. A reporter for the *San Francisco Chronicle* approached him after the decision was announced, and asked whether Mrs. Foltz and Mrs. Gordon were now going to be admitted "among a lot of innocent law students who had never seen a woman." Hastings replied that he had at first supported the admission of women, and had changed his position only because of the objections raised by the board of directors. He felt that the college should now comply with the court order. He did, however, believe (or so the *San Francisco Chronicle* reported) that

> some separation of the sexes in the lecture room was imperative. The friction of studious silk with contemplative broadcloth was not to be thought of. It was a wild imagining. He had not yet decided what form of feminine isolation would be best. The legal carpenters might be instructed to erect a gilt-edged and golden-railed balcony [in the classroom], a gallery with gilt and pearl-inlaid lattice in the style of Turkish harems, a pagoda with minarets, or a simple Oregon-pine platform in one corner, with plush furniture, sheet-iron door, and the legend, "All hope (of marriage) abandon ye who enter here."[18]

Serranus Clinton Hastings, donor of Hastings College of the Law, ca. 1890. *University Archives (UARC PIC 13:0684).*

The founder of the college might have been willing to drop the ban on women law students, but the board of directors was not. They immediately appealed the decision to the California Supreme Court, and obtained a stay of the writ, allowing them to continue to keep women law students out of the classroom while the matter was pending. Foltz acknowledged the cleverness of their delaying tactics, writing later that the board of directors "knew that though I had much law I had little money, and they hoped . . . to wear out my courage or cool my ardor."[19]

If that was the intention of the members of the board, they underestimated Clara Foltz. She used the intervening months to study for and pass a further bar examination that qualified her to argue before the California Supreme Court. When the case was heard in November, she once again represented herself. So impressive was her performance that when the court adjourned one of the justices who had known her as a young woman in San Jose took her aside and said, "You are not only a good mother; you are a good lawyer. I have never heard a better argument, for a first argument, made by any one."[20] Both sides presented the same arguments and the same rebuttals, and the result was the same: Hastings College of the Law was ordered to follow the admissions policy of the University of California and admit women. In his published opinion Chief Justice

William Wallace echoed the reasoning of Judge Morrison's earlier ruling, but in addition addressed the issue of whether or not the Organic Act of 1868 required the University of California to be coeducational:

> It is conceded that females are now, and for several years last past [sic] have been, admitted as students of the University; and the provision of sec. 17, of the Political Code, that words used in the masculine gender comprehend as well the feminine gender, would seem to entitle females to enter the University as students at large.[21]

The question was settled; the board of directors was thoroughly rebuked. But they were not done yet. At the instigation of Delos Lake, one of the attorneys who had represented Hastings College in the case, the board unanimously passed a resolution that no one who had already been admitted to practice before the California Supreme Court would be allowed to register for law classes. The measure was a calculated slap at Clara Foltz. Evidently the board members had not yet read the full decision, which expressly provided for the admission of attorneys who were already in practice.

With the ruling of the California Supreme Court the question was settled, and Clara Foltz was free to attend Hastings College of the Law. But did she?

She later claimed to have attended for two years, before the demands of her family and her practice forced her to drop out.[22] There is no record in the board's minutes or in the University *Register* indicating that she ever attended more than the three initial lectures that led to her ejection. However, the *Register* is neither complete nor reliable as a record of enrollment; she very well might have been a student even though she does not appear on any of the lists.[23]

The question goes to the heart of the problem of documenting the life of Clara Shortridge Foltz. Aside from the public documents generated by her legal struggle with Hastings College of the Law, and a few colorful and highly imaginative newspaper articles, the primary source of information about her life is a series of autobiographical columns titled "Struggles and Triumphs of a Woman Lawyer," which she published in her own suffragette monthly, *New American Woman* (1916-1918). The series has been described as "a sustained self-encomium of exaggerated facts and biting invective against enemies and allies in the women's movement," that reveals "some paranoia, an absence of graciousness either in victory or defeat, and a compulsion to take credit for everything that had been achieved in the movement in California."[24] Though Laura De Force Gordon stood at her side braving the insults of Hastings law students, and was her co-counsel in the courtroom during the legal arguments, Foltz tended to airbrush Gordon out of her later accounts of the struggle. She was equally quick to obscure the contributions of her own family, often recounting the story of her labors as a single mother of five, clawing her way out of hard-scrabble poverty to the pinnacle of the legal profession. Gone from the picture are her parents and siblings, who provided unflagging emotional support—and childcare—to give her the opportunity to study the law. When she was interviewed in 1897 by the *New York Times* she claimed to have accomplished everything entirely on her own: "She was married when she was only fifteen years old, and was left a widow while she was still young and with five children to support. She bravely declined offers of aid from her relatives and declared her intention to study law."[25]

Most intriguing is her treatment of her erstwhile husband, the improvident, unfaithful, and feckless Jeremiah Foltz.[26] Though legal documents record that she divorced Jeremiah in 1879 in San Jose, at least a year earlier she began telling people that he was dead. From 1885 on she consistently presented herself as the bereaved widow of a loving, devoted,

departed husband. As Barbara Allen Babcock has written, "She did not drape her story in simple black but added frills, making it one 'of her romantic marriage at fifteen, of her widowhood when scarcely out of her teens.'"[27]

One of the major obstacles facing any woman who wanted to practice law was the widespread belief that entering a manly profession would destroy any chance for a happy marriage. The virulently sexist views of Wisconsin's Chief Justice Edward G. Ryan, read in the courtroom during the first of the Hastings trials, were unfortunately shared by a large number of Americans, men and women. Overcoming that perception was one of the hurdles Clara Foltz faced in opening the legal profession to women, but her own life presented an inconvenient truth: as she progressed towards becoming a famous lawyer, her marriage disintegrated. It is unclear from this distance whether Jeremiah's desertion forced her to find a more lucrative profession with which to support her five children, or whether Clara's passionate pursuit of a law career drove an insecure Jeremiah into the arms of another woman. She clearly felt that her contemporaries would assume the latter, and so she took the most expedient course available to her, reinventing herself from an abandoned divorcée into an heroically struggling widow.

What continues to fascinate about Clara Shortridge Foltz is the passion with which she constructed her persona. Her dramatic description of the crucial role she played in the signing of the Woman Lawyer's Bill (just on the stroke of midnight!) has a breathless, *Perils of Pauline* quality to it that defies logic and is not supported by contemporary evidence. Where her own biography was concerned, she never let the facts get in the way of a good story. She was relentlessly self-promoting, always placing the spotlight directly on herself as the woman who could beat any man at his own game, without sacrificing a whit of her genuine womanliness. While part of the blame undoubtedly lies with the style of journalism of the time, and with the expectations of the newspaper readers, Foltz was unquestionably tireless (and not always truthful) in the shaping of her public image. As Babcock points out, "Repeatedly, press accounts and interviews stress Foltz's feminine virtues: her home's tasteful décor, her beautiful dress, her womanly manner. This happens so often that she, rather than the many different interviewers, must have placed this emphasis."[28]

Chief Justice Ryan painted a sordid picture of the milieu of the typical trial lawyer: "selfish and malicious, knavish and criminal, coarse and brutal, repulsive and obscene . . . ." Rather than argue that a woman's presence might change the vicious atmosphere of the courtroom, Foltz maintained that a woman could be just as tenacious as any man in dealing with the nastiness of life. Throughout her career she walked a very fine line. She needed to be as smart, competent and ruthless as her male counterparts, but without for a moment letting slip her traditional femininity. The elaborate coiffures, the expensive clothes, the tasteful home décor, the effusive affirmations of the joys of married life—they were the subterfuge for her aggressive pursuit of fame in the rough-and-tumble of a man's world, and it could be argued that without someone willing to play that somewhat shady game, progress for women in California's courtrooms would have been delayed for many decades.

Clara Shortridge Foltz was a force of nature that blew across the path of the University of California. She may well have been a student for only three days, but she left the institution profoundly changed. She opened the law program to women, and in the process led the California Supreme Court to clarify the legal status of coeducation at the university. To suggest that she was perhaps more P.T. Barnum than Joan of Arc in no way denigrates her many accomplishments, since it is clear that unchallengeable competence as a lawyer would not have been enough. The times required a woman with brashness, moxie, panache and ego—all wrapped up in black silk and white linen of the Piccadilly pattern. Clara Foltz played the part superbly.

ENDNOTES

1 Clara Shortridge Foltz, "The Struggles and Triumphs of a Woman Lawyer," *The New American Woman,* November 1915, quoted in Mortimer Schwartz, Susan L. Brandt, and Patience Milrod, "Clara Shortridge Foltz: Pioneer in the Law," *Hastings Law Journal,* 27:3 (1976), 551.

2 Ella Sterling Cummins, "Clara Shortridge Foltz," *San Francisco Magazine,* ca. 1883, quoted in Barbara Allen Babcock, "Reconstructing the Person: the Case of Clara Shortridge Foltz," *Biography: an Interdisciplinary Quarterly,* 12:1 (Winter 1989), 7.

3 Foltz, "Struggles," June 1916, quoted in Schwartz, 547.

4 Thomas Garden Barnes, *Hastings College of the Law: the First Century* (San Francisco: Hastings College of the Law Press, 1978), 18-19.

5 *Minute Book of the Board of Directors, Hastings College of the Law,* v. 1, 31, quoted in Barnes, 47.

6 *San Francisco Chronicle,* January 30, 1879, at 1, col. 4.

7 *San Francisco Chronicle,* February 25, 1879, at 1, col. 3.

8 Ibid.

9 *Matter of Goodell,* 39 Wis. 232, 245-46 (1875).

10 Ibid.

11 *Directory of Graduates of the University of California, 1864-1916* (Berkeley: California Alumni Association, 1916), 2.

12 *San Francisco Call,* February 25, 1879, at 1, col. 3.

13 *Alta California,* February 25, 1879, at 1, col. 5.

14 *San Francisco Chronicle,* February 25, 1879, at 1, col. 1.

15 *San Francisco Chronicle*, March 6, 1879, at 3, col. 2.

16 Ibid.

17 Ibid.

18 Ibid.

19 Foltz, "Struggles," September 1916, quoted in Barbara Allen Babcock, "Clara Shortridge Foltz: 'First Woman,'" *Valparaiso University Law Review,* 28:4 (1994), 1281.

20 Oscar T. Shuck, *History of the Bench and Bar of California* (Los Angeles: The Commercial Printing House, 1901), 831.

21 Opinion of the Court at 35, Foltz v. Hoge, 54 Cal. 28 (1879).

22 Schwartz, "Clara Shortridge Foltz," *Hastings Law Journal,* 27: 3 (1976), 555.

23 Barnes, 55-56.

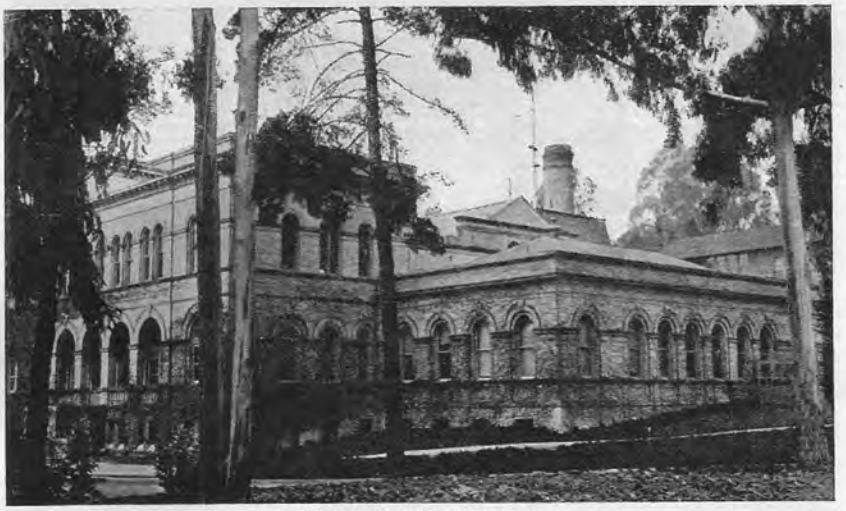
24 Ibid., 49.

25 *New York Times,* July 11, 1897, at WM4 , col. 1.

26 For a brilliant dissection of Clara Foltz's treatment of her marriage, see Babcock, 5-16.

27 Ibid., 6.

28 Ibid., 16, note 31.



THE MECHANICS BUILDING

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The enrollment of all students during the present academic year in the College of Mechanics is the largest of any year in the history of the University.

C. L. CORY.

1921 Blue and Gold.

CLARENCE CORY AND ELECTRICAL ENGINEERING

John Blake Torous

WHILE THE DEPARTMENT of Electrical Engineering and Computer Science (EECS) at UC Berkeley is today internationally renowned for excellence in the most advanced technologies, its rich historical legacy has not yet received proportional attention. Electrical engineering at the University of California has been developing since its inception by Clarence L. Cory in 1892, providing the foundation for the advanced semiconductor, signal processing and integrated circuit research. Even in its early years, electrical engineering at the university had an active and dynamic history that changed as quickly as the technology behind it.

In response to California's growing need for electricity at the turn of the century, Cory incorporated electrical engineering into Berkeley's curriculum and simultaneously founded the university's first electronics laboratory. When the engineering colleges were reorganized in 1903, Cory became dean of the Department of Mechanical and Electrical Engineering. Under Cory's leadership, the department pioneered high-voltage power transmission technologies through the late 1910s, enabling cities such as San Francisco and Los Angeles to access hydroelectric power from the Sierra Nevada. The field of electrical engineering began to expand toward radio and consumer electronics during the 1920s, however, presenting the mechanical and electrical engineering department with challenges of finding a new direction for electrical engineering research while also sharing resources between the two now more disparate disciplines composing it. Before becoming an autonomous department in 1930, electrical engineering struggled externally to define its role and place within the university and internally to define its area of technical expertise.

California's Need for Electrical Engineering

Electrical engineering at the university arose from the advent of practical electrical technologies around the 1880s. As physicists began to harness the power of electricity, they created a myriad of new applications. In 1876 Alexander Graham Bell and Elisha Gray invented the telephone; five years later, Thomas Edison introduced the incandescent light bulb; and in 1887 the first electric streetcars were established in the United States. The demand for electrical technologies was strong immediately following their creation, especially in California, where San Francisco was home to the first electric street lighting in the country. California also developed the largest electric streetcar network in the world in Los Angeles.[1]

In 1889-90 the University of California launched its first course devoted to electrical technologies and was offered by the physics department. The new class, Electrical Measurements (Physics V later renumbered Physics III), focused on the more pragmatic side of electricity and magnetism. Its brief course description in the university register states only that lessons were to be based on W. E. Ayrton's text Practical Electricity and would include a lab session.[2] The fact that the course was centered on lessons from a textbook suggests that it was not intended to encourage innovation but rather to instill general competence. It was an elective class during the first three years of its inception.[3] In 1892-93 the focus of the course shifted to the teaching of "the theory and absolute measurement of Electricity and

Magnetism" according to the university register for that year.[4] Yet theory and measurement were not what California needed to keep apace with the electrification of the state.

The physicist's interest in electricity was more abstract than that of streetcars and light bulbs. "It is a well known [sic] fact that alternating currents do not follow Ohm's Law and that nobody knows what law they do follow," wrote the American engineer George Prescott in 1888.[5] Alternating current, which drove many of the new technologies, was governed by a challenging set of differential equations that required a heavy knowledge of mathematics. While physicists strove to elucidate the universal principles and laws behind alternating currents and other electrical phenomena, such a complete knowledge was not required to create more reliable lights and more powerful streetcars. The electrical engineer Charles Steinmetz summarized his frustration with physics when he wrote in 1893 that "Maxwellian Theory does not exist in practice, but merely haunts as a phantom transformer in text-books and mathematical treatises."[6] An engineering approach toward electricity was much more relevant as it could produce the immediate results desired by the state instead of intangible theories.[7]

Only one college at the university stood out as the clear choice for the introduction of electrical engineering in 1892: the history and purpose of the College of Mechanics provided an ideal context for this new field. The college was founded as part of the University of California in 1868 as stipulated in the provisions of its land grant charter. The College of Mechanics offered a multifaceted curriculum that, while providing students with a foundation in mining, steam, and machine technologies, also emphasized a background in German, metallurgy, geology, political economy, and civil engineering. The heterogeneity of the department was reflected by its faculty. Although faculty varied with time, the university register of 1886-1887 presents a typical composition as seen in Table 1. While such a diverse faculty may appear rather arbitrary, it well suited the needs of electrical engineering. The differential equations of alternating currents required a mathematician, the novel properties of electricity a physicist, the design of light bulbs a chemist, and the synthesis and creation of new technologies an engineer. Having a professor of German was also useful as much of the pioneering work in electrical engineering was being conducted in Germany. Thus the College of Mechanics offered a good balance of professors needed to teach and to investigate electrical engineering.

Table 1. Number of professors by specialty in the College of Mechanics, 1886–87

Mathematics	3	Military Science and Tactics	1
English	2	Geology and Natural Science	1
Physics	1	Chemistry	1
German	1	Mechanical Engineering (Hesse)	1
French and Spanish	1	Civil Engineering	1

Source: Derived from the *Register of the University of California, 1886-1887.*

Further, the College of Mechanics fostered a mission of practical service and research to California that matched well with electrical engineering. Research in the College of Mechanics was led by Dean Frederick G. Hesse and directly supported California's early mining industry. Hesse undertook one of the university's first efforts at scientific research with a project to determine the efficiency of different bucket shapes utilized on a water

wheel. The mining industry also sought the department's help in improving efficiency of the flat vane, and Hesse immediately improved the design, according to College of Mechanics Professor Joseph Nisbet LeConte.[8] In addition, the university register of 1881-1882 indicates that graduating seniors in the college were required to write research papers on topics also relevant to industry. A sample of thesis titles include, "Hydraulic Pumping System as applied to Mines as applied to the Chollar, Norcross, and Savage Mines, Virginia City, Nevada," "A proposed System of Centrifugal Pumps for Mines," and "A Design and Discussion of a Hydrostatic Press."[9]

A view of the old Mining and Mechanics Building, ca. 1900. (Built in 1879.) EECS History, http://www.eecs.berkeley.edu/department/history.shtml.

The college also held responsibility for the university's power plant, where it maintained a boiler, steam engine, and gas engine. Junior and senior students would help maintain and run these machines as part of their training in shop practice. Another senior thesis from 1881-82 reflecting the College of Mechanics' work on campus was titled "A proposed Water Wheel for the furnishing of power to run a Lathe on the University Grounds."[10] Thus the College of Mechanics' history of producing engineering research relevant to California industries made it an appropriate venue to locate electrical engineering, which was now expected to produce similar results. Further, the goals of electrical engineering were parallel to those of the College of Mechanics in supplying power to California's industries, be they mining, lighting, or street railways.

The problem of supplying electricity to California's cities contained one significant challenge that the College of Mechanics was not prepared to handle, however. The main source of electricity in the 1890s came from hydroelectric plants. These plants employed the energy of a moving river to turn powerful dynamos that in turn produced electricity. Yet California's major cities, such as San Francisco and Los Angeles, were not located along major rivers, and the nearest hydroelectric plants were located hundreds of miles away in the mountains of the Sierra Nevada. In 1890 there were few power transmission technologies and their range was low, making it difficult to meet the cities' demand for electricity. The "most spectacular transmission line to date" in 1891 was only 175 kilometers long and located in Germany, writes the historian Robert Kline.[11] Thus California found itself in the paradoxical position that forced it to pioneer long-distance power transmission technologies. While the College of Mechanics was well prepared to establish an electrical engineering program, it had no experience in this complex yet significant practical problem.

Cory's Arrival and the Early Years of Electrical Engineering at Berkeley

While Dean Hesse wanted the College of Mechanics to adopt electrical engineering, he also recognized that he would have to hire an expert in the field to address its unique challenges. In 1892 Hesse selected young Clarence L. Cory as the university's first professor of mechanical and electrical engineering. Cory had earned a bachelor's degree of mechanical engineering in electrical engineering from Purdue University in 1889. Cory graduated from Purdue at age 16, likely making him one of the youngest to receive such a degree.[12] He subsequently attended Cornell University, where he earned his master's in mechanical engineering in 1891, with a specialization in electrical engineering. Cornell was the first school

in the United States to offer courses in electrical engineering only eight years earlier, in 1883. Therefore, in 1892 Cory would have been one of the few individuals who had actually studied electrical engineering in this country. LeConte and Cory attended Cornell together and it was he who had recommended Cory to Hesse for the position.[13] Joseph N. LeConte, Cory's friend and colleague throughout their lives at Berkeley, was named after his father who was one of the university's first faculty members, Joseph LeConte, professor of geology and natural history.

Clarence Linus Cory from Jones, *Illustrated History of the University of California,* 1895.

Hired as an assistant professor in the College of Mechanics, Cory was asked to develop the college's electrical engineering program during a period of great growth. "It was an opportune time to take up electrical engineering in the United States," writes Kline about the field in 1890.[14] "While telegraphy was a mature industry, telephony, electric light and power were barely a decade old [and] the latter field was booming." The electronics industry was growing tremendously, and the General Electric Company had just increased its employment to 6,000—up 2,000 from just the previous year. The first electric elevator had recently been installed by the Otis Brothers, and more than 5,500 electric streetcars were in service across the country in 1891.

Assistant Professor Clarence Cory (left) enjoying an outing with student Guy Bayley, 1898. *University Archives (UARC PIC 13:3381a).*

Cory immediately began teaching courses in electrical engineering that were offered as electives to seniors in the College of Mechanics. The 1893-94 academic year was Cory's first at Berkeley and was also marked by the university's first class of electrical engineering, which included a lecture, laboratory, and design component.[15] The design and laboratory component of the class is significant for it indicates that from the beginning, Cory sought to introduce innovation into Electrical Engineering at Berkeley. Students could choose between this class or the more traditional mechanical engineering and drafting classes. By the 1897-98 academic year, this one Electrical Engineering elective was replaced by five non-elective courses.[16] These classes were grouped under the titles of Electrical Engineering or Electrical Machinery and Construction. The university register shows that Cory alone taught these classes for the first years of their inception. He offered courses that had direct practical applications to California's industrial needs and the problem of transmitting hydroelectric power from the Sierra Nevada to the coastal cities. The course description of Electrical Machinery and Construction 10a/b included: "applications to electric lighting and power distribution. The location and construction of electric lighting, telephone, telegraph, and power circuits and electric street railways." Another course, Electrical Engineering 11b, specifically dealt with "long-distance power distribution . . . and other applications of electricity for industrial purposes."[17] In these classes, Cory presented solutions to California's two main problems: getting power to the cities and efficiently using that power for lighting, communications, and transportation. Thus we see that Cory kept electrical engineering very practical and tied to the state's immediate needs. Cory's five electrical engineering courses accounted for approximately 30 percent of the College of Mechanics' offerings around 1900.[18]

As a new field, electrical engineering lacked long-standing traditions or a professional culture, notes historian Monte Calvert.[19] It soon found an identity in the corporate culture, however. Large electrical manufacturers like Westinghouse and General Electric became closely integrated with the educational system. "General Electric had direct control over the most prestigious avenue of postgraduate electrical engineering education in the United States [in 1900]," writes Ronald R. Kline.[20] The university registers show that the College of Mechanics chose not to compete with this system and offered few graduate classes. Instead Cory created a program that placed an emphasis on the fundamental principles of electrical engineering. A survey by the Society for the Promotion of Electrical Engineering of eighteen electrical engineering curricula in 1899 revealed that only four schools required a course in differential equations: Massachusetts Institute of Technology, the Armour Institute, Ohio State, and University of California.[21]

The new Mechanics Building, completed in 1893, from *Album of Twenty-Five Views of University of California*, 1912. *Courtesy of Steven Finacom.*

At the same time that Cory was pioneering the undergraduate curriculum, he and young Joseph LeConte were also establishing the new electronics laboratory3that would serve as center for electrical engineering

research. The university provided $63,000 to construct 41,600-square-feet of floor space in the new Mechanics Building.

With its completion in 1893, Cory and LeConte installed a range of mechanical and electrical equipment. To provide power to the lab, they installed a 100-horsepower boiler that was fueled by coal. The main piece of electrical equipment was a 20-kilowatt, 120 volts direct current (DC) Edison bi-polar machine. Other experimental generators were powered by a 50-horsepower engine that received its energy in the form of steam from the central boiler. The laboratory also contained many other small DC and AC generators, such measuring devices as galvanometers, and a 60-cell storage battery that discharged 25 amperes.[22] According to Cory's colleagues, "The installation of electrical equipment [in the lab] was surpassed by few universities of the country."[23] Running such a lab, especially with boilers and engines, necessitated the hiring of a plant engineer and fireman. Further, the senior class was also expected to assist with the laboratory's operations.

Cory used the new laboratory to meet "the growing demand for electrical power in many of the [s]cientific [d]epartments [of the university] such as Physics, Chemistry, and Mining,"[24] according to LeConte. He and Cory ran wires from their electrical laboratory to South Hall and the library to provide electricity for arc lamps. Their efforts also provided the university with its first-ever lighting system and gave a new meaning to its motto: "Fiat Lux." However, early arc lamps were unreliable; LeConte and Cory were often called upon to repair the system, even at night. "I remember one night when President Kellogg was giving his annual reception, three lamps went out of action at critical locations, so that we [Cory and I] in our dress suits climbed the poles and got them going while on our way to the reception," wrote LeConte.[25]

Electric light pole in front of North Hall, ca. 1895. *University Archives (UARC PIC 6:046).*

Cory's efforts to bring electricity from his lab to the campus served as a microcosm for the lab's true goal of bringing electricity from the Sierra Nevada to the cities. In a 1900 paper, Cory analyzed the 150-mile-long high-voltage line that brought power from the Mokelumne River to San Francisco. After calculating the line's parameters, he made suggestions on the best ways to increase its efficiency.[26] Cory also studied alternating currents and had published a paper in 1899, in which he explored the relationship between

the power factor and demagnetizing current in alternators.[27] Graduates of Cory's program continued the lab's work. In his memoirs, Robert Sibley writes about "Herbert A. Barre, '97, pioneer in long-distance high-voltage transmission of electric power" and "James B. Black, '12, who has carried agricultural electric power distribution to new heights by securing private investment of over a billion dollars, a world record achievement of this kind."[28] Cory's research program addressed the needs of California and improved the efficiency and range of long-distance power transmission.

Yet power transmission was not the only factor that limited the electrification of California. Gas cost half as much as electricity in 1890 and continued to challenge electrical engineering technologies throughout the early twentieth century. Around 1900 electrical engineers were creating quiet and clean electric vehicles that could travel 100 miles between charges,[29] but the lack of charging stations and especially the advent of the Ford Motor Company's more economical gasoline-powered Model T spelled the end of this technology. The high cost of electricity also limited its accessibility to the home, and in 1915 only 25 percent of Americans homes were electrified. Kline writes, "There was too much capital investment in the older [gasoline based] system of steam engines, belt shafts and, pulleys,"[30] and the high cost of electricity did not encourage a rapid conversion. Thus while city utilities, electric railways, and large manufacturers created a demand for and could afford electricity, many individuals could not.

Cory understood the significance of this economic problem, and his colleagues noted that "he early recognized the responsibility and relation of power and light companies to the public and his outstanding engineering contributions were the solutions of problems involving true appraisal of public utility properties and equitable rates for power and light."[31] Believing that the best way to keep apace with the rapidly growing electrical industries and to understand their needs was to become an active participant, Cory spent 1901 on sabbatical in San Francisco forming his own engineering consulting company, Cory, Meredith, and Allen.[32]

Between teaching, research, and consulting, Cory still found time for leisure. The Cory family house was located on College Avenue north of Bancroft Way (near the present site of the Calvin Lab). According to Steven Finacom, "The LeContes, Dean Christy of Mining, and Professor Slate of Physics lived on the same city block bordered by College, Piedmont, and Bancroft, putting Cory in close personal proximity to some of the leading faculty in fields related to his own."[33] Cory was married to Mayme Pritchard Cory, and they had one daughter, Marian Elizabeth Cory. In the recollections of his colleagues, "Cory was a devoted lover of nature. Nearly every weekend found him tramping the hills of Marin County with a small group of close friends, and many

A view of Red Slate Mountain's peak, first ascended by Cory and LeConte in 1898. http://en.wikipedia.org/wiki/Red_Slate_Mountain(accessed April 2006).

of his summer vacations were spent with pack train in the High Sierra."[34] Exhibiting a more adventurous side, Cory and LeConte climbed many mountains in the Sierra Nevada. In 1898, the two were the first to ascend the 13,163-foot peak of Red Slate Mountain in the Sherwin Range of the Sierra Nevada.[35] Such expeditions also had a pragmatic side: in 1895 Cory and LeConte scouted new sites for hydroelectric plants that would later prove "valuable," according to faculty colleagues.[36]

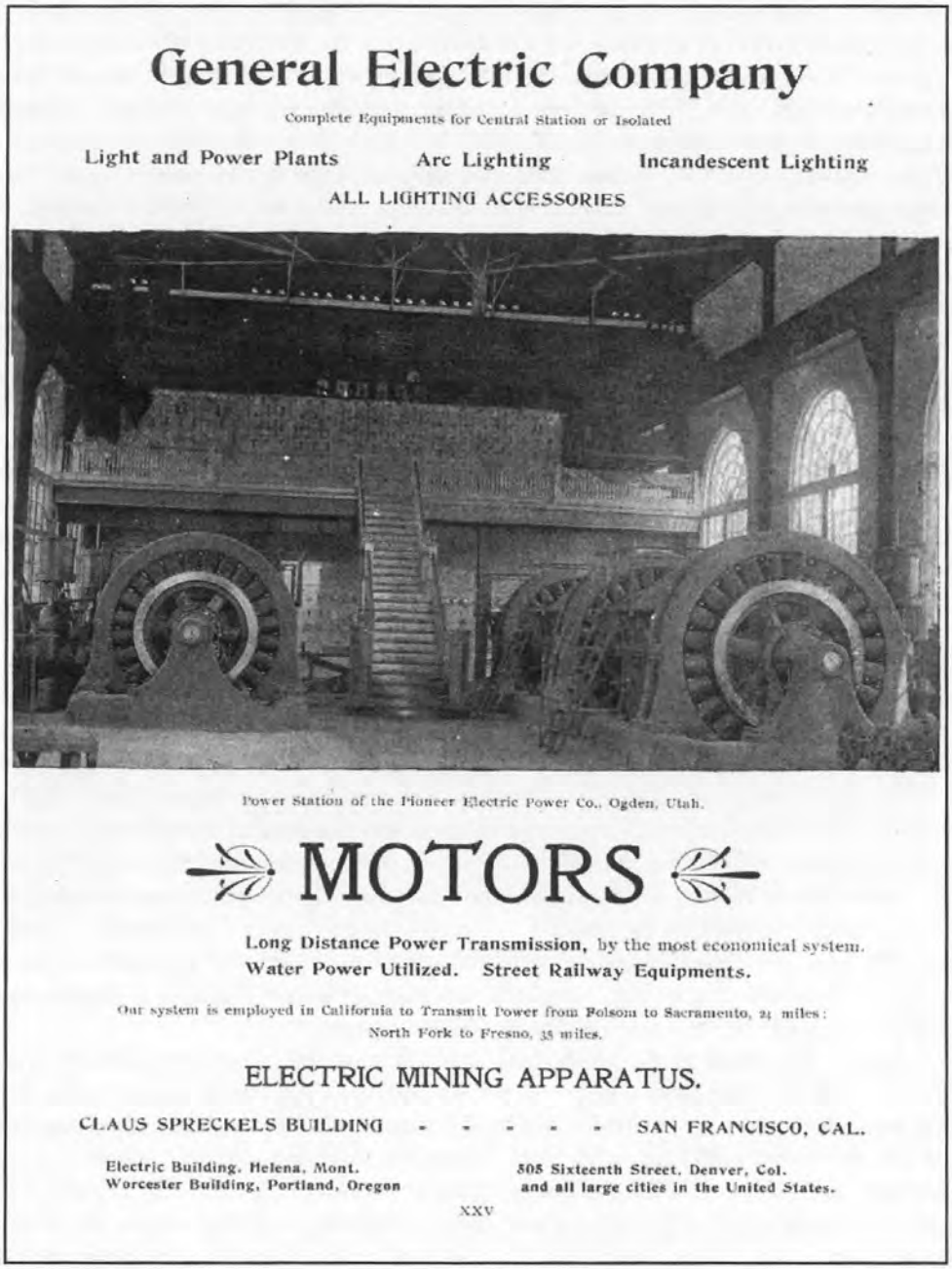
Cory's Leadership of the Department of Mechanical and Electrical Engineering

By 1900 the study of electrical engineering was rapidly evolving. The famous electrical engineer Charles Proteus Steinmetz introduced the complex number representation in 1897 to simplify greatly the mathematics required to solve the differential equations associated with alternating currents. The rise of graphing techniques also replaced the need for exact solutions to challenging equations. Electrical engineers began their own research into the material properties and laws of motors, current, inductors and hysteresis that were more relevant and applicable to their problems than the work of physicists. Thus the multifaceted College of Mechanics that had originally provided strong support for electrical engineering at Berkeley no longer may have been as pragmatic or beneficial as it had been just a decade earlier. Perhaps in response to these and other changes in the field, the university reorganized the College of Mechanics and created inside it the Department of Mechanical and Electrical Engineering in 1903.[37]

To lead both the college and its new department, Dean Hesse selected Cory as his replacement in 1901. The department that Cory assumed responsibility for did not feature the diverse faculty of the old College of Mechanics and included only professors, instructors, or assistants with engineering backgrounds, as evidenced in the university register of 1903-1904.[38] Although the name of the department might have seemed to imply equality between electrical and mechanical engineering, the department employed more faculty and offered more courses in mechanical engineering. It initially may seem odd to have both mechanical and electrical engineering together in one department, yet it was a wise move as the two fields remained closely allied in 1900. The massive hydroelectric plants that produced the electricity were mechanical engineering feats with large rotating turbines and hydraulic machinery as seen in an advertisement of a hydroelectric plant shown on the opposite page.

While electrical engineers innovated transmission of that electricity to the cities, they worked closely with mechanical engineers to create new motors for electric railways, transformers to step up and down voltage, and other practical electromechanical technologies. Cory used his training as a mechanical engineer to undertake projects that drew equally upon both sides of his engineering knowledge.

As dean of the department, Cory found himself thrust into a new administrative role, including membership on the Student Affairs Committee, also known as the Discipline Committee. According to colleagues, "His sympathetic cooperation with and energetic support of the student organizations founded after the introduction of student self-government by President Wheeler, serve as bench marks in the history of faculty-student relations at the University of California."[39] Cory also received all inquiries from companies and other universities interested in hiring students from the Department of Mechanical and Electrical Engineering. California Polytechnic wrote to Cory in 1915 asking if he knew of a qualified "lighting engineer for the city of San Luis Obispo,"[40] while Harvard inquired into anyone interested "in undertaking computation of a new set of logarithms," and the University of Colorado looked for a young engineering graduate qualified as an instructor in mechanical drawing and descriptive geometry. Cory replied personally to most of these requests. Serv-



Advertisement of a hydroelectric plant showing the need for collaboration between mechanical and electrical engineering. *1899 Blue and Gold, xxv.*

ing as the primary contact between the university and industry, his opinion was valued by companies such as General Electric, which always sought Cory's recommendation in its hiring of students.

Such duties began to take their toll on Cory as he was able to devote less time to his research, teaching, and consulting. In January 1909, Cory wrote an "absolutely confidential" letter to the Massachusetts Institute of Technology (MIT) complaining of his position at Berkeley: "I cannot say that I have enjoyed being the chairman [of the Student Affairs

Committee] . . . and while I have been glad to assist the University in connection with the building and operation of its plant, yet I often felt that the Professor of Greek was very lucky as compared with myself, since, though he might have troubles, they were certainly less numerous than mine."[41] He continued, "I have thought only with pleasure of becoming a member of your department, and, while I should always hope to do my share of faculty committee work, I am certain that to be relieved of the work involved upon a Dean of a department or College and also the responsibility connected with the extension and operation of a university power plant would consummate my secret hope for a number of years." Cory was clearly dissatisfied with being the dean of the Department of Mechanical and Electrical Engineering, but he did not leave Berkeley and would continue in that role for another 21 years. Not enough relevant documents have been found to explain why Cory chose to stay and a gamut of speculations is possible. In his letter, Cory stipulated that MIT should match his salary, provide him with interesting work, and allow him to continue his consulting firm. As the historian John W. Servos explains in an article on chemical engineering at MIT from 1900 to 1939, many MIT professors were involved with consulting at the time.[42] Thus either MIT could not match Cory's Berkeley salary or was unable to offer him more interesting work. Regardless of the reasons, the incident provides a rare glimpse into Cory's personal opinions and underscores that he preferred academic duties over administrative.

Cory kept his research apace with the rapid changes in electrical engineering technologies through the 1910s. As long-distance power transmission became a realizable goal, research switched from creating new electrical technologies to improving those already in existence. In 1915 Cory wrote to Cornell University to obtain information about sending two alternating currents through the same conductor by varying frequency as he believed such a technique would "produce the maximum economy in copper for any given total loss in transmission."[43] The fact that electrical engineers had the time to study these important yet minor problems reflects a new confidence and security in their methods of high-voltage power transmission. When Cory was asked about the most significant research undertaken by the laboratory in 1916, he responded , "the most important research work . . . had to do with the possible dispersion of fog with the use of very high-voltage, high-frequency discharge."[44] Fog, endemic to San Francisco, was another minor problem in transmission as it caused a slight loss in efficiency due to current leakage.

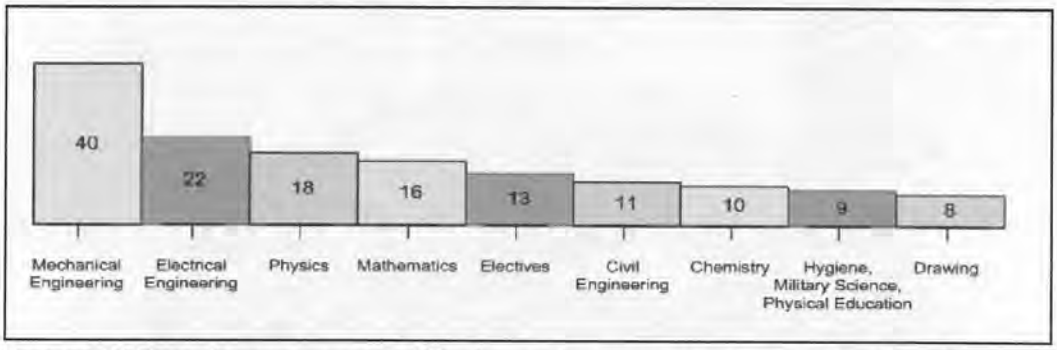
Research that made high-voltage transmission more efficient also made electricity cheaper, and by 1915 the public began to see its potential. An article in the *Ladies Home Journal* published that year entitled, "You Will Think This a Dream," described a near future when electricity would "cook all meals, heat and cool temperature-controlled homes, run industry and propel all forms of transportation."[45] Prominent electrical engineers like Charles Steinmetz supported such utopian visions, claiming that "the means for all these things are here now."[46] Combined with the standardization of outlets and plugs in 1915, sales of household electronic items doubled from $24 million in 1915 to nearly $48 million in 1916. These new demands for even more electricity kept Cory and other electrical engineers striving to increase efficiency and lower costs further.

While advancing research, Cory did not neglect his teaching duties and continued to update the curriculum. He believed that a strong foundation in mathematics and science was the best training for an electrical engineer. "Owing largely to Cory's influence, curriculum requirements in mathematics, physics, and mechanics were raised to higher levels,"[47] wrote Robert Seidel in his informal survey of the program.

The undergraduate program in electrical engineering for 1916 shows the curriculum with each semester unit corresponding to one hour of instruction and two hours of student

preparation. Mechanical engineering, drawing, and civil engineering together composed 40 percent of the curriculum, suggesting that the electrical engineering was still heavily tied to these other fields. The stability that the electrical engineering program had finally found was soon to be shaken, however.

Chart 1. Distribution of the 147 units required for the undergraduate program in Electrical Engineering, 1916



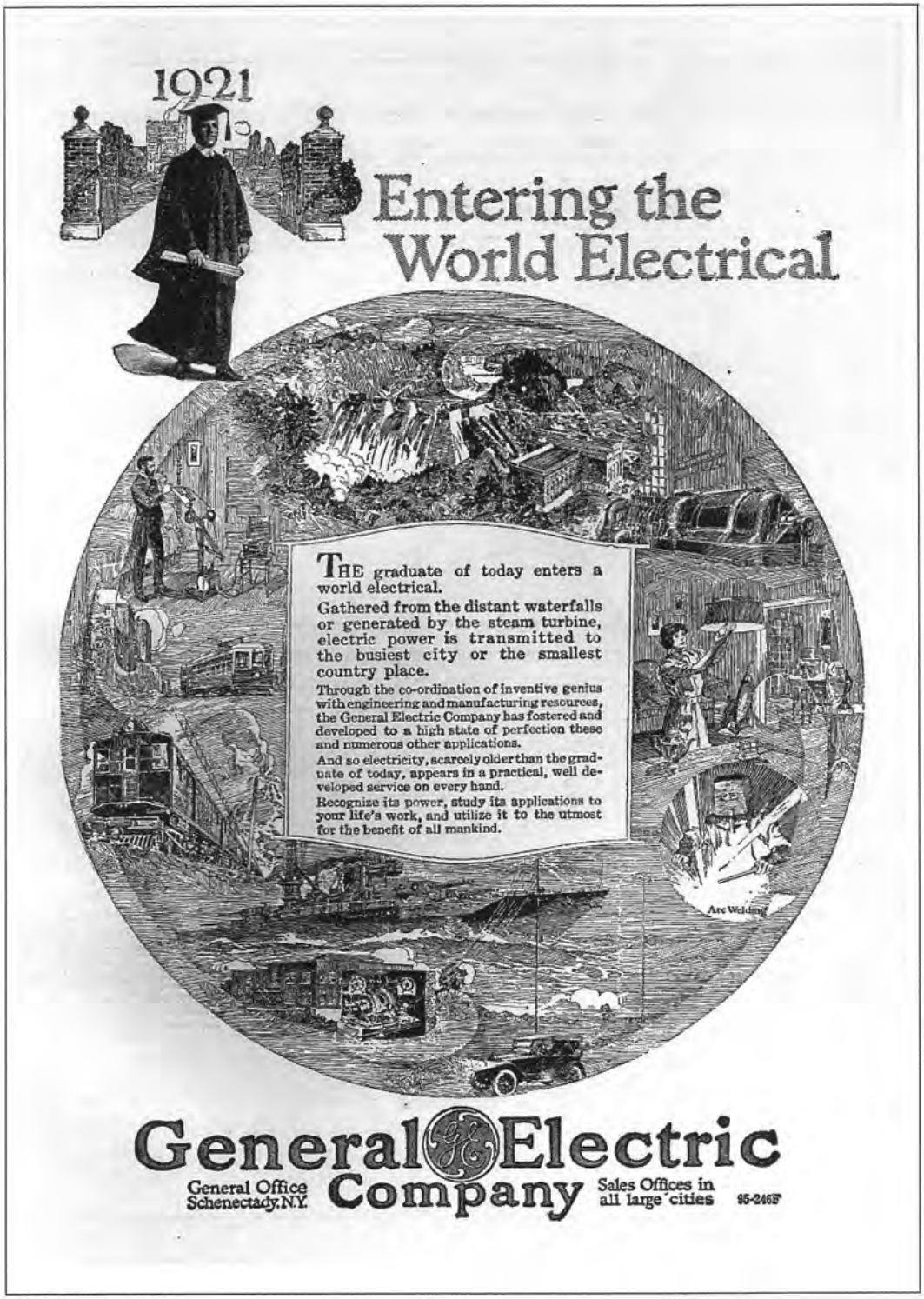
Source: 1916 letter from an unspecified faculty member responding to an inquiry from the University of Arizona. *University Archives (CU-39, box 1:5).*

The advent of World War I and the United States' entry in 1917 quickly changed the Department of Mechanical and Electrical Engineering from an important research and teaching institute into what Cory aptly titled a "versatile war laboratory." By November 1917, the draft took many engineering students from the classroom and into the trenches. Worried that the "next draft will take all engineering students 21 and over . . . and practically close every single engineering college in the country," the Case School of Applied Science sent a letter to Cory and the president of the university, asking them to sign a petition to the U.S. Secretary of War.[48] Although we do not know whether Cory or the president signed the petition, it would have been irrelevant for electrical engineering at Berkeley, as Cory himself soon left to serve as a consultant and assistant director of the Nitrate and Powder Plants in West Virginia, which produced explosives. The manufacturing of nitrates required large amounts of electricity and Cory thus was put in charge of power production.[49]

Just as the federal government virtually nationalized the country's telegraph, railway, and agriculture industries through the War Industries Board, it also took control of the Department of Mechanical and Electrical Engineering.[50] The government established both a radio and a shipping board school at Berkeley that made use of the department's labs and faculty. One of the newly hired junior professors, G. L. Greeves, provided all necessary instruction of radio transmission, elementary telegraphy, telephony, circuit work, and code practice to the Radio School's 240 men.[51] It seems surprising that a junior faculty member was put in charge of such a gargantuan task, but the department had no other professors qualified to teach the subjects. This circumstance foreshadowed the growing importance of radio in electrical engineering as well as the department's lack of resources devoted to it.

New Research Directions for the Department and Its Initial Response to Radio

The Department of Mechanical and Electrical Engineering quickly returned to normal with the conclusion of the war as Cory and the engineering students resumed their positions at Berkeley, replacing the Radio and Shipping Board Schools. It pleased Cory that the department inherited much of the schools' machinery, including three new steam



1921 Blue and Gold.

engines, a steam turbine, a steam boiler, various internal combustion engines, as well as a 14,400-square-foot wooden mechanics annex building that these schools left behind. Yet instead of using these resources to establish a formal radio program at Berkeley and build

upon the work done during the war, Cory utilized them to "make possible investigation and research work directly related to important power problems."[52]

As Berkeley, other universities, and industry all continued to investigate power transmission, however, they began to notice diminishing returns. By the 1920s, high-voltage power transmission was a well-studied problem and the field was forced to turn in new directions as the electrical industry entered a postwar slump in 1922. The General Electric Company wrote to Cory in that year expressing that "we have reduced their forces extensively and are running below output."[53] Instead of recruiting students for its hydroelectric or power transmission divisions, the company asked Cory to recommend graduating seniors possessing knowledge of fractional motors, small transformers, small generators, battery-charging equipment and farm lighting equipment. Supplying electricity no longer concerned General Electric as much as finding applications for its consumption. As electricity became more plentiful and affordable to the average consumer during the 1920s, electrical engineering found itself catering no longer to the large private utilities and street railways but rather to individuals desiring innovative ways to use this new source of energy. Over half of all urban residences had electricity by 1920, and more importantly, the capital investments in the older steam engine, belt shafts, and pulley technologies were finally no longer economical. In addition to homes, factories quickly began to electrify and created a further demand for practical applications of electrical engineering.

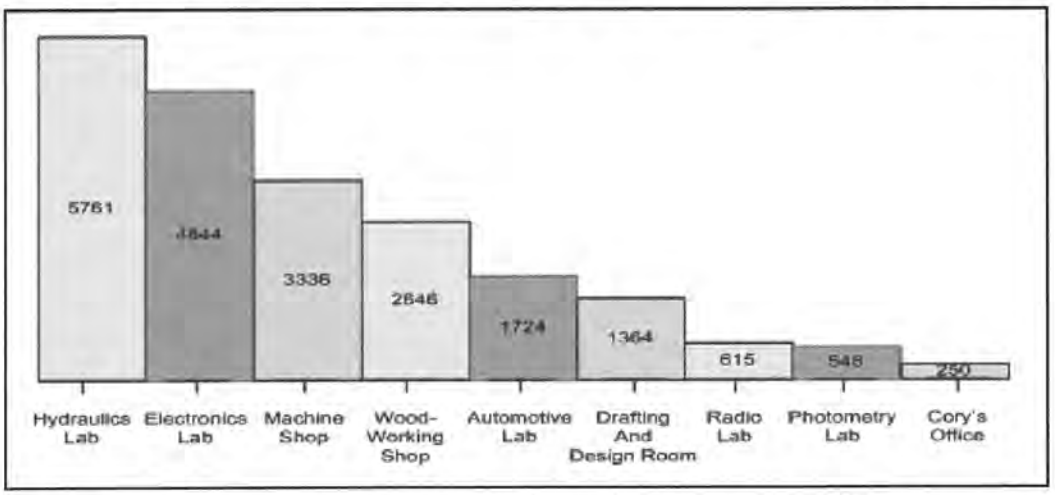
Cory seems to have anticipated this shift, for Berkeley electrical engineering quickly assumed research roles in this new direction. The electrical engineering labs began to test automobile headlights for the State Highway Department in 1919. The product of this research was detailed candlepower and adjustment tables that quantified the requirements for reliable and safe headlights. According to Cory, "not only the design and efficiency, but also the cost of manufacturing [headlights] has been materially reduced."[54] While automobile headlights may not have been as inspiring as the lofty power lines that stretched from the mountains to the sea, headlights were only a small part of a new more broad research plan that included everything from airplane engines to shipbuilding. General Electric Company's advertisement offers a good impression of what was considered a relevant topic in electrical engineering for the early 1920s. From the hydroelectric plant at the top of the illustration to the car at the bottom, General Electric depicted relevant applications of electrical engineering technology. Most of these technologies, such as the ship, locomotive, textile factory, and vacuum cleaner, were applications of electrical technologies that would have been of interest to newly empowered consumers or companies.

With electro-mechanic technologies in high demand, the Department of Mechanical and Electrical Engineering appeared to have a perfect foundation for further innovation. Cory was excited by what he considered "the two most noteworthy developments of perfecting the automobile and transportation through the air."[55] Thus neither Cory nor the department had significant interest in the nascent field of radio, which must have appeared as mere distraction compared to the advanced electro-mechanic technologies of the 1920s. This lack of interest is best exemplified in a series of personal letters between Cory and the General Electric Company. In 1924 the General Electric Company farsightedly wrote to Cory explaining that "right at this time we are especially striving to inspire interest in radio."[56] To recruit students into their radio department, General Electric offered immediate lab positions bypassing the company's student engineering courses usually required of new college recruits. Further, General Electric promised to allow students hired into the radio department the ability to switch easily to more traditional positions in the company after nine months if they were dissatisfied for any reason. Yet despite these benefits, Cory could recommend only one student in the entire graduating class who might be both interested

and qualified. In the recommendation for this student, Mr. Mayers, Cory was forced to admit that Mayers had not completed a single class in radio but instead was "enthusiastic" about the topic. Why was there so little interest in the field of radio among Berkeley electrical engineers?

As L. A. Geddes writes in his history of Purdue's electrical engineering department, "Following WWI, Purdue and other schools of electrical engineering found that they had two kinds of students, '60-cycle students' and 'odd-ball-students.' From before the war until the mid-1930s, electrical engineering continued to be dominated by the problems associated with 60-cycle power generation, distribution, and utilization. However, the future was to belong to the odd-ball engineers who had an interest in things that could be done with vacuum tubes such as radio."[57] Yet the future Geddes refers to was not in the early 1920s when neither Cory nor Berkeley's electrical engineering students viewed radio as a topic worthy of serious study. In the 1920s, the focus of electrical engineering was on more tangible electro-mechanical devices desired by both industry and consumer. The union of mechanical and electrical engineering in a single department further retarded the growth of radio at Berkeley, as such a topic would not promote harmony between the two fields. Electrical engineering grew allied to and in support of mechanical engineering and thus Cory promoted research and study in electrical topics with integral applications to mechanics. Mechanics composed more than 50 percent of the faculty in the department in 1923-24 according to the university register for that year.[58] Radio failed to fit well as a research topic as it was a purely electrical technology that was largely independent of mechanical engineering. Evidence of the scarce resources allocated to radio research may be seen in Chart 2, which presents the floor space division in the Mechanics Building in 1924.

Chart 2. Lab space allocation in square feet in the Mechanics Building in 1924

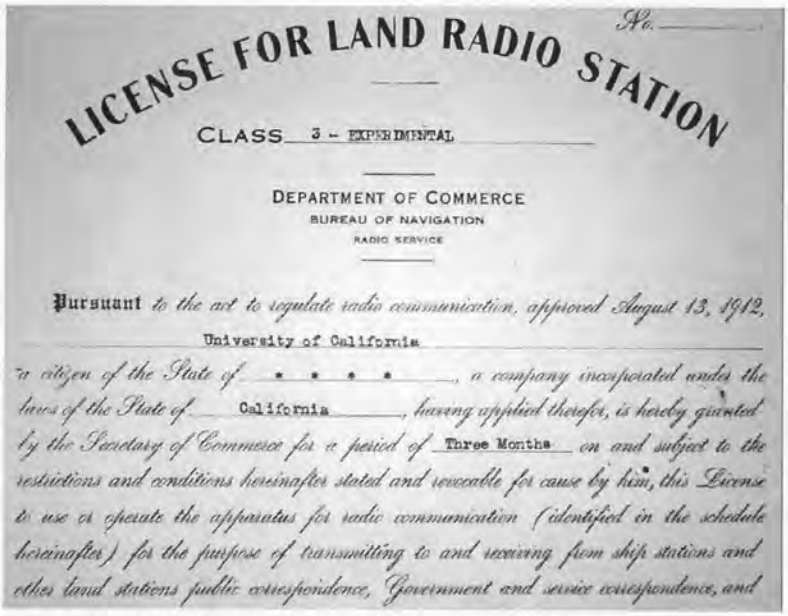


Source: Survey of the Physical Needs of the Campus, 1924. *University Archives (CU-39, box 2:5, aeronautics folder).*

The radio lab was only two and one-half times larger than Cory's own office and approximately eight times smaller than the Electronics Lab, where projects like headlight testing and high-voltage transmission characteristics were executed. The small lab space allocated for radio research may indicate the low priority or emphasis that Cory and the department placed upon it. Note also the smaller total square footage allocated for electrical engineering research as compared to that of mechanical engineering research with

such facilities as the Hydraulics Lab, Machine Shop, and Wood-Working Labs. Mechanical engineering was clearly the dominant component of the Department of Mechanical and Electrical Engineering. Researching a purely electrical topic void of mechanics would have been a challenge.

Still the topic of radio was not completely ignored as Robert Seidel has suggested in his history of the department. Assistant Professor G. L. Greeves, who had headed the war Radio Board School, led the radio instruction and research at Berkeley. After much contemplation documented in correspondence between Greeves, the university president, Cory, and other faculty, in 1923 the Department of Mechanical and Electrical Engineering agreed to purchase a used radio set from the Extension Division for $800.[59] The purchase was motivated by Greeves's complaint that "under present conditions the [radio] laboratory is very poorly equipped and in general no more than one type of very simple experiment can be conducted at one time, and then only with considerable difficulty and undue loss of time."[60] A few months after Greeves took possession of the radio set, the director of the Bureau of Standards in the Commerce Division of the federal government wrote to Cory, "In extending our work of transmitting standard frequency signals to cover the entire United States, it is desirable to establish a station on the Pacific Coast which would transmit. We would like to interest some school or college in this work as the precise measurements necessary would probably be made there more carefully there than anywhere else."[61] Cory quickly accepted the above proposal and in 1923 Berkeley was issued a class 3-experimental license for a land station:



No. _____

LICENSE FOR LAND RADIO STATION

CLASS 3 - EXPERIMENTAL

DEPARTMENT OF COMMERCE
BUREAU OF NAVIGATION
RADIO SERVICE

Pursuant to the act to regulate radio communication, approved August 13, 1912,

University of California

a citizen of the State of * * * *, a company incorporated under the laws of the State of California, having applied therefor, is hereby granted by the Secretary of Commerce for a period of Three Months on and subject to the restrictions and conditions hereinafter stated and revocable for cause by him, this License to use or operate the apparatus for radio communication (identified in the schedule hereinafter) for the purpose of transmitting to and receiving from ship stations and other land stations public correspondence, Government and service correspondence, and

Top portion of the License for Land Radio issued to the Department of Mechanical and Electrical Engineering in 1923. *University Archives (CU-39, box 5:5).*

When the radio station was not being used for broadcasts, the Department of Mechanical and Electrical Engineering was authorized to conduct research and testing according to the license provision. The products of such research have not yet surfaced in any archival documents. Whatever radio research was conducted was done without the aid of any journals from the library, for only in the 1930s did an electrical engineering professor request

that the library subscribe to a radio research journal, the *General Radio Experimenter.*[62]

Greeves also led Berkeley's two radio courses, EE6A/B and EE115A/B. Elements in Radio Communication (EE6A/B) was a popular class and had an enrollment of 63 students in 1922, most of whom were electrical engineering majors. Perhaps more significantly, the majority of students enrolled are sophomores, possibly indicating that younger generations of students were beginning to view radio as an increasingly important topic. The students' affinity towards radio may be called into question, however, given the fact that the department's other radio class, EE115A/B, Advanced Radio Engineering, was not offered in 1920-21 or 1921-22 due to a lack of interest and would subsequently be rarely offered.

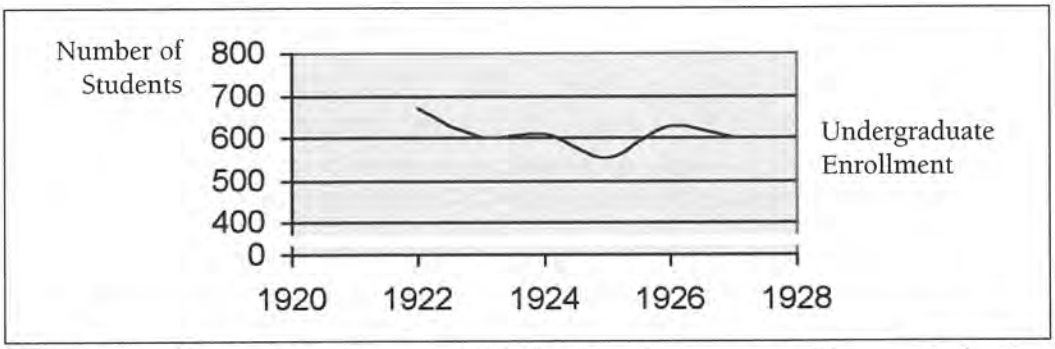
Table 2. Number of students enrolled in Elements in Radio Communication (EE6A/B) in 1922 by their concentration and year in college

Concentration	Sophomores	Juniors	Seniors	Total
Electrical Engineering	27	11	4	42
Mechanical Engineering	11	2	1	14
Chemistry	1	1	4	6
Letters & Science	0	1	0	1
Total	39	15	9	63

Source: G. L. Greeves letter about his radio classes, 1922. *University Archives (CU-39, box 5:9).*

While students may not have been drawn to radio at Berkeley, they were still attracted to the more traditional field of study offered by the Department of Mechanical and Electrical Engineering. Specific undergraduate enrollment in electrical engineering alone is unknown, but the annual presidents' reports do indicate that total enrollment in the Department of Mechanical and Electrical Engineering was rather constant at approximately 600 students during the 1920s.

Chart 3. Undergraduate enrollment in the Department of Mechanical and Electrical Engineering by year



Source: Derived from presidents' reports, 1922-1927, from the department. *University Archives (CU-39, box 5:9).*

Cory noted that "many students enter from junior colleges in California and other states and countries in order to complete their upper division work. As a result, the number of students enrolled in third and fourth year classes offered by the Department of Mechanical and Electrical Engineering exceeds the number of students in the College of Mechanics who take the required second year courses in Math, Physics, Electrical Engineering, and Shop Work."[63] This glut of students in third- and fourth-year courses was a problem, as the majority of upper-division courses, especially in electrical engineering, were lab based. Undergraduate instruction called for so much lab space and time that the department was unable to increase graduate student enrollment significantly in the later 1920s. As Cory bluntly wrote to the president in 1928, "The floor space is adequate for the needs of undergraduates but not well adapted for graduate or faculty research work."[64]

Faced with this influx of students, Cory nevertheless managed to ensure that the Department of Mechanical and Electrical Engineering continued its research efforts. By maintaining the original purpose of the old College of Mechanics, Cory clearly encouraged investigations into topics relevant to industry. In Cory's 1926 report to the president of the university he described 45 industry-related projects in California conducted by the department from 1923 through 1926. Approximately one-third of these projects were related to electrical engineering, reinforcing the hegemony of mechanical engineering in the department. The main research avenue of the electrical engineers at Berkeley remained based in electro-mechanical technologies. The department conducted work, for instance, for the Pacific Fruit Express Company, the Southern Pacific Railroad, and the Santa Fe Railroad on an electrical-operated refrigeration plant. It also investigated lighting efficiency for the Bureau of Supplies in San Francisco and tested devices made by the General Electric Company, Westinghouse Electrical and Manufacturing, the Western Electric Company, the Pacific Telephone and Telegraph

Although this EMD E1 locomotive would not be built until 1937, the railways could only begin efficient transportation of fruits after the installation of electrically operated refrigeration plants as investigated by the department. *Courtesy of the author.*

Company, and the American Telephone and Telegraph Company. Other investigations, according to the 1926 report, included "electric power operated dry docks" and testing of "the new turbo-electric power generating plant installed at the U.S. mint in San Francisco."[65]

These efforts of the department show that most electrical engineering research continued to be conducted in conjunction with or as applied to mechanical engineering projects. Again, the topic of radio was notably absent, further indicating that Cory did not deem it of serious interest to industry. Nevertheless, electrical engineers in the early 1920s contributed significantly to the automobile, lighting, railroad, and shipping industries.

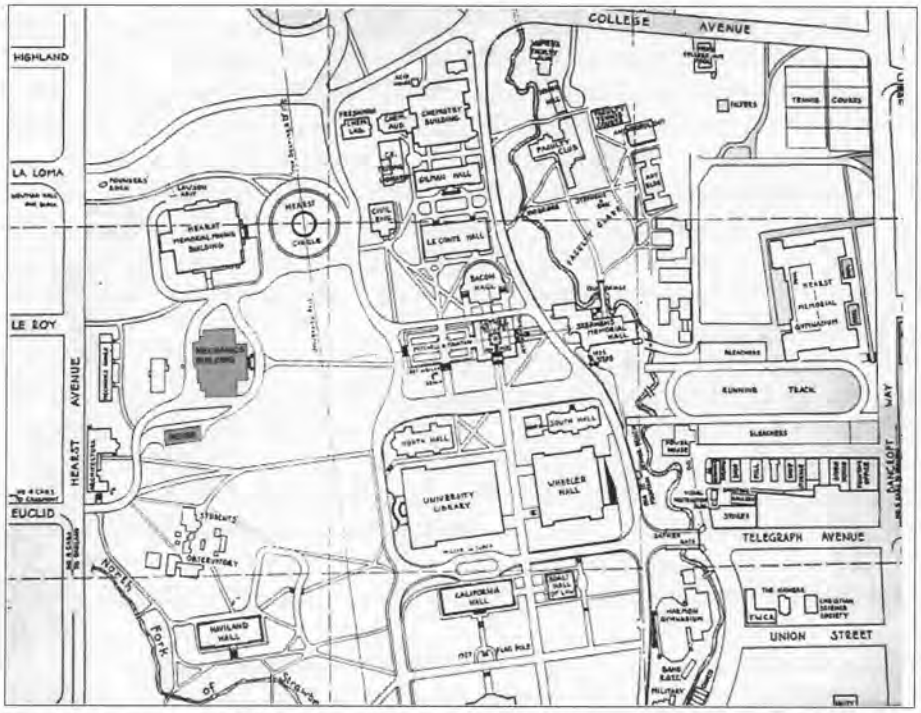
Although Cory clearly encouraged research that paralleled industry goals, he also explicitly drew the line between the university and industry. In 1923, West and Company of Philadelphia offered the department the rights to hold and use the company's new hydraulic technology in the Mechanics Building with the understanding that the machinery would remain the property of that company. Supported by the president of the university, Cory gracefully yet forcefully replied that "the University should have complete control of the equipment in our laboratories. We are glad to co-operate with industry, but the University will not furnish to manufacturers written statements of the performance of the apparatus [or permit product demonstrations.]"[66] Cory believed that the college's labs should remain autonomous and must not become dependent or controlled by industry, even if such a stance meant refusing to work with the newest technologies.

As the 1920s progressed, research clearly had become integral to electrical engineering at Berkeley. "Science is now advancing at a rate so rapid, that no industry can long ignore the importance of research and survive," wrote Cory to the *California Engineer* in the mid-1920s. A note of caution must be added about the word research in the context of pre-World War II electrical engineering, however. In his brief, contemporary history of what is now known as the Department of Electrical Engineering and Computer Sciences (EECS), David A. Hodges explained that "before WWII, much electrical engineering research was empirical and involved compiling better tables from which an engineer could look up values and only after the war did the more scientific side of research emerge."[67] Hodges referred to such empirical research that may be found in the many editions of the book, *Reference Data for Radio Engineers*, to which many electrical engineers contributed and upon which they relied in those days.[68]

To facilitate further research, Cory petitioned the regents for construction of a new building for the Department of Mechanical and Electrical Engineering. In response, Hesse Hall was constructed in 1924 to provide space in which a new power laboratory, motor and generator test room, and radio laboratory were established. With much of the bulky machinery now moved out of the Mechanics Building, more electrical engineering lab and classroom space became available. The location of the Mechanics Building and Hesse Hall west of the Hearst Mining Building are shown in the 1930 map of the Berkeley campus.

Cory's Departure and the Separation of Mechanical and Electrical Engineering

Sudden change within the Department of Mechanical and Electrical Engineering cut short Cory's research plan. In 1928 he was diagnosed with cerebral arteriosclerosis, and his condition deteriorated rapidly. Faculty member Morrough O'Brien wrote that when he joined the department in 1928, Cory was "ill mentally, gone to pieces with age. The real director was Associate Dean Baldwin Woods in the president's office, who had to approve the budget."[69] Regardless of whether O'Brien was exaggerating Cory's condition, as cerebral arteriosclerosis does not necessarily result in mental illness, the fact remained that Cory was unable to take an active role in the department's decisions and leadership. Perhaps the disease had taken its toll even before 1928, as the archives begin to show fewer records of his activities past 1926 and Cory's name appears less frequently. With new faculty members Baldwin Woods and Llewellyn Michael Kraus Boelter largely in control, the coexistence



Map of the campus, 1930, showing the Mechanics Building and Hesse Hall (shaded).

of both mechanical and electrical engineering in a single department came into question. While Cory represented an earlier generation of engineers who had watched electrical engineering find support in and grow from mechanical engineering, newer faculty seemed more inclined to notice the differences between the two fields. Without the leadership of Cory to hold them together, mechanical and electrical engineering immediately began to draw apart.

The undergraduate curriculum in electrical engineering was demanding, as the students had to fulfill many mechanical engineering requirements in addition to their electrical engineering classes. In 1928, however, the Department of Mechanical and Electrical Engineering restructured the undergraduate curriculum. The Committee on the Correlation of Work in Electrical Engineering noted that "a study of the outline for electrical engineering courses indicates that most of the applications of the principles have been made to machinery, particularly of the rotating type."[70] In a conscious effort to separate electrical from mechanical engineering, the committee proposed new syllabi for electrical engineering classes that would focus on solely electrical engineering applications, such as radio and communication lines.

Innovations in technology further increased the separation between mechanical and electrical engineering. As Geddes has written in his history of Purdue's electrical engineering department, "The 1927 development of heater cathode vacuum tubes made radio receivers practical. Before the heater cathode tube, radio receivers were battery operated. With the new heater cathode tube, radio receivers could be operated from domestic power lines and radio reception was available at any time by the flick of a switch."[71] Unlike Cory, those now in charge of the department chose not to hold back research in radio and instead allowed it autonomy in exploring this new vacuum tube technology. This combination of autonomy and technology created enormous growth for radio. According to the president's

report for 1927, ten of the department's 17 "investigations and experimental research" projects were electrical engineering-related with mechanical engineering projects in the minority. While this reversal may in part be ascribed to the improvements in vacuum tubes, such a difference in research from the 1926 president's report may also be the result of a conscious change in the department's focus. In allowing electrical engineering to become unfettered from mechanical, the department realized the full potential of the field and immediately allowed electrical engineering to pursue non-mechanical-related research. The department's research interests in 1928 included "radio receiver design and loudspeaker cabinet design," "audio frequency filter systems," and "audio amplifiers," according to the president's report for that year.[72]

With radio suddenly a valid research topic, electrical engineering students and faculty found themselves working with a significant yet purely electrical topic that had few correlations with mechanical engineering. To become proficient in radio and the nascent communications field, which would soon include television as well, an electrical engineer no longer required a strong background in mechanical engineering. While Cory himself had maintained a balance of both fields, he was no longer in control or in the majority. The first step in separating mechanical and electrical engineering had come via the 1928 Committee on the Correlation of Work in Electrical Engineering but the second would be far more drastic.

The Committee on the Reorganization of the Engineering Colleges was formed in early 1930 and voiced the view that "a separation [of the Department of Mechanical and Electrical Engineering into separate Electrical Engineering and Mechanical Engineering departments] would not be difficult . . . [and is] advocated on the basis of the difference of work in electrical and mechanical engineering . . . and had not a single member of either faculty opposed to the separation."[73] On March 31, 1930, the Academic Senate unanimously approved this separation and electrical engineering became its own separate department.

Cory's reaction to the disbanding of the department that he had helped to create and lead for almost 30 years is unknown. He officially retired in 1931. A clear indication of the magnitude of change in electrical engineering over the 38 years of Cory's tenure at Berkeley is exemplified in a letter Cory received from Henry Ford's special representative inquiring whether he had "anything in the line of antique electrical equipment which might be gotten for a museum which is being built by Mr. Ford."[74] The equipment that Cory had used to found Berkeley's first electronics lab four decades earlier was now prized by museums as radio raced electrical engineering into a new era.

While the technology that Cory pioneered may have been replaced, the work he conducted in founding electrical engineering at Berkeley, creating the electronics laboratory, and serving as dean of the Department of Mechanical and Electrical Engineering for more than 30 years was not forgotten or unacknowledged. The generation of faculty that led after Cory's retirement and death in 1937, sought to honor his achievements officially in 1950. Robert Sibley wrote in 1952 that Cory "brought a marvelous spirit of enthusiasm to his work. So much so that the beautiful and wonderfully equipped new Electrical Engineering Building over back of the Mining Building has been christened in his memory—the Clarence Cory Building."[75]

Cory Hall on Hearst Avenue as it stands today. It was completed in 1950. Photograph by author.

ENDNOTES

1 Robert W. Seidel, "A History of the Department of Electrical Engineering at the University of California, Berkeley" (paper prepared for the Project of the Nuclear Sciences and Electronic Technology in the West. Bancroft Library, University of California, Berkeley, 1974), 3.

2 *Register of the University of California, 1889-1890* (Berkeley: Regents of the University of California), 44.

3 *Register, 1890-1891,* 52; *Register, 1891-1892,* 56.

4 *Register, 1892-1893,* 61.

5 Ronald R. Kline, *Steinmetz, Engineer and Socialist* (Baltimore and London: The Johns Hopkins University Press, 1992), 20.

6 Ibid., 117.

7 Verne A. Stadtman, ed., *The Centennial Record of the University of California* (Berkeley: University Printing Department, 1967), 76. A similar development took place with the introduction of the field of optometry at Berkeley. Optometry was initially a part of the physics department as it was considered an application of the discipline. Optometry remained based within physics from 1921 to 1940, when a separate Department of Optometry was established, followed by the current School of Optometry. I am grateful to Steven Finacom, University of California, Berkeley, for sharing this insight.

8 Joseph N. LeConte, "Early Recollections of the Mechanical and Electrical Engineering Departments" (Berkeley: typescript, 1939), 8.

9 *Register, 1881-1882,* 60.

10 Ibid., 61.

11 Kline, 74.

12 "Clarence Linus Cory, Mechanical and Electrical Engineering: Berkeley," *In Memoriam, University of California* (Berkeley: Academic Senate, 1937), 8.

13 LeConte, 11.

14 Kline, 26.

15 *Register, 1893-1894,* 82.

16 *Register, 1897-1898,* 193.

17 *Register, 1896-1897,* 142.

18 *Register, 1900-1901,* 228.

19 Kline, 27.

20 Ibid., 41.

21 Ibid., 173.

22 LeConte, 15.

23 "Cory," *In Memoriam,* 8.

24 LeConte, 17.

25 Ibid., 18.

26 Clarence L. Cory, "Regulation in Long-Distance Transmission," *Journal of Electricity, Power, and Gas,* 10 (1900), 6-13.

27 Clarence L. Cory, "Regulation of Alternating Current Generators," *Journal of Electricity, Power, and Gas,* 8 (1899), 33-40.

28 Robert Sibley and Carol Sibley, *California Pilgrimage: A Treasury of Tradition, Lore, and Laughter* (Berkeley: Lederer, Street, and Zeus, Co., Inc., 1952), 124.

29 Carl Sulzberger, *Competing Electric and Gasoline Vehicles,* http://www.ieee.org/organizations/pes/public/2004/sep/peshistory.html (accessed April 2006).

30 Kline, 126.

31 "Cory," *In Memoriam,* 9.

32 Ibid.

33 Steven Finacom. Personal correspondence with author. Berkeley, CA, May 19, 2006.

34 "Cory," *In Memoriam,* 10.

35 *Red Slate Mountain,* http://www.absoluteastronomy.com/ref/red_slate_mountain (accessed April 2006).

36 "Joseph Nisbet LeConte, Mechanical Engineering, Berkeley." *In Memoriam: University of California* (Berkeley: Academic Senate, 1950), 18.

37 Verne A. Stadtman, *The University of California 1868-1968* (NY: McGraw-Hill Book Co., 1970), 187. The reorganization of the College of Mechanics appears to correspond with President Benjamin Ide Wheeler's success in securing new income from the state in 1901. This period in the university's history has been characterized as an era of growth in which many departments expanded.

38 *Register, 1903-1904,* 246.

39 "Cory," *In Memoriam,* 9-10.

40 City of San Luis Obispo to Cory, 1915, College of Engineering records, CU-39, box 1:3, University Archives, The Bancroft Library, University of California, Berkeley.

41 Cory to Professor Jackson of MIT, January 9, 1909, College of Engineering records, CU-39, box 1:27.

42 John W. Servos, "The Industrial Relations of Science: Chemical Engineering at MIT, 1900-1939" (paper presented at the annual meeting of the History of Science Society, Johns Hopkins University, October 1979).

43 Cory to Electrical Engineering faculty at Cornell, 1915, College of Engineering records, CU-39, box 1:11.

44 Seidel, 7.

45 Kline, 284.

46 Ibid.

47 Seidel, 7.

48 Case School of Applied Science to Cory and the president of the university in response to the draft for WWI, November 24, 1917, College of Engineering records, CU-39, box 1:6.

49 "Cory," *In Memoriam,* 9.

50 Stadtman, 1967, 179-201. University President Wheeler received the approval of the regents in his request "to offer the war department such use of the grounds, buildings, and equipment at Berkeley and Davis as may accord with the plans and needs of the department in the training of troops."

51 Seidel, 8.

52 Ibid., 9.

53 General Electric Co. to Cory, 1922, College of Engineering records, CU-39, box 1:82.

54 President's Report of 1926 from the Department of Mechanical and Electrical Engineering, 1926, College of Engineering records, CU-39, box 5:4.

55 Seidel, 10.

56 General Electric Co. to Cory, 1924, College of Engineering records, CU-39, box 1:82.

57 L. A. Geddes, *The History of Purdue Electrical Engineering (1888-1988)* (West Lafayette, IN: School of Electrical Engineering, Purdue University, 1988), 10.

58 *Register, 1923-1924,* 185.

59 Letter about purchasing radio equipment from the Extension Division, 1923, College of Engineering records, CU-39, box 5:9.

60 G. L. Greeves letter complaining of the lack of resources allocated for radio, 1923, College of Engineering records, CU-39, box 5:9.

61 George K. Burgess, Director of the Bureau of Standards, to Cory, November 1923, College of Engineering records, CU-39, box 5:9.

62 Professor L. F. Fuller to library, 1930, College of Engineering records, CU-39, box 4:5.

63 President's Report of 1926.

64 President's Report of 1928 from the Department of Mechanical and Electrical Engineering, 1928, College of Engineering records, CU-39, box 5:4.

65 Cory, "Services the Department of Mechanical and Electrical Engineering Has Rendered to Organizations in California," President's Report of 1926.

66 Cory to West and Company, 1923, College of Engineering records, CU-39, box 4:5.

67 Professor David Hodges (EECS) in discussion with the author in Berkeley, February 9, 2006.

68 H. P. Westman, *Reference Data for Radio Engineers* (NY: Statford Press Inc., 1956).

69 Morrough P. O'Brien, *Dean of the College of Engineering, Pioneer in Coastal Engineering and Consultant to General Electric,* an oral history conducted by Marilyn Ziebarth, Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 1988, 20.

70 Notes from the Committee of Correlation of Work in EE, 1928, College of Engineering records, CU-39, box 4:4.

71 Geddes.

72 President's Report of 1927 from the Department of Mechanical and Electrical Engineering, 1927, College of Engineering records, CU-39, box 5:4; President's Report of 1928.

73 Notes from a meeting of the Committee on the Reorganization of the Engineering Colleges, March 10, 1930, College of Engineering records, CU-39, box 4:15.

74 Jas. W. Bishop to Cory, February 1929, College of Engineering records, CU-39, box 4:20.

75 Sibley and Sibley, 123.

Cory (right) in 1898. *EECS History,* http:www.eecs.berkeley.edu/department/history.shtml

THE RISE AND FALL OF SOCIAL ECONOMICS

Carroll Brentano

THIS ESSAY IS ABOUT A FIELD, social economics, and the person, Jessica Peixotto (1864-1941), who taught in that field at the University of California, Berkeley from 1904 to 1935. She retired as full professor emeritus after a career embodying both the vision and the practice of the field, from its rise to the beginnings of its demise.[1]

In the January 2008 edition of the Web encyclopedia, Wikipedia, there is no article called "social economics," although the subject is referred to in several articles dealing with the origins and development of the field of economics. Social economy (or economics) did however exist at the University of California, as a separate course of study, announced in 1912 by the economics department because of "the widespread interest in the control of poverty has given rise, in recent years, to a demand for the services of the trained social worker."[2] Although an actual School of Social Welfare was not founded until 1944, three historic strains had been coming together: "the multiplication of specialized institutions for charity and corrections, the agitation for social reform and the development of social science."[3] The fruit of these being social economics. Although, while, in Berkeley, economics professors Carl Plehn and Ernest Moore were, after 1904, the leaders of this academic emphasis, the force and backbone of the movement was Professor Peixotto. She taught the courses that were to add up to what was by 1912 called social economics: Contemporary Theories of Social Reform, The Child and the State, Care of Dependents, Crime as a Social Problem, and Poverty.[4] Or, what was described in the 1910-1912 president's report as "the field of constructive and preventive philanthropy."[5]

Jessica Peixotto, ca.1910. *University Archives (UARC PIC 1300:004).*

But the core subject was poverty and Peixotto's exploration of its history, causes, and potential amelioration. Her syllabus for Economics 180, "The Control of Poverty," (1923-24), begins: "The purpose of this course is the consideration of those social activities and theories that result from the fact that all persons and families are not economically self-sufficient." As "economic activity in general and the industrial organization of society in particular determine immediately the nature and the extent of poverty . . . the study of poverty [related to] the study of politics, sociology, psychology, the natural sciences [it] is primarily a question of

social economics [our emphasis]."[6] Very specifically, Peixotto defined poverty as "an adverse relation between the flow of money income and power to buy the goods and services considered the necessities of life in a given locality at a given time."[7] This was where her work was centered: finding and publishing the information about the flow of money income, and what goods and services were available in a given locality or a given time. Research was pursued into the less covered question of what were "considered the necessities of life" by means of cost of living surveys constantly adjusted for the evolving tastes and desires of the respondents to her questionnaires.[8]

Although admitting that the reliability and utility of cost of living studies like her own, "are not the science hoped for" they were the basis for the practical knowledge needed for progress in the betterment of the plight of the poor—and basic for the academic field of social economics.

For us now living in an era when economists and our government are telling us that *consuming* is what we were put on earth to do in order to have, at the least, a rich and powerful nation, and at the most, happiness and virtue, it is difficult to understand the era from which Jessica Peixotto was emerging. Around 1900 there was a belief in something called the "morality of spending," where the poor proved their immorality by being frivolous spendthrifts.

South Hall, original home of economics, 1912. *University Archives (UARC PIC 5:42).*

For example, a famous teacher and writer, Ellen Richards, the first MIT female professor (of nutrition), came to Berkeley in the summer of 1909 to lecture. In one of her talks "Is the Increased Cost of Living a Sign of Social Advance?" she made the point that a "high cost of living was due to a growing love of pleasurable sensations and to a habit of speeding up life all along the line," but warned that "unless there is a high and noble purpose behind it all, it works no advance."[9]

Richards had allies, but the age of the rise of the consumer was dawning and the whole discourse on poverty and its remedies was being turned upside down. The growing love of pleasurable sensations and life speeding up all along the line, still attacked and made fun of by the redoubtable Thorsten Veblen, was happening.[10] "Social economists" among others, were ready to investigate these new phenomena and see what their possible consequences might be. Studying the "cost of living" in all its manifestations came into vogue.

A government bureau, the National Industrial Conference Board, was moved to give its attention to this subject by the rapid rise in prices of commodities which followed the beginning of World War I: "Probably no factor in our economic life has such general importance as the cost of living."[11] After 1918 the board began to use the expenditures of actual workers' households as bases for its analyses. The statistics on how the workers spent their incomes over the 1910s and 1920s, as the N.I.C.B. report illustrates, marks the leaving of the age of the "morality of spending" and the beginning of the age of social responsibil-

Bernard Moses, 1894. *University Archives (UARC PIC 13:3489).*

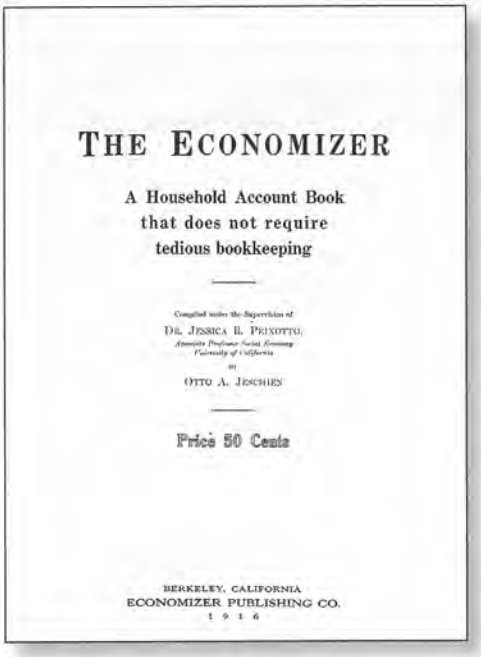
ity for the cost of living, and with it a concern for the level of dignity of the average family, Jessica Peixotto's central concern.[12]

Peixotto was, in 1922, a full professor of social economics. Her book, *Getting and Spending at the Professional Standard of Living*, a study of the incomes and expenses of ninety-six Berkeley faculty families, facts collected in six weeks between 1922 and 1923, was published in 1927.[13] The study has been called "the most intensive examination of middle-class budgets" in the United States before 1940.[14] Budget studies, while not new in the 1920s, were to be a significant part of the curriculum of social economics, wherever taught, and a career-long concentration of Jessica Peixotto. Her continuing work, producing and interpreting these studies, was central to her insistence on the need for exact factual bases for any claim to understanding the American economy, and in her case, the roots and manifestations of poverty. As she states in the syllabus of her poverty course (the heading of chapter two is The Standard of Living as a Determinant of Poverty), "In this course, however, the interest centers on the nature and the causes of poverty, standards of living, the relation of such standards to low income and in the distribution of national and personal wealth."[15]

Professor Peixotto, from a large, well-off, and cultured San Francisco family had been schooled largely at home and had been for a time in charge of the family household affairs. She came to the university in 1891 at the age of twenty-seven where she was in the class of 1894 with her friend Frank Norris, and returned for a PhD a few years later.[16] She studied with Bernard Moses, attending his seminar with one other student, future university president David Barrows, and wrote her dissertation, later published commercially, on socialism in France.[17] It was dedicated to Moses "in grateful acknowledgement of inspiration and guidance."[18] She obtained the degree in 1900, and without a precise career in mind, was asked by President Wheeler to teach a course on contemporary socialism, later one on the history of socialism. By 1907 she was a regular member of the economics department and by 1917 was a full professor.[19]

Over the years, sometimes under the banner of social economics and at other times, sociology, a title she disliked, she taught all the department's do-gooder courses and was involved in creating the Berkeley departments of social welfare and criminology.[20] As a founder in 1923, and as longtime director, of the Heller Committee for Research in Social Economics, she supervised its sponsored research until her retirement in 1935.[21] Writing the foreword to the 1927 Heller survey of professional families, Peixotto believed their expenditures "represent the habitual requirements of a typical American family, occupied in one of the professions, with a standard of living shaped in such as customs, conventions, fashions, and, in even greater degree than by any *rationale* of spending, the temptations of the shops."[22]

Her own work surveyed the spending of several levels of San Francisco area workers; first, university faculty (initially canvassed by professor's wives) and later the spending of unionized workers, San Francisco typographers. Her survey questionnaires seemed to blend the advisory with the investigative in producing real facts about what was spent and


THE ECONOMIZER

A Household Account Book
that does not require
tedious bookkeeping

Compiled under the Supervision of
DR. JESSICA B. PEIXOTTO,
Associate Professor Social Economy
University of California
by
OTTO A. JESCHIEN

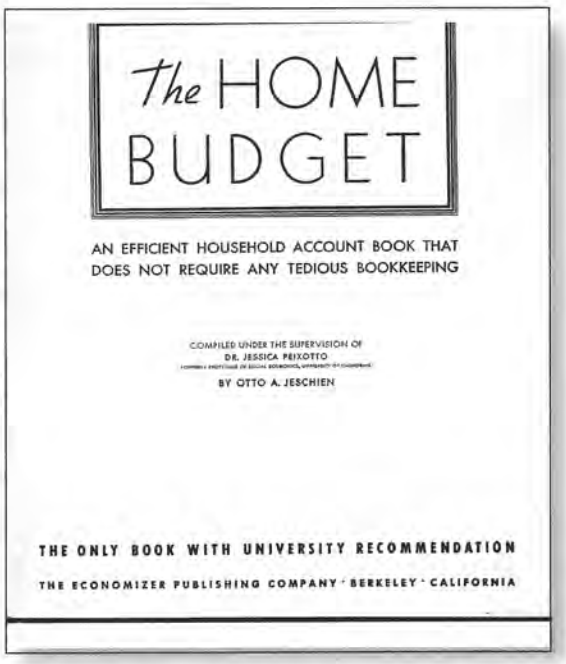
Price 50 Cents

BERKELEY, CALIFORNIA
ECONOMIZER PUBLISHING CO.
1916

The Economizer, 1916 (Fifth edition). "Mr. Jeschien's well-conceived little book will, I believe, prove a source of pleasure and profit to whomsoever uses it." Jessica B. Peixotto.

and disseminated useful for the individual record keeper, but also to the branches of government just then intent on knowing the financial status of each of the various income classes in their areas. In response to this apparent need, in 1920 a faculty committee was appointed to answer the state's Civil Service Commission's request for a cost of living survey for state employees. The members, besides Peixotto, were Solomon Blum, M.E. Jaffa, and R.G. Sproul. Every year thereafter the Heller Committee for Research in Social Economics, directed by Peixotto, conducted similar surveys. Typical of the material presented in these surveys are commentary about family expenditures that might be considered novel compared with prewar habits: "ownership of a modern home, in a 'good neighborhood'; food that . . . has elaboration of menu and of service; the husband's lunches taken away from home; . . . an automobile, a vacation, occasional what was bought. An example of her admonitions to the householder is her promotion of *The Economizer* a 1916 booklet (for sale for fifty cents) titled "A Household Account Book, that does not require tedious bookkeeping," It contains blank pages for spending records under the rubrics of clothing, investment (taxes, insurance), advancement (lodge, club or union, books, church, theater), health, and "extra items." In her foreword, Professor Peixotto advised "Those who use the system suggested by this little book and keep therein for two or three years a record of how their money goes, will find that its promise for saving is not the only utility of such household accounting."[23]

Many housewives must surely have felt more secure having the facts of their families' economic lives in front of them month after month; but not only were the cost of living surveys that Peixotto and her students collected


The HOME
BUDGET

AN EFFICIENT HOUSEHOLD ACCOUNT BOOK THAT
DOES NOT REQUIRE ANY TEDIOUS BOOKKEEPING

COMPILED UNDER THE SUPERVISION OF
DR. JESSICA PEIXOTTO

BY OTTO A. JESCHIEN

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The Home Budget, 1955 (Thirtieth edition of *The Economizer*). "A successful and simple system of management of household finances has been set forth in the preceding pages, and now the author will attempt to 'Show you how,' using a sample budget of a $3,000 annual income. An average family will be considered, having four members."

CHART OF DISBURSEMENTS FOR VARIOUS INCOMES

	Annual Income of $960.00		Annual Income of $1200.00		Annual Income of $1800.00	Annual Income of $2400.00		*Your Income* $.....	
Operating Expenses	30%	$288.00	34%	$408.00	*The Dividing Line between Set and Fluctuating Percentages*	34%	$816.00	..... %	$.....
Food.....	38	364.80	34	408.00		25	600.00	.....	.....
Clothing	10	96.00	10	120.00		14	336.00	.....	.....
Investment.....	10	96.00	10	120.00		12	288.00	.....	.....
Advancement.....	6	57.60	6	72.00		9	216.00	.....	.....
Health	6	57.60	6	72.00		6	144.00	.....	.....

Illustration from *The Economizer,* 1916. "Food: Includes everything its name implies. It also accounts for meals taken outside and sweets."

CHART OF EXPENDITURES FOR VARIOUS ANNUAL INCOMES

	$2,400		$3,000		$4,000		$5,000	
Savings and Investment	10%	$20.00	10%	$25.00	10%	$33.50	12%	$50.00
Taxes	6	12.00	10	25.00	12	40.00	14	58.25
Food	30	60.00	29	72.50	29	96.25	23	97.00
Maintenance	32	64.00	30	75.00	29	96.25	32	132.50
Clothing	12	24.00	10	25.00	8	27.00	8	33.00
Health and Personal Care	6	12.00	5	12.50	5	16.75	4	16.75
Advancement	2	4.00	4	10.00	4	13.50	4	16.75
Recreation	2	4.00	2	5.00	3	10.00	3	12.50
Total		$200.00		$250.00		$333.25		$416.75
	$6,000		**$7,500**		**$10,000**		**Your Annual Income** $_____	
Savings and Investment	13%	$65.00	15%	$93.75	22%	$183.00	___	_____
Taxes	15	75.00	17	106.25	18	149.00	___	_____
Food	21	105.00	19	118.75	14	117.00	___	_____
Maintenance	32	160.00	28	175.00	25	210.00	___	_____
Clothing	9	45.00	10	62.50	10	83.00	___	_____
Health and Personal Care	4	20.00	4	25.00	4	33.00	___	_____
Advancement	3	15.00	4	25.00	4	33.00	___	_____
Recreation	3	15.00	3	18.75	3	25.00	___	_____
Total		$500.00		$625.00		$833.00	___	_____

Illustration from *The Home Budget,* 1955. "Several items are distorted and sub-standard, but because of increased taxes and a higher cost of living, are unavoidable. Making a few sacrifices and avoiding all but necessary buying will help you to achieve your goal."

patronage of commercial amusements, some formal hospitality. The standard adopted excludes the possibility of expensive clothing, membership in exclusive clubs, extensive entertainment, or private schooling for the children."[24]

As an accepted expert in consumption theory, Jessica Peixotto was called, during World War I to serve on several committees and councils devoted to the care of women and children, both in Washington, DC and in Sacramento. During her tenure in Berkeley "Miss Jessica Peixotto" served on community committees like the Charity Organization Society of Berkeley, and was a founder of the Baby (later Children's) Hospital in Oakland.[25] How piquant that the Jessica Peixotto who had written the dissertation on French socialism, based entirely on rigorous archival research (in French) should fulfill in her later years the perfect picture of Lady Bountiful. But they were of a piece, as were her long years of

Emily Huntington, 1950, from her oral history. Photograph by Wayne Miller, Magnus Photos.

collecting and publishing the sometimes dusty statistics of housewives' market baskets. She died, a full professor emeritus of Social Economics, in 1941, loved and revered by her colleagues.[26]

Her work and her courses, particularly "The Control of Poverty," were taken up by two of her students, true acolytes, both women, Emily Huntington and Barbara Armstrong.[27] Huntington, who was an undergraduate in Jessica Peixotto's class, Family Budgeting, (probably, according to Huntington in 1970, later to be called "economics of consumption"), and after her PhD at Radcliffe, returned to Berkeley and taught the Peixotto course on poverty. "My longest and closest association [as a student] was with Jessica Peixotto. She was the person most responsible for stimulating my interest in economics . . . She encouraged me and gave me confidence."[28]

Professor Huntington became in turn the director of the Heller Committee from 1935 until her retirement. With the death of Mrs. Emanuel S. Heller in 1959 and then of her son Edward in 1961, the money from the family ended and shortly afterward so did the grants from the university. Saddened by this, Emily Huntington had to assume that it was the friendship with Jessica Peixotto that inaugurated the Heller support, and the ending of that family tie and perhaps other demands for the committee's funds produced the rise and demise of the institution. Her comment was that although federal funds might become available for a continuation of the Heller Committee's annual Wage Earner Budgets, "I still wonder whether any University research organization will concern itself with social problems which cannot always be turned into mathematical symbols."[29]

Emily Huntington was the last economics professor to call herself a social economist and with her retirement in 1961 the title Social Economics expired.[30] The sort of survey research Peixotto had championed and her followers had carried on, often with Heller Committee money, was no longer in fashion in economics departments. Statistics ruled.

As the generation of Jessica Peixotto brought rigorous academic research and intellectual vigor to the study of man's inhumanity to man in the field of social welfare, the next generation of economists, overwhelmingly male, subordinated these studies to "scientism." Social economics, as it was practiced in the first two decades of the twentieth century turned out to be the stepping-stone between the beginnings of economics as a science and the profession (initially completely female) of social welfare.

Jessica Peixotto enumerates the various problems associated with poverty—"character, family relations, sanitation and hygiene, of work and of leisure" then adds "it is likewise a political question. But first of all, the problem of the control of poverty is a question economic relationships."[31] Over time, how many sociologists, social psychologists, politicians, activists, and social workers themselves, have found answers to this problem under

these titles. But Jessica Peixotto never was less than a believer in the need to learn and to teach basic truths of economics. The bottom line for her was that "those social activities and theories . . . result from the fact that all persons and families are not economically self-sufficient," and she believed that "the study of problems of poverty is primarily a question of social economics."[32]

Of course, this was her own subject, and she never deserted it. When in 1913 she wrote a letter to President Wheeler complaining about her own lack of timely promotion, "later comers get first place," and of her heavy course load "I can never again give thirteen hours of instruction," she adds that the "work on social economics has in four years grown from a mere handful of students to some 230 last year."[33]

Emily Huntington said of Peixotto's continuing and unwavering fascination with poverty: "Although [she] had been brought up in a family where I understand there were no economic strains, she had real concern for the problems of the lower income groups. For some reason which I could never fathom, her interest seemed to be in the history of the treatment of the poor and the reasons for the existence of poverty."[34] Can this reason be fathomed now?

The graduate seminar in 1894-95, given by Bernard Moses that Jessica Peixotto shared with David Barrows, may have been her introduction to turn-of-the-century socialism. Moses, we know, taught courses in socialism and on the social insurance movement in Britain.[35] Her, Peixotto's, socialistic sympathies are evident from the beginning. The first course she taught, "Socialism in France," was based on her dissertation research in France and in the England of the Webbs and their Fabian Society.

There is clear evidence in her 1901 dissertation of Peixotto's pervasive sympathy for the French socialist movements and socialists themselves, both before and after the revolution. The published dissertation's preface, begins "A little more than a hundred years ago, there were in France groups of men radically opposed to the society they saw about them These men were, moreover, passionately eager to impose upon the nation . . . a new social order which they advocated." The principles of this group, "the French Irreconcilables" were the "principles of the French Revolution, " and today there is a political party holding these same ideals "sharply criticizing the established social order." They plan a future where "'progress shall engender only progress; that is, prosperity, health, education and equal intellectual development for all.' The creed of the party goes by the name of Socialism."[36]

Twenty years later, Peixotto illustrates the "socialist creed" in the syllabus of her Poverty course of 1924:

> [The] incentives behind contemporary "radical" movements:
> 1. Disapproval of great wealth, especially of the contrasts between the life of the rich and of the poor.
> 2. Sympathy for the poor; disapproval of squalor; insistence upon the disabling nature of poverty.
> 3. Hatred of inequality to the point of hating those who have place and power.
> 4. Desire to have plenty for one's self and to universalize plenty as well as all other opportunities of modern life.
> 5. Desire to do away with all class distinctions, legal or social.[37]

The syllabus challenges the present social order with its high and low standards of living, contrasts of incomes "the root of all evils; the cause of whatever is bad in the 'moral' conditions, the living conditions, and the working conditions of contemporary society. Status, as well as wage of the worker said to be both unfair and impolitic." There

will be analysis of "certain types of ownership and of contract pointed out; current modes of production and distribution, and the present competitive organization of industry" to show a "causal relation to the social maladjustments generally patent. These are in turn pronounced disastrous to human relationships and productive of social inequalities, altogether undesirable and unnecessary."

The fundamental changes urged in the basic programs of: anarchism, communism, socialism (including the Fabians), guild socialism, syndicalism, social ownership of land (single-taxers); and finally "consumers gradually to control industry . . . (the cooperative movement)." This section finishes: "Tactics advocated for bringing about these changes" moves from education to political action (party organization), to "direct action" (general strike, shop action, sabotage), and, last on the list, terrorism.[38]

If indeed, Jessica Peixotto was a closet (or open) socialist, how might it have affected her relations with her colleagues, the larger university, and the greater world? A fellow member of the economics department, Professor Ira Cross, himself a professed socialist, says in his oral history that she was a liberal.[39] His interviewer mentions that Peixotto was "quite outspoken against the conviction of Mooney and Billings at the time of the bomb that was exploded in San Francisco." Yes, replied Cross, "but she never had an attack made on her ideas or teachings by anybody, that I know of."[40]

Jessica Peixotto might, in this excerpt from her dissertation, have been speaking of herself:

> A pessimistic view of the present is the first essential to the making of a socialist, but this alone will not suffice. This spirit will produce the man who dreams of "Cities of the Sun," but it will not lead him to expect to see them realized. To be a socialist, a second characteristic is equally essential. Along with a pessimistic attitude in regard to the present, there must go an unquenchable hopefulness in regard to some better future to be realized here on this earth.[41]

Meanwhile, social economics died: but the School of Social Welfare went on, the Department of Criminology went on, at least for awhile, the courses on labor, crime, health insurance, child protection, law, were and are, taught. As the historian of the social economics era at the university, Mary Cookingham, says, Jessica Peixotto and her followers "achieved their major goals, and by their accomplishments, eliminated the need for a separate subfield within the Berkeley economics department."[42]

Wesley Mitchell, a prominent member of that same department, famous for his groundbreaking work in a totally new specialty, business cycles, wrote of his colleague's "aim to make science serve humanity. . . . Yielding to no one in her demand for thoroughness, precision, and objectivity in investigation . . . in the common fields of daily life, trying to wring from the stubborn soil harvests of knowledge that the housewife and the workingman can use."[43] Mitchell, while patronizingly referring to the housewife and workingman as beneficiaries of Peixotto's work, correctly gives her credit for her strict adherence to the rules of science, what she herself was proud of. But, across America, it was science, loosely interpreted as the statistical method, and favored by the younger, male economists coming into the profession after World War II, that put an end to social economics; "as academic social science became more professional . . . social scientists framed their empirical research to generate theory about economic activity, while also distancing their scholarship from direct application and concerns with reform." Mary Ann Dzuback is here speaking of the nation as a whole, but we can, I think, apply this conclusion to Jessica Peixotto's Berkeley.[44]

Barrows Hall, later home of economics, 1964.
University Archives (UARC PIC 17R:1).

ENDNOTES

1 Mary E. Cookingham provides the most inclusive coverage of Jessica Peixotto's life, career, writings, and her position in the academic community of her time in "Social economists and reform: Berkeley, 1906-1961," *History of Political Economy,* 19:1, Spring 1987, passim. This author's copy is so marked up that the original print is sometimes obscured. An obituary of Mary Cookingham was published in 2001 by M.C. Levenstein, in which the Berkeley economics department is given as an example of Cookingham's examination "of the role of . . . female college graduates in the workplace during the late 19th and early 20th centuries." http://eh/pipermail/hes/2001-April/000240.html

2 Verne A. Stadtman, ed., *Centennial Record of the University of California,* (Berkeley: University of California Printing Department, 1967) 76-77.

3 Ibid.

4 Ibid.

5 "The most notable progress has been . . . in the expansion of the work under Professor Peixotto's charge, which may be designated the field of constructive and preventive philanthropy." *Biennial Report of the President of the University of California,* 1910-1912, November 1912, 35.

6 Jessica Peixotto, *Syllabus for Economics 180, The Control of Poverty,* 1923-24, University of California Syllabus Series, No. 154, 5.

7 Poverty syllabus, 10

8 Jessica Peixotto and her research is one of the case studies in Daniel Horowitz's *The Morality of Spending,* an intellectual investigation of how American writers have viewed their fellow citizens' habits of consumption. Daniel Horowitz, *The Morality of Spending* (Baltimore & London: Johns Hopkins University Press, 1985), 138-47.

9 Caroline L. Hunt, *Life of Ellen S. Richards* (Boston: Whitcomb & Barrows, 1912), 313. See also Maresi Nerad, *The Academic Kitchen* (Albany: State University of New York Press, 1999), 35. For a more detailed description of Richards's attacks on immigrants's visits to saloons, parks, and festivals, her warnings to "civilized people to stay clear of places where the mass of people warmed" such as "libraries, museums, and concert halls" and to avoid the threat of "clubs, apartments, and hotels." see Horowitz, *The Morality of Spending,* 84. No less an authority than Agnes Morgan, in her article on Home Economics in Stadtman, 1967, 94-95, cites Richards as the instigator of the home economics movement in Berkeley.

10 In his famous *The Theory of the Leisure Class,* Veblen (1857-1929) a friend of many of the Chicago and Berkeley economists, colleagues of Peixotto's, makes statements like this about the consuming class: "However widely or equally, or fairly, it may be distributed, no general increase of the community's wealth can make any approach to satiating this need, the ground of which is the desire of everyone to excel every one else in the accumulation of goods." (NY: The Modern Library, 1934), 32.

11 *The Cost of Living in the United States 1914-1929* (New York: National Industrial Conference Board, Inc., 1936), v.

12 Horowitz, 38.

13 Jessica B. Peixotto, *Getting and Spending at the Professional Standard of Living* (NY: Macmillan Co., 1927), 13. The subtitle is: "a study of the costs of living an academic life," and the book presents the argument that faculty families are no longer living a monastic life devoted to study, but are now part of the larger upwardly striving middle class, sharing with the economic theory of the day "the belief in the beneficent effects of an expanding scale of wants usually called a rising standard of living."

14 Horowitz, 141.

15 Poverty syllabus, 25.

16 For another overview of Jessica Peixotto's life and career see the warm appreciation by her colleagues Henry Hatfield, "Jessica Blanche Peixotto," and Wesley Mitchell (foreword), in Henry R. Hatfield, ed., *Essays in Social Economics in Honor of Jessica Peixotto* (Berkeley: University of California Press, 1939). Mary Ann Dzuback's article "Jessica Blanche Peixotto," in the *American Biographical Dictionary,* vol.no. 258-60 is concise and thorough; see also "Jessica Blanche Peixotto," *In Memoriam: University of California* (Berkeley: Academic Senate, 1941), 24-25.

17 Jessica Blanche Peixotto, *The French Revolution and Modern French Socialism* (NY: Thomas Y. Crowell, & Co., 1901).

18 Bernard Moses (1846-1930) "was one of the University's great men, one of those wise statesmen who played a leading role in setting its basic standards establishing its ideals." Berkeley professor of history from 1875 with a PhD from Heidelberg, Moses taught political science as well and was "in effect California's social sciences department." Lincoln Constance, *Berkeley and the Latin American Connection, the Twentieth Bernard Moses Memorial Lecture* (Berkeley: Regents of the University of California, 1978), 4. Moses had studied the new German insurance schemes and taught courses on socialism and the economic conditions of laborers in England.

19 In 1912 Peixotto was paid $2000, as were all the other assistant professors. She was the only female. *Biennial Report,* 397.

20 The study of crime in the 1920s and 1930s dealt primarily with women and juveniles. Mary Ann Dzuback, "Women and Social Research at Bryn Mawr College, 1915-40," History of Education Quarterly, 33:4 (Winter 1993), 599.

21 "Cost of Living Studies, Quantity and Cost Estimate of the Standard of Living of the Professional Class," Heller Committee for Research in Social Economics of the University of California, vol. 5, 1928, 132. However, "annual attendance at the football games is assumed to be habitual," 155.

22 "Cost of Living Studies," iii.

23 Jessica Peixotto, foreword to *The Economizer* by Otto A. Jeschien (Berkeley: Economizer Publishing Co., 1916). In somewhat different form, The Economizer was republished as *The Home Budget,* in a thirtieth edition, in 1955 by the same author and publisher, but with the extra title "The only book with university recommendation."

24 "Cost of Living Studies," 132.

25 John G. Aronovici,"Berkeley's Early Nurse and Social Worker," *Berkeley Historical Society, Newsletter* 26:2 (Fall 2007), 1-7. Other founding members of the charity society besides President Wheeler, the bank president, and the police chief, August Vollmer, was her economics colleague, Professor Adolph Miller.

26 "Peixotto," *In Memoriam,* 24-25. See also Wesley Mitchell's foreword to Hatfield, ed., *Essays in Social Economics.*

27 Emily H. Huntington, "A Career in Consumer Economics and Social Insurance," an oral history conducted in 1971 by Alice Greene King, Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 1971, 46. See also an appreciation of Emily Huntington's career in Cookingham, 55-56, 63-64 For an anonymous, short, but useful description of Barbara Nachtrieb Armstrong's (1890-1976) life and her career ending as a professor of law at Boalt Hall, see the *Chronicle of the University of California,* 1:2 (1998), 48. See also Cookingham, 54-55.

28 Huntington oral history, 41, 43-46.

29 Ibid., 46. This conclusion is echoed in Mary Ann Dzubeck's 1993 article about an all-woman institution. Much of what Dzuback writes about the teaching and learning in Bryn Mawr's social economy curriculum sounds similar; and the position of one woman was crucial, although in the case of Jessica Peixotto, she was in the company of like-minded male colleagues, Professor Susan Myra Kingsbury was not. (Dzuback, 606.)

30 Although, Lucy Stebbins, who had been combining the jobs of teaching in the economics department and being the dean of women for her entire active life, was listed as late as the 1954 directory as "Professor of Social Economics, Emeritus."

31 Poverty syllabus, 5.

32 Ibid.

33 Nerad, 40-41.

34 Huntington oral history, 8.

35 Hatfield, 7

36 Peixotto, *French Revolution,* v-vi.

37 Poverty syllabus, 20.

38 Ibid, 21-22.

39 Cookingham, 59. Cross had been a teaching assistant for Veblen at Stanford, came to Berkeley in 1914 and remained to teach to huge classes in Wheeler Hall, and considered Jessica Peixotto an important friend.

40 Ira Brown Cross, "Portrait of an Economics Professor," an interview conducted by Joann Dietz Ariff, Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 1967, and his explanation of institutional economics: "Personally, I cannot see what is accomplished by the use of calculus in analyzing human behavior," 10.

41 Peixotto, *French Revolution,* 198.

42 Cookingham, 65.

43 See endnote 16. Wesley Mitchell (1874-1948) taught at Berkeley from 1903 to 1912. He married in 1911 Lucy Sprague, dean of women and one-time housemate of Jessica Peixotto's.

44 Dzuback, 605.

Setting-up exercise in the Department of Physical Culture, from Jones, *Illustrated History of the University of California,* 1895.

	Average of 15,000 students at Yale, Amherst and Cornell.	Average on entering University of California.	Average after two years' instruction, University of California.	Average Increase.
Weight, in kilos	61.2	58.3	63.2	4.9
Height, in M. M.	1725	1724	1734	10
Girths:				
Neck	349	336	355	19
Chest—repose	880	830	881	51
Chest—full	927	882	932	50
Right thigh	517	491	519	28
Left thigh	512	489	521	31
Right calf	359	340	352	12
Left calf	349	335	349	14
Right upper arm	295	291	314	23
Left upper arm	291	285	306	21
Right forearm	267	261	271	10
Left forearm	261	256	269	13
Strengths:				
Back	137	115	148	33
Legs	166	145	223	78
Upper arm	92	80	141	61
Forearm	40	40	46	6
Lung capacity	3.7	3.8	4.3	.5

Results of men students exercising and using appliances offered by the Department of Physical Culture, from Jones, *Illustrated History of the University of California,* 1895.

CREATING AND DESTROYING ONE OF THE BEST DEPARTMENTS OF PHYSICAL EDUCATION

Roberta J. Park

UNTIL IT WAS "DISESTABLISHED" IN 1997 the physical education department at the University of California was one of the oldest—and certainly one of the most prestigious—at an American university. In addition to benefitting hundreds of thousands of Berkeley students, it had had a significant role in making public school physical education in California preeminent—a status that, unfortunately, the state no longer can claim.[1] It had made valuable contributions to the extensive city and county recreation programs that once served large numbers of children and youth, had an early role in preparing "reconstruction aides" (the precursor to physical therapy), and had often joined with organizations like the American Red Cross in projects that benefitted both campus and community. Some of its faculty had engaged in research projects at UC San Francisco, Donner Laboratory of Medical Physics, the Institute of Child Welfare, and other campus units.[2] Among the faculty some had made valuable contributions to staging scenes in *Hamlet* and other productions offered by the Department of Dramatic Arts or had given hundreds of hours each semester to Orchesis (the students' modern dance club formed in 1929) and other student groups.[3] Of particular significance, it had had a defining—many would say the defining—role following World War II in shaping physical education as an academically grounded field.

Physical education is probably the most misunderstood of all subjects that comprise the curriculum. Its fundamental goal is that summarized in John Locke's famous 1693 dictum *mens sana en corpore sano*. Human beings need constant reminders about the importance of "a sound mind in a sound body" and the role of physical activity in maintaining health. As the twenty-first century begins many of the issues that troubled Americans in the late 1800s and early 1900s are again receiving attention. Since 1990 hundreds of articles like "Physical Activity and Public Health" and "Health Opportunities With Physical Exercise" have appeared in the *Journal of the American Medical Association, Health Education Research, Journal of Pediatrics, International Journal of Epidemiology,* and scores of other clinical and scientific publications.[4]

Whereas authors of these focus primarily, albeit not exclusively, upon physiological matters, others are investigating those relating to psychological and social well-being. Not unlike observations that sociologist Charles Zueblin had made in 1902 regarding the value of properly supervised children's playgrounds "to the welfare of the modern community,"[5] the United States Office of Juvenile Justice in 1999 listed "structured playground activities" and "after-school recreation programs" as significant factors in increasing positive behaviors and improving academic achievement.[6] Unfortunately, little is being done to put the findings of research into practice.[7] There is a need to reestablish intelligently designed programs like those for which the state of California once was well known and to place the leadership of these in the hands (and minds) of women and men whose training has reached the standard of UC Berkeley's former Department of Physical Education.

Beginnings at Berkeley

"It is owing to the close connection of the mental faculties and their powers with

those of the body that the training of both should go on together." These words appeared near the beginning of an article published in the early student publication, *The Berkeleyan,* in March 1874. The writer noted the importance that philosophers of antiquity had placed upon exercise, declared that the cost of a gymnasium "would soon be cancelled by giving to the University truer and better students," and closed with the words "Let those who have our mental training in their hands and our future welfare at heart, see that our physical wants are no longer neglected."[8] Similar articles followed. One in January 1877 referred to Governor Henry Haight having observed at the 1871 commencement that the aim of education should be "to secure a healthy and equal physical, moral, mental, and aesthetic development, or, borrowing Plato's definition, to give the body and the soul all the perfection of which they are capable."[9]

Berkeley's precursor to the *Daily Californian* was not the only place where such comments could be found. In his *1875-77 Report of the President of the University* John LeConte listed as his highest priorities for the campus a museum, a library, and a building that would serve as a gymnasium, auditorium, and military drill-room.[10] (The Morrill Land Grant Act of 1862, under whose conditions the university had been established, required instruction in military training as well as agriculture and the mechanic arts.) In 1876 the *Journal of Social Science* published physician J. J. Putnam's article "Gymnastics for Schools" in which the respected neurologist called for much greater attention to such matters; noted the deplorable lack of properly trained teachers; and pointed out that programs conducted for reasons of health must have quite a different focus than those whose aim is athletic achievement.[11] Even Daniel Coit Gilman (then president of Johns Hopkins University) made brief remarks about the value of physical education in his presidential address at the American Social Science Association's 1879 annual meeting.[12] Six years later the American Association for the Advancement of Physical Education (today known as the American Alliance for Health, Physical Education, Recreation, and Dance) was founded. Nine of its first ten presidents held medical degrees.[13]

Original Harmon Gymnasium, 1880s. *Hearst Gymnasium Historical Collections.*

Local businessman A. K. P. Harmon had written to the Board of Regents of the University of California in 1878 expressing his willingness to "construct on the University grounds a building to be used as a gymnasium, and on extra occasions, as an auditorium." Its "prime object," Harmon stated, was to enable students to obtain "a certain reasonable amount of exercise." He urged the university to secure the "services of an excellent instructor" and expressed hope that suitable hours would be set aside for female students.[14] The 21,200 square foot wooden Harmon Gymnasium (the third building to be constructed on the Berkeley campus) was opened in early 1879.[15]

In his *1882-84 Biennial Report* William T. Reid, the university's fourth president, enthusiastically stated, "Such satisfactory results have followed from systematic physical training, conducted upon sound physiological principals, that the gymnasium is rapidly assuming an importance almost, if not quite, coordinate with the many other branches of education." The purpose was to "accompany the well balanced mental training of the college with an equally well balanced physical training." Athletics, he noted, served quite different ends. The director of the gymnasium, Reid stated, must be a man who had a thorough medical education and also had "made physical development a special study." It was his hope that systematic physical training soon would become a part of every student's work.[16]

In 1886 the board of regents appropriated $3,000 for the establishment of a Department of Physical Culture.[17] The Academic Senate soon voted that all male undergraduates during their first two years of attendance "be required to take five half hours per week of active exercise."[18] The Department of Physical Culture opened in 1888 with Frank Howard Payne, MD, as director. His responsibilities included overseeing the required program (instruction was given by Walter Magee), giving each man an annual medical examination, and providing lectures on physiology and hygiene. Payne reported the progress of his department in the December 1890 issue of the *Pacific Medical Journal,* citing several instances where a student's health had been improved. He also made the perceptive observation, "Physical culture means far more than is suggested to the outside world."[19]

Views similar to those articulated by Reid and Payne were appearing in the *Boston Medical and Surgical Journal* (today's *New England Journal of Medicine*), educational jour-

PACIFIC MEDICAL JOURNAL.

Vol. XXXIII. DECEMBER, 1890. No. 12.

Original Articles.

PHYSICAL CULTURE AT THE UNIVERSITY OF CALIFORNIA.

By F. H. PAYNE, M. D., Berkeley, Cal.
(Read before the Alameda County Medical Association, Aug. 12th, 1890.)

Less than two years ago, the Department of Physical Culture was established at the University of California. From the beginning it has had unqualified success, and is to-day not only an important feature of the institution, but it bids fair to grow in favor and popularity as the work it accomplishes becomes better known.

Pacific Medical Journal, December 1890. *Hearst Gymnasium Historical Collections.*

nals, and publications like the widely circulated *North American Review.* Reporting on the 1889 Boston Conference on Physical Training, which was attended by 2,000 individuals, the *B.M.S.J.* stated, "[W]e believe that a department of physical education should be given a place and voice in the regular curriculum."[20] The following year Luther Halsey Gulick (a graduate of New York University Medical School) declared physical education to be a new profession "involving for its fullest appreciation a profound knowledge of man through physiology, anatomy, psychology, history and philosophy."[21] Such subjects would become the core of Berkeley's AB major in physical education.

In his 1890 article Payne had expressed hope that someone would provide a gymnasium for the women students. Phoebe Apperson Hearst (the university's first woman regent) donated the large wooden reception hall adjoining her home in 1899. This was moved to the campus and converted into a gymnasium. An outdoor basketball court surrounded by a high fence was built and in 1901 a physical education requirement for women students began.[22]

Original Hearst Gymnasium, known as Hearst Hall, 1900-1901. *Hearst Gymnasium Historical Collections.*

Before World War I "gymnastics" (various forms of calisthenic exercises designed to achieve strength, flexibility, coordination, and proper body alignment) formed the core of the required physical education program at Berkeley and elsewhere. Exercises for men typically drew upon the German form, which included the use of equipment like the vaulting horse and parallel bars, or the "system" designed by Dudley Allen Sargent, MD, director of the gymnasium at Harvard. The Swedish system of gymnastics, which used little or no equipment, was favored for women.

At Berkeley women students, who had learned the game thanks to Mr. Magee, played basketball (then considered a very minor sport) before men did. Women as well as men also might engage in sports like tennis as extracurricular activities. The major "intercollegiate" sports (football, baseball, track, and crew) were limited to participating male athletes and were controlled by the ASUC (Associated Students of the University of California). In the early 1900s aesthetic dancing then folk dancing were added to the women's curriculum. An outdoor pool was built for them in 1914—the men already had one in Strawberry Canyon. Following the creation of separate men's and women's departments that year, more sports were added to both curricula and both units began what would become very large intramural programs.[23]

In the early hours of June 21, 1922, Hearst Hall burned to the ground.[24] Upon learning of the disaster, William Randolph Hearst telegraphed President David Barrows indicating his intention to build a fireproof structure in memory of his mother to replace the destroyed gymnasium (Hearst Hall).[25] Hearst selected as architect Bernard Maybeck, whose designs included the Palace of Fine Arts at the 1915 Panama-Pacific International Exposition. When it became apparent that Maybeck was more interested in creating a monumental beaux arts building than a utilitarian gymnasium, Dean of Women Lucy Stebbins and Ruth Elliott (director of the Department of Physical Education for Women) asked William Campbell, who had just become president, to intercede. Campbell's letter to Maybeck was stark: "I have examined the blue prints carefully, I have shown them to the representatives of the women connected with the University and to the Grounds and Building and the Finance Committees of the board of regents. All of these persons have commented unfavorably as to their meeting the requirements of the situation."[26] Campbell assured Hearst that the needed facilities for women students must be paramount,[27] and Julia Morgan (UC 1894, who had studied in Paris at the École des Beaux-Arts) was engaged to ensure that this was accomplished.[28]

Hearst Gymnasium, showing the southeast pool, 1927. *University Archives (UARC PIC unnumbered from 28A, box 3).*

The well-appointed Phoebe Hearst Gymnasium for Women was dedicated on April 8, 1927,[29] and volleyball, water safety instructor training, fencing, and several other activities were added to the curriculum. The Woman's Athletic Association (a student organization that conducted its affairs under the guidance of the Department of Physical Education for Women) began offering a wider range of intramural as well as extracurricular interclass events.[30] Following a two-week visit in 1928 by Margaret H'Doubler (the University of Wisconsin's modern dance authority), Orchesis was formed and soon the young women were giving productions to which the general university community was invited.[31]

A steel and concrete Men's Gymnasium—subsequently named Harmon Gymnasium—replaced the old Harmon Gymnasium in 1933. The new facility, built at a cost of $1,000,000 ($485,000 from the estate of Ernest V. Cowell; $100,000 from the ASUC; the remainder from state funds) included a research laboratory; special rooms for instruction in such activities as wrestling and fencing; squash courts; and a large arena where men's intercollegiate basketball games were played. The arena was used for physical education classes between 9:00 a.m. and 3:00 p.m.; the men's intramural program used it for basketball and other activities starting around 8:00 p.m.[32] Immediately to the south of the building two large outdoor pools (one for swimming, one for diving) were built. Their use was divided among men's physical education classes, intramural activities, and intercollegiate practices and events.

When the physical education requirement was eliminated in 1933 the Academic Senate approved "election" of one class per semester as part of a student's graduation units.[33] Although enrollments initially declined, within two years they exceeded the earlier numbers. Most classes were given at the elementary, low-intermediate, and high-intermediate levels; and students were encouraged to take a variety so that they could learn a number of skills to use throughout their adult lives. By 1941 thirty different types of sport, gymnastic, and dancing activities were available to male students; female students could chose from more

New Harmon Gymnasium, ca.1933. *Hearst Gymnasium Historical Collections.*

than twenty.[34] In spring 1962, enrollments in the physical education activity program were 3,797—nearly 22 percent of Berkeley's undergraduate students; another thousand had sought admittance but could not be accommodated. Growing numbers of graduate students who had appropriate qualifications to serve part-time as teaching assistants and had completed Physical Education 305 (Methods of Teaching Physical Education Activities)—their teaching was overseen by faculty who held the title Supervisor of Physical Education—helped increase the number to 5,255 in spring 1965.[35]

The AB Major in Physical Education

In 1890 the director of the Department of Physical Culture, Dr. Frank Payne, had apprised Acting University President Martin Kellogg of the state's need for competent teachers—a need that was occurring throughout the country as the 1891-92 Report of the United States Commissioner of Education[36] and scores of other late nineteenth-century publications attest. On February 11, 1897, the Academic Council recommended the establishment of a two-year course that could be taken by any man or woman who was completing the bachelor's degree program. This consisted of four units of anatomy and sixteen units of work provided by the Department of Physical Culture (e. g., anthropometry; physiology of exercise; hygiene; physical examination and diagnosis; exercises adapted to public schools).[37] According to contemporary Delphine Hanna (director of Physical Training at Oberlin College) this led to the first four-year degree program in physical education in the United States.[38]

Frank Payne, MD, first director of the Department of Physical Education. *Hearst Gymnasium Historical Collections.*

Senate Bill 599, signed by California's governor on May 26, 1917, made physical education a requirement in the public schools[39] and increased the demand for teachers. In 1925-26 prerequisites for Berkeley's Group Major in Physical Education and Hygiene included: Physiology 1A, Physiology 1B (or Bacteriology 1), Economics 1A-1B, Psychology 1A, and Hygiene 3 (Elementary Epidemiology). The upper-division AB major courses, several of which required laboratory participation, included: Anatomy 102, Hygiene 101B (Child Hygiene), Hygiene 147 (Health Education), Psychology 166A, Economics 180, Physical Education 140 (Physiological Hygiene—later renamed Exercise Physiology), Physical Education 151 (Applied Anatomy), Physical Education 130 (Theory of Physical Education) or Physical Education 175 (History and Principles of Physical Education and Recreation), Physical Education 131 (Recreation Administration) or Physical Education 170 (Nature, Function, and Organization of Play). For those men and women who planned teaching and similar careers, there were professional courses such as Physical Education 160A-160B (Theory of Rhythmic Activity) and Physical Education 301A-301B (Methods and Practice in Teaching Gymnastics and Mass Athletics).[40] A fifth year of postgraduate work, required by state teacher certification regulations, was the responsibility of Berkeley's School of Education, which worked cooperatively with the Department of Physical Education for Men and the Department of Physical Education for Women. (The two merged into a single department in 1942.)[41] A master of arts degree in physical education consisting of twenty units and a thesis was approved by Berkeley's Graduate Division in 1930.[42] By 1941 fifty-six colleges and universities in the United States were offering graduate degrees in physical education.[43]

Since the 1890s a small number of individuals who held faculty positions in departments of physical education had engaged in research. However, at Berkeley and elsewhere the primary focus until after World War II remained the preparation of teachers, recreation leaders, health education workers, and such topics as pre-physical therapy training. (Prior to the 1960s the University of California prepared teachers for most subjects taught in the

A Study of Physical Education in State Universities

Showing a Series of Four Dates—First Faculty Instruction, First Departmental Organization, First Professional Training, First Major Unit

Universities	First Faculty Instruction	First Departmental Organization	First Professional Training	First Major Unit
California	1888	1888	1897	1897
Idaho	1898 (W)	1908	1910 [1]	1922
Illinois	1891	1893	1898 (M)	1905 [6]
Indiana	1890 (W)	1891	1897 (W)	1919
Iowa	1896	1899	1905 [2]	1918
Kansas	1893 (W)	1894	1900	1920
Michigan	1894	1901	1913	1921
Minnesota	1891 (W)	1896	1913 [3]	1919
Missouri	1894	1900	1903	1914
Nebraska	1889	1895	1897	1897 [7]
Ohio State	1896	1902	1912	1924
Ohio	1899	1912	1922	1922
Oregon	1894	1894	1909	1909
Texas	1903	1903	1916	1923
Utah	1893 (W)	1893	1902	1914
Washington	1895	1894	1896 [4]	1906 [8]
Wisconsin	1888 (W)	1890 (W)	1899 [5]	1911
Wyoming	1902	1913	1915	1925

W = for women
M = for men
[1] Not continuous, appears again 1912 (W) 1916 (M)
[2] Not continuous, appears again 1910
[3] Not continuous, appears again 1916 (W) 1922 (M)
[4] Not continuous, appears again 1906
[5] Not continuous, appears again 1908 1911
[6] Not continuous, appears again 1919
[7] Not continuous, appears again 1921
[8] Not continuous, appears again 1912

Teachers College, Columbia University
Contributions to Education, No. 268

Ruth Elliott, *The Organization of Professional Training in Physical Education in State Universities* (New York: Teachers College, Columbia University, 1927).

public schools. The School of Education conducted "supervised teaching" courses in mathematics, English, German, art, and ten other subjects. Some departments—e.g., French, mathematics, physical education—also included 300-level teachers' courses in their departmental offerings).[44]

Following World War II greater numbers of physical education faculty had begun to engage in research. One such individual was motor development authority Anna S. Espenschade, professor of physical education at Berkeley. The May 1960 *Research Quarterly* supplement "The Contributions of Physical Activity to Human Well-Being," in which members of the American Medical Association and the American Association for Health,

Anna Espenschade (PhD in Psychology), authority on motor development in children, 1941. Photograph by Kee Coleman. *University Archives (UARC PIC 13:2191).*

Physical Education, and Recreation reviewed then-current physiological, neuromuscular, psychological, and sociological research,[45] and the 1960 book *Science and Medicine of Exercise and Sports,* which assessed the state of research in the physiological, psychological, cultural, historical, therapeutic, nutritional, growth and development, and other areas relevant to the field, marked a major transition. In the book's introduction, editor Warren Johnson likened physical education to medicine in that both have important and necessary intersections with many fields of investigation.[46]

Although discussions were occurring at national meetings and at many institutions, it was the seminal 1964 paper, "Physical Education—An Academic Discipline," by Franklin M. Henry, professor of physical education at UC Berkeley, that had the greatest influence in moving physical education much closer to a scientific/scholarly enterprise. When describing what he believed was the proper structure of the bachelor's degree program, Henry pointed out that whereas courses in anatomy, physiology, physics, and appropriate behavioral and social sciences provided the foundations, students majoring in physical education then needed to pursue specialized studies in physiology of exercise, kinesiology and biomechanics relevant to human movement, neuromuscular coordination, motor activity, the role of sports, dance, and physical activities in various cultures, and other relevant areas. The needed work, he believed, could not be achieved only by interdisciplinary arrangements because traditional disciplines were not adequately informed with respect to "integrated knowledge." The proper model was a "cross-disciplinary" program within its own department.[47] Berkeley's program, which had moved from a group to a departmental major, already incorporated both. Its foundations were interdisciplinary; the "cross-disciplinary" integrated upper-division portion of the major was provided by a faculty that could help students understand matters from broader perspectives even though their specific research areas differed.

Franklin Henry (PhD in Physiological Psychology), authority on motor learning and control. *Hearst Gymnasium Historical Collections.*

By 1960 the graduate program was attracting a growing number of students from abroad as well as from the United States. They,

like the faculty, became increasingly dissatisfied with the joint Department of Physical Education/Department of Education doctoral degree, which required too many professional courses. Mary Lou Norrie (who became chair in 1973) successfully petitioned the Academic Senate for a separate and much more academically oriented PhD conducted under the auspices of the Department of Physical Education. It was during this period that specialized organizations such as the International Society of Biomechanics and the International Society of Sport Psychology grew rapidly as did publications like the *Journal of Motor Behavior* and *Medicine and Science in Sport*. Berkeley's faculty made many major contributions to those in their particular research areas.

To facilitate interaction among its faculty and graduate students, in 1978 the Department of Physical Education asked that its exercise physiology, biomechanics, motor development, motor behavior, and sociocultural laboratories (which were dispersed throughout the building) be relocated near each other in the north wing of Harmon Gymnasium.[48] During renovations that followed, Harmon's collection of books and journals was moved to Hearst Gymnasium, where the departmental library and archives already contained several thousand volumes as well as a vast assortment of research documents, annual reports of city park and recreation departments, those of various health agencies, and additional materials of great value to historians and others interested in health and hygiene, physiology of exercise, growth and development, play and recreation, outdoor education, modern dance, folk dance, sports, the Olympic movement, and much, much more.

With only seven professors, by the early 1990s Berkeley's Department of Physical Education had produced a remarkable amount of the best research in areas ranging from lactate metabolism to the history of exercise science and sports medicine. Nineteen Supervisors of Physical Education, a tenurable title once used at most University of California campuses, were in charge of the professional portion of the curriculum. They taught a large number of physical activity classes and provided mentoring for graduate teaching assistants who worked with the activity program. (Graduate students who served as teaching assistants in academic classes were mentored by faculty in their particular area of research.)

Its graduate students were of the highest caliber, and upon completion of their degrees they were sought by institutions of higher learning, private laboratories, a variety of health and medically related fields, and for other positions. All this was about to be demolished as a consequence of massive reorganizations of the biological sciences that began in the early 1980s and then by some administrators' desires for full-time equivalent (FTE) to support new, and often esoteric, fields of study.

By 1980 the fifty-department College of Letters and Science had been organized into four divisions: humanities, social sciences, physical sciences, and biological sciences (which included the Department of Physical Education). Berkeley's several hundred biology faculty were dispersed among numerous Letters and Science departments as well as in the College of Natural Resources and the School of Public Health. Each department/unit was responsible for the recruitment of its own faculty. The absence of a medical school—that function having been located in the late 1800s at the Toland Medical College, now the University of California at San Francisco—oriented biology at Berkeley decidedly to sub-cellular and molecular approaches.

Since the 1960s, research in the biological sciences had been undergoing extensive changes and Berkeley's "rankings" in several fields had fallen. This troubled several faculty members including Letters and Science Dean, and soon to be vice chancellor, Roderic Park (a professor of botany), and efforts were initiated to remedy the situation. These included the creation of a special Internal Biological Sciences Review Committee charged with "evaluating the programs in the biological sciences on the Berkeley campus and analyzing the space

Graduate students, ca. 1980. *Hearst Gymnasium Historical Collections.*

needs of these sciences."[49] Among the committee's several recommendations was the creation of a very powerful Chancellor's Advisory Council for Biology.[50]

The Advisory Council's December 3, 1984, "first draft" report on Reorganization of the Biological Sciences recommended that the numerous existing departments be reorganized into two areas: (1) studies in molecular and cellular biology and (2) studies in organismal, ecological, and evolutionary biology.[51] Upon receipt of the document, the chairman of the Department of Physical Education called the faculty together and charged an ad hoc internal review committee with drafting a response, stating: "The decisions which we all make in the next several weeks will be, I believe, the most consequential the Department of Physical Education has ever made."[52]

The department's response, submitted in January 1985, cited the Advisory Council report's overwhelming orientation to sub-cellular and molecular concerns, its failure to recognize "the importance of studying intact functioning individuals," and a "complete lack of knowledge . . . of the discipline of Physical Education." Also cited was the fact that Berkeley's department had been the leader in the development of physical education as an academic discipline; that its many graduates were to be found in a wide variety of careers ranging from physical therapy, nursing, and medicine to research and education. Moreover, for decades the campus Student Health Service had recognized that its activity program performed "an important role in the immediate and long-term health needs of the student body," and compelling evidence existed that physical activity was important for the maintenance of health. Further, the department had a long history of "providing leadership in the

field of physical education for the people of the State of California" and it was the only one in the University of California system that offered degrees from the AB through the PhD. Therefore, it should "be left intact."[53]

Physical education was not the only department dissatisfied with the biological sciences reorganization plans. Over the next six months several, often contentious, open meetings were held. The vice chancellor issued the Advisory Council for Biology's second iteration in July 1985, noting that because "many objections had been raised . . . [t]he Physical Education Department will be the subject of a separate administrative committee review."[54] The department responded that its current structure best ensured continuing contributions and pointed to the favorable report it had received from a duly constituted Academic Senate program review committee in 1977.[55] In the end, it was not the administration but the Academic Senate (which has authority over curricula) that conducted the 1985 review.

In early spring 1988 an extremely supportive Academic Senate review report (which called for an increase of professorial faculty) was sent to the Department of Physical Education, where it was made available to all faculty and graduate students for comment. In her letter to the graduate dean (to whose office the response was to be sent), the chairman pointed to the Academic Senate committee's endorsement of the cross/interdisciplinary nature of its AB degree programs, noting that the Senate review committee had stated that Berkeley's physical education major "already is an intellectually rich and diverse human biology major, reflecting liberal education at its best."[56]

Many factors—external as well as internal—influence decisions educational institutions make. Financial support for higher education in California declined in the early 1990s.[57] The new campus administration urged the Department of Physical Education to consider having its faculty assigned to other departments—a request to which the chairman strenuously objected.[58] Confronted with growing financial deficits, a new vice chancellor then created an Academic Programs Working Group (with ten disciplinary area advisory panels) to evaluate course work across disciplines. These matters led a "re-visitation" (conducted in 1992) of the 1988 review of the Department of Physical Education and to a confirmation of the support that it had received earlier. In its 1992 reassessment the Academic Senate's Graduate Council declared that the Department of Physical Education had "a keen sense of the field (in research, scholarship and practice) and had made a compelling case for increasing its faculty."[59]

Nonetheless, the administration refused to provide support and it was becoming evident that physical education and three small departments were in jeopardy.[60] In early August 1994 the recently retired chairman of the Department of Human Biodynamics (the name the Department of Physical Education had been granted in 1993) wrote to its new chairman outlining the repeated intransigence of the administration and noted that its willingness to ignore established Academic Senate procedures was tantamount to making "a travesty of the notion of faculty governance." Why, she asked, should not the Department of Human Biodynamics "be the center of human/systems physiology on the campus"?[61] Constant vigilance, she warned, would be needed to counter the desires of some administrators to seize its FTE. The department's response was not sufficiently compelling, its promised faculty positions were not forthcoming, and it was disestablished in 1997.

Epilogue

Although Phoebe Apperson Hearst might be somewhat surprised to find young men now engaging in a variety of activities at the "women's gymnasium," she doubtless would be pleased that many of the purposes for which she and her son had given gymnasiums are still being fulfilled. The campus administration did have the wisdom to retain the former

Department of Physical Education's exemplary instructional physical activity classes. These now are organized within a Physical Education Program (no longer a department) headed by a very capable director who formerly had served as the department's vice chair. Hundreds of young women and men continue to enroll each semester in classes ranging from aquatics, ballet and modern dance to martial arts and tennis, and more. Those who wish to gain understandings of the physically active body that are informed by both academic and applied perspectives (is this not the basic paradigm in medicine?) may do so in Physical Education/ Integrative Biology 165 (Biomechanical Analysis of Human Movement) and other types of lecture and laboratory classes this program also offers.

In April 2007 Berkeley's Center for Studies in Higher Education issued the results of a two-year study that had focused upon the need for research universities to give renewed attention to general education. Among several things that the study called for were more "*interdisciplinary* instructional collections or packages of courses around timely issues"; more opportunities to involve undergraduates "in research activities in academic, laboratory, and field settings"; and the need to improve the teaching methods of faculty and graduate teaching assistants.[62] Had not Academic Senate reviews in 1988 and again in 1992 stated that Berkeley's physical education major was "an intellectually rich and diverse human biology major, reflecting liberal education at its best"? Had not the cross-disciplinary upper-division major been built upon an interdisciplinary foundation that involved both psycho/social and biological understandings? Had not the AB major included several courses that required all enrolled students to engage in laboratory, field, and other research modes? Had not its graduate teaching assistants received mentoring from members of the faculty? Do not today's children and youth need the educationally sound physical education classes and after-school programs that once were provided for them? *Quo Vadis 2010?*

ENDNOTES

1 The California School Boards Association recently reported that more than 50 percent of school districts were not in compliance with state physical education mandates. "Physical Education and California Schools," California School Boards Association, *Governance and Policy Services,* October 2006, 2.

2 See, for example, Roberta J. Park, "A Long and Productive Career: Franklin M. Henry—Scientist, Mentor, Pioneer," *Research Quarterly for Exercise and Sport,* 65 (1994), 295-307; idem, "'Time Given Freely to Worthwhile Causes': Anna S. Espenschade's Contributions to Physical Education," *Research Quarterly for Exercise and Sport,* 71 (2000), 99-115.

3 Roberta J. Park, "Learning and Understanding the 'Conversation of the Blades'," *Chronicle of the University of California,* 6 (2004), 109-116; idem, "Creating from Minds and Bodies: The Spring Dance Concert," ibid., 77-88.

4 R. R. Pate et al., "Physical Activity and Public Health: A Recommendation from the Centers for Disease Control and Prevention and the American College of Sports Medicine," *Journal of the American Medical Association,* 273:5 (1995), 402-407; M. Coday et al., "Health Opportunities with Physical Exercise (HOPE): Social Contextual Interventions to Reduce Sedentary Behavior in Urban Settings," *Health Education Research,* 17:5 (2002), 637-647; W. B. Strong et al., "Evidence Based Physical Activity for School-age Youth," *Journal of Pediatrics,* 146:6 (2005), 732-737.

5 Charles Zueblin, *American Municipal Progress: Chapters in Municipal Sociology* (New York: Macmillan Co., 1902), 134-138.

6 Richard F. Catalano et al., "School and Community Interventions to Prevent Serious and Violent Offending," *Juvenile Justice Bulletin,* October 1999. See also, Rolf Loeber and David P. Farrington, eds., *Serious and Violent Juvenile Offenders: Risk Factors and Successful Interventions* (Thousand Oaks, CA: Sage Publications, 1998).

7 In 2006 the Centers for Disease Control and Prevention reported that fewer than 30 percent of high school girls and fewer than 38 percent of high school boys attended daily physical education classes. The situation is even worse in elementary schools, where teachers typically do not have the needed training, www.gov/HealthyYouth/Physical Activity (accessed September 2007). See also, *U.S. Department of Health and Human Services, Healthy People 2010,* 2nd ed. (Washington, DC: Government Printing Office, 2000), vol. 2, section 22. www.healthypeople.gov.

8 "A Plea for a Gymnasium," *The Berkeleyan,* March 1874, 10.

9 "Muscle," *The Berkeleyan,* January 30, 1877, 2.

10 *Biennial Report of the Regents of the University of California for the Year 1875-77,* Berkeley: University of California, 56-57.

Women faculty, ca. 1967. *Hearst Gymnasium Historical Collections.*

11 J. J. Putnam, "Gymnastics for Schools," *Journal of Social Science,* 8 (1876), 110-124.

12 D. C. Gilman, "Annual Address of the President," *Journal of Social Science,* 10 (1879), 17.

13 See Roberta J. Park, "Science, Service, and the Professionalization of Physical Education: 1885-1905," *Research Quarterly for Exercise and Sport,* Special Centennial Issue (1985), 7-20.

14 A.K.P. Harmon to Board of Regents of the University of California, [month unknown] 20, 1879, 380g P18 V.1-pamphlets. University Archives, University of California, Berkeley. (Hereafter University Archives.)

15 "Harmon Gymnasium," *The [San Francisco] Mirror,* November 16, 1878. Additions in 1903 more than doubled the building's size.

16 *Biennial Report of the President of the University of California on Behalf of the Board of Regents, 1882-84,* 34-35.

17 Before World War I departments often were referred to as "physical culture" or "physical training" rather than "physical education."

18 Academic Senate, 1887-89, Regents' records, CU-1, box 6:2. University Archives.

19 F. H. Payne, "Physical Culture at the University of California," *Pacific Medical Journal,* 33 (December 1890), 705-710.

20 "The Boston Conference on Physical Culture," *Boston Medical and Surgical Journal,* 121 (1889), 566-567.

21 Luther H. Gulick, "Physical Education: A New Profession," *Proceedings of the 5th Annual Meeting of the American Association for the Advancement of Physical Education* (Ithaca, NY: Andrus and Church, 1890), 59-66.

22 For these and other details see Roberta J. Park, "A Gym of Their Own: Women, Sports, and Physical Culture at the Berkeley Campus," *Chronicle of the University of California,* 1:2 (1998), 21-47.

23 So many teams were signing up for men's intramural basketball during the early 1960s that games had to be held in the Harmon Gymnasium arena as late as 1:00 a.m. The Department of Physical Education's responsibility for intramural sports would continue until 1976 when a separate Department of Recreational Sports (which had no curricular authority) was created.

24 "Hearst Hall Burnt; Loss Over $150,000," *Berkeley Daily Gazette,* June 21, 1922.

25 William Randolph Hearst to David P. Barrows, June 21, 1922, President's records, CU-5, Ser. 2: 1922, 1281. University Archives; "W. R. Hearst to Rebuild Women's Gymnasium Given by His Mother," *Daily Californian,* June 24, 1922.

26 W. W. Campbell to Mr. Maybeck, October 23, 1923. President's records, CU-5, Ser. 2: 1923, 259. University Archives.

27 William R. Hearst to William W. Campbell, January 27, 1924; William W. Campbell to William R. Hearst [telegram], February 2, 1924. CU-5, Ser. 2: 1924, 319. University Archives.

28 "Memorandum on Conference Between Mr. William Randolph Hearst and President Campbell This Afternoon," November 16, 1923. Bernard Maybeck Papers, Documents Collection, College of Environmental Design, University of California; Dean Walter M. Hart to Julia Morgan, March 13, 1924, President's records, CU-5, Ser. 2: 1924, 319; Julia Morgan to Walter Hart, President's records, CU-5, Ser. 2: 1924, 319. University Archives.

29 "Annual University Day Celebrations to Include Many Colorful Events." *Daily Californian,* April 8, 1927; "Greek Theater [and] Hearst Memorial Gymnasium," ibid. (Special Supplement).

30 In 1915, after Maude Cleveland became director of the Department of Physical Education for Women, Berkeley's female students began participating in semi-annual field days with Stanford and Mills College. As elsewhere, the W.A.A. program did not exist solely for sport; developing leadership skills and giving service were important components. By the 1950s extracurricular sports competitions for female students had grown considerably. It was the passage of the Education Act of 1972 (notably Title IX) that brought these to the prominence that they enjoy today (in programs now run by athletic, not physical education, departments).

31 "Women Get Four Tennis Courts by President's Grant," *Daily Californian,* January 22, 1923; "Miss H'Doubler's Extension Class—1929," Hearst Gymnasium Historical Collections. (Hereafter HGHC.)

32 Use of this space for both instructional physical education classes and intramural sports was terminated when Harmon Gymnasium was converted into Haas Pavilion.

33 The reason given was the financial situation caused by the Great Depression, but it is more likely that some faculty who were of the opinion that an institution of higher learning should be concerned only with matters of the mind saw this as an opportunity do away with things having to do with the body.

34 University of California, Berkeley, *General Catalogue, 1941-42,* 369-370, 373.

35 "Physical Education: Enrollment in Activity Courses, Fall 1959-Spring 1965." (Report compiled by the Department of Physical Education.) HGHC.

36 *Report of the Commissioner of Education for the Year 1891-92* (Washington, DC: Government Printing Office, 1894), vol. 1, 494-594.

37 "Teachers Course in Physical Culture," February 11, 1897, Regents' records, CU-1, box 25:8. University Archives. "Teachers Course in Physical Culture," University of California, *Annual Announcement of Courses of Instruction for the Year 1898-99,* Berkeley, 1899, 119-122.

38 Delphine Hanna, "Present Status of Physical Training in Normal Schools," *American Physical Education Review,* 8 (1903), 293-297.

39 California was the sixth state to enact such legislation. The Secretary of the California Committee to Promote Physical Education, which had a significant role in fostering it, was Maude Cleveland, director of Berkeley's Department of Physical Education for Women.

40 *University of California Bulletin, Announcement of Courses, 1925-26,* 217, 220.

41 With few exceptions, across the country departments of physical education for women and departments of physical education for men did not join until the late 1960s and 1970s. However, classes that comprised the upper-division major had been open to both sexes since the early 1900s. Exercise physiology, for example, typically was taught by the men's department; kinesiology (applied anatomy and matters related to physical therapy) typically was part of the women's department curriculum. Until the 1950s, the tendency was to have separate physical activity classes for men and for women, except in such subjects as dance. The early merger at Berkeley was a consequence of the death in 1942 of Frank Kleeberger (director of the Department of Physical Education for Men) and the illness of Violet Marshall (director of the Department of Physical Education for Women).

42 University of California, *Announcement of the Graduate Division, Physical Education,* November 1930.

43 Jack E. Hewitt, "The Graduate Major in Physical Education, *Research Quarterly,* 13 (1942), 252-256.

44 See Roberta J. Park, "Health, Exercise, and the Biomedical Impulse, 1870-1914," *Research Quarterly for Exercise and Sport,* 61 (1990), especially pages 135-136; University of California *General Catalogue, 1941-42.*

45 "The Contributions of Physical Activity to Human Well-Being," *Research Quarterly,* 31:2, part II (1960), 261-375.

46 Warren R. Johnson, ed., *Science and Medicine of Exercise and Sports* (NY: Harper and Brothers, 1960).

47 Franklin M. Henry, "Physical Education–An Academic Discipline," *Journal of Health, Physical Education, and Recreation,* 35:7 (1964), 32-33, 69. (What Henry described was essentially the AB major in physical education that he and his departmental colleagues at Berkeley already had created.)

48 Mary Lou Norrie to Ted Chenoweth, January 25, 1978. HGHC.

49 Martin Trow, *Biology at Berkeley: A Case Study of Reorganization and Its Costs and Benefits,* Research and Occasional Papers Series: CSHE. 1.99. (University of California, Berkeley: Center for Studies in Higher Education, 1999). http://cshe.berkeley.edu/publications/docs/PP.Trow.Biology.1.99.pdf

Men faculty, 1968. *Hearst Gymnasium Historical Collections.*

50 According to Trow, the Council "was essentially the chief mechanism of reform for overriding departmental authority on crucial issues," ibid., 9.

51 Trow, *Biology at Berkeley: A Case Study of Reorganization and Its Costs and Benefits;* Chancellor's Advisory Council for Biology to Chancellor Michael Heyman and Vice Chancellor Roderic Park, December 3, 1984. HGHC.

52 Roberta J. Park to Professors Bredemeier, Brooks, Lehman; Ms. Scott, Mr. Cutino, Dr. Frey, December 11, 1984. HGHC.

53 George A. Brooks (Acting Chairman) and Roberta J. Park (Chairman) to Vice Chancellor Roderic B. Park, January 22, 1985. HGHC.

54 Vice Chancellor Roderic B. Park to Berkeley biology faculty, July 19, 1985. (To which is attached the Joint Report of the Chancellor's Advisory Committee on Biology and Subcommittee for Second Iteration: "Reorganization of the Life Sciences," July 15, 1985.) HGHC.

55 Roberta J. Park to Vice Chancellor Roderic B. Park, August 30, 1985. HGHC.

56 Roberta J. Park to Dean Joseph Cerny, Re: Statement Regarding Response to the Report of Committee to Review the Department of Physical Education, April 25, 1988. HGHC. Another comment by the Review Committee all too accurately reflects generally held misconceptions of what physical education really is about: "The faculty of Berkeley's Department of Physical Education contradict [the] common perception."

57 Jack McCurdy and William Trombley, *On the Brink: The Impact of Budget Cuts on California's Public Universities* (Santa Clara, California Higher Education Policy Center, 1993).

58 Roberta J. Park to Provost Carol T. Christ and Dean David R. Bentley, September 23, 1991. HGHC.

59 Graduate Council Report on the Review(s) of the Department of Physical Education, May 18, 1992. HGHC.

60 Scandinavian and Art Practice received support from relevant members of the faculty and were retained. Dramatic Art was reconfigured, largely by administrative action, as Theater, Dance, and Performance Studies.

61 Roberta J. Park to Timothy P. White, August 8, 1994. HGHC. The diagram on page 104, of Jack H. Wilmore, "Building Strong Academic Programs for Our Future," *Quest,* 50 (1998), 103-107, which illustrates that physical education departments at eight of ten state-supported universities in Arizona, Oregon, Washington, and California (four in the University of California system) had been eliminated or downsized is telling. After all, administrators do speak to each other!

62 Center for Studies in Higher Education, University of California, Berkeley: *General Education in the 21st Century: A Report of the University of California Commission on General Education in the 21st Century* (April 2007), especially pages 22-24. http://cshe.berkeley.edu/research/gec/

Parallel bars in the Department of Physical Culture, from Jones, *Illustrated History of the University of California,* 1895.

CELEBRATING THE BEVATRON

Marjorie Dobkin

THE BEVATRON at Lawrence Berkeley National Laboratory (LBNL), one of the most important particle accelerators in the world during the 1950s and 1960s, will soon be demolished. The U.S. Department of Energy, which closed the main Bevatron building (Building 51) in February 1993, announced that "on-site deconstruction" of the building was scheduled to begin "approximately July/August 2008."[1] But it is still there. LBNL officials have proposed commemoration of the Bevatron through a monument or permanent display. Let us begin the commemoration now, while the facility still stands on a hill above the UC Berkeley campus.

With an energy range of 6.2 BeV (billion electron volts), the Bevatron was the largest, highest-energy accelerator in the world when it opened in 1954 at the University of California Radiation Laboratory or UCRL, predecessor of the Lawrence Berkeley Laboratory.[2] Like most other UCRL facilities, the Bevatron was owned and funded by the U.S. Atomic Energy Commission, or AEC (predecessor of the U.S. Department of Energy), and managed by the University of California. It was constructed on land owned by the Regents of the University of California and leased to the AEC.

Designed for the study of high energy nuclear processes of the cosmic energy range, it was the world's "most productive accelerator of the 1950s."[3] During the 1950s and 1960s four Nobel Prizes were awarded for particle physics research conducted in whole or in part at the Bevatron. UCRL Head Engineer William Brobeck and staff designed the Bevatron as a type of accelerator called a proton synchrotron—a machine that accelerates protons (the nuclei of hydrogen atoms) until their velocity is relativistic, or almost as great as the speed of light.

View of laboratory hill area, with Bevatron in foreground and 184-inch cyclotron in background, June 1958. *LBL Photographic Services MISC 1240.*

The Bevatron was at the forefront of physics research because of its capacity to generate the highest energies produced by accelerators of the late 1950s. The greater the energy of the protons striking a target, the more massive or numerous the newly created particles were likely to be. The highest velocity that protons attained in the Bevatron was 184,500 miles per second, or 99.2 percent of the speed of light. This is equivalent to an increase in energy of 6.2 billion electron volts (BeV).[4]

By the late 1960s, during a period of substantial federal government support for physics research and rapid advances in accelerator design, the Bevatron had been superseded by more powerful accelerators at other laboratories. An AEC congressional report projected its closure in 1974.[5] However, the Bevatron was granted a new lease on life in 1971. A proposal by a UCRL nuclear chemist, Albert Ghiorso, to connect the Bevatron to the SuperHILAC, a linear accelerator just up the hill, resulted in a hybrid facility known as the Bevalac.

With the opening of the Bevalac in 1974, the focus of research at the facility shifted from the acceleration of protons to the acceleration of heavy ions (ions heavier than helium) and from high energy particle physics research to three new areas of research: nuclear heavy-ion physics; medical research and therapy in cancer treatment; and cosmic ray experiments which simulated conditions encountered by astronauts in outer space. Throughout the whole period of its operation, from 1954 through 1993, the Bevatron/Bevalac was used not only by scientists at UC Berkeley but by visiting scientists from around the country, as well as foreign scientists from Europe, the Soviet Union, Israel, Japan and other countries.

Ernest O. Lawrence, the Radiation Laboratory, and the Bevatron

The British scientist John B. Adams views the Bevatron and other synchrotrons of the postwar period as the beneficiaries of an exceptionally "smooth" evolution of accelerator design and development that had begun with Ernest O. Lawrence's invention of the cyclotron, a circular particle accelerator, in the early 1930s.[6] Lawrence was a UC Berkeley physics professor when he won the Nobel Prize in 1939 for inventing the cyclotron. He was also "one of the greatest scientific promoters of his time,"[7] with a remarkable talent for securing federal government support for UCRL programs and facilities, including the Bevatron later on.

The Radiation Laboratory: 1931-1939

Lawrence organized the University of California Radiation Laboratory (often called simply the Rad Lab) in 1931 on the main campus of UC Berkeley, where he developed the cyclotron in the early 1930s. UCRL was renamed the Lawrence Radiation Laboratory (LRL) in 1958, in memory of its founder; in 1971 the name of the laboratory was changed to the Lawrence Berkeley Laboratory (LBL).

The cyclotron provided a major breakthrough into the realm of high energy physics by applying Lawrence's principle of repetitive acceleration. In the 1920s, direct-voltage accelerators had been developed which gave particles a single, accelerative push. The direct-voltage accelerator was, however, severely limited in its energy range. In a cyclotron, accelerating particles travel a spiral path within a relatively small space, receiving repetitive applications of comparatively small voltages. This exposure to many accelerative pushes results in the acceleration of particles to high energies.[8]

The first practical cyclotron, built in 1931 by Lawrence and M. S. Livingston, was an 11-inch machine (with magnet pole faces 11 inches in diameter) and yielded charged particles of sufficient energy to cause nuclear disintegrations. Rapidly succeeding generations of larger and more efficient cyclotrons (27.5-inch, 37-inch, 60-inch) continued to establish frontiers of new energy ranges and deeper penetrations of the atomic nucleus.[9]

University officials rewarded Lawrence for his success with the cyclotron program in 1936, by establishing the Radiation Laboratory as an independent division of the UC Berkeley Department of Physics. The vast potential of cyclotron research had by that time gained both national and international recognition. With Lawrence's help, cyclotrons were built at other universities in the United States, as well as in Europe, the Soviet Union, and Japan.[10]

In 1939, at the age of thirty-eight, Lawrence received the Nobel Prize in physics for his invention of the cyclotron and for his pioneering research with it. The Nobel Prize was a triumph not only for Lawrence but also for the University of California, since Lawrence was the first professor at a public university in the United States to receive the award.[11]

The physicist and cold war historian Herbert York, one of the early students at the Radiation Laboratory, summarizes in the following passage the substance of the cyclotron invention, and Lawrence's enduring contribution to the field of accelerator design:

> [The cyclotron] was a machine for accelerating protons and other nuclear particles to high velocities by means of an ingenious combination of oscillating electric and static magnetic fields. Its basic purpose was to probe the properties of the atomic nucleus and to investigate its constituents. There were other machines for this purpose—all were popularly called atom smashers—but Lawrence's cyclotron proved to be the most powerful and effective. More important, his approach appeared to offer the potential for virtually unlimited further development and extension. In fact, more than half a century later, nearly all of the world's huge particle accelerators are based on concepts that, while different in detail and generally much more elaborate, are the direct descendants of Lawrence's original invention.[12]

The Radiation Laboratory: 1940–1945

Lawrence's Nobel Prize helped generate funding from the University of California and the Rockefeller Foundation for the expansion of programs and facilities at the Radiation Laboratory during the early 1940s. Having outgrown its original site on the main campus of UC Berkeley, the laboratory focused its plans for future development on Charter Hill, to the east of the campus, which had a commanding view of the university, the city of Berkeley, and San Francisco Bay to the Golden Gate. This hill, rising dramatically above the Greek Theatre and the football stadium, was intended as a showcase for the largest cyclotron ever built. The 184-inch cyclotron, which began operation in 1942, was housed in a landmark building designed by renowned campus architect Arthur Brown Jr., as a "visually dominant structure [that would] assert the pre-eminence of science."[13]

Historians J. L. Heilbron and Robert W. Seidel, who have written the definitive history of the early years of the Rad Lab, described the entrepreneurial spirit that drove Lawrence and UC President Robert Gordon Sproul in their quest for newer and bigger accelerators. "The success of the cyclotron had inspired competitors, including two clones of the 60-inch; if the Laboratory wished to stay ahead, it must cross the new frontier where, as cosmic ray studies indicated, 'strikingly new and important things' were to be found. Sproul wanted to keep Berkeley ahead."[14]

These ambitions were fed by timely scientific innovations and also by generous patronage—by private foundations during the prewar period and federal government agencies during and after the Second World War. The regents of the University of California also played a vital role as laboratory sponsors by approving contracts with the Atomic Energy Commission (AEC) for university management of UCRL and by providing university land for laboratory expansion.[15]

During World War II, UCRL accelerators that had originally been built for physics research were mobilized by the Manhattan Engineer District (MED) for the development of a prototype for electromagnetic separation of uranium isotopes used in nuclear explosives. The weapons program generated rapid development of UCRL facilities and personnel; by 1944 there were more than thirty buildings and laboratories on the main campus and Charter Hill and a staff of more than 1200 scientists, technicians, and engineers.[16]

The Radiation Laboratory: Immediate Postwar Period

The partnership of the physics community and the federal government that had been established for the weapons program during World War II continued during the post-war period. The arms race with the Soviet Union during the Cold War provided new justification and popular support for government sponsorship of physics research and accelerators with potential military applications.[17]

Accelerator development in the years just after the Second World War was, Heilbron argues, the result of a "trade-off, more or less explicit, between physicists and government. . . . Physicists received generous support for research that was of little, if any, direct concern to the sponsoring agency, in return for supplying trained manpower and technical advice. Most of the PhDs trained with Atomic Energy Commission funds at university accelerator laboratories did go to work for the AEC in one way or another."[18]

The Rad Lab's contribution to the atomic bomb program during the war paved the way for government support for the continued expansion of laboratory programs and facilities in the immediate postwar period. Lawrence secured funding from the MED and its successor organization, the Atomic Energy Commission, for an ambitious development program that focused on four new accelerators: the Bevatron, designed in 1946-48 for the acceleration of protons to energies of over six billion electron volts; the 4,000-ton 184-inch synchrocyclotron (completed in 1946), operating at first at 380 MeV (million electron volts); a synchrotron (opened in 1947) designed for the acceleration of electrons to 300-million volts; and a linear accelerator (completed in November 1947) incorporating Luis Alvarez's ideas for the use of microwave power to accelerate protons to high energies.

The Bevatron was the first UCRL building to be constructed on the Frank Wilson Tract, a 97-acre parcel that adjoined the main university campus on the north, and Charter Hill (the 184-inch cyclotron area) on the south. After the Second World War, the Wilson tract had been considered as a possible site for the United Nations headquarters.[19]

The Bevatron Planning Process

The initial phase of the Bevatron planning process took place in the late 1940s during a period of rapid dissemination of accelerator ideas, fostered both by cooperation and competition among various research laboratories. William Brobeck, Head Engineer at UCRL, designed a 10 BeV proton synchrotron in the fall of 1946 after taking an engineer's course on accelerator construction at UCRL in the summer of 1946. The 10 BeV energy limit was set, Brobeck explained, because it seemed "the largest machine that could be made in the near future without departing from the techniques used on machines at present in operation."[20]

The physicist I. I. Rabi borrowed copies of Brobeck's plans to persuade officials at Brookhaven National Laboratory (BNL) in New York to undertake a similar accelerator program there. Mark Oliphant, a physicist in Birmingham, England, who had visited UCRL during the war, had by this time already planned a 1.3 BeV proton synchrotron, scheduled to begin operation in late 1949. (Actual operation of the Birmingham machine was delayed

until June 1953.) With this array of competition "Lawrence knew, therefore, that he would have an uphill fight to win AEC support for Brobeck's machine, which he needed to remain ahead in accelerator design."[21]

Political gamesmanship and funding negotiations played a crucial role in the design of Bevatron's energy threshold. Lawrence first sought approval from the AEC in 1947 for $9.6 million for a 10 BeV proton synchrotron designed by William Brobeck. When this proposal exceeded AEC budget limitations, Lawrence reduced the energy in half, to 5 BeV. UCRL physicists Edwin McMillan and Wolfgang Panofsky suggested an energy of 6 BeV, the level estimated to be necessary for the production of antiprotons.[22]

In late 1947 and early 1948, UCRL and Brookhaven engaged in a competitive race for design and approval of proton synchrotrons in the 2 to 6 BeV range. The General Advisory Committee (GAC) of the AEC took a diplomatic course by recommending in February 1948 that "two machines, aimed at substantially different maximum energies, should be built and that the energies and locations [of each] should be determined as a result of consultation between the laboratories" and the AEC.[23]

The GAC recommendation left open the vital question of which laboratory would win approval for a higher energy machine. On March 8, 1948, Lawrence revised his proposal again, now calling for a larger machine with a radius of 55 feet, with a primary goal of achieving 6-7 BeV protons. Brookhaven adhered to its original proposal for a 2-3 BeV machine (the Cosmotron) with hopes of eventual construction of a 10 BeV machine. On April 14, 1948, the GAC finally approved the two proposals—UCRL's 6 BeV Bevatron and Brookhaven's 3 BeV Cosmotron as "major tools for basic research."[24]

Lawrence and the AEC

The AEC's authorization of the Bevatron, the fourth major accelerator at UCRL in the postwar period, was a tribute to Lawrence's finesse as a negotiator and underscored the preeminence of the Radiation Laboratory's leadership in high-energy physics. By focusing on accelerator design and construction, rather than reactors, UCRL avoided the security problems faced by other AEC facilities such as Argonne, Oak Ridge and Brookhaven. With Lawrence as director, the Rad Lab made a successful transition to peacetime research, and its postwar accelerators "helped set the tone of modern big science."[25]

Proton Synchrotron Development

The British scientist John B. Adams traced a remarkably "smooth" line of development from Lawrence's early cyclotrons to the design of the Bevatron and other synchrotrons in postwar period:

> What happened was that one type of machine succeeded another and as each type reached a limiting energy, sometimes for fundamental reasons but more often because extending its energy would have led to prohibitive costs, a new idea was put forward which overcame these limitations and allowed higher energy machines to be built. The remarkable thing was that these new ideas arrived at just the opportune moment so that the research proceeded rather smoothly from one energy range to the next. When the cyclotrons of Lawrence and Livingston were reaching their energy limit due to relativistic effects causing the particles to drop out of phase with their accelerating voltage, McMillan and Veksler invented phase stability. The cyclotron became the synchrocyclotron and the energy limit was extended from about 20 MeV to nearly 1 GeV. [GeV is equivalent to BeV.] When the huge magnets of the

> synchrocyclotrons looked like becoming an economic limitation, annular magnets were adopted and the accelerating voltage frequency was tracked with the rising magnetic field to keep the particles circulating at constant radius as their energy increased. This new type of machine, called the synchrotron, enabled the energy limit to be pushed up by another order of magnitude to 10 GeV.[26]

The synchrotron principle of magnetic particle acceleration derived from three independent sources all occurring within a few years of each other. The first proposal for a proton accelerator was made by Marcus Oliphant of the University of Birmingham, England, in 1943 although the proposal was not published until 1947.

The Bevatron also drew upon the idea of phase stability developed by two scientists working independently—a Russian scientist Vladimir Veksler (1944) and physicist Edwin McMillan of UCRL (1945). Both versions of the phase stability concept "presented methods by which particles in resonance-type accelerators could be kept in resonance with the radiofrequency fields indefinitely, and could be accelerated to much higher energies."[27] The Bevatron and other proton synchrotrons were the "culmination of phase-stable accelerators," and produced the highest energies of the accelerators built in the immediate postwar period.[28]

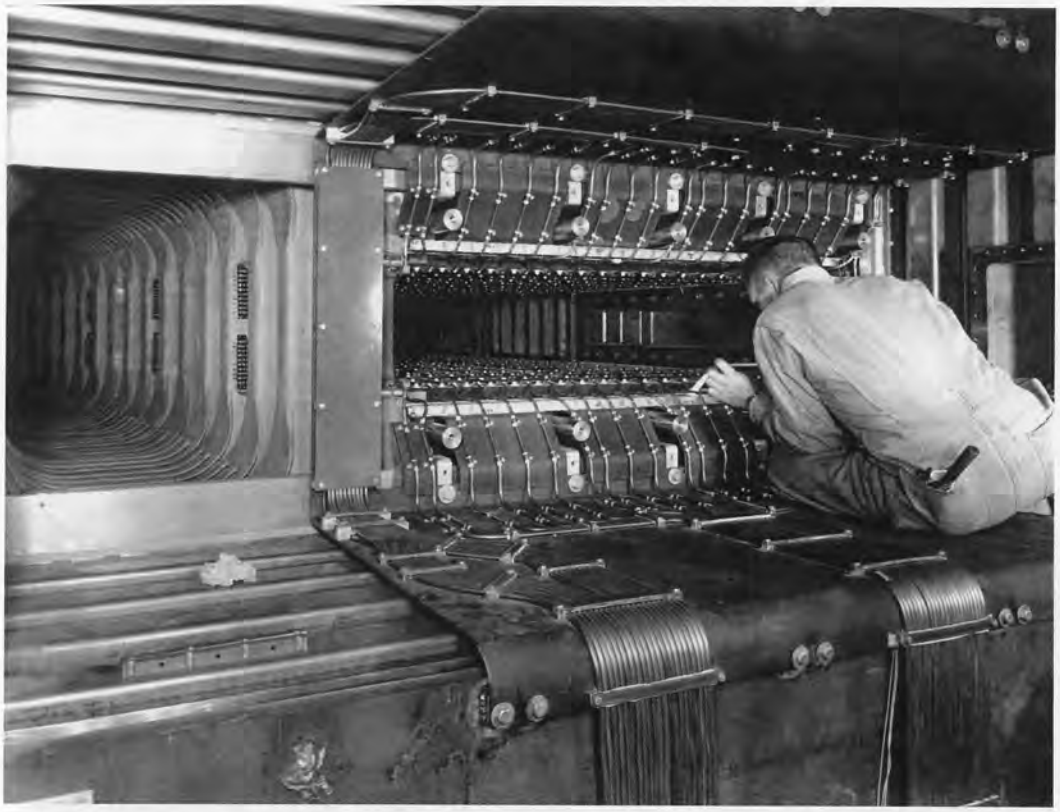
Bevatron Design

> The Bevatron was a circular accelerator in which particles were kept in a circle of constant radius by a magnetic guide field that rose in time as the particles were accelerated by a radio-frequency voltage. Protons in the Bevatron were accelerated by electromagnetic forces and all particles moved in the same direction, forming a beam. After the particles were accelerated to the desired energy, the beam was steered to strike a target. When a beam of high-energy protons from the Bevatron struck a target, interactions occurred between the speeding protons and the stationary nuclei of the target. The interactions often produced particles that did not exist before the collision.[29]

UCRL built a quarter-scale model of the Bevatron in 1949 to work out design problems. Success with the model prompted the start of construction of the full-scale version in September 1949.[30] The quarter-scale model was sent to the California Institute of Technology and after upgrading was used for several years to accelerate electrons.[31]

Progress on the Bevatron was interrupted from 1950 to 1952 by the diversion of Rad Lab scientists to a new project, a materials-testing accelerator (MTA) built on an abandoned naval air station at Livermore, California, 45 miles east of Berkeley. The MTA, a proton linear accelerator designed for the production of critical materials, was considered a top priority after explosion of the first Soviet atomic bomb in 1949. The shift in priorities signaled a new period of laboratory mobilization for national defense. Difficulties in the design and operation of the MTA, and the discovery of new sources of uranium in the western United States, led to termination of the MTA project, and the return of Rad Lab personnel to Berkeley and to the Bevatron in 1952.[32]

While UCRL staff was working on the MTA project in Livermore, Brookhaven made consistent progress on the Cosmotron that began operation in 1952. Experience gained from both the Cosmotron and UCRL's quarter-scale model helped the Rad Lab fine-tune the full-scale Bevatron and resolve a central question in its design—the beam aperture. Brobeck's original design called for a large aperture between the magnet poles, 4 feet high



Technician working at Bevatron beam aperture crawl space on left, December 29, 1953.
LBL Photographic Services BEV 657.

by 14 feet wide, but this would have produced protons of only 1.5 BeV. In 1950, UCRL planned the Bevatron with a 2' x 6' aperture for an energy of 3.67 BeV, with allowances for future modification for an energy range of 6 BeV. In December 1951 it was decided to plan directly for a 6 BeV machine, with an aperture of 1' by 4'.[33]

The Bevatron was in operation by early 1954 and reached the target of more than six billion volts of energy in April 1954. As Heilbron explained, "When completed in 1954, the 10,000-ton synchrotron could accelerate well-behaved protons through 4,000,000 turns in 1.85 seconds without their deviating from the median orbit by more than a few inches. Their journey to 6.2 BeV lasted 300,000 miles."[34]

Bevatron Components

The Bevatron had a four-part injection system for putting the protons into orbit at the start of each pulse. The main function of the injection system was to preaccelerate the protons to an energy of 19 million electron volts (MeV) and direct the beam of protons into orbit in the main part of the Bevatron.[35]

Almost the entire mass of the Bevatron, except for the shielding, was devoted to producing the magnetic guide-field. The Bevatron had a magnet diameter of approximately 120 feet, dominating the interior of the building. The massive ring-shaped electro-magnet contained about 9700 tons of iron. It was divided into quadrants, producing a magnetic guide field that kept the protons on a path of more or less constant radius during acceleration.[36]

When the protons had been fully accelerated in the vacuum chamber of the Bevatron they were directed to some form of target. Originally all the targets were internal to the main ring. But the massive magnet structure and the magnetic field proved to be obstructions to the placing of targets.[37] In a later development, primary protons themselves were extracted and directed to external targets. After the protons struck their targets the magnetic field and oscillator frequency returned to their initial values to prepare for the next cycle. The time from the beginning of one cycle to the beginning of the next was about six seconds.[38]

Bevatron with concrete shielding after upgrade, February 16, 1963. *LBL Photographic Services BEV 3816.*

Bevatron Upgrades

When the Bevatron opened in 1954 it was the most powerful accelerator in the world. By the early 1960s, its maximum energy of 6.2 BeV had been surpassed by several new machines at other facilities, including Brookhaven's 33 BeV Alternating-Gradient Synchrotron, CERN's 28 BeV Proton Synchrotron, and the USSR's 10 BeV machine at Dubna. From 1958 to 1960 Bevatron director Edward Lofgren headed a group of scientists and engineers in planning a major modernization of the facility, with assistance from Walter Hartsough, who was in charge of operations at both the Bevatron and Bevalac for many years. The machine was shut down in July 1962 for the improvements and reopened in February 1963.

One of the main improvements was a powerful new injection system for the preacceleration of protons directed into the Bevatron. To compensate for the increased beam intensity, and control background radiation levels, tons of new concrete shielding were added. A concrete "igloo" housing experimental equipment was placed at the hub, and a new seven-foot-thick ceiling was built over the entire accelerator.[39]

The increased beam intensity also raised residual radiation levels inside. Before the upgrade workers actually entered the machine's tank for routine maintenance; now this would have to be kept to a minimum, and internal targets were moved by remote control.[40] In the early years, scientists and workers had entered the magnet gap in the Bevatron for inserting targets and making measurements. Physicist Glenn Lambertson recalls taking a "hot trip" through the Bevatron:

> A person could also roll through the gap itself on a special flat scooter—it was a hot trip both thermally and radioactively. My first job in the gap was that of measuring the pulsed magnetic field. We built a cart to carry the pickup coil; this was made of non-conducting and non-magnetic materials. . . . This contraption, trailing cables, was pulled through the quadrant with a rope. With some fussing, it did work and gave us the data to know the energy of that first beam on April 2nd [1954].[41]

Particle Detectors Used with the Bevatron

The new particle discoveries that took place at the Bevatron in the 1950s and 1960s were made possible not only because of advances in accelerator design but through developments in particle detector technology. The Rad Lab had not been a pioneer in particle detection methods or technology before World War II, but developed a strong instrument section after the war.[42]

The bubble chamber, invented by physicist Donald Glaser in 1952, and improved by LBL physicist Luis Alvarez, was a visual detector that showed paths or tracks of charged particles in liquid hydrogen. Glaser won the Nobel Prize in Physics in 1960 for his invention of the bubble chamber. He was a UCRL scientist at the time of the award, but the invention had been made when he was a graduate student at the University of Michigan.[43]

A 72-inch bubble chamber, the largest built up to that time, was completed at UCRL in March 1959. This was the first giant bubble chamber, and a prototype of the large liquid hydrogen bubble chambers later used in high energy physics all over the world. The chamber was housed in a new building adjacent to the Bevatron. By 1960 bubble chambers had become the most prominent detectors of particles from high-energy accelerators, replacing the cloud chambers, counters, and nuclear emulsions that had been used as standard detectors of ionizing particles in 1952.[44]

Scientific Discoveries Made with the Bevatron

During the 1950s and 1960s two Nobel Prizes were awarded for particle physics research conducted at the Bevatron, briefly described below. Berkeley scientists using the Bevatron also provided crucial supporting research for two Nobel Prizes in Physics associated with other laboratories—theory of parity nonconservation: 1957 Nobel Prize to Tsung-Dao Lee of Columbia University and Chen Ning ("Frank") Yang of Princeton while working at Brookhaven's BNL; and theory of strangeness and the eightfold way: 1969 Nobel Prize to Murray Gell-Mann, California Institute of Technology.

Antiprotons: Nobel Prize to Emilio Segrè and Owen Chamberlain, 1959

The existence of the antiproton, the antiparticle of the proton (nucleus of the hydrogen atom) had been theorized since 1930. It is now known, in relativistic quantum theory predictions, that every subatomic particle has an antiparticle, identical in every respect except that all chargelike properties (electric charge, strangeness, charm, etc.) are opposite. "Antiparticles do not normally exist in the ordinary world of matter, and if produced they exist for only a short time, for when they collide with ordinary particles they are annihilated with them. The result of the annihilation is the creation of other particles that usually decay quickly and dissipate into energy."[45]

At the beginning of 1955, when scientists at the Bevatron began the search for the antiproton (the negative proton), the division of the "particle kingdom" into particles and antiparticles had not yet been fully established, and some physicists doubted whether the antiproton existed.[46] However most physicists at the lab "were firmly convinced that an-

Discoverers of antiproton at Bevatron with Edward Lofgren, Bevatron director: from left, Emilio Segrè, Clyde Wiegand, Edward Lofgren, Owen Chamberlain, Thomas Ypsilantis, October 6, 1955. *LBL Photographic Services BEV 940.*

tiprotons were being created in the nuclear debris formed when protons in the Bevatron beam struck a target of copper. The trick was to catch and detect them."[47]

The Bevatron, capable of boosting protons to energies of 6 BeV, was the only accelerator operating in 1955 with enough energy to produce antiprotons. Different teams of scientists at the Bevatron entered into a kind of competitive race to find the antiproton. Physicist Edward Lofgren played a substantial part in the process, both as leader of one of the teams and as Bevatron director responsible for coordinating and scheduling the use of the machine.[48]

A team of scientists led by physicists Owen Chamberlain and Emilio Segrè found clear evidence of a negatively charged particle with exactly the same mass as a proton—the antiproton. Two members of their team who made important contributions to the discovery were Clyde Wiegand and Thomas Ypsilantis.[49]

Segrè and Chamberlain won the Nobel Prize for their experiment in 1959. Chamberlain discussed the importance of the discovery in a retrospective essay published in 1989. "In assessing the impact of the discovery on physics, I would say it was certainly no surprise. Most theorists predicted that the antiproton was there to be found when conditions were right. Still, the discovery cleared the air: It allowed people to proceed more confidently into a rewarding future."[50]

Discovery of the Resonances: Nobel Prize to Luis Alvarez, 1968

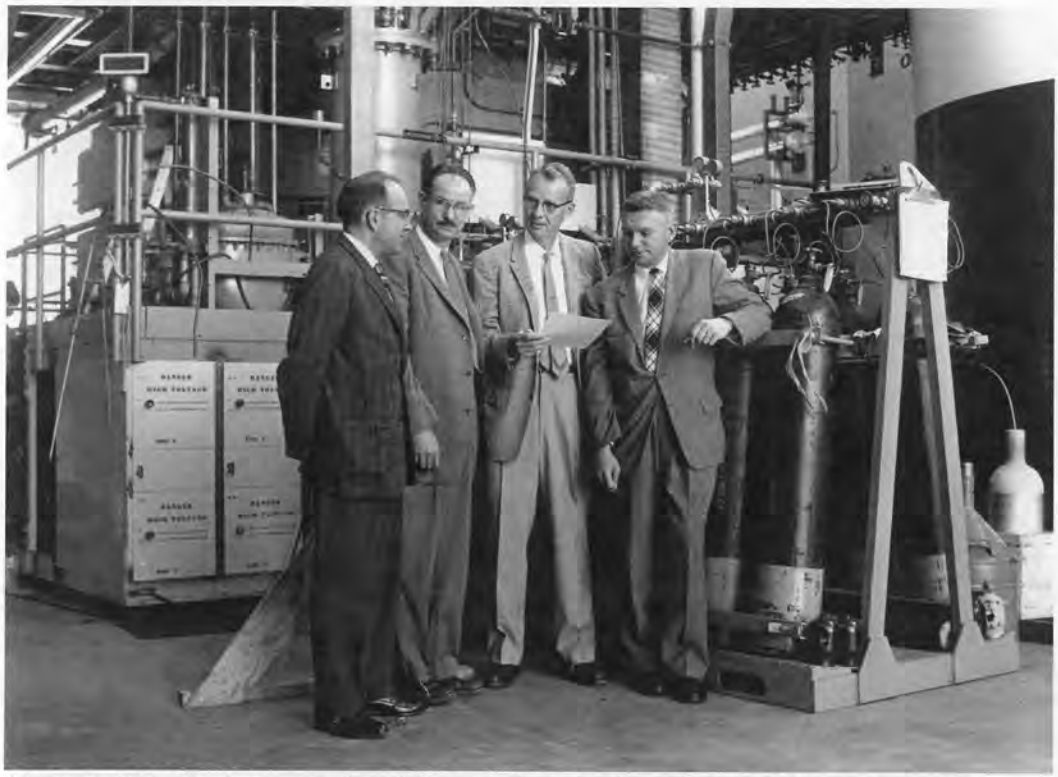
Resonances are particles whose lifetimes are too short—10^{-23} second—to leave visible tracks. They travel about a trillionth of an inch before decaying into two or three other particles. Bubble chamber photographs showed only a spray of tracks at the point where

the resonance was formed. After the first resonance was discovered by Enrico Fermi in Chicago in 1952, physicists began analyzing spray patterns.

Luis Alvarez's 72-inch bubble chamber at the Rad Lab, completed in 1959, was the most advanced tool for detection of resonances in the early 1960s. The first vector meson, the K*, was discovered at the Rad Lab in 1960. By 1961 a pion-pion resonance, and a three-pion resonance led the way to a new era of resonance discoveries in the 1960s.[51]

Alvarez won the Nobel Prize in Physics in 1968. The award was given in recognition of two related contributions: 1) Alvarez's development of the bubble chamber technique—the use of large liquid hydrogen bubble chambers and computer-linked data processing systems; 2) Alvarez's involvement in finding 18 of the resonances, which were either discovered or co-discovered in film from one of the two big LRL bubble chambers, the 15-inch or the 72-inch.[52] Alvarez recalled the thrill of his pioneering work at the Bevatron:

> The early days at the Bevatron were unbelievably exciting; we were repeating and extending the work that had been done by cosmic-ray physicists in the past 20 years. But our "cosmic rays" traveled horizontally instead of vertically, were billions of times more intense, and ended up in our bubble chambers, where we could take a good look at them![53]



Alvarez bubble chamber group: from left, H. Paul Hernandez, Edwin McMillan, Luis Alvarez, James Donald Gow, July 1959. *LBL Photographic Services Morgue 1959-46 (P-1).*

Bevalac: The Idea and Early Development

The idea of combining the Bevatron with a linear accelerator known as the Super-HILAC was originally conceived in 1971 to develop a biomedical program, and to explore the potential of heavy ion beams in cancer therapy. SuperHILAC nuclear chemist Albert

Ghiorso, in proposing the Bevalac idea, was also influenced by another important factor. The Bevatron, superseded by more powerful accelerators at other research institutions, was already slated to be shut down by the AEC, and the Rad Lab sought new reasons to keep it open.[54]

Ghiorso's idea for the connection between the two machines was to use the SuperHILAC as a heavy ion source and injector for the Bevatron to combine the best features of both machines—the heavy ion capability of the SuperHILAC and the high-energy capability of the Bevatron. Ghiorso recalls that his inspiration for the idea of the Bevalac was a map showing the proximity of the Bevatron to the SuperHILAC, situated approximately 500 feet uphill:

> I remember returning from the Accelerator Conference at Chicago and talking to [Frank Selph] about his progress. He happened to have a map of the hill showing the various locations of the tunnels where he was thinking of placing his linac. I noticed that the Bevatron was not very far away from the SuperHILAC and I suggested, somewhat facetiously, that maybe we should consider injecting our beam into that machine!
>
> Within a few minutes Frank had calculated that the idea was indeed feasible and the Bevalac was born. Ed McMillan was one of the first persons that I went to with our idea. His reaction was typical of him. "Why didn't I think of that!"[55]

Exterior view of Bevalac: arrows show path of particles from SuperHILAC at top, down the transfer line to Bevatron at bottom, finally to target areas within High-bay Building next to Bevatron, April 1975. *LBL Photographic Services CBB 766-4673.*

Funding for the Bevalac was secured through the influence of Glenn Seaborg, a Rad Lab chemist who had just returned after several years as chairman of the AEC. Seaborg and Edwin McMillan, who became the Rad Lab director after Lawrence's death in 1958, had won a shared Nobel Prize in 1951 for their discoveries in the chemistry of the transuranium elements:[56]

> We still had to worry about getting the funds for the 2M$-transfer line to carry the SuperHILAC beam down to the Bevatron. Although he had just stepped down as Chairman [of the Atomic Energy Commission] and had returned to Berkeley, Seaborg still had lots of influence. He called one of the regents of UC, who in turn called Caspar Weinberger, the Director of OMB under Nixon, and persuaded him to place the needed transfer line into the budget. The rest is history! Under the very capable hands of Ed Lofgren and Hermann Grunder, the Bevalac became a great and successful accelerator.[57]

The Bevalac ushered in a new era of research at the laboratory. The focus of the Bevatron had previously been in particle physics research; only comparatively light particles (mesons, protons, electrons, alpha particles, deuterons, etc.) were available to experimenters at high energies. The Bevalac was ultimately capable of accelerating all of the naturally occurring heavy nuclei. Heavy ions from the SuperHILAC were injected into the Bevatron through the transfer line, or beam line, and accelerated to 2.1 BeV per nucleon for applications in nuclear medicine, nuclear physics, or cosmic ray experiments. The beam time at the Bevalac was divided so that one third was for biomedical use and two thirds were for nuclear science experiments in a wide range of fields including elementary particle production with heavy ions, nuclear fragmentation, cosmic-ray simulation and atomic physics.[58]

The Bevalac was the only research facility in the world capable of accelerating to high energies the nuclei of all the elements of the Periodic Table—from the lightest element, hydrogen, all the way up to uranium, the heaviest of the naturally occurring elements.[59] The Bevalac, together with the 88-inch cyclotron, became the country's leading facility for heavy-ion research, drawing scientists from universities and laboratories throughout the United States, and from all over the world, including China, Japan, Germany and Israel.[60]

Closure of the Bevatron/Bevalac

The Bevatron/Bevalac closed in February 1993, thirty-nine years after the first beam was circulated. The decision was made by the U.S. Department of Energy after several years of deliberation, and in spite of last-minute appeals by NASA, which sponsored the facility's cosmic ray research. An article in the LBL periodical *Currents,* described the decision as a primarily political one, in a period of budget shortfalls. "The Bevalac was, in essence, a victim not of scientific obsolescence but of today's adverse economic climate. The money could not be found to fund an LBL proposal to keep the accelerator running for ground-based cosmic-ray experiments that would help assess radiation risks to astronauts on deep-space missions."[61]

Judith Goldhaber, veteran science writer for LBL publications, summarized the achievements of the Bevatron/Bevalac, emphasizing the extraordinary versatility that allowed the facility to flourish as long as it had:

> In the past, LBL's Bevalac was often snatched from seemingly inevitable closure, to be reborn each time into a whole new productive chapter of its

career. But now it seems to have finally used up all of its nine lives. As the Bevatron/Bevalac neared the end of its usefulness . . . the areas of research it had pioneered moved to other facilities around the nation.

The original version of the accelerator, the Bevatron, has been called (by physicist Ed Lofgren, who was in charge of its operations from 1954 until his retirement from the job in 1979) "the last of the great accelerators built in . . . 'the Lawrence style,' . . . durable and adaptable. That's why it's not surprising that the Bevatron has endured and adapted so well over the years."[62]

ENDNOTES

This article is adapted from part of "Bevatron and Bevalac, Lawrence Berkeley Laboratory, Historic Architectural Evaluation Report" prepared for Lawrence Berkeley Laboratory and the U.S. Department of Energy by Marjorie Dobkin and Michael Corbett, July 1994, as part of an environmental review process. Parts of this report were also used in a 1997 Historic American Building Survey/Historic American Engineering Record (HABS/HAER) report for the Bevatron.

1 http://www.eh.doe.gov/nepa/2008APS/science.pdf

2 *The Bevatron,* LRL Publication 29/15M/November 1969 (Berkeley: University of California Lawrence Radiation Laboratory, 1969), 15.

3 Robert W. Seidel, "Accelerating Science: The Postwar Transformation of the Lawrence Radiation Laboratory," *Historical Studies in the Physical Sciences,* 13 (1983), 397.

4 Timothy Barklow and Martin Perl, "Elementary Particle Physics," in *Encyclopedia of Physical Science and Technology,* 5 (1987), 13.

5 William Wenzel, "Bevatron" (lecture, Lawrence Berkeley Laboratory Conference: The Bevatron/Bevalac Its People and Science, October 25, 1993), 8.

6 Ibid., 5.

7 Seidel, "Accelerating Science," 377.

8 UCLRL, *Annual Report,* 1966, 1-2. LBL Archives.

9 Daniel M. Wilkes, "Lawrence Radiation Laboratory," in Verne A. Stadtman, ed., *The Centennial Record of the University of California* (Berkeley: University of California Printing Department, 1967), 324.

10 Herbert F. York, *Making Weapons, Talking Peace: A Physicist's Odyssey from Hiroshima to Geneva* (NY: Basic Books, 1987), 11.

11 Herbert Childs, *An American Genius: The Life of Ernest Orlando Lawrence* (NY: E.P. Dutton & Co., 1968), 294.

12 York, *Making Weapons,* 11.

13 David Gebhard, "Lawrence Berkeley Laboratory, The 184-Inch Cyclotron Building. The Historical Significance of the Building. Recommendations in Regard to Proprosed Alterations," (Berkeley: Ira Fink and Associates, Inc. University Planning Consultants, 1987), 4.

14 J. L. Heilbron and Robert W. Seidel, *Lawrence and His Laboratory, A History of the Lawrence Berkeley Laboratory,* vol. 1 (Berkeley: University of California Press, 1989), 474.

15 Seidel, "Accelerating Science," 375.

16 Ibid.

17 Laurie M. Brown, Max Dresden, Lillian Hoddeson, "Pions to Quarks: Particle Physics in the 1950's," in Brown et al., eds., *Pions to Quarks: Particle Physics in the 1950's* (Cambridge, New York: Cambridge University Press, 1990), 11.

18 J. L. Heilbron, "An Historian's Interest in Particle Physics," in Brown et al., eds., *Pions to Quarks,* 50-51.

19 "Chimes From the Campanile," *California Monthly,* 55 (August-September 1945), 22.

20 J. L. Heilbron, Robert W. Seidel and Bruce R. Wheaton, *Lawrence and his Laboratory: Nuclear Science at Berkeley* (Berkeley: Lawrence Berkeley Laboratory and Office for History of Science and Technology, 1981), 76.

21 Seidel, "Accelerating Science," 392; Childs, *An American Genius,* 401.

22 Seidel, "Accelerating Science," 394; Robert W. Seidel, "The Post-War Political Economy of High-Energy Physics," in Brown et al., eds., *Pions to Quarks,* 498; Heilbron, "An Historian's Interest in Particle Physics," 51.

23 Seidel, "Accelerating Science," 396.

24 Seidel, "Accelerating Science," 397; Childs, *An American Genius,* 402.

25 Seidel, "Accelerating Science," 399-400.

26 John B. Adams, "The Evolution of Big Science," in *Proceedings of the Celebration of the 50th Anniversary of the Lawrence Berkeley Laboratory.* (United States Department of Energy, 1981.), 105.

27 M. Stanley Livingston, *Particle Accelerators: A Brief History* (Cambridge: Harvard University Press, 1969), 39; V. Veksler, "A New Method of Acceleration of Relativistic Particles," *Journal of Physics, USSR,* 9 (1945), quoted in M. Stanley Livingston, ed., *The Development of High-Energy Accelerator,* (NY: Dover Publications, 1966), 202-210; E. M. McMillan, "The Synchrotron—a Proposed High Energy Particle Accelerator," *The Physical Review,* 68 (1945), quoted in Livingston, *The Development of High-Energy Accelerators,* 211-212.

28 Livingston, *Particle Accelerators: A Brief History,* 50.

29 F. T. Cole and M. Tigner, "Particle Accelerators," *Encyclopedia of Physical Science and Technology,* 10 (1987), 152.

30 Childs, *An American Genius,* 409.

31 Edward J. Lofgren, Interview and tour of Bevatron and Bevalac with Marjorie Dobkin and Michael Corbett, September 20, 1993.

32 Seidel, "The Post-War Political Economy of High-Energy Physics," 501; Childs, *An American Genius,* 409, 466.

33 Glen R. Lambertson, "The Bevatron," (draft of presentation at Lawrence Berkeley Laboratory Conference: The Bevatron/Bevalac Its People and Science, October 25, 1993), 3.

34 Heilbron, Seidel and Wheaton, *Lawrence and his Laboratory,* 79.

35 *The Bevatron,* LRL Publication 29/15M/November 1969, 7-10

36 Ibid., 4-5.

37 Ibid., 10-11.

38 Ibid., 4-6.

39 Glen R. Lambertson, "The Bevatron" 6-8; "Bevatron To Be Made More Modern; Big Modification Program Is Planned," *The Magnet,* 4:7 (1960), 1-2; "Bevatron Due Back on Job This Month," The Magnet 7:2 (1963), 1, 4-5; "Rebirth of Bevatron Acclaimed by Scientists," *The Magnet.* 7:3 (1963), 1.

40 "Bevatron To Be Made More Modern," *The Magnet,* 4:7 (1960), 1-2; "Bevatron Due Back on Job This Month." *The Magnet* 7:2 (1963), 1, 4-5.

41 Lambertson, "The Bevatron," 4.

42 Heilbron, Seidel and Wheaton, *Lawrence and his Laboratory,* 79-80.

43 Barklow and Perl, "Elementary Particle Physics," 27.

44 Hugh Bradner, "Bubble Chambers," *Annual Review of Nuclear Science,* 10 (1960), 109; Heilbron, Seidel and Wheaton, *Lawrence and his Laboratory,* 79, 86-90; David M. Ritson, *Techniques of High Energy Physics,* (NY: Interscience Publishers, 1961), 301-364; Peter Galison, "Bubbles, Sparks and the Postwar Laboratory," in Brown et al., eds., *Pions to Quarks,* 213-251; Michael Riordan, *The Hunting of the Quark* (NY: Simon & Schuster, 1987), 75; William B. Fretter, "Nuclear Particle Detection (Cloud Chambers and Bubble Chambers)," *Annual Review of Nuclear Science,* 5 (1955), 145-178.

45 "Antilambda Seen In Bubble Chamber," *The Magnet* 3:8 (1959), 1; Barklow and Perl, "Elementary Particle Physics," 11.

46 Riordan, *The Hunting of the Quark,* 66.

47 Judith Goldhaber, "LBL to Commemorate Bevatron's 30th Anniversary," *LBL Currents* 11:41 (1984), 1.

48 Heilbron, Seidel and Wheaton, *Lawrence and his Laboratory,* 83-84.

49 Riordan, *The Hunting of the Quark,* 66-67; Heilbron, Seidel and Wheaton, *Lawrence and his Laboratory,* 81-85; "Segrè and Chamberlain Win Nobel Prize," *The Magnet* 3:11 (1959), 1.

50 Owen Chamberlain, "The Discovery of the Antiproton," in Brown et al., eds., *Pions to Quarks: Particle Physics in the 1950's,* 273-284.

51 Riordan, *The Hunting of the Quark,* 80-81.

52 "Luis Alvarez Wins Nobel Prize," *The Magnet,* 12:11 (1968), 1; Luis W. Alvarez, "The Hydrogen Bubble Chamber and the Strange Resonances," in Brown et al., eds., *Pions to Quarks,* 299-306.

53 Goldhaber, "LBL to Commemorate Bevatron's 30th Anniversary," 1-2.

54 Albert Ghiorso, "On the Origin of the Bevalac" (lecture, Lawrence Berkeley Laboratory Conference: The Bevatron/Bevalac, Its People and Science, October 25, 1993), 4; Heilbron, Seidel and Wheaton, *Lawrence and his Laboratory,* 100; Diane LaMacchia, "Bevatron." Video script. (Berkeley: Lawrence Berkeley Laboratory Office of Public Information? 1993), 6-7.

55 Ghiorso, "On the Origin of the Bevalac."

56 "Heavy Ion Facility, the Bevalac, is on the Way," *The Magnet* 17:8 (1973), 1, 6; Jose Alonso, "Current Status and Planned Improvements of the Bevalac," in Sheryl Elam, ed., *Biological and Medical Research with Accelerated Heavy Ions at the Bevalac* 1974-1977, 3. (Prepared for Division of Biological and Environmental Research, U.S. Energy Research and Development Administration. On File, LBL Library. LBL-5610.)

57 Ghiorso, "On the Origin of the Bevalac," 4.

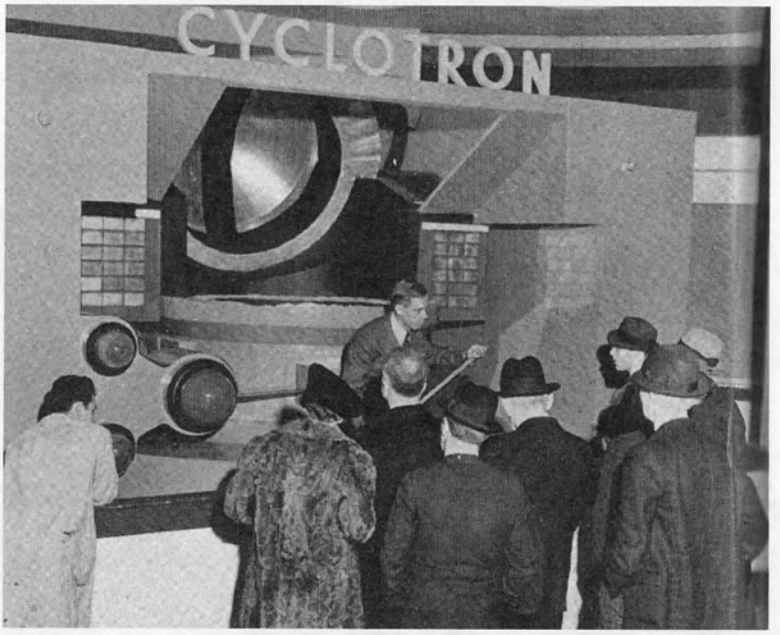
58 Alonso, "Current Status and Planned Improvements of the Bevalac," 5.

59 Goldhaber, "LBL to Commemorate Bevatron's 30th Anniversary," 2; Diane LaMacchia, "Bevatron," 8; Herman A. Grunder and Frank B. Selph, "Heavy-Ion Accelerators," *Annual Review of Nuclear Science,* 27 (1977), 380-386.

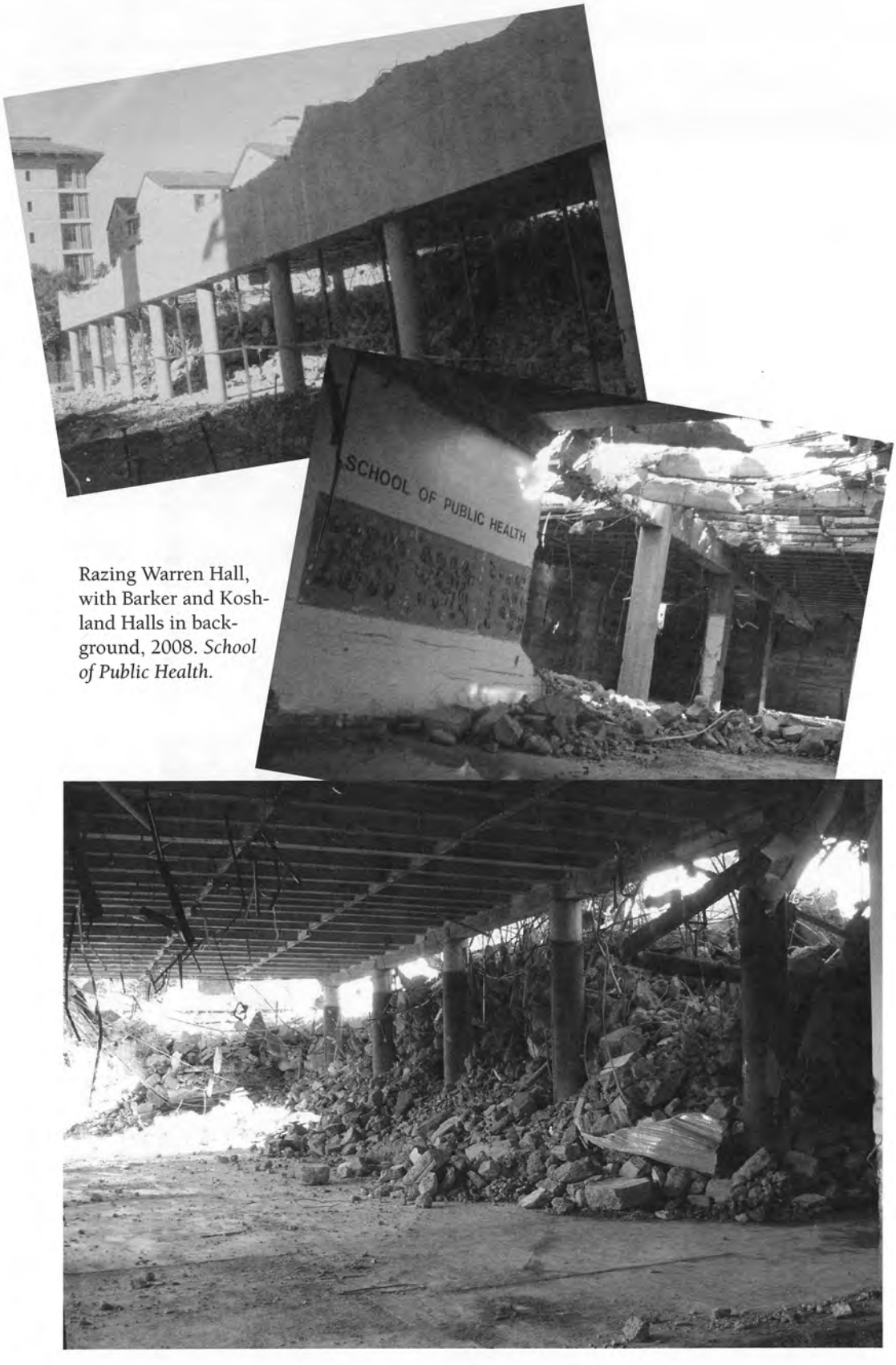
60 Heilbron, Seidel and Wheaton, *Lawrence and his Laboratory,* 102; "First Acceleration of Heavy Ions at the Bevatron," *The Magnet,* 15:9 (1971), 1; Adrienne Kopa, "Bevalac Draws Users From Around the World," LBL *Currents,* 34 (1988), 1.

61 "Bevalac Slated to Close." LBL *Currents,* 19: 37 (1992), 1.

62 Ibid.



"Several times daily, at this model of the university's cyclotron, operation and uses of the huge atom-smasher are explained to spectators" at the Golden Gate International Exposition. *1939 Blue and Gold.*



Razing Warren Hall, with Barker and Koshland Halls in background, 2008. *School of Public Health.*

UPS AND DOWNS OF SOME OF OUR BUILDINGS

William Roberts and Janet Ruyle

MOST OF THE FOLLOWING PAGES SHOW buildings that are no longer with us, and sometimes we show the replacements that followed. We have added a little history of each.

Warren Hall
1955–2008

Named for Earl Warren, Class of 1912, Warren Hall was built to house the School of Public Health. (See Bolstad article in this issue.) Teaching in public health had begun in the 1930s, but it was not until 1943 that Earl Warren signed a bill in the state legislature formally establishing the School of Public Health. Warren Hall was completed in 1955, designed by architects Masten and Hurd. In addition to the school, the building also housed the Cancer Research Genetics Laboratory and the Public Health Library, a branch of the main library system.

Demolition of the building began early in 2008; its replacement will be the Li Ka Shing Center for Biomedical and Health Sciences. Phase Two of Berkeley's Health Sciences initiative (Phase One is the Stanley Biosciences and Bioengineering Facility), the center will provide facilities for interdisciplinary research in molecular mechanisms in human health and disease sciences.

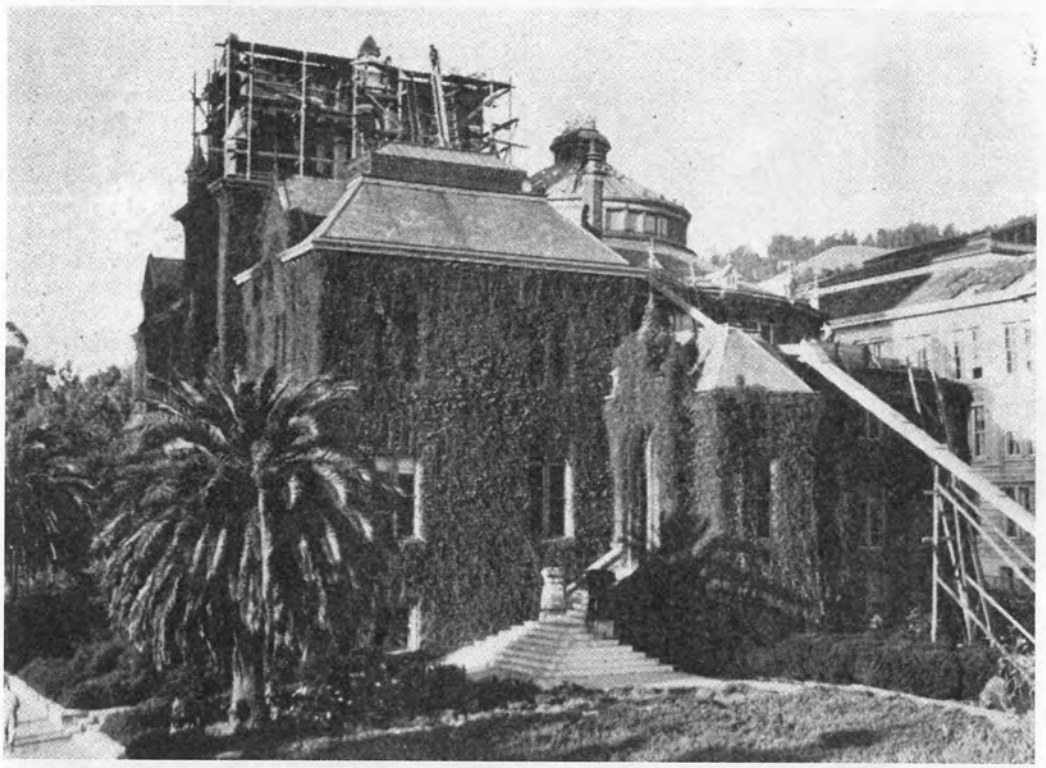
Architect's elevation for Warren Hall. *University Archives (UARC PIC 11J:1).*

Bacon Library and Art Building, later Bacon Hall 1881–1961

The original name of Bacon Hall was Bacon Library and Art Building, built in 1881 as the first separate library building, with art galleries for the university's art collection on the third floor. An addition was made to the building in 1902, but the library moved to Doe Library in 1911, at which time the building was renamed and remodeled for the Departments of Geology and Geography. Bacon Hall was razed in 1961 to clear the site for Birge Hall, home of the growing Department of Physics.

West façade of Bacon Hall, with the Mechanical Arts Building in the background, 1886. *University Archives (UARC PIC 7:4).*

Demolition of east side of Bacon Hall with top section still intact, and LeConte Hall Annex is to the right, August 1961. *University Archives (UARC PIC 7:60).*



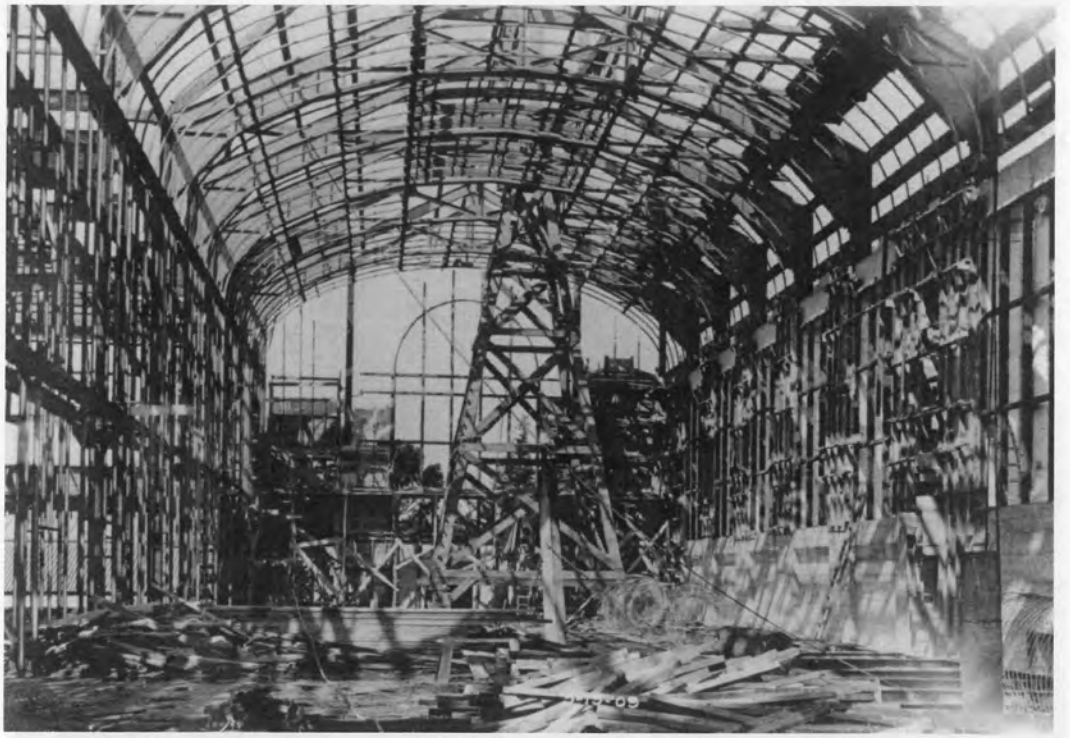
Removal of clock tower in Bacon Hall, early November 1925. *University Archives (UARC PIC 7:45).*

Doe Memorial Library
1917–present

The first library on the Berkeley campus had an inauspicious collection of some one thousand volumes from the College of California, housed in South Hall. Bacon Hall was its next home, but the rapid growth of the collections soon outgrew that gracious building; after occupancy by various departments, Bacon Hall was razed in 1961. A fortuitous bequest by Charles Franklin Doe led to the building of the present building, designed by John Galen Howard, in 1911 when the first phase of Doe Library was opened. The building in its present outward form was not actually completed until 1917 with the addition of the third and fourth floors. The interior book stacks were built in stages as the collection grew; the final phase of stack construction was not until 1952. These stacks were removed after the construction of the underground Gardner Stacks under the central glade, completed in 1994.

Excavations for Doe Library, with Botanical Garden in background, January 9, 1908. *University Archives (UARC PIC 9:91).*

Construction of north façade of Doe Library, with University Library block being lifted into place above main entrance, 1909. *University Archives (UARC PIC 9:24).*



Construction of north reading room, 1909. *University Archives (UARC PIC 900:21).*

North reading room with students. *University Archives (UARC PIC 9:121).*

Sather Gate and Bridge
1911–present

Originally a wooden footbridge over Strawberry Creek in 1873 when classes were first held, John Galen Howard transformed the south entry to the campus with his elegant Beaux-Arts gate and bridge, funded by Jane Sather in 1908. The new concrete bridge for foot traffic and wagons (and later automobiles) was enhanced by smaller arches for pedestrians, impressive granite towers with marble panels (with a story all their own—for another time), and a grand arch over the gateway bearing its name, with a star and the university's motto, Fiat Lux, added by President Wheeler. Enormous urns bracket the bridge on all sides. Sather Gate is now crossed only by foot.

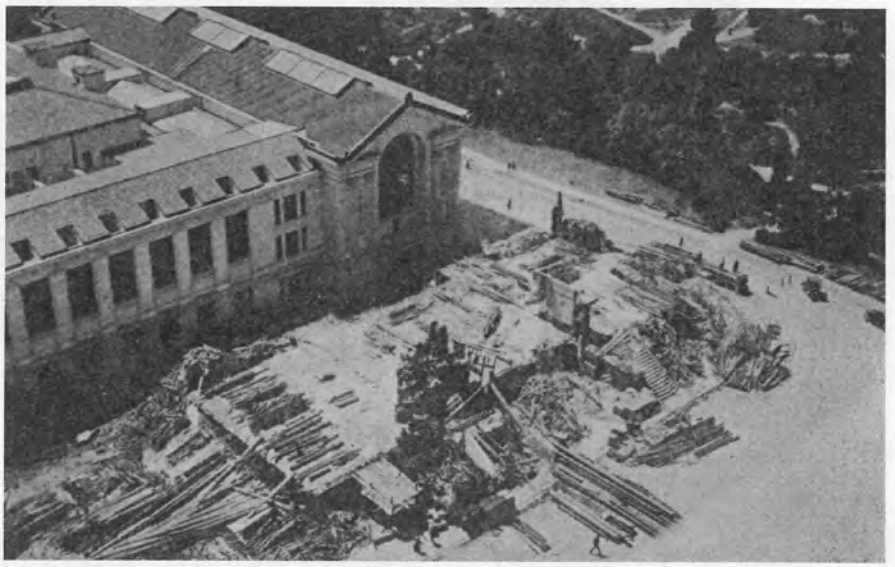
Sather Gate bridge under construction, August 3, 1909. *University Archives (UARC PIC 3:110).*

1911 postcard of Sather Gate, from Susan Cerny, *Berkeley Landmarks,* 2001.

North Hall
1873–1931

North Hall was completed in 1873, the second building on the Berkeley site, a companion to the still-standing South Hall. It was designed by the same architect as South Hall, David Farquharson, but instead of being of stone, it was primarily of wood. It housed the Office of the President and Recorder until 1906, as well as some academic departments until the top levels were razed in 1917 as a fire hazard. The concrete ground floor served as a student center for the ASUC student offices and store until the building of the Stephens Union in 1923, and this floor was removed in 1931. The site is now occupied by the Doe Library Annex.

East façade of North Hall in 1911, with students on Senior Bench and banner for "Candida" over entrance to student store. *University Archives (UARC PIC 6:6).*



Razing upper levels of North Hall, with Doe Library in the background, July 9, 1917. *University Archives (UARC PIC 6:24).*

Doe Library Annex, The Bancroft Library 1950–present

The Library Annex, designed by Arthur Brown, Jr., was completed in 1950, providing much needed space for various departments of the library, including government documents, newspapers and serials, and notably The Bancroft Library. The annex has just undergone seismic retrofit and renovation to provide upgraded facilities for Bancroft and its various collections, as well as housing the offices of the University Librarian and the Library Systems Office.

Annex being built, ca. 1949. *University Archives (UARC PIC 3:666(a)).*

View of completed Library Annex, with cars parked on University Drive in foreground, 1950. *University Archives (UARC PIC 9:87).*

Architect's drawing of the remodeled Bancroft Library in the Doe Library Annex, 2005.

New interior of the Doe Library Annex housing The Bancroft Library, 2008. Photograph by Peg Skorpinski.

Cowell Memorial Hospital, west façade, 1958. *University Archives (UARC PIC 10H:2).*

Cowell Memorial Hospital 1930–1993

In 1930, the Ernest V. Cowell Memorial Hospital opened on the site where the Haas School of Business now stands. Designed by Arthur Brown, Jr. (Coit Tower, S.F. City Hall), it was a four-story, inpatient facility, said to be "without equal in the country." Cowell, a Berkeley alumnus, made a bequest of $250,000 for building the hospital as a replacement for the Student Infirmary which occupied a house at 2220 College Avenue, when College Avenue ran north of Bancroft Way. The hospital expanded in 1960, with a gift from the Cowell Foundation, to include 100 beds. In the 1960s Cowell took its first disabled student, housing 15 disabled students by 1968. A shift in care to more outpatient services prompted the closing of the surgery suite in 1971 (surgeries were shifted to Alta Bates Hospital), and the beginning of nurse practitioner care, coupled with waning finances, led to closing the inpatient wing in 1990. The building had outlived its usefulness, and the new University Health Service at the Tang Center opened in 1993.

Cowell Hospital going down, July 1993. Photograph by Janet Ruyle.

Cowell Hospital's south wing almost demolished, with Calvin Laboratory (Chemical Biodynamics Lab) at right, July 1993. Photograph by Janet Ruyle.

Haas School of Business
1995–present

In the meantime, the campus was looking for space to enlarge the Haas School of Business. In the past, business administration, originally the College of Commerce, had occupied both the South Hall for four decades and then Barrows Hall for the next three decades before having a building of its own. The land occupied by Cowell Hospital provided a suitable site, and the difficult decision was made to raze the hospital for the new business school. Construction of the seven-level facility was completed in 1995.

Haas School in September 2008. Photograph by William Roberts.

South Hall Annex
1913–2008

An unwanted child by some since its conception, the annex was designed by John Galen Howard, built in 1913, and demolished in 2008. It was a one-story concrete shop attached to South Hall (only 2,409 square feet at a cost of $6,000) that was a home to a variety of occupants but was originally created for the Department of Physics, located in South Hall, that needed the space to construct and repair its equipment. However, it was built only after overcoming criticism from the Regents' Committee on Grounds and Buildings that objected to its placement as the Campanile was going up for the campus "ought not be marred" by the addition. By 1923 student honorary societies used the cozy little annex for offices and meeting rooms.

From the mid-1930s through the 1960s it was the site of the student and alumni placement offices, commonly known as Buroc—the Bureau of Occupations. By that time the interior was made up of tiny cubicles with pass-through windows and panels, and an

exterior window to allow students to get gardening and baby-sitting jobs, as well as professional positions for degree holders. In 1944 university planners officially slated the annex for removal. Nevertheless it remained intact and after Buroc left, it was occupied for a while by a research project in library science.

The building was again remodeled in the mid-1970s for the Center for Studies in Higher Education. Small offices were created around the perimeter with a large seminar/library room in the center to provide a place where visiting scholars, Berkeley faculty and administrators, and state-level administrators could discuss research on colleges and universities in the United States and abroad. And once again in 1978, campus planners reported the "building has no architectural distinction" and was slated for removal.

Finally, in July 2008, the staff of the Center for Studies in Higher Education was forced to move and the annex was demolished to improve the open space setting around historic South Hall and below the foot of the Campanile. Sic transit gloria mundi.

South Hall Annex in the 1980s. Window on right slid open for students looking for a job in an earlier time.

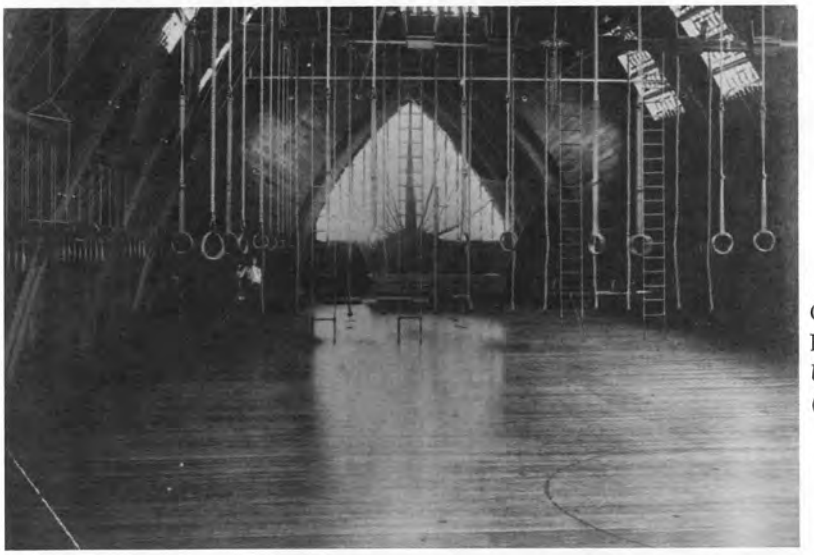
Windows of little cubicles, later offices, within.

Researchers at work.

Remains of the annex, July 26, 2008. Photographs by Janet Ruyle.

Hearst Hall
1898–1922

This unusual building was designed by Bernard Maybeck as a large entertaining hall for Phoebe Apperson Hearst in 1898; it originally stood on Channing Way, just below Piedmont. In 1899 Mrs. Hearst presented it to the university, had it moved to College Avenue (which then ran north of Bancroft Way), and had it remodeled as a gymnasium and meeting space for women students. Women students comprised approximately 45 percent of the student body at that time, but no provision had previously been made for such activities. Hearst Hall was destroyed in a fire in 1922. William Randolph Hearst made a gift of Hearst Gymnasium for Women in 1927 in memory of his mother.



Gymnasium of Hearst Hall, ca. 1902. *University Archives (UARC PIC 10A:25).*

Hearst Hall burning; illustration from unidentified publication, 1922. *University Archives (UARC PIC 10A:12b).*

LAWRENCE BERKELEY LABORATORY AND THE MANHATTAN PROJECT

RECOLLECTIONS OF EDWARD J. LOFGREN, PHYSICIST

Tim Troy

Now we are all sons of bitches.
—*Kenneth Bainbridge, Trinity Site director on witnessing the first atomic explosion, July 16, 1945.*

EDWARD LOFGREN, retired nuclear physicist, and I were headed to the popular Fat Apple's in Berkeley for lunch. It's one of Ed's favorite restaurants in a town he clearly loves and has lived in since 1936. Ed, ninety-five, is associate director emeritus of the Lawrence Berkeley Laboratory and was one of the young physicists involved with the Manhattan Project in Los Alamos, New Mexico, in 1944 and 1945. Indeed, Ed may be one of the few still-living staff members of that historic project headed by the legendary J. Robert Oppenheimer which climaxed with the detonation on July 16, 1945, of the first atomic bomb at the Trinity Site in a remote desert valley in southern New Mexico. It happened at precisely 5:29:45 a.m. Mountain War Time. Most agreed, following the explosion, that the world would never be the same. "I am become Death, the destroyer of worlds," Oppenheimer is said to have said, quoting from the Bhagavad-Gita.

Ed and I talked about whales as we drove up from his retirement condo down in the Piedmont area of Oakland to North Berkeley. We try to get together for a meal once a month or so. Sometimes we are joined by others, his daughter Laurel, for example, who might be visiting from England. Laurel is an archaeologist. Chatting about books, I told him about a new one I was reading on the history of whaling in America, *Leviathan,* by Eric Jay Dolin. Ed appeared to be very interested in getting a copy of the book. He's an avid reader about many things including the environment, alternative fuel sources, biographies, history, world politics and solutions to the world's crises.

Edward Lofgren, 1970. *Ernest Orlando Lawrence Berkeley National Laboratory.*

I noted that the use of whale oil as a fuel for creating light dropped off in the second half of the nineteenth century after oil was discovered in Pennsylvania in 1859. "Fortunately, for the whales," Ed said when I mentioned it. Ed has a dry sense of humor and his comments are often very concise.

Ed and I first met in 2000 when I'd begun an oral history project with the paleo-archaeologist J. Desmond Clark through the Regional Oral History Office [ROHO], a unit of the University of California, Berkeley's Bancroft Library. ROHO had conducted an oral history with Ed Lofgren

E. O. Lawrence in front of Old Rad Lab, 1931. *Ernest Orlando Lawrence Berkeley National Laboratory.*

and other physicists from the Lawrence Berkeley Laboratory in the 1970s. I did further oral history work with Ed this last year, focusing particularly on his time at Los Alamos and his early postwar years at Berkeley in the development of the nuclear particle accelerator called the Bevatron.

Arriving at the restaurant, Ed explained the origin of its name. "As I understand it," he said, "it was originally called Fat Albert's after the skinny guy who began it." He smiled at the irony of that and continued, "Subsequently, Albert and his wife divorced and for whatever legal reasons, the name had to be changed. Somehow it ended up as Fat Apple's." The first time we went to the restaurant together for lunch, I noted (without mentioning it to Ed) the ironic coincidence of the restaurant's name and the plutonium atomic bomb, "Fat Man," which was the focus of Ed's work at Los Alamos.

Lofgren, the youngest of seven children, was born into a working-class Swedish immigrant neighborhood on the far south side of Chicago in 1914. His father, Joseph Emanuel Lofgren, was a machinist. The family moved to Los Angeles in 1928, prompted by Ed's sister, Ellen, who'd gone to work for the Union Pacific Railroad. Ed attended public schools in Los Angeles and graduated from Belmont High School in 1931 at the height of the Depression.

"As far back as I can remember," Ed said in our recording, "science was my primary interest." Stars and astronomy had been at the top of his list initially, and being an exceptional student, he received an invitation to enter Cal Tech in Pasadena. When he went enthusiastically for an orientation to the famous school, however, he was told that the scholarship he'd been offered did not include room and board. The intensity of the program precluded his taking time to work for those, and with considerable disappointment he never enrolled.

Ed worked in gas stations and grocery stores for a while. In 1932 he took a position as a clerk with Security First National Bank and attended Los Angeles Junior College (now Los Angeles City College) part-time. Sometime late in those years he began to read articles at the Los Angeles Public Library about Ernest Orlando Lawrence, who was just beginning serious work on radiation research using a cyclotron at the University of California, Berkeley.

Old Radiation Laboratory, 1931–1959. *Ernest Orlando Lawrence Berkeley National Laboratory.*

"In those days," Ed explains, "we used the word 'ra-

diation' favorably, as a good thing. Now, of course, it would be seen negatively." Ed caught a ride with a friend, and they drove up U.S. 101 for a visit to the then relatively modestly sized campus in Berkeley. Ed was smitten by Lawrence's famed energy and excitement and research focus—and also by the northern California climate. In 1936 as the age of tweny-two with two hundred dollars in savings, he moved north and found work as a supply clerk in the Capwell, Sullivan & Furth department store in Oakland and enrolled at the University of California. Boarding in Berkeley, Ed would do his homework on the street cars that plied then between the two East Bay towns. In the summer of that same year he was offered a job in Lawrence's "Rad Lab," housed then in a "ramshackle wooden building," as an assistant cyclotron operator.

The Department of Physics, in LeConte Hall and chaired by Raymond Thayer Birge, was already beginning to be staffed by notable people. Edwin McMillan, an eventual Nobel Laureate, was there as was J. Robert Oppenheimer ("a fabulous figure even then," Ed says). Ever self-effacing, Ed told me, "I had no pretense of becoming a theoretical physicist." The operation then was small but intense. The enormous complex that is now the Lawrence Berkeley Laboratory on the steep hillside above the Berkeley campus was nonexistent. Ed described the eventual site as nothing more than a horse pasture with a giant yellow "C" painted in the middle of it.

Ernest O. Lawrence, then and throughout Lofgren's career, was never less than a heroic figure for him, and except for his work in New Mexico during the war and at the University of Minnesota from 1946 to 1948 where he did cosmic ray research with Frank Oppenheimer, Robert's brother, Ed has never left Berkeley. He did participate in many international conferences, of course, and in 1959 lived in Geneva as a visiting fellow at the European Laboratory for Particle Physics, known as CERN.

Lofgren graduated with a BS degree in 1938 and took a position in the physics department as a teaching assistant for sixty dollars per month. He was not closely associated with the Radiation Laboratory at that point though he describes how its research had begun to anticipate weapons-related work in reaction to knowledge that the Germans were engaged in atomic energy development. The lab was on a "war footing," Ed notes. "Many saw that the war was coming." Money from the federal government started to come in to support progress in the separation of uranium isotopes. A cyclotron essentially takes subatomic particles and smashes them into atoms resulting in more subatomic particles and released energy. The process uses enormous magnets and high speed rotation. Electrons were eventually replaced with protons which were accelerated to nearly the speed of light with synchronized "kicks" or "boosts" to increase the speed of the particles.

At the time, Oppenheimer held a joint appointment with Berkeley and Cal Tech to the south. Ed remembers catching a ride to Los Angeles with Oppenheimer on one of his commutes. "Two of us rode with him in his roadster," Ed recalls. "I was in the back seat. Fast! Oppie drove very fast!" Even so, it was an all-day trip down Route 101. (On another occasion, Ed described riding with Lawrence who was given to turning around to talk to people in the back seat of his car. "Terrifying," says Ed.)

One day in 1940 Lofgren was met by Lawrence on the stairs of LeConte Hall. "Lofgren," he said, "I have a job for you." Ed had begun to map out a doctoral thesis, but Lawrence said, "Don't worry about anything! Birge will take care of that." He hired Ed on the spot to focus on atomic-weapons-related research using uranium isotopes. The whole load of running the cyclotron was put on the backs of graduate students and technicians. William Salisbury, Edwin McMillan, Luis Alvarez and other senior faculty people at Berkeley headed off to MIT to work on the development of radar. "Radar was crucial," Ed notes. "We had

Lawrence and staff of sixty-inch cyclotron, 1938. *Ernest Orlando Lawrence Berkeley National Laboratory.*

it by Pearl Harbor, but it was still in an experimental stage." Lawrence had succeeded in getting something like a million dollars from the Rockefeller Fund to finance the uranium isotope work that became the center of the Radiation Lab's efforts in Berkeley. Ed notes that with the exception of chemistry, scientific work in World War I was very limited. "All weapons are horrible and all warfare is horrible," he concedes, but well before Pearl Harbor in 1941, Lawrence and key brokers like James Bryant Conant, president of Harvard, and Alfred Loomis as well as many theoretical scientists saw that war was all but inevitable and felt very strongly that science had important contributions to make.

In the summer of 1941 a very top secret conference was held in LeConte Hall attended by many physicists. "I remember the guards on the stairway," Ed notes. Lawrence was there as was, of course, Oppenheimer. The two were then close friends—something that would not survive in the postwar McCarthy years.

After Pearl Harbor and the United States' declaration of war, Ed notes, "I dropped all my academic classes, my cosmic ray research, everything! I worked my tail off, repairs to the cyclotron, electronic work, lathe work. It wasn't just turning knobs and flipping switches." They had heard of secret work going on at the University of Chicago and "some unknown place in the West." But they hadn't actually heard the name "Los Alamos" at that point. Electromagnetic isotope separating equipment developed at the Rad Lab in Berkeley was then enlarged to an enormous industrial scale at a newly constructed facility in Oak Ridge, Tennessee. Westinghouse, General Electric, and Allis Chalmers were all contracted into that effort.

Since the army had taken over the research and lab development in Oak Ridge and

at another facility in Hanford, Washington, there was a great deal of compartmentalization with the intention of maintaining secrecy. "We knew that the goal of all of this was a uranium bomb," Ed remembers. "But much of what I learned about the project, apart from our own work at the Berkeley lab, I learned through involved British scientists with whom I had some contact." During the last year and a half of the war many British scientists had come to the Radiation Lab and to other federal science centers including Los Alamos.

Ed remembers a moment when the Berkeley lab's wartime director, Donald Cooksey, came in and said, "Clean the place up! Groves may be coming through tomorrow." General Leslie Groves was the overall director of all of the uranium project sites including Hanford, Oak Ridge, and Los Alamos. He was "a big guy!" Ed recalls. "One time I was returning to California from a trip down to Oak Ridge, and in a railroad depot, Nashville I think it was, I bumped into Groves and walked up to him, put my hand out to greet him, and just got back a totally icy stare." Nobody was to recognize anybody else in public for security reasons.

Eventually Lofgren, with a number of his energetic young colleagues at Berkeley, was asked by Lawrence to join Oppenheimer in an important and highly secret project relative to the ending of the war. Ed, who'd just mapped out a doctoral thesis project, was actually recruited by Donald Shane, a Berkeley astronomer who had taken on a personnel administrative role at Los Alamos. Ed was told that he was to go down to Santa Fe, New Mexico, and report in at 109 East Palace Avenue, the project's secretive personnel processing unit and the office of Dorothy McKibbin, the energetic greeter of the newly arrived participants in the Manhattan Project. During Ed's Los Alamos visit, which lasted two or three days, he met with Oppenheimer and visited several of the growing research groups. A very large number of books, of course, have been written about the project and its apocalyptic products. At least five books on Oppenheimer (including one science fiction novel) were published in 2005 alone, and at least two were published in 2008.

Ed with his wife, Lenore, and two young daughters, Helen and Laurel, drove to Los Alamos in the fall of 1944. (Their third daughter, Claire, was born after the war.) They were greeted by Oppenheimer and invited to dine with him and his wife, Kitty. The Lofgrens settled into a small, plywood prefab bungalow. Construction on the isolated mesa-top, formerly a ranch school, had moved ahead on a colossal scale by that point. "It didn't look like a comedown to us," Ed says. The family had been living in an apartment on Lincoln Street in Berkeley, essentially a student ghetto kind of neighborhood. "I could walk to work," Ed remembers. They had a small gasoline ration for their car, but they saved it for occasional trips to Bandelier National Monument or into Santa Fe.

Time was of the essence and the staff at Los Alamos had grown tremendously. Ed was soon assigned to head the team of young physicists and technicians working on designing the explosive detonator for what would be called Fat Man, an implosive atomic bomb which used plutonium rather than uranium. The team had initially been headed by Luis Alvarez, but Alvarez was called off to coordinate development work at the chosen test site in the desert east of the railroad town of Socorro in south-central New Mexico. It was called the Trinity Site, and explanations of the name's origin abound. A young scientist, Hugh Bradner, was second in charge. Bradner, who still lives in the San Diego area, went on after the war to develop, of all things, the wet suit so important to divers.

Fat Man was essentially spherical, though with its rounded nose and four-sided winged tail structure, it looked pretty much like what we would now consider a cartoon image of a bomb. It was about the size of a Volkswagen "Bug" and weighed over ten thousand pounds. The bomb consisted of blocks of layered explosives called lenses, twelve of which were pentagonal in shape and twenty hexagonal. When fitted all together the lenses looked

Fat Man (right) and Little Boy. *Los Alamos National Laboratory.*

something like a giant stitched soccer ball. The physicist Seth Neddermeyer came up with the initial lens concept, and George Kistiakowsky finalized the explosive lens design. The inner layer of the blocks surrounded the round plutonium core. The thirty-two inserted detonators designed by Ed's group were fired at exactly the same instant. Each detonator was double wired to account for possible electrical failures. The fast exploding outer layer ignited the inner layer and forced its energy downward against the plutonium core. This "implosion" would create a supercritical condition in the plutonium and, subsequently, a nuclear explosion.

Lofgren's small group was one of a number of divisions of the "G," or "Gadget" Division headed by Robert Bacher. The "Gadget" was the bomb. They worked in a small shack a mile or so from the main laboratory at Los Alamos. Pueblo Indian women were bused up daily from their communities on the Rio Grande to work in a number of service roles—cleaners and cafeteria workers mainly—at Los Alamos. Ed remembers them as excellent, reliable employees, who worked on his team behind protective shields tamping explosive powders into metal detonator cores about the size of large pill bottles or toilet paper tubes. They worked on a large number of sample detonators of varying designs with different kinds of powder and wiring configurations before the final product was sent off for manufacturing by an explosives company near China Lake, California. "There was a very high degree of determination," Ed recalls, "to make the whole thing work." They labored six-day weeks. "Off on Sundays." Ed's group reported to the fabled "Cowpuncher Committee," which was overseeing the whole buildup to the test at Trinity.

Lofgren went down to the Trinity Site several days before the actual test to oversee the detonator installation efforts. "A number of us drove down in a laboratory car," he recalls and remembers afternoon thunderstorms and, finally, the small man-made structures, wooden military barracks, at the site in an "endless desert" in every direction. Ed made

one climb up the tower on which Fat Man was mounted. "I did see the bomb up there," he recalls. (The steel tower was subsequently vaporized in the explosion.)

Ed stayed in a long barracks building with rows of army beds. It was near the McDonald Ranch house, he recalls, in a desert valley called, somewhat coincidentally, *Jornada del Muerto*, Journey of Death. The ranch land and its buildings were confiscated by the army to allow for the test. It was some 10,000 yards from the bomb tower.

Paul Aebersold, whom Ed knew from Berkeley's medical physics program, was responsible for monitoring the possible radiation fallout from the test. He needed a large number of people to man sites on a large circle surrounding ground zero and asked Lofgren to join his crew. There would be pairs, one scientist or technician and one soldier on a circumference of a circle with a five-mile radius. "We were given a shovel and a radio and a radiation monitoring meter. At the explosion, our instructions were to protect ourselves. That's what the shovel was for. We were to dig a shallow trench and lie face down. After the explosion we'd read our radiation meters and call if there was a problem. We would be out there for several hours. Well, we found a small arroyo, or ditch, so we didn't have to do any digging. At the start of the countdown, which we could hear on our radio, we lay face down as instructed."

The young man with Ed, whose name he regrets not remembering, came from the SED, or Special Engineering Detachment of the army. Men with technical or scientific training were shunted off into SED work during the war. More highly trained people were given full draft exemption. "We went out to our stations that evening. We brought water and a bit of food. There was concern that there might be a rain shower which would delay the countdown. We each had a piece of welder's glass. Our strict instructions were not to look up during the explosion. We had to wait a minute or so before looking and then only through this special shield glass."

The bomb was detonated at 5:29:45 a.m. Mountain War Time on July 16, 1945. "The sky was luminous. A big, boiling cloud at a great distance. It seemed like a long time before we heard anything, and then there were repeating echoes after the original explosion—one side, then the other side, as the sound bounced off the low mountain ranges surrounding the valley. So you heard the explosion several times, I remember. Diminishing each time." Then came the shock wave. "It seemed like a very long time. And then, BANG! Surprisingly strong!"

There was a betting pool, Ed remembers. "A dollar, fifty cents. Most felt it would 'go,' but the betting pool had to do with picking the number of kilotons that would be generated. The guesses were all over the map from its failing completely to unreasonably high figures and everything in between." The bomb actually generated something like twenty kilotons of energy, the equivalent of twenty thousand tons of TNT.

Ed describes the mushroom cloud which took a few minutes to form after the detonation: "Higher and higher, and then it drifted off toward the east." Dawn was approaching.

Aebersold's group gathered. There was no significant radiation at ground level, but enormous amounts of radioactive dust rose high into the atmosphere. That ultimately dissipated as the cloud moved still further to the east. The fur on some cattle at some distance turned ominously white, but there was little other detectable radiation damage. The group ate breakfast and most then returned later in the morning to Los Alamos.

Over the months that Lofgren was there, from the fall of 1944 to the test in the summer of 1945, Los Alamos and its—by then—massive staff was very focused on a highly scientific and even frantic effort to develop the weapon of weapons. The fear, pervasive then, was that the Germans were engaged in a similar effort. "We thought only about the

Trinity Site explosion, .016 seconds after explosion, July 16, 1945. *Los Alamos National Laboratory, PA-98-0520.*

war, not a later time. We had continuing reports concerning the war and the severe battles being waged," Ed says. "This, we felt, will end it. Only later did we think of the wider implications." After a pause, he adds: "A sign of immature thinking? Obviously, because there were still lots of questions, even when the war was finally over. But at the time, they were not in my consciousness, and that's true of many, many people."

Over some now well-documented objections and misgivings, Fat Man, the plutonium bomb Ed had worked on, was subsequently dropped on Nagasaki on August 9, 1945, less than a month after its successful Trinity test. Tragically, 40,000 people were killed in less than a second, and tens of thousands were injured. Tens of thousands more would die from radiation sickness in years to follow.

"Little Boy," of a different design, using enriched uranium-235 and a gun-type design in which a "bullet" of uranium was shot at a larger uranium "target" spike, was actually the first atomic bomb used against the Japanese. It was dropped on Hiroshima on August 6, 1945, killing an estimated 70,000 instantly. Another 60,000 would subsequently die from the effects of radiation.

By the time the Japanese had surrendered on August 15, 1945, Lofgren had returned "as fast as I could" to Berkeley to concentrate on finishing his PhD. He was still faced with two of the five or six exams he was required to take, and he had to write a dissertation. His topic was, somewhat understandably, the separation of uranium isotopes.

Intense scientific work resumed at the Radiation Lab under Lawrence, though Oppenheimer subsequently went off to Princeton to develop its Institute for Advanced Studies. Philosophical differences, and misgivings over the use of the atomic bombs, had begun to play on people, and differences surfaced between Lawrence and Oppenheimer. "They were

great buddies before the war," Lofgren notes. "They vacationed together, visited Oppie's ranch in New Mexico. But they were somewhat of an odd couple. Oppie was extremely well-read. Lawrence was much more of a country boy. A good physicist, but as to art and literature and so on—things Oppie had always been interested in—Lawrence had no interest or talent. Oppie was independently minded. What they had in common," Ed concludes, "was science: building up the lab. Lawrence was under the spell of a few very rich and powerful people who could fund the effort. No money was coming to the lab from the university at that point. Research science had to seek out wealthy sponsors." Lawrence, for example, had gotten one million dollars from the Rockefellers. That was a record amount at the time.

Berkeley had a policy that said that they would not hire their own graduates. Lofgren received recruitment letters from the University of Illinois, the University of Rochester, and even the General Electric Corporation. John Williams of the University of Minnesota, who had been at Los Alamos, asked Ed to join the faculty there as soon as he'd wrapped up his PhD work. Phillip Morrison, one of Oppenheimer's graduate students and Ed's close friend, moved on to other institutions like MIT and became very well known. Ed McMillan, who had been an assistant professor at Berkeley before the war, ultimately became the director of the Berkeley Laboratory following Lawrence's death in 1958. Luis Alvarez returned to Berkeley to further develop the electron nuclear accelerator as did the theoretical physicists, Robert Serber and Emilio Segrè. Edward Teller, whose foot-dragging and second-guessing throughout the development of the bomb at Los Alamos is amply documented in many books, began work on the hydrogen bomb. Eventually he would succeed in his efforts. The first hydrogen bomb was detonated on November 1, 1952, on Eniwetok Atoll in the Pacific Ocean with a yield of 10.4 megatons, 450 times more powerful than Fat Man at Trinity Site and Nagasaki.

Lofgren spent several postwar years at the University of Minnesota working with Frank Oppenheimer on cosmic ray research. Together with Edward Ney, and with funding from General Mills, they adapted helium weather balloons to ascend to altitudes of 100,000 feet. The balloons would carry up to fifty pounds of scientific equipment in thirty-inch aluminum spheres for measuring and tracking incoming nuclear particle paths using photo emulsions. "Ultimately, a shower of cosmic rays," Ed explains, "is pretty much a sample of the universe." They lost one or two balloons during their research. They were equipped with radios as were the cars the scientists drove to try to track them from the ground.

J. Robert Oppenheimer, Enrico Fermi, and Ernest Lawrence, (left to right). *Ernest Orlando Lawrence Berkeley National Laboratory.*

Ed remembers the years at the University of Minnesota with fondness. "Frank Oppenheimer," Ed says, "was a good person, though he was somewhat lost in the shadow of his brother." Ed pauses and then adds, "J. Robert Oppenheimer was simply one of the most

powerful intellects that ever was." Frank Oppenheimer subsequently fell victim to the House Un-American Activities Committee's investigations. He admitted some affiliation with the Communist Party, and the University of Minnesota would subsequently fire him.

Lofgren notes at this point that "the lab at Berkeley and Lawrence and the development of a very big accelerator, the cyclotron, were still at the top of my list." At the invitation of Lawrence, he returned to Berkeley in 1948. "It was like asking a hungry person if he'd like some food," Lofgren describes it. Lawrence was operating on a national scale. He traveled a great deal, and the daily management at the lab was left to Don Cooksey. "Before the war, science, not just physics, was a great big orphan," Lofgren describes it. "The government didn't finance anything. After the war that all changed. Lawrence, recognized, was supported by the government and money came in to build the Bevatron. Big science was practically invented by Lawrence and his people." The Atomic Energy Commission coordinated the Bevatron accelerator development with Brookhaven in the east and the Berkeley lab in the west. Many other universities were involved as well. William Brobeck, a mechanical engineer with an interest in particle physics came on board. "He was a great asset to the laboratory," Ed says. "Things that had to be made mechanically, well, he saw that they were made right."

About this time, the House Un-American Activities Committee [HUAC] had begun to investigate the Atomic Energy Commission's membership. Lofgren was called by the AEC security people. "It was a terribly unsettling kind of experience," Ed recalls.

"I had needed clearance to return to Berkeley and the lab." Monies were coming in. Alfred Loomis had given Lawrence some substantial funds, but the AEC was the primary funder and could control who came and went. "Here was a thing that's going to threaten your whole career. And what the hell is it all about?" Ed anguishes still. He spent a whole day in front of the committee of four people. People came and went. "They asked things about my beliefs, all kinds of things. It was a very stressful, difficult thing. They set it up in a way to knock you to pieces if they could. The security branch of the AEC was riding high in those days."

He pauses and then glumly recollects the interrogation: "Did I know so and so? What did you know? What did you think about him? It was a pretty nasty experience." Years later and through the Freedom of Information Act, Ed got a copy of the transcript of his interrogation session. "They really put me through the wringer, but I managed to survive. 'You can go now,' they said at the end of the day. It was a horrible, horrible experience that could only have been cooked up by really nasty people!"

Lots of factors probably led to Lofgren's being hauled before the AEC. It was concerned about people who opposed postwar weapons development they were coordinating. Did Ed have misgivings about all of this? "Yes, indeed, I did. But there were some people who had more opposition and occasion to think about it all and had had misgivings about it even before the development of Los Alamos and the Manhattan Project." In describing the Communist aspect of HUAC's focus, Ed says, "I had known people at the physics department and in classes who turned out to be Communists. But so what? So did a hundred thousand other people! Once a security system like that is set up, it needs grist for the mill. They better have something to do or they'll loose their jobs."

Lofgren remembers the empty stores along Telegraph Avenue in Berkeley after the war. Some were rented by organizations with social agendas. "I had dropped into one of these once. Something about downtrodden people in Alabama, South Africa, and so on. I can't remember what the hell the name of it was. But anyway. They were passing the hat and I put in a dime or a quarter, big money then. Well, there was a notation in my secu-

rity file that I had attended a meeting and contributed money! There were snoops all over the place. Maybe they were in the audience or had infiltrated the organization." I asked Ed how thick his file was. He replied holding up a thumb and forefinger to indicate the thickness—about two inches!

Of course they asked Lofgren about his relationship with Frank Oppenheimer, which had been both a true friendship and a professional partnership. But they had never, as far as Ed can remember, gotten into political discussions. The focus had been on high-altitude cosmic ray research, not lofty philosophical debates and musings.

Several days after returning to Berkeley from Washington, Ed received a "Q" clearance, which allowed him to be hired by Lawrence and the Berkeley lab but prevented access to certain things. Eventually he received a complete clearance classification.

Relative to the postwar Soviet buildup of atomic weapons, Ed notes that the international situation had become very serious. "The idea that war might happen was very, very real." The Bevatron, which could be used to develop advanced atomic weaponry was only about half completed. Ed explains in simple terms how 98 percent of most uranium isn't fissionable. Zapping uranium-238, for example, with an accelerator beam can transform it into uranium-235, a much more fissionable form of the element. Ed recollects Lawrence saying, "Let's think of a big accelerator and a big beam!" The debate was soon centered on possible sources of natural uranium and how to render those sources fissionable. "We knew, and the Soviets probably knew, that Canada and Africa held the most deposits," Ed says. Incredibly, bounties were offered in the 1950s to prospectors who were asked to scour the West in search of possible unknown deposits. "Geiger counters were distributed to them," Ed recollects. "And they found lots of small deposits." A solution to the problem of transforming the mostly low-grade ore into fissionable materials was then developed. A linear accelerator one mile long would be constructed, and a site was actually chosen in Missouri. The idea was to develop a beam of 100,000,000 volts, an amount the cyclotron in Berkeley would not be able to generate. The linear accelerator would be sixty feet in diameter, and Lofgren was selected to develop a device that would inject 50,000 volts into the front end of it. He actually completed his part of the project, though the Missouri mile-long accelerator was never built. Not for naught, Ed notes with some pride, the injector was subsequently used by Willie Fowler at Cal Tech to measure the production of energy by the sun.

In 1958 Ernest O. Lawrence died. He was only fifty-seven. Edwin McMillan was selected to be his successor. "McMillan was the most intellectual and the most superb physicist," Ed recollects. "He left you with the impression that he knew everything. But he was a very modest guy. Oppenheimer was brilliant, but he was also something of a showman."

The new device being designed at the Berkeley lab was called an MTA, Material Testing Accelerator, a name chosen, Ed says, to obfuscate its actual intent. "Its real purpose was to generate fissionable materials from a feed stock of non-fissionable uranium." In short, the production of weapons material. The 1950s were a time of rapid development in Berkeley. The staff was increased considerably. There were lots of interruptions as the work proceeded, Ed remembers. Eventually all classified national defense work was removed from Berkeley to the new laboratory facility at Livermore, on the other side of the low mountains to the east of San Francisco Bay.

Construction of the Bevatron under the guiding genius of William Brobeck proceeded then at the Berkeley lab. [See Marjorie Dobkin's "Celebrating the Bevatron" in this issue.] It took about six years to complete the construction, owing to interruptions relative to the parallel development of the Livermore facility. Too, Ed notes, the Berkeley hills on which it was constructed are not stable. Even after construction was completed, the need for

underground supports for the ring could only be done by laborious tunneling methods. The Bevatron's name derives from the fact that it is a synchrotron, or synchrocyclotron, which can produce a billion electron volts. It included a ten-thousand-ton doughnut-shaped electromagnet with a diameter of 135 feet. Atomic particles could go round the circuit two million times in one second. New atomic particles were discovered including antiprotons and antineutrons (antielectrons had been found previously in cosmic rays). Emilio Segrè and Owen Chamberlain won the 1959 Nobel Prize for their discovery of the antiproton. Ed notes that a third physicist, Clyde Wiegand, was not included in the award though he probably should have been.

Competition for the use of the Bevatron grew, and Lofgren, who had been appointed head administrator by Lawrence before his death in 1958, had to deal with all of that. Many of the able young physicists that Ed brought onto the staff, scientists like William Wenzel, ended up—as staff members—having to deal with other people's problems. "My physicists were kind of left behind as a result," Ed notes somewhat wistfully. (A note: many people feel that Lofgren himself should have been the recipient of the Nobel Prize for his years of work as director of the popular program.) In the 1960s shielding was added to the Bevatron and the beam enlarged. There were occasional generator shaft problems, cracks and such. A huge current was used, but not at a steady rate. Rather pulses of the current were fired at the rate of about six per second. Flashovers occurred occasionally causing shutdowns. "Sometimes we'd have weeks of downtime," Ed recalls. "There would be much clamoring for more and more operating time. The number of people involved was very great. Science people from England, France, Sweden and other countries came to the lab." Lawrence had

Ed McMillan and Edward Lofgren posed on Bevatron shielding blocks, 1963. *Ernest Orlando Lawrence National Laboratory.*

Ed Lofgren with Francisco Troy, left, and Miguel Troy, in front of Oppenheimer's former home in Kensington, 2007. *Courtesy of the author.*

always encouraged this international involvement and effort and Lofgren continued that tradition. He traveled to Switzerland in 1963 to consult in the development of what would become the largest accelerator in the world at CERN.

Today, Lofgren, who retired from the active staff at the Lawrence Berkeley Laboratory in 1981, keeps up with the literature as best he can. "My understanding becomes less and less as research knowledge becomes more and more detailed," he notes regrettably. "Fermi was probably the last physicist who knew all the fields of physics."

One Sunday before brunch at Fat Apple's Ed, my two sons, and I drove up the hill to visit 1 Eagle Place in the little community of Kensington next to Berkeley. This was the large, white, Spanish-tiled-roofed house where J. Robert Oppenheimer lived when he was at the University of California. Ed noted when we parked and got out that as a young grad student he'd served as a bartender at some of Oppie's parties. More recently a reception for a new book about Oppenheimer had been held there, and Ed had been one of the invited guests. "The last time I saw Oppie," Ed recalled wistfully as we stood in front of the house and looked out over the bay toward San Francisco, "was meeting him in the Faculty Club at Berkeley. I don't recall the circumstances, but it was a year or so before he died. I just ran across him, and we greeted each other. He obviously looked very stressed and not very healthy. We just greeted each other in a pleasant way."

After brunch at Fat Apple's, we ordered up coffee refills and Lofgren talked about the state of the world. I mentioned Iran and its nuclear development. "Very worrisome things," was Ed's tacit response. We talked about the future of nuclear energy and alternatives. "We're addicted to enormous quantities of energy," Ed began. Relative to nuclear sources specifically, he elaborated: "My feelings are very mixed. As with coal and oil there is no ash and other garbage, but nuclear reactors yield enormous amounts of extremely dangerous materials. I'm concerned that civilization has not matured to the point where it can safely handle these radiation wastes. Surely you can demonstrate that it is possible to handle them: you can bury the shielded containers of waste and so forth. But it's not a small job. It's a very, very big job. The question is, have we—meaning 'civilization'—developed the political and moral will to handle the waste properly?"

We moved on to alternative sources, wind, solar, tidal, and so on, and Ed pointed out that they all have demonstrably strong possibilities but that they also all have environmental

and cost issues, like wind generators in bird migration flyways. "There's no free lunch as far as I know," Lofgren concluded. "The best society can do is to pursue *many* avenues of energy supply."

Lofgren saw our twentieth-century efforts to dam rivers and harness energy as essentially a no-win situation. When we got back to his apartment he rummaged through his many shelves and piles of books to find and lend me *Cadillac Desert* by Marc Reisner, which thoroughly documents that aspect of American history. Ed concluded our brunch on both optimistic and gloomy notes. "My major worry," he stated, "appears to be unrestrained population growth."

Relative to the war and the bomb: "The price that the world paid for that series of episodes was extremely high. I don't know if we, so called 'civilized people,' would or could go through that again." He downed the last of his coffee. "The U.S. is *not* innocent," he said and paused. "The U.S. committed some pretty horrible episodes in history. I feel *uneasy* about where the hell we're going. By 'we' I mean so-called 'civilized' people."

Dairy cows grazing in Strawberry Canyon in the 1880s. *Courtesy of the Berkeley Historical Society.*

SURVIVING IN A CHANGING AND OFTEN HOSTILE ENVIRONMENT

THE BERKELEY INSTITUTE OF INDUSTRIAL RELATIONS

George Strauss

ACADEMIC INSTITUTIONS DEALING WITH CONTROVERSIAL SUBJECTS are fair game for attack from all sides. How Berkeley's Institute of Industrial Relations (recently renamed the Institute for Research on Labor and Employment) dealt with this problem—especially under Clark Kerr—is the main subject of this paper.

Interest in the field of industrial relations at Berkeley goes back as far as the 1920s when Berkeley's then closely intermeshed College of Commerce and Economics Department included a nucleus of influential economists interested in labor. Most notable of these were Ira ("Doc") Cross, Paul Taylor, and Charles Gulick (all lived to ripe old ages). In the mid-1930s Cross was the first arbitrator for the longshore industry, giving the union a major win in one of his first decisions. (Kerr held this job later on.) Earlier, in the 1920s Berkeley Extension sponsored a Labor School in San Francisco, in some ways the forerunner of our present labor center. Another Berkeley economist, Solomon Blum, wrote what was possibly the first textbook specifically on industrial relations.[1]

The immediate postwar period might be called academic Industrial Relations' "Golden Age." The postwar wave of strikes had made labor relations the country's number one social problem—or so many Americans thought, including the large cohort of returning veterans (such as myself) who jammed universities, courtesy of the GI Bill. In 1947, for example, labor was the most popular "field of interest" listed by members of the American Economics Association.[2] At Berkeley, as elsewhere throughout the late 1940s and 1950s, courses associated with industrial relations were popular in a variety of departments, as suggested by their titles, for example, Personnel Psychology, Labor Economics, Organizational Sociology, as well as Collective Bargaining (in the Business School). Kerr's own course, Business Administration 150, held in Wheeler Auditorium, drew up to 400 students (in part testimony to Kerr's outstanding skill as a lecturer).

The institute's immediate history begins with a lunch held sometime in 1944 between then President Robert Gordon Sproul and then Governor Earl Warren. Fearing that the end of the war would lead to a resumption of the especially bitter labor-management battles which had marked California during the 1930s, the governor wondered whether the university might enlarge its educational base to include industrial and labor relations and so help facilitate what he later called "open and honest labor-management relationships." Warren may well have been influenced by the fact that his fellow Republican, New York Governor Tom Dewey (and rival for the presidential nomination) had just proposed what became the New York State School of Industrial and Labor Relations. As Kerr put it later:

> The impression I got from Warren was he wanted to change the image of California for the sake of attracting industry as a place that wasn't either riven with class conflict as in Northern California or under the domination of right-wing reactionaries as in Southern California. He wanted a more

> moderate . . . point of view. Somehow or other we were supposed to help, by getting the two sides together and educating leaders on both sides.[3]

In short, what Warren wanted was to provide a neutral ground in which labor and management could meet, with academicians providing research input. He saw the institute as playing a bridging role.

Sproul was not unprepared for the governor's proposal. The Berkeley faculty (especially E. T. Grether, then dean of the business school) had been much concerned with the postwar period.[4] Further, Sproul had a long memo proposing a new labor relations program, sent to him by Paul Dodd (later the UCLA institute's first director) which was then passed on to Warren. Grether was active in the early planning, and in fact in December 1944 wrote language for possible inclusion in the governor's forthcoming budget message.

Grether proposed that the new program be housed in an institute. Upping the ante, the governor, in his January 8, 1945, "State of the State" address to the legislature, recommended that instead of an institute, a School of Industrial Relations be established at Berkeley and Los Angeles.[5] The governor argued that "the techniques in this field [industrial relations] are at least as important as those in the fields of business management and technological advancement for which our schools offer special training."

Early Institute Directors: Lloyd Ulman, George Strauss, Clark Kerr, Ray Miles, Sheldon Zedeck, ca. 1992. Photographer unknown. *Courtesy of the author.*

The governor's proposal met considerable opposition, particularly from conservative and agricultural interests which viewed unions as socialistic or communistic. After almost being defeated, the proposal passed just before the legislature adjourned, and only after the governor exerted considerable political clout. Though downgrading the school to an institute and reducing its proposed appropriation, the legislature gave its approval on July 17, 1945. The final bill provided for the establishment of "an institute of industrial relations and the maintenance of courses in Industrial Relations and extension activities and

research in connection therewith, utilizing the full resources of the University of California and especially its faculties and facilities on the Berkeley and Los Angeles campuses of said University."[6]

The governor's message, the language of the authorizing bill, and the reports of the campus and university statewide committees which set the direction for the new institute, all made it clear that the institute would have two goals. Its first was to engage in research and the provision of research apprenticeships for graduate students. But as did many other UC Organized Research Units, it had a second goal: to provide educational services for the community—and especially for unions and management. In fact, as the governor saw it, one of the institute's main tasks would be community relations: conferences, workshops, and courses. Further, the governor felt the institute should be concerned with education at the high school level.

The expectation was that the institute's two functions, namely research and community service, would be mutually reinforcing: the institute's contacts in the community would facilitate research; meanwhile its research would form the basis for its community outreach programs. Sixty years later the institute still plays these two roles although coordination between the two may be weaker.

Once the law was signed a joint administration-faculty committee was appointed at Berkeley to give the institute direction. The committee's report gave strong support for giving the institute a dual role. Quoting from the report:

> The Institute should . . . emphasize the point of view that the public welfare encompasses the interests of all segments of society . . . requires testing the actions of all groups . . . against certain recognized principles basic to our democracy. [There should be the] closest possible integration between the community and the campus activities of the Institute. [A major aim] should be to make an impact on the community by offering facilities for training personnel, for interchanging ideas, and for disseminating the products of academic research.
>
> [In programs there should be a] mixing of labor and management to provide interchange of thoughts and viewpoints for the sake of encouraging understanding, tolerance, and the habit of mutual association.
>
> The Institute should center on a research core [and research findings should be utilized in the various conferences and classes]. Feeding information back and forth between the world of labor relations and the research center should be constant. . . . The research program should be the major means of bridging the gap between the University and the community in the field of industrial relations.[7]

Three main issues had to be resolved before the institute could get going. The first was whether there should be only one institute, to be located at Los Angeles, or two, one at Berkeley and the other at Los Angeles. After much debate it was finally decided to establish two institutes, but they were to be closely coordinated by a committee (under Professor Harry Wellman) to report directly to Sproul. The next decision involved the institutes' relationship to teaching departments. Berkeley had assumed its institute would be in the business school. Los Angeles would have placed it in economics. Eventually both were made independent.

The last question was who would be director at Berkeley. After a careful search the

committee picked Clark Kerr, then a thirty-four-year-old full professor at the University of Washington, and in doing so it passed over several possible internal candidates. Kerr, who received his PhD from Berkeley, was a first-rate scholar and already had a strong record of publications. Equally important, he had established a considerable reputation as a neutral practitioner while working on the War Labor Board.[8] The search committee's file included recommendations from numerous labor and management notables, including a very strong, unsolicited letter from Dave Beck, later president of the Teamsters' Union (and still later jailed for tax fraud and theft).

The Kerr Years

The regents appointed Kerr as director in December 1945.[9] The institute moved into its new quarters on the second floor of California Hall (now the chancellor's office) during the spring and summer of 1946 though it was not fully staffed until 1947. The fact that the institute obtained such a key campus location was early evidence of Kerr's political skills.[10]

In staffing the institute Kerr's intent was to draw on academicians from a broad range of departments. Of the initial appointees three came from business administration and one from social welfare but this list was soon expanded. The list eventually included economics, business, political science, sociology, psychology, social welfare and law.[11] For the most part institute faculty were well rewarded: they held joint appointments, two-thirds in their teaching departments and one-third plus a two months summer appointment in the institute.

Kerr made strategic use of the availability of part-time institute positions to influence appointments in teaching departments such as sociology and economics. As described by Professor Emeritus Joseph Garbarino:

> When he [Kerr] found someone he wanted to hire he would approach the appropriate Department and propose that they consider the person for an appointment. In return, when the Departments were recruiting someone they thought might, or *usually would not* [emphasis added], fit in the Institute they would get Clark to agree to pick up one-third of their salary to offer a reduced teaching load to close the deal.[12]

Among those given part-time (typically short-term) institute appointments despite their minimal industrial relations interests were Harvey Leibenstein, Roy Radnor, West Churchman, and Frederick Balderston. The institute also provided the first home for the Center for Research in Management Science (now the Fisher Center for Management and Management Technology in the Haas School of Business).

By contrast, the bulk of the new appointees were interested in collective bargaining, broadly defined. With some exceptions they were expected to teach in their subject matter department, to do research relevant to industrial relations and also to work with the community. Indeed Kerr was something of a taskmaster. A witticism attributed to him: when asked what "one-third time" amounted to his reply was "All the rest of your time."

In this way Kerr introduced industrial relations related courses into the teaching departments. But he was less successful in integrating these courses across campus into some sort of "group major" in a way which would "avoid duplication. . . . Everybody wanted to give human relations," he said. "I ran across increasing resistance by the departments that some institute should have something to do with what they offer. They all looked upon themselves as a self-contained unit."[13]

In addition to academic faculty Kerr brought in two outside staff people, both with War Labor Board experience, Ron Haughton who was put "in charge of Labor-Management Relations" and later Lloyd Fisher, a one-time research director of the International Longshoremen and Warehousemen who became associate directors.

Fairly quickly Kerr and Haughton developed a series of public conferences dealing, for example, with issues such as the newly enacted Taft-Hartley Act. Chairs of such programs included both Governor Warren and President Sproul. Among the speakers were such notables as Senators Hubert Humphrey, and Wayne Morse, General Motors president Charles Wilson, Auto Workers president Walter Reuther, AFL president William Green, and Professor Sumner Slichter, then perhaps the country's most prominent industrial relations guru. Many of these conferences were held in San Francisco hotels or Harmon Gym on campus. Several two- or three-day programs took place in more elegant quarters at the Ahwahnee in Yosemite. Some sessions drew over a thousand attendees.

From the beginning it was realized that large scale programs involving both union and management were not enough. Each side had special needs. And so a series of specialized programs were developed, on topics such as grievance handling for unions and wage and salary administration for management. Most of the management programs were jointly sponsored by University Extension (as were the labor ones technically). Many were organized or taught by Berkeley faculty. Professor Garbarino recalls, for example, representing the institute in organizing an annual East Bay Management Conference sponsored jointly with the Oakland Chamber of Commerce and the United Employers Associations. In addition he taught a variety of union courses, a series of lectures on labor history for an Oil Workers local in Rodeo and a similar series for a Teachers' local in Richmond as well as (along with two colleagues, Arthur Ross and Van Dusen Kennedy) being "corralled into teaching a credit version of BA 150 [the basic IR course] in Salinas to guards from Soledad prison for which we each made two trips to handle all-day sessions on six successive Saturdays."[14]

Preserving Neutrality: Attacks from Both Sides

Kerr thought it critical that the institute be seen as neutral between management and labor. Given the times this was difficult. During the locally famous Oakland general strike Provost Monroe Deutch asked Kerr to help settle it. Kerr declined, arguing that the university shouldn't be involved.[15]

To preserve the appearance of neutrality Kerr at first insisted that no staff member be identified with one side. "I was concerned that the programs [be] more or less balanced. I did not want the labor side to become anti-employer and the employer side to be anti-labor."[16] Eventually, to strengthen community ties Kerr dropped this staff neutrality requirement and began hiring as "community representatives" practitioners identified with one side or the other, for the most part on a part-time basis. These included, for example, Teamster Business Agent (and later U.S. Congressman) Jeffrey Cohelan and Robert Grunsky, director of the California Metal Trades Association, then a major employers' association

Perhaps inevitably, despite these efforts, Kerr and the institute were attacked by both labor and management. Labor left-wingers suspected Kerr of being pro-management. After all his teaching appointment was in the Business School (as was that of many other institute faculty members). Ipso facto he must be pro-management. Later some in labor objected to the institute ever offering programs for management. At least, they insisted, programs for management should include some labor speakers.

Kerr, himself, was no red-baiter but he had some unpleasant experiences with Communists while at the University of Washington, and he tried to keep his distance from

them. Nevertheless he was charged with being a Communist. (As we now know, J. Edgar Hoover suspected Kerr and indeed later tried hard to get him fired as university president.) Thus Kerr was quite upset when, without consulting him, President Sproul appointed an advisory committee which included some well-known Communists. On the other hand, he got along with more conservative labor leaders, especially the local leaders of the AFL. (This was a time when the AFL and the CIO still were separate and rather antagonistic organizations.)

Kerr was suspect by some more conservative managers in part because as a graduate student in the 1930s he had studied the condition of California agricultural workers and also because he had hired Lloyd Fisher, a former Longshoremen's (a left-wing union) research director as associate director of the institute.

Early in his term as director Kerr was hauled before the regents and questioned sharply, particularly by one regent representing agricultural interests. "They were concerned that I might do another Grapes of Wrath" he said.[17] On another occasion a group of San Francisco employers insisted the institute shouldn't run courses for unions. And that if it didn't stop this they would boycott Kerr as an arbitrator. "They threatened me a bit . . . wanted to bluff me out . . . I said I would think about it."

The Balance between Research and Community Relations

What should be the relationship between research and community relations? And what sort of research should the institute do? These were much debated issues during the institute's early days and the subject of a variety of committee reports.

As might be expected, community relations staff argued that community relations and research should receive equal attention and further the two should have equal weight in determining academic faculty promotions. Kerr's own position was that research came first. Given the nature of Berkeley as a university, he said, that was the way it would have to be.

But what kind of research and who would do it? It was already established that academic faculty would teach some non-credit courses for the labor-management community. Should community relations staff engage in research? Some argued they should. A professional staff should have "equal responsibilities for research and off-campus activities." Despite these arguments substantial formal published research by nonacademic staff had to wait till the 2000s with the formation of the Institute for Labor and Employment (as described later on).

Should research be confined to labor-management relations or should it be broader? Jeffrey Cohelan, then a part-time staff member, argued that research emphasis should be on industrial relations in the community. A memo prepared by the community relations staff concluded that if a request were made for the institute to provide services which are not "bargainable between labor and management," the institute should try to get another department to handle it. Professor Vaden Fuller suggested that research should be guided by "the demands of labor and management." Kerr's position was that the institute couldn't afford to do this. Instead, one, research should be undertaken for research reasons; but two, there was an obligation to translate this into popular form where possible. The Faculty Advisory Committee concluded "research topics should be of long-term as well as current significance" and "The source material should be primarily regional but the subjects should be of more general interest."[18]

Probably consistent with Warren's original expectation as well as the Advisory Committee's recommendations, much of the institute's original research was locally oriented.

A series of studies of individual industries was published with the title of the "West Coast Collective Bargaining Series." Other studies looked at, for example, job evaluation in the Southern California aircraft industry and multiple-employer bargaining in the West Coast paper and pulp industry.

Not all of the early research was locally focused. It was during this period that through a series of academic publications Kerr and Ross made their major contributions to what was sometimes called the "California School" or "neoclassical revisionist" approach to industrial relations. In this work Kerr, in particular, tried to bridge the two major economics camps then current, the neo-classical and the institutionalist and to combine the best of both. Many of these studies were foundation financed.

Business Agents—Building Trades, Institute Conference for Construction Business Agents, August 25, 1978. Photographer unknown. *Courtesy of the author.*

The Ross Years: Attack from Labor

With Kerr's promotion to chancellor and eventually to president, Grether (still dean of the business school) became acting director. Arthur Ross succeeded him. Under Ross, foundation money poured in (for example a large Ford Foundation funded study of unemployment which involved most of the institute faculty as well as scholars from other universities). A new journal was founded, *Industrial Relations,* which was to be devoted to "all aspects of the employment relationship." Meanwhile the research itself began to have less direct practical application. Studies involving companies and unions as research sites became less common and less was primarily regional. As a consequence the faculty-community relations link weakened. Responsibility for community relations programs devolved increasingly on two community relations coordinators, one for management, the other for labor (and in 1960 both incumbents were fairly ineffectual).

Although Bay Area management took these developments in stride (for reasons to be discussed later), labor felt badly neglected. With growing stridency, unions began to attack the institute and especially its director, whom, they charged, ignored their concerns. Labor's

demand was that the university establish an independent labor institute which would be devoted solely to its needs. The university, labor argued, provided substantial education and research services for agriculture, business, medicine, and many other interest groups—but hardly anything for labor. By contrast, the state universities in New York, New Jersey, Pennsylvania, Illinois, Michigan, Wisconsin, and Minnesota all supported major labor education programs. As Kerr put it: "For some reasons that I never understood the trade union movement . . . and [some] very solid people became completely turned off on the Institute . . . it was really violent. . . . I never understood the depth of their passion."[19]

As lobbying pressure increased in Sacramento, Kerr, now president, appointed a special committee to review the institute. The committee's report recommended a substantial strengthening of the institute's community activities. Shortly after the report was filed, Ross and the incumbent labor coordinator resigned.

The Ulman Years

Appointed in 1963, Lloyd Ulman, the new director, moved vigorously to repair the breach. With Kerr's cooperation, negotiations were opened between the Berkeley and Los Angles IIRs, on one hand, and a labor committee, on the other. In time an agreement was reached establishing quasi-autonomous Centers for Labor Research and Education in each institute. An implicit part of the agreement was a substantial increase in university funding for labor activities. These new labor centers would be funded in part through a separate budgetary account.

The number of professional labor staff at Berkeley was increased from one to three and then to four. Don Vial, then the State Federation of Labor's research director, was hired as the Berkeley labor center's chair. The labor education program was much enlarged and upgraded.

Working together Ulman and Vial introduced a series of imaginative new programs, most of which were funded by the Ford Foundation. All were inspired in part by developments in the real world of industrial relations. Several deserve special note.

The 1960s were marked by the Civil Rights movement and numerous demonstrations, some directed against unions, which were easy targets since African Americans were under-represented among the ranks of labor leaders. In an effort to ameliorate this problem, at least in the San Francisco area, the institute organized the Minority Trade Union Leadership Program. Funded by the Ford Foundation, this program involved an on-campus full-time training program for about fifteen carefully selected rank-and-file minority-group union activists who took leave from their regular jobs and while on leave were reimbursed by the Ford Foundation for their lost income. The purpose, of course, was to equip these rank-and-filers with the knowledge and skill required to be union officers or staff people.[20] Classes were taught by regular labor education staff or by hired experts and the syllabi were designed to meet the special needs of this particular group of students. A typical day's classes might include economics, arbitration, labor history and labor law in the morning and writing and public speaking in the afternoon.

The program was successful in that most of the graduates eventually found full-time jobs either with unions or the government, but the program was expensive. The foundation funded a second program. There was no third session; however, many of the syllabi developed by the institute were adopted by new labor studies programs organized at Laney College, Oakland, and community colleges in San Jose and San Francisco, as well as San Francisco State. Later a similar, less intensive evening program just for women was organized by Dr. Betty Schneider of the institute staff.

A somewhat related and very innovative Ford Foundation funded program involved sending groups of Bay Area workers to Europe to work on jobs equivalent to their own at home. Thus a group of about eight longshoremen were sent to the Netherlands to work on the Rotterdam docks. A similar group of nurses went to London and a third group, this time of seamen, shipped on a Norwegian ship. Each group was accompanied by an observer whose job it was to observe, interview, and record the reactions of Bay Area workers to some very different ways of organizing work overseas. Eventually descriptions of each group's experiences were published.[21]

Another industrial relations development led to a different kind of program. Through the 1960s and 1970s the Legislature passed a series of laws gradually extending collective bargaining rights to practically all California state and local government employees, including teachers. A problem was that neither side, labor nor management (and particularly management), was prepared for collective bargaining. Stepping into the breach the Berkeley and Los Angeles institutes began offering courses and conferences on how to bargain as well as on the legal rights of the parties. In time this led to a practitioner-directed publication, *California Public Employee Relations,* which now comes out six times yearly. CPER includes news stories of labor relations developments at all levels, state, municipal, school district, and university, analyses of relevant recent legal decisions, as well as articles by practitioners.

Amid growing concern over the impact of industrial practices on worker health, Congress in 1973 passed the Occupational Health and Safety Act. Responding to the same need the institute established its own Labor Occupational Health Program (LOHP), offering classes and advice to unions seeking to resolve occupational health problems affecting their own members In time this program received federal funding. While once such funding became available other universities established labor occupational health programs of their own; Berkeley's was one of the first to be established and among the few to survive cutbacks in federal funding. Currently LOHP is in the School of Public Health.

Management Programs

While the labor center thrived during this period, the management program atrophied. The explanation is simple: the competition was too great. University Extension offered after-work basic level business-oriented courses. Meanwhile the business school launched an executive education program for mid-level managers. The typical executive education course involved several days of full-time work on campus. The number of management consultants rapidly increased, and many of these advertised themselves as equipped to offer training and advice to meet the special needs of given clients.

At one time it was expected that the income from management courses would pay the management coordinator's salary and leave enough "profit" to pay for other activities: the Robin Hood principle, the rich would pay for the poor. But it didn't work out that way. By the 1980s few of the small number of management programs offered earned enough to even pay their own expenses, leaving little to pay for staff salaries. By 1987 when the incumbent management coordinator retired, he was not replaced. Probably the management program should have been eliminated much earlier. It was kept on primarily to preserve the institute's image of neutrality.

Did that mean the end of management programs? Not entirely. Back around 1960 Professor Mason Haire, a psychologist, sponsored a series of roughly monthly dinners for top managers held at a top restaurant. Following the then popular Great Books format, participants were assigned a popular business book—or at least several controversial articles

—which participants were expected to read and then discuss after the meal. A considerable success at first, the program gradually lost attendance and was finally dropped. Professor Raymond Miles (later business school dean) revived this format in the 1970s, this time with speakers. Again it was successful at first and then lost membership. Finally it was revived once more in the late 1990s, with Miles again and Richard Clark, PG&E's retired CEO, taking the lead and the Haas school providing co-sponsorship.

This program permitted companies to send a delegation to periodic day- or morning-long discussions of current developments in the human resources field, often including faculty members' presentation of the results of their own research. A major purpose of this program was not just to raise money. It was to provide leads and contacts for faculty and graduate student research. In this it was successful. Unfortunately, some of the participating companies, such as the Bank of America, were bought out by outside firms, their headquarters moved from San Francisco, and some of the key participants became jobless themselves. End of program.

In another effort to find a management-oriented niche not occupied by competitors Professor Sheldon Zedeck, a psychologist, organized a series of programs on fairly technical subjects, such as assessment centers, which brought to Berkeley some of the country's major experts on the subjects in question. This program did well at first but then may have run out of cutting-edge technical issues of interest to local practitioners.

In short, labor had a need for institute programs. Management did not.

Later Developments

Space permits only a quick sketch of later developments. The contributions of post-Ulman directors—Ray Miles, George Strauss, Sheldon Zedeck, Clair Brown, Jim Lincoln, Margaret Weir, and Michael Reich—must be largely ignored as well as the problems they faced.

Tight university budgets led to cutbacks in campus support, making the institute more and more dependent on hard-to-get outside grants. In allocating cuts, successive directors gave priority to protecting graduate student support. The labor center suffered particularly. At the low point its staff dropped to one professional coordinator and a secretary. Earlier LOHP's federal grant was unexpectedly not renewed, leading to much of its staff being unexpectedly laid off.

Turning to the larger world, academic interest in industrial relations began to fade nationwide. By 1960 union membership began to decline. Strikes were fewer; labor-management relations somehow stabilized. During the 1960s other problems, such as civil rights, the Vietnam war, poverty programs and free speech on campus, attracted the headlines and engaged the interests of socially progressive students and faculty. This was particularly true at Berkeley, where interest in industrial relations, defined as union-management relations, never recovered after the 1960s.

Enrollment in industrial relations classes also declined. (Sometime in the mid-1980s I taught the campus's last class in Collective Bargaining. Only twelve students enrolled, many of whom may have taken the class solely because of its convenient 9:30 to 11 hour). As faculty with a major interest in union-management relations left Berkeley or retired[22] they were not replaced by people with similar interests. Meanwhile critics charged that industrial relations dealt with "the agenda of the 1940s." The university's resources, it was claimed, might better be spent on more contemporary problems.

While to the outside world industrial relations might still mean union-management relations, the interests of younger institute faculty increasingly focused on a much broader

range of topics, for example, the organizational structure of semiconductor firms. The field increasingly enveloped the "entire world of work." As interests became more diverse, the institute increasingly morphed into a collection of semiautonomous "centers." There were "research centers" populated largely by faculty and graduate students and "community outreach centers" consisting primarily of nonfaculty union-oriented staff. The first group included, for example, the Center for Work, Technology and Society. Among those in the second group were the Labor Project for Working Families and the Center for Labor Research and Education. For the most part these centers were funded by outside agencies and, if their grants dried up, the centers disappeared.

Meanwhile the institute lost its monopoly over industrial relations, as broadly defined. A quite distinguished group of labor economists developed around the Department of Economics in Evans Hall and these had only weak relationships with the institute. Why? There are a variety of explanations, among others that the Evans Hall group paid greater attention to new approaches to economic theory.

Geography also played a role. As mentioned earlier the institute was originally located at the center of campus in California Hall close to South Hall, which then served as headquarters for economics, sociology, political science and business. During this immediate post-war period the campus was desperately short of faculty office space; many faculty members had to double or triple up. Since the new institute had offices available they were quickly grabbed. So, as Kerr commented, "we did have people from a whole lot of departments that really lived more at the Institute than they did in their departments—maybe considered it their primary office."[23] Although these early institute faculty came from different traditional disciplines, they shared similar interests and considerable cross-fertilization occurred. Among graduate students there was at least one marriage.

Institute of Industrial Relations, 2521 Channing Way, Berkeley, California. *Courtesy of the author.*

The good times didn't last. In 1970 the chancellor's office took over California Hall, exiling the institute to Channing Way (Epworth Hall) two blocks off campus. Meanwhile many of the social science departments went to Barrows Hall. Later economics moved to Evans Hall and business to Piedmont Avenue, both fifteen minutes walk from Channing, a walk few people made on a regular basis. Hoping to preserve its clientele, at first the institute reserved a whole floor of offices for faculty and graduate students. But as time went by these received less and less use. Eventually most of the space went to the community focused centers, especially the labor center.

Conflict Reignites

In 2000 as a result of much labor lobbying (a story in itself in which Kerr, then almost ninety, played an important part), the legislature appropriated $6 million for what became called the Institute for Labor and Employment (ILE). This was essentially a grant-making body for labor-oriented activities organized by the Berkeley and Los Angeles labor centers and for faculty and graduate student research on other campuses and elsewhere. This appropriation was renewed for several years in a row with only small cuts each time, largely because of overall budgetary stringency. Meanwhile the program became the target of an escalating campaign of opposition from conservative business groups, especially the nonunion Associated Building and Contractors. ILE was charged with being "anti-capitalist." "Unions are private organizations," it was charged, "so why are taxpayers required to cough up money for union propaganda?" California was not alone in this. There were similar campaigns in other states against university-sponsored union-sympathetic programs.[24] In California the campaign was successful, at least for a while. Governor Gray Davis, a Democrat who had appoved the $6 million appropriation, was recalled in fall 2003 and replaced by Arnold Schwarzenegger, a Republican. Among the new governor's first steps was to cut and then in 2005 exercise a line-item veto to totally eliminate all funding. By 2007 the Democrats were considerably stronger. Still the governor's proposed budget left out ILE. Labor lobbied hard for its revival. Several months passed as the two sides deadlocked. Finally two Republican senators changed their minds. In the final budget, ILE's original $6 million appropriation was restored.[25]

Name Changes

In the process there were some name changes. The title "Industrial Relations" had fallen into disrepute almost worldwide. The term, it was charged, had become too identified with manufacturing and union-management relations. It "smelled of smoke stacks" and dealt with the "agenda of the 1940s." So one by one, academic industrial relations institutes and departments adopted newer titles suggesting broader jurisdictions. This happened at MIT and Illinois, for instance, and even at the University of Sydney, Australia. In our country, after a considerable battle within the field's academic society, the Industrial Relations Research Association renamed itself the Labor and Employment Research Association. Following this trend, in 2007 the Berkeley and Los Angeles Institutes of Industrial Relations both became Institutes for Research on Labor and Employment. Left ambiguous was whether "Labor" meant the labor factor generally or just unions.

Somewhat surprisingly the regents (a majority of whom were probably Republicans) renamed ILE's successor the Miguel Contreras Labor Program. (Contreras had been a Los Angeles labor leader.) In this way the institute's service to the labor movement was presumably legitimized.

Much of the labor center's present work involves topics of primary interest to labor, although some involve facilitating labor-management cooperative "partnerships." Little of

this work is dramatic and some partnership may not be entirely voluntary, but the work as a whole seems to be highly valued by labor and much is quite innovative. Further, the center regularly makes what often turn out to be short-term (as a year or so) appointments of union staff people to study and research specific problems in an academic setting. Those positions serve somewhat the same function as fellowships in the Center for Advanced Study in the Behavioral Sciences at Stanford.

So the institute survives and even thrives, though almost always in a potentially hostile environment. But no attempt this time to bridge the gap between management and labor. During the latest budget crisis the labor program survives in July 2009. And then? Will we be bailed out again? Given the national, state and university fiscal problems, there is reason for concern.

2521 Channing Way, detail. *Courtesy of the author.*

ENDNOTES

1 Solomon Blum, *Labor Economics* (New York: Henry Holt, 1925).

2 Edwin Witte, "The University and Labor Education," *Industrial and Labor Relations Review,* 1 (October 1947), 7.

3 Clark Kerr, transcript of interview conducted by George Strauss, August 5, 1985, available in the Institute for Research on Labor and Employment Library, 6–7.

4 Grether's oral history describes at some length the negotiations involving himself, Sproul, and UCLA Provost Clarence Dykstra, among others, which led to the institute's founding. E. T. Grether, "Leader in Campus Administration, Public Service, and Marketing Studies, and Foremost a Teacher." An oral history conducted by Harriet Nathan, Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 1993. (BANC MS 94/85)

5 Under the University of California system, schools and departments teach credit courses, institutes do not.

6 Assembly Bill 391 (1945).

7 "Initial report of the Berkeley Committee to advise the President with reference to the establishment of an Institute of Labor [sic] and Industrial Relations pursuant to Assembly Bill 391 as amended," unsigned and undated. The original of this report, along with other early institute internal documents, was destroyed when the institute's basement was flooded in the 1980s.

8 Even before the legislature authorized the institute, in a May 29, 1945, memo, Grether had recommended that Kerr be director.

9 According to Kerr he had some doubts as to whether he should accept the Berkeley offer. Washington had already promoted him to full professorship and all Berkeley offered was associate professorship. Nevertheless his wife badly wanted to return to California and her wishes carried the day,
Kerr 1985 interview, 6.

10 Previously California Hall had been the president's office, but the office had moved to Sproul Hall in 1941.

11 Kerr 1985 interview, 7.

12 Personal communication, November 21, 2004.

13 Kerr 1985 interview, 7.

14 Garbarino personal communication.

15 Kerr said later, "It was one of those things that through misunderstandings [sic] and everything just blew up much bigger than deserved to be. I wasn't sure any rational people from the outside could do anybody very much good. And there were some extremely experienced people on both sides who didn't need any help." Kerr 1985 interview, 16. Later, when he was chancellor there was a transit strike. This time Kerr did work behind the scenes to settle it, but justified this (at least to himself) on the grounds that the strike prevented students from getting to class.

16 Kerr 1985 interview, 20.

17 Kerr 1985 interview, 14.

18 See endnote 7.

19 Kerr 1985 interview, 17.

20 Not everyone in the labor movement was enthusiastic about this program. One prominent local leader asked the Ford Foundation angel responsible for administering the grant, "How many people are you going to train to run against me next time I run for office?" to which the angel responded, "How many do you have?"

21 Robert Schrank, *Industrial Democracy at Sea: Authority and Democracy on a Norwegian Freighter* (Cambridge, MA: MIT Press,1985); Robert Schrank, *American Workers Abroad* (Cambridge, MA: MIT Press, 1979).

22 Among these were Walter Galenson, Joe Garbarino, Van Dusen Kennedy, S. M. Lipset, Arthur Ross, George Strauss, Harold Wilensky and Lloyd Ulman. A majority of these served as labor arbitrators. Illustrative of changing emphases, none of their successors did.

23 Kerr 1985 interview, 23.

24 David Bacon. "Class Warfare," *Nation*, January 12, 2004.

25 By this time it had been renamed the UC Labor and Education Research Fund.

THE SCHOOL OF PUBLIC HEALTH, 1936–1955

Judy P. Bolstad

THE ONSET OF PUBLIC HEALTH on the University of California, Berkeley campus began as early as 1919, when the Department of Hygiene enrolled its first class of students.[1] At that time, John Force, professor and first chairman of the department, oversaw the policies and curricula of the programs being offered.[2] Consisting of primarily an undergraduate program, the department offered courses in such areas as sanitation and microbiology.[3] According to William C. Reeves, who later became one of the deans of the School of Public Health, the purpose of the program on sanitation was basically to train those who were already sanitarians to be able to work in health departments at higher levels.[4] He stated that

> The objective was to raise the standards for sanitarians to a college level . . . So they actually had an undergraduate curriculum for people to become qualified to be licensed sanitarians who could pass state examinations and be concerned with controlling environmental factors that affect health. They were elevating the level of sanitarians who were working for local health departments.[5]

Similarly, the laboratory microbiology program opened new doors for people who wanted to become higher-level laboratory technicians and helped them to develop the

Warren Hall just after it was constructed, 1955. Photograph by William T. Larkin. *School of Public Health, External Relations and Development Office.*

The laboratories in the Department of Hygiene were modest in the 1930s. Photographer and date unknown. *School of Public Health, External Relations and Development Office.*

ability and qualifications needed to take state examinations and meet regulations.[6] Previously, there had never been programs such as these in California, and the Department of Hygiene was the first to offer this kind of higher education for local public health workers. Although the department was not in any way comparable to a formal public health school, its presence helped establish an awareness of and create interest in current public health issues, both locally and around the world. The department also established a potential need for the development of a curriculum in public health on the Berkeley campus.

Although a partnership had been established several decades earlier between the University of California and the State Department of Public Health, the Department of Hygiene truly helped to cement this relationship. For instance, the State Department's hygienic laboratory, which eventually became the division of laboratories of the state, was physically housed in the Department of Hygiene at Berkeley.[7] This allowed for the use of shared facilities as well as an increase in collaboration among the faculty and state researchers. In addition, many state employees came and took classes in the department.

While the Department of Hygiene had existed on the Berkeley campus for two decades, it was not until the late 1930s, under the direction of Karl F. Meyer, that the department clearly expressed an urgent need for expansion.[8] As the head of the bacteriology department, Meyer was strongly supportive of the Department of Hygiene and its function as a "basis for public health development in the West."[9] In August 1936, he helped to develop and implement the first public health graduate curriculum in the Department of Hygiene. The curriculum, which was approved by the Graduate Council for a four-year program, led to a Certificate in Public Health.[10] The establishment of the curricula was made possible by a grant from the State Department of Public Health, which had received funding from the United States Public Health Service under the provisions of the Social Security Act dealing

with "the extension of public health services."[11] The curriculum consisted mainly of bacteriology and epidemiology courses and many years later, Edward S. Rogers, the third dean of the School of Public Health, stated that "it was a very unique sort of program, intensive and highly personalized."[12] With only seventeen students in the four-year program, it was no surprise that focused and individualized attention could be given in the classroom.

Concurrently, the Department of Hygiene began offering short courses for sanitarians and sanitary inspectors as well as a course for health officers who were not qualified for the four-year program.[13] In 1937, more than seventy-five students completed the short courses in sanitation, and in May of that year, the first class to graduate from all of the short courses with a Certificate in Public Health included "fourteen health officers, one public health engineer, one public health laboratory technician, and one statistical technician."[14] The success of the curriculum and short courses in this first year inspired a desire to make the curriculum more formal and expand it to include courses on other public health topics. In addition, the curriculum's impact on the significant increase in enrollment in the department was a strong factor in determining the need for an actual school of public health.

On July 23, 1937, Meyer and his colleague, Charles B. Lipman, submitted a detailed report to University of California president, Robert Gordon Sproul, expressing the need for a school of public health in California. In the report, they described the existing curriculum for public health at Berkeley, the duty of the university to provide public health training, and a plan for future public health work at the University of California, Los Angeles.[15] Specifically,

> It is our firm conviction that, whether or not financial assistance is rendered, the University of California through such grants as we are now obtaining from the United States Public Health Service or from foundations or other sources, it is our duty as a state university to offer adequate training for those persons who are preparing to assist in the far-flung public health program of the country which is now shaping itself. This is our conviction because we believe that the people of any state look to the state university to take the initiative in matters which are so vital to the public weal as the conservation of the health of the community.[16]

The report recommended that the regents establish at Los Angeles both a school of public health and a department of public health. The reason for suggesting that a school be established at Los Angeles rather than at Berkeley was primarily an issue of location. There were many more existing district and county health departments in southern California than in the San Francisco Bay Area, and cities such as Los Angeles, Westwood and Santa Monica could offer more opportunities for training centers for public health students.[17] Simultaneously, it was recommended that the Department of Hygiene at Berkeley be terminated and faculty who were not reassigned to the new School of Public Health at Los Angeles should be reassigned to the Berkeley Department of Bacteriology, which should then be renamed the Department of Bacteriology and Preventive Medicine.[18] Although the recommendations were not implemented, the fact that Meyer and Lipman had come to these conclusions in their report made clearer that a public health school was needed in the state.

Trouble arrived in 1939, when the Department of Hygiene ran out of federal funding for the curriculum in public health. Due to extreme pressures from the faculty in the department as well as from the State Department of Public Health to establish a public health school on the Berkeley campus and "upgrade public health services in California," Meyer felt it was time to begin implementing a way to obtain this goal.[19] He assembled several

people from various organizations to come together to lobby for a school of public health.[20] Some of the people Meyer recruited included Lawrence Arnstein of the American Social Hygiene Association; Floyd Higby, executive secretary of the Tuberculosis Association; and William P. Shepard, vice-president of the Metropolitan Life Insurance Company.[21] It took a lot of collaboration and work to gather everybody together, but Meyer's dedication truly showed how important establishing a public health school was to him. In 1942, the Northern California Public Health Association, with endorsement by the California Medical Association, decided to appoint a committee consisting of Arnstein, Higby, Shepard and others to present the need for a California school of public health to the state legislature.[22] According to Reeves, Meyer was "such a clever politician that he knew he shouldn't be the principal spokesman in Sacramento. That's when he got William Shepard, who was the vice president of one of the big life insurance companies in the West, to be the head of the lobbying group."[23] Among other things, Meyer also convinced Charles E. Smith, who was teaching preventive medicine at Stanford medical school, to work with the state medical society to rally support.[24] The amount of preparation and work that the committee put into preparing for their presentation to the legislature was worth the effort, no matter what the end result was.

Earl Warren. Photograph by Joan Ray, date unknown. *Bancroft Library, BANC PIC 1970.045—FR.*

In Sacramento, the lobbying group was very successful in obtaining support "both for strengthening the State Department of Public Health and for [the] founding of a formal School of Public Health."[25] They presented their case to the 1943 California State Legislature and to Governor Earl Warren, who had just been elected. Staying true to one of his campaign pledges in the previous year to "reorganize the Department of Public Health," Warren's first appointment to the position of Director of Public Health was Wilton Halverson, who had previous experience working as the Director of Health for Los Angeles County.[26] Then in Warren's first legislative session, a bill (AB 515) was passed "directing the University to establish a School of Public Health on a state-wide basis with facilities at Berkeley, San Francisco and Los Angeles, and authorizing the money to start it."[27] Later, according to Edward S. Rogers,

> This was a most unusual way to have a department of the University come into being. Normally the state legislature doesn't set up an academic program. There's a question in my mind, of constitutionality as to whether or not the legislature should interfere in the internal affairs of the university in this way—but I would be the last to complain about it in this instance. The Warren administration of course was exemplified by a very close supportive relationship between the university and state government.[28]

It was indeed true that the establishment of the new School of Public Health occurred under unique circumstances. No other existing public health school in the nation at that time had ever had such strong support from the state government in its founding. The fact that Governor Warren regarded public health research as of such great importance also heavily influenced the school's establishment. In January 1944, an official School of Public Health at Berkeley was established by the regents of the university. This action "reflected a widespread recognition of the need for such facilities on the west coast."[29] Berkeley could finally begin serious public health research.

On March 23, 1944, an article in the *Daily Californian* stated: "The first school of public health west of the Mississippi has been established at the University..."[30] The article explained that the university would change the name of the Department of Hygiene to the Department of Public Health within the new school.[31] Many congratulations were given to all of the people involved in establishing the school, but there was still much work to be done and the next step was to find a dean. After much discussion, the Department of Hygiene faculty came to a consensus, which was that they needed to bring a new person in from the outside. There was nobody on the current faculty who would be an appropriate dean—someone who had enough experience as well as ambition to start a new school. Eventually it was decided that Walter Brown should be brought in as the acting dean. A retired physician from Stanford, he inspired and motivated the faculty and had new ideas about how the school should operate. He remained as dean until 1946.

Due to World War II, the School of Public Health became more and more prominent, as the "demand for trained public health personnel" resulted in more undergraduate and graduate courses being developed to train "public health officers, epidemiologists, public health engineers, industrial hygienists and other specialists."[32] The *Daily Californian* indicated that "the first official activity of the school w[ould] be a special training course for sanitarians to meet the present needs of state and county health departments."[33] It was especially important for sanitarians, who were professionals engaged in the practice of environmental health, to be trained to monitor the health of armed troops and ensure that food supplies were sanitary. In addition, sanitarians were responsible for ensuring the control of communicable diseases such as tuberculosis, typhoid, and measles.

Dr. Walter Brown, first dean of the School of Public Health. Photographer and date unknown. *School of Public Health, External Relations and Development Office.*

According to Reeves, since there was also a huge population growth in California in the 1940s, "public health agencies were becoming responsible for increasingly large numbers of people."[34] This increase in population allowed the school to develop and the need for more public health research and training validated its existence. In order to recruit new faculty, Rogers stated that the plan was to establish a "setting for intellectual

and scientific exchange to make it possible for the department to recruit a caliber of staff that would not otherwise be obtainable, providing the possibility of engaging in the informal sort of exchange that is really the most significant type of exchange among professional people."[35] This was where the partnership between the State Department of Public Health and the School of Public Health became most valuable. Faculty and state researchers collaborated with each other in research, teaching, and formal study.[36] In turn, state researchers participated as "lecturers in highly specialized areas or in areas where practical experience was relevant."[37] Rogers stated that "this relationship also helped California to compete for the highest caliber of county and city health officers . . . at a time when competent health officers were in short supply."[38]

One of the first problems encountered was that the new school needed more space for classrooms and faculty offices. According to Reeves, "we had a few teaching rooms, labs, and offices in the Life Sciences Building, but you couldn't possibly put an expanded faculty in there. So the administration was very generous; they put us in building T-4 wooden barracks built during World War II."[39] Even though T-4 was not quite large enough, it was indeed larger than the original space. However, it was inconvenient for the faculty and students to have to walk back and forth between their regular classrooms in T-4 and the laboratories, which were still in the Life Sciences Building. In addition, faculty offices were very close to each other, which had positive as well as negative results. The benefit was that faculty could easily collaborate with each other, but the negative impact was the lack of privacy, causing tension. Even so, T-4 was useful for the time being and allowed the school to keep functioning with an ever-growing faculty and student population.

Dr. Edward S. Rogers, third dean of the School of Public Health. Photographer and date unknown. *School of Public Health, External Relations and Development Office.*

During 1944, the School of Public Health mainly offered undergraduate courses for approximately 100 students majoring in the areas of "(1) Sanitary Sciences, which led to an upgrading of sanitarians in health agencies in California and the Western U.S.; (2) Public Health Laboratory . . . ; (3) Public Health Education; (4) Biostatistics; and (5) Pre-administration, whose majors became assistants to health officers and hospital administrators."[40] Graduating with a major in public health led to a bachelor of science degree with special emphasis in any one of those five subject areas.[41] What made the school stand out was that it "pioneered in this broad undergraduate training," whereas other older public health schools in the country including Harvard, Johns Hopkins, and Yale offered only graduate programs and the undergraduate programs offered at the Universities of Minnesota and North Carolina were geared toward public health nursing.[42]

In 1945, the first students in the new graduate program for the master's degree in public health were enrolled.[43] The class consisted of less experienced students as well as those who had already been working in health

agencies and organizations for years.[44] In 1946, the American Public Health Association accredited the School of Public Health, proudly making it the only accredited public health school west of the Mississippi River.[45] That same year, William McDowell Hammon was selected to be the second dean of the school, with Edward S. Rogers succeeding him as the third dean. Rogers was the first person to attempt to secure enough funding and support for a new building to house the school. Reeves discusses the financial situation at the time,

> The real objective at that time was to get enough money from state sources that he [Rogers] could get matching funds from the federal government, and that's what all the schools of public health in the United States were doing. Harvard, Hopkins, and all those places built big monolith buildings, of which 50 percent or more were funded by the federal government. Dr. Rogers fought, fought, and fought and finally got enough money from the state that if we had matching funds from the federal government, we could have a nice, big building. And then all of a sudden, the federal government stopped such support.[46]

After 1946, the decision was to continue plans for a new building based on the needs of an ever-expanding school. According to Reeves, the "building was only a fraction of the size that was originally planned."[47]

Nevertheless, the School of Public Health continued to grow, and in 1947 the first doctoral degree in the school was granted—the DrPH (still true). The following year, the field training program started, which allowed an even closer working relationship between the State Department and the school. Students were placed as interns within the State Department, and this mutually beneficial program provided them with hands-on field training experience, while giving the State Department access to some of the brightest young minds in the country.

By the 1950s laboratory space in the Life Sciences Building had become limited. Photograph by William T. Larkin. Date unknown. *School of Public Health, External Relations and Development Office.*

From 1951 to 1967, the dean of the school was Charles E. Smith, of whom Reeves said "in a relatively short period, Chuck [Smith] elevated the School from the status of a new and relatively unknown school to an institution of worldwide reknown."[48] Upon his acceptance of the position of dean, Smith stated,

Charles E. Smith, fourth dean of the School of Public Health. Photographer and date unknown. *School of Public Health, External Relations and Development Office.*

> Only the challenge and opportunities in our School of Public Health could blast one from the association of a happy hearth and home where I had lived and worked for nineteen years. The decision was strengthened immeasurably by outstanding support of the University Regents and administration in building the School to an unexcelled position in the Nation, a program already so well underway. Even these prospects would not have sufficed without the inducements of membership in the congenial family of outstanding colleagues which Deans Brown, Hammon and Rogers added to the nucleus of the former Department of Hygiene. Also there was the association with many old friends in the rest of the University and the special privileges of a real partnership with fellow workers of the California State Department of Public Health. It is my deepest hope that I may maintain the old associations with the medical school faculties and build even stronger ties with the medical profession in general and health officers in particular. Together, we must continue our School's development in a pattern of Western comradeship and cooperation.[49]

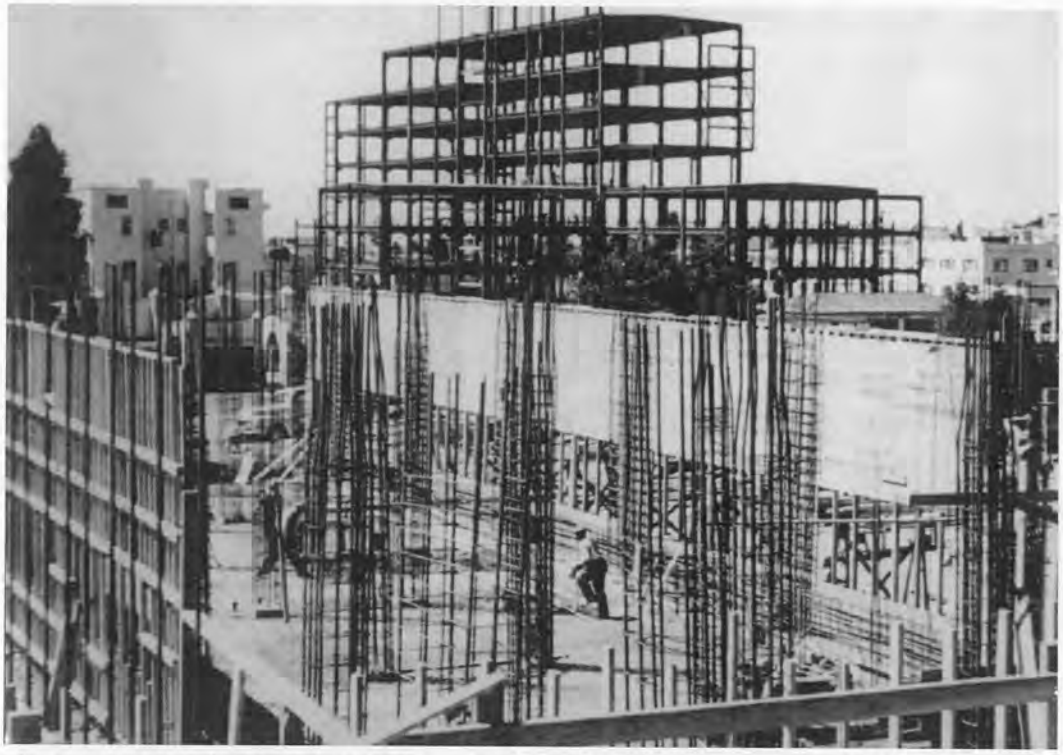
Smith influenced the strong ties between the School of Public Health and the state's department. Among many other accomplishments during his deanship, in 1952 the school was finally able to establish a PhD curriculum and degrees for epidemiology and biostatistics, which further expanded graduate student enrollment.[50]

In 1953, the School of Public Health finally secured and received enough funding for a new building. The northwest corner of the Berkeley campus was selected to be the future home and ground was broken on April 28 of that year.[51] Governor Warren, Halverson, Shepard, and Arnstein among others, saw to it that at the same time Warren Hall was being constructed, the building which would one day house the State Department of Public Health was being built simultaneously across the street on the corner of Hearst and Shattuck Avenues. According to Rogers,

> Our planning included such things as a joint library, located in the school with several staff positions funded by the department, which made for a strong acquisition program; and a cafeteria in the department headquarters to be used by school staff to encourage personal acquaintance. . . . We worked very closely, in developing this whole plan, to have our school located on the corner of the Berkeley campus nearest to where we hoped to locate the department headquarters building. . . . This was not easy . . . there was] pressure to locate on less expensive property because the site he [Halverson] wanted was prime commercial property in down town Berkeley and also straddled a minor geological fault. It was eventually constructed on a special kind of roller to accommodate to any earth movement.[52]

Budgetary constraints and land safety issues were not the only difficulties that were faced as planning for the two buildings continued. Even the desired location of the northwest part of campus presented initial problems. The College of Agriculture had previously laid claim to the west end of campus, which conflicted with plans for the new school. According to Rogers, Claude Hutchison, dean of the College of Agriculture along with Percy Barr, professor of forestry, supported and spoke on behalf of the new building for the school. Even though there were conflicts within the power structure between the university and College of Agriculture, the end result was that the land was granted to the school.

To no one's surprise, after the building was constructed, it was unanimously decided that it would be named Earl Warren Hall, after the thirtieth governor of California and fourteenth chief justice of the United States. As the primary figure in obtaining funding



The construction of Warren Hall began on April 28, 1953, and was nearly finished in less than two years. Photographer and date unknown. *School of Public Health, External Relations and Development Office.*

for the building, Warren, with his strong leadership and endorsement, helped to make the dream of having a modern and efficient building come true. In addition, the School of Public Health was formally established and funded during the Warren administration, so it seemed fitting that the building should be named after him. As Robert Gordon Sproul, president of the University of California, stated in 1955,

> During his [Warren's] administration as governor and due in large measure to his personal interest, the California State Department of Public Health developed into what it is now a department with no superior in the United States, a department moreover stressing local responsibility for public health service, jointly planned and effectively integrated.[53]

Designed by well-known architects, Masten & Hurd of San Francisco, the plan for the new building was developed by observing other existing buildings containing public health schools as well as other laboratories and health institutes all over the country.[54] The hope was for Warren Hall to be "one of the finest expressions of school architecture in the State."[55] Initially, there was difficulty in getting approval for the design, because, according to Rogers, "the old university architectural plan was of the Italian Renaissance period and was highly symmetrical."[56] The new building design was modern and unlike any other building on campus at the time. Eventually, the university accepted the plans for the new building. Costing nearly two million dollars, it was to house the School of Public Health, the Cancer Research Genetics Laboratory, as well as the joint library for the school and State Department of Public Health.[57] The six-story structure stood on the corner of University Avenue and Oxford Street as a representation of the hard work that had been put into creating a home for the school. All but one wing of Warren Hall, where the laboratory was situated, was devoted to teaching and administrative offices.[58]

View of the newly constructed Earl Warren Hall on the northwest corner of campus. Photographer and date unknown. *School of Public Health, External Relations and Development Office.*

The Public Health Library's bright reading room was a popular place to study. Photographer and date unknown. *School of Public Health, External Relations and Development Office.*

The public health library, which was established on July 1, 1947, as a sub-branch of the biology library, was relocated to the first floor of Warren Hall and newly incorporated into the university library system.[59] The library moved into its new quarters in Warren Hall during the week of April 25, 1955, and merged with the library of the State Department on May 2.[60] The collection combined the old university public health library section, which was located in the Life Sciences Building, with various state department library materials, to create a joint library for both state employees and the faculty and students on campus.[61] Library materials from state health department locations all over the Bay Area, including libraries which were housed in the Phelan Building in San Francisco and the Farm Credit Building in Berkeley were also merged into the collection.[62] During this time, the library developed a contract agreement with the state department where specialized library services would be provided for state employees.

On September 17, 1955, Earl Warren Hall was dedicated as the official building for the School of Public Health at Berkeley, bringing together the state department and the school, and creating a unique joint library as well as a collaborative department. William P. Shepard delivered the dedicatory address and Chancellor Clark Kerr presided.[63] A genuinely happy occasion, the dedication ceremony was held outdoors on the roof.[64] At the time, the new building and facilities proudly placed the school among the top ten in the nation.[65] Dean Charles Smith predicted that enrollment in the school's programs would at least double in the new building to two hundred students.[66]

Over the next decades, the school's enrollment and programs continued to flourish and the strong roots that were established between the school and the state department remained strong. Today, the public health library still provides specialized contracted services to state department employees, including instruction on library resources and databases, document delivery and literature searching. In addition, a large number of graduates from the school each year find careers at the state department, and researchers there still lecture on public health topics at the school.

In 2007 most of the School of Public Health and its library were relocated from Warren Hall to University Hall. Even though the school is no longer housed in its original building, the history of its establishment and spirit that the founders of the school exhibited in the thirties and forties will always be remembered. Whether these pioneers were lobbying to establish the school, trying to obtain money for a new building, or struggling to get the land to build it on, their perseverance in maintaining close ties with the State Department of Public Health was key to their eventual success. The story of the establishment of Berkeley's School of Public Health is an honorable one and unique in the United States.

In early 2008 Warren Hall was torn down. A suitable ceremony was held.

Hundreds of people attended the dedication ceremony, held outdoors on the roof of the ground floor, just above the auditorium, 1955. Morgan Hall in background. Photograph by William T. Larkin. *School of Public Health, External Relations and Development Office.*

ENDNOTES

1 *Honoring the Past, Shaping the Future: 50th Anniversary, School of Public Health, University of California at Berkeley* (Berkeley: School of Public Health, University of California, 1993), 1.

2 *Honoring the Past,* ibid.

3 William C. Reeves, "Arbovirologist and Professor, UC Berkeley School of Public Health: Oral History Transcript" conducted in 1990 and 1991 by Sally Smith Hughes, Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 1993, 472-473.

4 William C. Reeves, 472.

5 Ibid.

6 Ibid.

7 Earl Warren, "Earl Warren and the State Department of Public Health," an oral history conducted by Gabrielle Morris, Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 1973, 29.

8 *Honoring the Past,* ibid.

9 William C. Reeves, 475.

10 *Announcement of the Curricula in Public Health: 1937-1938.* School of Public Health Archives, University of California, Berkeley, 5.

11 Ibid.

12 Earl Warren, iv.

13 *Announcement,* ibid.

14 Ibid.

15 Charles B. Lipman letter to President Sproul, July 23, 1937, School of Public Health Archives, 1-5.

16 Ibid., 1.

17 Ibid.

18 Ibid., 2.

19 Earl Warren, v.

20 William C. Reeves, ibid.

21 Earl Warren, ibid.

22 R. A. Bolt, "Program Dedication: Earl Warren Hall," 1955, School of Public Health Archives.

23 William C. Reeves, ibid.

24 Earl Warren, ibid.

25 Ibid.

26 Earl Warren, 13.

27 Ibid.

28 Ibid.

29 *UC Announcement of the School of Public Health, 1948-1949.* School of Public Health Archives, 7.

30 "First Western Public Health School Begun," *Daily Californian,* March 23, 1944, 14.

31 Ibid.

32 Ibid.

33 Ibid.

34 William C. Reeves, 480.

35 Earl Warren, vi.

36 Ibid.

37 Ibid.

38 Ibid.

39 William C. Reeves.

40 *The School of Public Health—Where We Were—Where We're At.* School of Public Health Archives, 1976, 3-4.

41 "UC School of Health Moves Into New $1,500,000 Quarters," *Berkeley Daily Gazette,* 1955.

42 Ibid.

43 William C. Reeves, 478.

44 Ibid., 479.

45 R. A. Bolt, ibid., and *UC Announcement,* ibid.

46 William C. Reeves, 495-496.

47 Ibid., 496.

48 William C. Reeves, "Farewell Chuck," *Highlights,* University of California, Berkeley, Spring 1967.

49 *T-4 Reports,* no. 1, School of Public Health Archives, 1949, 3-4.

50 William C. Reeves, "Arbovirologist," 489.

51 *Honoring the Past,* 2.

52 Earl Warren, vi.

53 "Major Buildings Rise on Campus; UC Looks Ahead," *Berkeley Daily Gazette,* September 14, 1955, 36.

54 "New School of Public Health Building," *Highlights from the School of Public Health,* 9:2 (1951), 3. School of Public Health Archives.

55 "Work Rushed on Health Structures," *Berkeley Daily Gazette,* January 14, 1955.

56 Earl Warren, vii.

57 "U.C. To Dedicate Earl Warren Hall," *Oakland Tribune,* September 15, 1955.

58 Ibid.

59 "Warren Hall To Be Dedicated Tomorrow at 2:30," *Daily Californian,* September 16, 1955, 13.

60 Louise Eastland, "Annual Report of Public Health Library." Berkeley: Public Health Library Archives, University of California, 1955, 1.

61 Warren Hall, ibid.

62 Louise Eastland, "Suggested Procedures for Disposing of State Department of Public Health Materials Not Needed in Public Health Library." Berkeley: Public Health Library Archives, University of California, November 16, 1955, 1.

63 "UC Dedication of Warren Hall Set Tomorrow," *San Francisco Chronicle,* September 16, 1955.

64 *The School,* 4.

65 "U.C. To Dedicate," ibid.

66 *The School,* ibid.

PIPE DREAMS AND FLOPPEROOS IN PIVOTAL YEARS AT BERKELEY, 1958-1961

Ray Colvig

IN 1958 ROBERT GORDON SPROUL RETIRED after having been president of the University of California for twenty-eight years, and Clark Kerr, Berkeley's first chancellor, took Sproul's place. It was a time of profound changes and growth for the university as a whole as well as for Berkeley with new buildings, areas of study, colleges, and campuses with more students, faculty and staff. Student life and activism began to change. Glenn T. Seaborg became Berkeley's second chancellor and served from 1958 to 1961. He witnessed, or more often, had to face a variety of issues, great and small, that arose during those tumultuous years, and fortunately for us, recorded them in his daily journal.

The Tithe Barn

It would be the oldest building in the United States. Or so they said (forgetting about the cliff dwellings and other remnants of the Anasazi Culture). Others said it would be the oldest European structure in the United States. It was called a "tithe barn," and few beyond some highly focused specialists had ever heard of such a thing.

The news came in letters from Professor Walter Horn, chairman of Berkeley's Department of Art (and an eminent art historian) addressed to UC President Kerr and Berkeley Chancellor Seaborg.[1] In his letter dated September 11, 1959, Horn said that he and a colleague, Ernest Born, had learned that the Hearst Foundation had crated away in a warehouse in San Simeon, the town adjacent to Hearst Castle, the timbers of a roof and some of the masonry of the supporting walls of an English monastic tithe barn of the fourteenth century. Horn wrote that in the Middle Ages "this type of building was used as an all-purpose structure, serving alternatively and interchangeably as a barn, as a feudal banqueting hall, as a market hall, as stables, and even as a college hall." As the name "tithe barn" suggested, a major use was to store products brought by farmers as required support of religious establishments—in this case the monks at Bradenstoke Priory, located about twenty-four miles northeast of Bath in County Wiltshire.

Horn described the dismantled structure as a wood-roofed stone building about 25 feet by 100 feet, and he pointed out that it "was of an earlier design than most other such structures found in England. . . . [I]f the University of California were to set up the Hearst Barn as a college hall . . . we would not only have enriched our state with an outstanding example of medieval carpentry work, but could even boast of having a college hall the design of which reflected a tradition earlier than that of any of the earliest surviving college halls of Cambridge or Oxford."[2] So there!

Horn was joined by other prominent faculty members in his enthusiasm for the proposal, and Seaborg agreed that it should receive serious consideration. Kerr, meanwhile, brought up the proposal at a meeting of the board of regents and received permission to "explore the acquisition of the monastic barn." After that, however, things went downhill, and the old problem of "devil in the details" began to apply, especially in the matter of funding. UC Vice President Harry Wellman wrote a stern message to Seaborg: "[W]ould you kindly let me know what nonstate funds are available or obtainable for meeting the

cost of reconstruction of the barn on your campus? It is estimated that the cost will be $300,000."[3] Seaborg admitted that he didn't have a ready answer and that money in the humanities was sorely needed for such projects as the Humanities Building and the Institute for Humanities (then in the planning stages). Opposition grew to include Consulting Landscape Architect Thomas Church, who said that "fine landscape quality would be lost." (One suggestion had been that the barn might reappear in the garden at University House, the stately residence of the university's presidents and later Berkeley's chancellors. Kerr squashed that idea—immediately.)

Finally, in April 1960 Kerr wrote to the head of the Hearst Corporation's Sunical Land and Livestock Division saying, in effect, "thanks but no thanks" for the offer. To do a proper job, Kerr wrote, would require "several hundred thousand dollars," which he described as "a formidable sum to raise in view of all the pressing demands for funds for student welfare, teaching, and research which the University must provide in view of expanding enrollments."

After Kerr's letter, the tithe barn was gone and forgotten as far as any records at Berkeley show. But it wasn't forgotten by the residents of the tiny village of Bradenstoke or by others throughout the United Kingdom during a time of rising interest in the preservation and restoration of antiquities. William Randolph Hearst, a controversial figure on the world scene (and as caricatured in the movie *Citizen Kane*), was portrayed. as a "plunderer" and "vandal"—a reputation in Britain and elsewhere that has persisted to the present day. (Of course the British themselves know something about being accused of plundering.) Among the ancient landmarks that Hearst and his travelling architect (not Julia Morgan) chose to grasp was the Bradenstoke Priory, dating from 1142 AD and one of the few monastic structures to escape the whirlwind of destruction ordered by King Henry VIII as he strove to erase the presence of the papacy throughout the land. Hearst had the priory itself demolished and parts taken to St. Donat's Castle in Wales, which he was fixing up for his own use. The adjoining tithe barn went to San Simeon, where it remained in storage after Hearst's death in 1951 and after the university's decision in 1960.

Later, with little or no publicity, the Hearst Corporation sold the crates and contents, and they ended up in the possession of millionaire freeway-builder (as well as rancher and philanthropist) Alex Madonna. With some of his fortune, Madonna had built a flamboyantly tarted-up motel, on US Highway 101 south of San Luis Obispo, named The Madonna Inn. (It contains, among many other things, some of the world's most famous urinals—built of rugged stones and encompassing actual waterfalls.) Madonna wanted to add a wedding chapel or reception space, and thought the old tithe barn might be the way to go. Alas, according to reports in Britain (now available on the internet), Madonna's scheme did not meet the latest requirements for earthquake safety.

Meanwhile, the campaign in England seemed to gather momentum. Their beloved priory was gone forever, but the people of Bradenstoke still had hopes of bringing back their tithe barn. Stories appeared in the *Guardian* and other places and were broadcast in a BBC television series called *One Foot in the Past*. The local member of Parliament even posted two questions in the House of Commons asking the Secretary of State for Culture, Media and Sports what the government was doing to help in the efforts to repatriate the old barn—and for good measure added a third question regarding the status of the demands from Greece for the return (from the British Museum) of the Elgin Marbles.

Alex Madonna died in 2004, leaving the ultimate fate of the Bradenstoke Tithe Barn in limbo. As of the spring of 2008, the old building is still in crates, according to an official of Madonna Enterprises, and stored by a surviving member of the family. Attempts in 2005 and 2006 to repatriate the building back to Bradenstoke were not successful, the official said.

What would have happened if the barn had come to Berkeley? Or if some donor had appeared to furnish half a million dollars for transporting, rebuilding, and upkeep? The Hearst Barn might have nestled somewhere between the Hearst Greek Theatre, Hearst Mining Building, Hearst Gymnasium, the Class of 1910 Bridge (funded in large part by Phoebe A. Hearst), Hearst Museum of Anthropology, and Hearst Avenue. It certainly would have been a novelty; a must-see for campus visitors. But as the years moved along from the 1960s to the 1980s and 1990s, earthquake safety requirements would become more demanding, and the retrofitting of a 500-year-old barn would have been challenging and very expensive indeed. Not only that, considering the angry messages coming from Britain, the Hearst Barn might have become Berkeley's version of the Elgin Marbles. Perhaps even a cause for student demonstrations. You can almost hear them now: "HEY HEY, HO HO, THE HEARST BARN HAS GOT TO GO." Remarkably, the old building itself might have been useful in such circumstances. A photograph of the intact interior, passed down from the Hearsts to the Madonnas, suggests a good choice as a holding facility for those arrested. As an added bonus, the students held inside could have a unique chance to study the details of medieval rustic architecture.

Bradenstoke tithe barn, before dismantling in 1929. *Courtesy of the author.*

Glenn Seaborg as Chancellor

Fortunately, the British have had better sources than William Randolph Hearst for their understanding of America and Americans. For many years, a standout was British-born Alistair Cooke, a superb writer and commentator who, through newspapers, books, radio, and television, helped the British and Americans understand each other. Writing in San Francisco in October 1958 for an article in the *Listener* (a widely read magazine published by the BBC), Cooke told what he had learned in Berkeley:

> I am at this moment looking out across the San Francisco Bay at the white campanile of the University of California at Berkeley. Here, in my own time, they had 6,000 students; today they have 19,000 in this northern branch of the University alone. By 1960, they expect to have 25,000; by 1970, 45,000. The chancellor of this university, a long, comely gentleman who might easily have passed for Huck Finn masquerading as a business man, recited these figures to me with no alarm. "We are trying something new in the world. We are trying mass, or if you like, massive education of high quality." The academic rating, by the way, of the undergraduate body at Berkeley is second only to Harvard.

Clark and Kay Kerr with Glenn and Helen Seaborg at the traditional reception for new undergraduates, September 29, 1958. Photograph by Ed Kirwan Graphic Arts, from Seaborg with Colvig, *Chancellor at Berkeley,* 1994.

In our sampling of what-might-have-beens in the university's past history, an enrollment of 45,000 at Berkeley by 1970 would bring out a "heaven forbid" today. But it was talked about in the period before work began on the Master Plan for Higher Education in 1959. That plan set enrollment limits for both existing and proposed new campuses in California, including a ceiling of 27,500 students at Berkeley (understanding this as an average for the school year which might be exceeded at peak periods). Yet, in the fall of 2007 Berkeley's enrollment was close to 35,000 and there are hints that enrollment might grow further again to help meet the state's higher education needs.

And what about saying that Berkeley's undergraduate body is "second only to Harvard" in its "academic rating"? That depends (to paraphrase a former president) on what the meaning of academic rating is. Harvard, with its much smaller enrollment, highly selective admissions, lavishly paid faculty, and enormous endowment, could no doubt produce quality measurements that would bowl over all other institutions. On the other hand, the first scientifically based nationwide assessment of quality in graduate education and research,

published in 1966 by the American Council on Education, showed Berkeley ranked higher in more fields than any of its competitors. A headline in the *Harvard Crimson* said, "We're No. 2 But We Try Harder." Over the following decades, comparable studies have continued to rate Berkeley at the very top.

Cooke's "Huck Finn" in disguise, Glenn T. Seaborg, became Berkeley's second chancellor in July 1958. The first Berkeley chancellor, Clark Kerr, advanced then to be president of the UC Statewide System (succeeding Robert Gordon Sproul, who had been president for 28 years). Seaborg, who won the Nobel Prize in chemistry in 1952 (shared with Professor Edwin McMillan, also of Berkeley) was already world famous for discoveries of chemical elements. He remained chancellor until early in 1961, when he accepted an appointment by incoming President John F. Kennedy to be chairman of the U.S. Atomic Energy Commission. Although Seaborg's term as chancellor was relatively short, it occurred at a pivotal time in the university's history. The immediate postwar years with floods of veterans had been followed by the "Silent Fifties" and rising threats from the Cold War. Ahead were the 1960s, to be marked by a wave of student activism and rapid increases in the student-age population. Seaborg had meticulously kept a daily journal since age 14 (available in campus libraries), and his voluminous papers are deposited at the Library of Congress. His years as chancellor offer an opportunity for close-up study at all levels—from daily life on campus to decision-making among the top executives. In his journal, for example, he noted some of the questions "large and small" that occupied his attention during his first month in office:

> Where to locate the new cyclotron? Where to put a new undergraduate library? Should the chancellor's office move to Sproul Hall? Should we convert a men's room (in South Hall) into a women's room? Should department chairmen be elected by secret ballot of the faculty, or just by a dean's consultation with the faculty? Who should be deputy director of the Livermore Laboratory? Who should be director of the Student Health Service? Should a beer company be a sponsor of Cal Football telecasts? (My answer on that one was "no," reversing the athletic director. He appealed, but the answer was still "no.")

In the preface to *Chancellor at Berkeley*, Seaborg also described the bare bones staffing of the chancellor's office:

> [T]he work of the chancellor's office at Berkeley was almost always a team effort in the strongest possible sense. We were a small group—only three vice-chancellors (all faculty members assigned on a part-time basis), two or three part-time faculty assistants, a budget assistant, and about 20 secretaries, typists, and file clerks. (And this on a campus with an enrollment of 22,000 students, faculty of 1,600, staff of 6,000, and annual operating budget of $50 million.)[4]

Seeding the Los Angeles River

Issues that arose on campus could result in decisions that were positive or negative—or in some cases wavered as though waiting for a miracle to happen. And in at least one case, it did. Sort of. At issue was a project proposed in 1959 to study the movements of groundwater in a large portion of the Los Angeles Basin drained by the off-and-on flowing of the Los Angeles River. Professor Warren Kaufman, a respected and innovative hydrolo-

gist in Berkeley's Department of Sanitary Engineering, had mapped out the experiment, subjected it to peer reviews and gained most of the permissions that he needed. To conduct the study, Kaufman had explained, he would inject a tracer chemical into the river bed at several locations. The chemical he chose was tritium, a low-energy radioactive isotope of hydrogen that was then gaining wide use in tracer studies (because it was considered "safe" and relatively cheap to produce).

One can imagine that a few decades later even the hint of a proposal to "tag" the waters flowing under Los Angeles with measurable radioactivity would leap into the news and prompt thunderous protest. That wasn't happening, but in the passage of memoranda in both the president's and the chancellor's office there were some who urged caution. One was Assistant Vice President James M. Miller, who handled aspects of the university's research contract with the Atomic Energy Commission. "This raises a legitimate question as to our position regarding health and safety aspects as well as public relations," Miller wrote. "It seems to me . . . that the University, and particularly the Berkeley campus, could be subjected to considerable adverse public opinion in the Los Angeles area if details of the proposed research effort would receive unfavorable handling by the press." Professor William Fretter, then a faculty assistant in the chancellor's office at Berkeley, penned a note on Miller's memo as he passed it on to Seaborg: "500 curies in the LA River!"[5]

Among others who sounded off was Linus Pauling, the maverick and outspoken scientist at Cal Tech, who had won the Nobel Prize in Chemistry in 1954 and would later win the Nobel Peace Prize. He was considering, Pauling said, the filing of a formal protest with the government. Meanwhile, Kaufman traveled to Washington DC, to speak to Willard Libby, a member of the Atomic Energy Commission on leave from the University of Chicago. (Early in his career, Libby had done pioneering research at Berkeley on carbon 14, and within a few months he would join the faculty at UCLA and eventually win a Nobel Prize.) He wired his advice to Seaborg: "Kaufman plan very sound. Suggest he proceed immediately ... (provided) he collects adequate samples of present water to assay later for cosmic ray and bomb tritium."

In the face of conflicting advice, both Kerr and Seaborg turned their thumbs down on Kaufman's proposal. Kerr had followed the unanimous advice of his cabinet, and Seaborg said he turned it down "because of questions of the University's legal liability and the fact that my request for further approvals from public authorities in Los Angeles could not be carried out within the spring testing period."

Frustrated by these developments, Kaufman said he would try to conduct some experiments outside the auspices of the University of California. With permission of local authorities in the San Joaquin Valley, he said, he could trace ground water seepage from a Madera County irrigation canal by use of five curies of HTO (a water incorporating a form of tritium). Later, he proposed studying the passage of water through the ground by putting 5 to 100 curies of tritium in an old oil well near Bakersfield and then looking for its appearance in another well miles away.

While these proposals were being examined and critiqued, an event occurred that brought the whole issue to a conclusion. This was the "miracle," we can now agree. But it wasn't an "act of God," as some unexplained events are labeled. No, this was very much explained, and it proceeded from an act of the Union of Soviet Socialist Republics. The Soviets had set off a series of powerful nuclear bombs in central Asia. Huge amounts of debris rose through the atmosphere and then traveled around the world on prevailing wind currents—dropping significant amounts of highly radioactive strontium 90 as the debris turned into fallout. With any amount of rain, the radioactive particles would percolate into the ground and join the groundwater flow. Kaufman would measure this movement with his

highly sensitive equipment. His research could proceed—thanks to the Russians!

Pacific Coast Conference

For six years before he became chancellor at UC Berkeley, Glenn Seaborg served as faculty athletic representative for the Berkeley campus.[6] To some, it seemed strange that a newly minted Nobel Prize winner would accept such a challenging assignment on top of his heavy responsibilities in teaching, research, and scientific leadership. But Seaborg loved sports, and he found it hard to resist the urgings of then-chancellor Clark Kerr.

"The thud of the pigskin."

"And stay out!"

Two *San Francisco Chronicle* cartoons by Robert Bastian (top: September 19, 1958 and bottom: November 5, 1959) from Seaborg with Colvig, *Roses from the Ashes*, 2000.

Seaborg could not have known in 1952 that a wave of scandal would sweep across the Pacific Coast Conference and test the wills and wisdom of the eight faculty athletic representatives who constituted the rule-making and enforcing arm over all the schools. By the time he became chancellor in 1958, the shocks had become so severe that the PCC had fallen apart. Only Oregon, Oregon State, and Washington State remained. The other five—Washington, Berkeley, UCLA, USC, and (belatedly and reluctantly) Stanford—agreed to form a new conference known as the Athletic Association of Western Universities (AAWU) or sometimes "The Big 5." Seaborg had taken a leading role in deciding on heavy punishments for the offending schools (principally UCLA, Washington, and USC), drawing up a charter for the new conference, and drafting a new set of rules. As chancellor, he continued to deal with athletics issues, including reorganization on all the UC campuses to shift intercollegiate athletics from quasi-control by student governments to direct control by the university.

With only five members, the AAWU needed to grow in order to match the size and strength of other major conferences such as the Big 10. One idea would be to form a national conference to include some big universities that had never become affiliated. Notre Dame and Army were most often mentioned. With air travel increasingly efficient and available, the proposal began to be known as an "airplane conference." In the logistical sense, it would

resemble the patterns that had enabled major league baseball, for example, to expand from the eastern states to the entire nation.

Just weeks after he had become chancellor, Seaborg flew to Geneva to attend the Second United Nations International Conference on the Peaceful Uses of Atomic Energy. There, at a reception hosted by the Soviet delegation, he met Father Theodore Hesburgh, president of Notre Dame University. And what did they talk about? Well, football, of course. They found that they had a mutual interest in the possibility of forming a new national football conference. "He thinks presidents should get together at a certain stage of development to be sure high academic standards are brought in," Seaborg wrote in his journal.

In the months that followed, the campaign for an "airplane conference" began to expand—with strong backing from the athletic directors at UCLA and Berkeley and from Bradford Booth, UCLA's faculty athletic representative. Writing of this later, Seaborg summarized Booth's points: "Booth said that a national conference would assure competition and flexibility, provide new faces, and offer leadership throughout the country. Without such an arrangement . . . the future of University of California athletics would be at best uncertain."

Planning continued, with the making of a list of "approved" schools that UCLA and Berkeley could schedule. Despite some initial interest from Father Hesburgh, Notre Dame had made it known by February 1959 that it was no longer interested. And Army had also removed itself from consideration. New on the list were Maryland, Kansas State, Florida, Florida State, North Carolina State, Texas, Oregon, Fresno State, San Francisco State, San Diego State, and San Jose State.

This brought a memo to Seaborg from Berkeley's Public Information Officer, Dan Wilkes, warning about "little known" schools such as Florida State: "Do they award a Thunderbird to each newly acquired athlete? If we play such schools often and regularly, we shall have a devil of a time combating the notion that we have gone professional—that we broke up the PCC in order to build schedules with better drawing cards."

More strong advice came from a group of prominent and highly respected faculty members:

> The sins of the old Pacific Coast Conference would be compounded in such an organization. . . . Our University would be subjected to overwhelming pressure to accept whatever degree of athletic professionalism would be necessary to hold our own in the conference. Such a complete surrender to big-time college athletics would be a severe blow to our present good reputation as an institution of higher learning.[7]

Promoters of the national conference continued to press forward, announcing a meeting at Chicago in June where the presidents of potential member schools would join the discussion. Seaborg said he didn't plan to attend in view of the faculty opposition and that "there would be little or nothing I could accomplish." Finally, Clark Kerr, who was never enthusiastic about the idea, put his foot down. Hard. He sent out the word on April 24. No one from Berkeley or UCLA was to attend the Chicago conference. The participation of the university in any national conference planning was ended. Hearing that, the other schools gave up as well. The Chicago conference was canceled. There would be no national conference. Not now. Not ever.

After more time had passed and wounds from the scandal days had healed, the three left behind schools joined the AAWU and it became the Pac 8. In the 1970s, the University of Arizona and Arizona State also joined, completing the conference as today's Pac 10.

Further Football Problems

Football for the alumni. In Clark Kerr's famous recitation, that was one of the three main concerns of a college president (along with sex for the students and parking for the faculty). For Glenn Seaborg, football was something he had loved from an early age—although as faculty athletic representative he came to know its darker side. A sportswriter had described Seaborg as a "football filbert," and he did enjoy attending both college and professional games.

As a boy growing up in the northern Michigan iron mining town of Ishpeming, Seaborg joined his father to see the town team play. There were no seats, so they walked up and down the sideline to watch the action. At one memorable game, the local players (mostly miners themselves) played a new team from Green Bay, Wisconsin, called the Packers. (They were sponsored by the Indian Packing Company—a meat packing company in Green Bay.) A young man named "Curley" Lambeau was the Packers' quarterback as well as a runner, passer, captain, coach, and manager. On the first three running plays, as Seaborg recalled it, three Packers went out with broken bones. But after that the Packers passed on nearly every play and beat the confused Ishpeming team 33-0.

In his two and a half years as chancellor, Seaborg attended nearly all of Cal's home games in Memorial Stadium. (A rare exception was the time that Helen Seaborg was giving birth to the couple's sixth child.) Not quite getting his "fill" at the Saturday game, Seaborg and some members of his research team would go to San Francisco on Sunday and watch the 49ers play at Kezar Stadium. They followed a kind of routine, as Seaborg noted in his journal, stopping after the game for a big steak dinner and at least once stopping to see a "girlie show" before returning home.

Except for some competition in gaining an audience and space on the sports pages, pro football across the bay had little or no relationship with the games played on the Berkeley campus. But would that be the same with a second pro team in the area—and in fact located right next door in Oakland? In January 1960 Oakland Mayor Clifford Rishell called Seaborg with the news that a new football league was forming and that Oakland was planning a strong bid for a franchise. To succeed in the bid, the Oakland team (not yet named) would need the use of a large stadium for the next year or two. After that, a new state-of-the-art stadium, which could be shared with the university, would open in Oakland. In order to meet their interim need, the Oaklanders would offer to lease Cal's 80,000-seat Memorial Stadium. It was the obviously perfect solution; a "slam dunk" in later parlance.

Seaborg didn't see it that way, but he told the mayor that they should meet with President Kerr and others. Before that could happen, some heavy-duty politicking began—bringing on what Seaborg called The Great Stadium Controversy (although it lasted only about five weeks). First in line was Assemblyman Don Mulford, a Berkeley alumnus who usually supported "downtown" Oakland interests. He stressed the advantages of the Oakland proposal and hinted that a refusal from the university could damage support in the legislature and elsewhere. Others followed Mulford, including *Oakland Tribune* editor William F. Knowland. But on campus and elsewhere in Berkeley, opposition to the Oakland lease was growing.

When the university regents' Committee on Educational Policy met toward the end of January, Kerr told the members that he opposed the stadium lease—because he was "hesitant about permitting the use of the University's facilities for professional activities, and . . . particularly concerned about taking any action which would result in bringing professional football crowds into the Berkeley community on Sunday afternoons."[8] The regents' committee agreed and voted to continue with the no-professionals policy.

The controversy, however, continued at full volume. Knowland's *Oakland Tribune* published a stern editorial headed "Time for University of California to Adopt a 'Good Neighbor' Policy." Resolutions supporting the stadium lease passed in the California State Senate, Alameda County Board of Supervisors, Oakland City Council, and Oakland Chamber of Commerce. Chamber President R. T. Nahas suggested there was a dog-in-the-manger problem in the university's position: "The fact that the Memorial Stadium is presently used only four or five Saturdays each year should, in our opinion, weigh your decision heavily in favor of our request."[9]

Opposition to the lease also grew, especially in Berkeley where the university's Academic Senate, Associated Students (ASUC), and the *Daily Californian* were joined by the Berkeley Ministerial Association, Chamber of Commerce, and Mayor Claude Hutchison. One Berkeley resident, living near the stadium, said he enjoyed football as a college activity: "But I believe Sundays have been set aside for other purposes than catering to a gang of hoodlums and gamblers which frequently follow the professional sports."[10] (His view seems almost prescient in foreseeing the later emergence of a raucous fan base notorious as the "Raider Nation.")

Back to the regents for a second time, the full board voted—with only three "no" votes—to continue the university's policy of opposing commercial use. In the fall of 1960, the Oakland Raiders of the new American Football League took the field for the first time. Seaborg noted that "spirits were high; facilities were makeshift." In the 1970s, the university did allow the Raiders to play in Memorial Stadium when the Oakland A's were using the Oakland Coliseum during postseason baseball competition. And in 1989, closing the door on bygones, foundations established by two of the Raiders' most prominent founders and owners awarded UC Berkeley two "naming" grants worth $15 million each. Soda Hall, a new computer sciences building, was named for Y. Charles "Chet" Soda; the reconstructed Life Sciences Building (considered the largest campus building in area in the nation) was re-named Valley Life Sciences Building after Wayne Valley. Stories around town said the two grants had been offered first to Stanford University but were rejected because the names of two Oakland developers weren't considered appropriate for Stanford buildings. Heaven forfend!

The Sex Professor

With 22,000 students in a fairly compact urban campus, UC Berkeley in 1960 could be expected to face problems of student welfare, behavior, and academic success (or lack thereof) among other issues. The chancellor could hope that such problems would mostly be handled at lower levels in the administration. And much of the time that would be true—but not always. Even in the so-called "Silent Fifties," students could get out of hand and bring embarrassment to the institution and its leaders. This had happened with the so-called "panty raids," when leaderless groups of mostly male students barged into campus women's residences and made off with articles of underwear. Under different circumstances, somewhat similar episodes had developed in the 1930s before football games—when Berkeley student mobs blocked streets, started fires, looted stores, and overturned vehicles. (Especially if they were painted the hated Stanford red.)

During Seaborg's time as chancellor, large-scale disturbances were mostly avoided, although the campus faced problems in the aftermath of the San Francisco City Hall riots (where students and others protested the hearings held by the House Un-American Activities Committee). On campus, disputes were more likely to involve political activities by student groups and interpretations of "free speech." In one rather bizarre case, it was a

matter of a very distant dispute becoming suddenly local and resulting in something being done and then undone—with both outcomes left standing.

It was in the spring of 1960 that there was an ongoing argument on campus about rules applied to on-campus student organizations and student government—i.e., the Associated Students of the University of California. After much study and advice, President Kerr had issued a set of definitions and modified rules that applied on all the campuses. They became known as "The Kerr Directives" and rapidly were the object of strong disagreement at a time when student activism was growing (following the "Silent Fifties"). One directive said that students' elected governing groups, such as the ASUC's Executive Committee (or "Ex Com"), could not represent themselves as speaking for the entire student body on issues outside the University of California. In the case of outside issues, a group such as Ex Com would have to include a disclaimer saying that the members spoke as individuals only. Violators could be punished for breaking university rules.

The spark that ignited a furor was a letter published in the *Daily Illini,* the student newspaper at the University of Illinois. Leo F. Koch, a 44-year-old assistant professor of biology at the University of Illinois (and 1941 graduate of UC Berkeley), wanted to give some advice to students—and particularly to students who were mature adults—making his point in a few words: "A mutually satisfactory sexual experience would eliminate the need for many hours of frustrating petting and lead to much happier and longer-lasting marriages."

At another place (such as Berkeley) and another time, Koch's little dictum would not have caused waves. But among the cornfields in the Midwest, it set off alarms and drew an instant response. University of Illinois President David Henry ruled that Koch's letter was "in unacceptably bad taste," and he recommended to that university's board of trustees that Koch be fired.

For a few days, the news made headlines around the country with Koch identified as the "sex professor." Among those who paid attention were some members of the ASUC's Ex Com. From their point of view, the decision to fire Koch was an outrage, and it needed to be condemned. They would compose a resolution and send it to Illinois. They knew that such a resolution, without a disclaimer attached, would be a violation of University of California rules—that is, of the Kerr Directives. And if they didn't know it, they were quickly warned by Alex Sherriffs, vice chancellor for student affairs, who said there would be serious consequences.

At the Ex Com meeting, a resolution full of "whereas" and "be it resolved" headings along with ringing phrases was put up for a vote. "The University of Illinois has violated . . . academic freedom by firing Professor Leo F. Koch for his expressed views on sex," the resolution stated. "Be it therefore resolved that the Executive Committee of the Associated Students of the University of California, representing the students of the University of California, condemn[s] the actions of the University of Illinois for this firing and strongly urges that Professor Koch be reinstated." The resolution passed by a vote of five to four, with the representatives of the faculty and the chancellor abstaining.

The Ex Com action unleashed a war of words. The *Daily Californian* jumped in on the side of the Ex Com majority with articles and editorials, Patrick Henry-like declarations, even an editorial headline in Latin (*"Alea Iacta est!"*—roughly translated as "the die is cast"). Seaborg released a memo, addressed to Ex Com, demanding that the resolution be rescinded. Sherriffs added further threats, warning ASUC President David Armor of possible "drastic changes" in student government. But it was too late; Armor had already mailed the letter to Illinois. Increasingly furious, Sherriffs pushed for disciplinary action including

Dave Armor, ASUC President, 1959-60, *1960 Blue and Gold.*

dismissal of ASUC's Armor. Kerr also told Seaborg that Ex Com's defiance of the rules should be referred to the Committee on Student Conduct, and that he might take steps to make ASUC membership voluntary (thus cutting its size and influence severely).

Local newspapers continued with daily coverage of the story and with considerable fascination—sometimes also edging toward a snicker. (An *Examiner* headline said "UC Students Won't Alter Free-Love Stand.") While prominent professors on campus took sides and issued statements, the head of the American Civil Liberties Union of Northern California said he had "serious questions" about the wisdom of taking disciplinary action against the students. Finally, as he wrote in *Chancellor at Berkeley,* Seaborg realized that he alone must take action:

> It had come down to me, and I delayed my trip to Washington to make a decision. I felt the pressures on every side. On the one hand, I had no choice but to uphold the will of the regents and the direction of the president—and I agreed with the basic principle that a compulsory membership organization should not take political stands on behalf of all of its members. On the other hand, I thought Kerr was being too harsh in his threats to "disown" the ASUC—and I didn't agree with Kerr and Sherriffs when they suggested that we should seek disciplinary sanctions. The position argued by Professor (Charles) Sellers and his colleagues was persuasive, I thought, but also somewhat impractical.[11]

Seaborg said he decided that "the only solution was to simply remove the problem by a bit of rhetorical surgery." He sent his letter on May 3 addressed to Armor and other members of Ex Com and to President Henry of the University of Illinois:

> Dear Mr. Armor:
>
> Since the Executive Committee of the Associated Students of the University of California, Berkeley, in its action of May 3, 1960, exceeded the limits of its authority, I hereby declare this action null and void and am so informing the president of the University of Illinois by carbon copy of this letter.
>
> I regret that the Executive Committee chose this deliberate action and am extremely disappointed in those responsible for it.
>
> I have asked the Student Affairs Committee to study the entire problem.
>
> Sincerely yours,
> Glenn T. Seaborg[12]

With this brilliant and Solomonic stroke, Seaborg had defused the wrenching dispute. With his "null and void," he had upheld the challenge to the university's authority. But Ex Com had won, too. As a practical matter, its view of rights and freedom had reached many minds and perhaps helped move a national discussion toward a new enlightenment in the years ahead. University of Illinois President Henry, in a reply to Seaborg, thanked him for sending a copy of the letter to Armor and then added a troubled thought: "I am sorry that

the unhappy and vexing case with which we have had to deal at Illinois in the matter of the recommended dismissal of an assistant professor has had troublesome repercussions on other campuses." In June, the University of Illinois Board of Trustees voted unanimously to dismiss Assistant Professor Koch a year ahead of his $5,900 contract.

Sather Gate Tradition

While the controversy over the "sex professor" and some disobedient students faded rapidly in 1960, another controversy involving a tiny sliver of the Berkeley campus (about two hundredths of the main campus land area) had germinated and would explode in a later year with repercussions felt into the twenty-first century. It was another case of something decided but never done. A case of a confused and misunderstood situation that would lead to serious finger-pointing as participants and historians retold the story.

By 1958 papers had been signed to extend the southern boundary of the Berkeley campus from Strawberry Creek and Sather Gate to Bancroft Way. Parts of this expansion had taken place much earlier, but now there were plans to build a large Student Center adjacent to the intersection of Bancroft Way and Telegraph Avenue—in other words, right at the main "front door" to the campus. The center design included a large Student Union building, a student office building, an auditorium-theater building, and a restaurant and cafeteria.

With the expansion, the northern block of Telegraph Avenue was no longer a city street. Instead, it was incorporated into a wide space becoming "Sproul Plaza," and the space outside Sather Gate was now "campus" instead of "city"—and campus rules applied. Pep rallies could happen, but not rallies and other forms of advocacy over political and partisan issues. Campus rules, dating back to the 1930s, didn't allow that. One rule had said that candidates for political office couldn't speak on campus unless their opponents were there to speak at the same time. President Kerr, with his skills as a persuader, had succeeded in getting the mostly conservative board of regents to drop the speaker ban, and had even gained approval for lifting a ban on communist speakers. But the prohibition on such forms of advocacy as recruiting for off-campus demonstrations and collecting money for a variety of causes remained. Kerr believed he needed that to balance his strong argument against punishing students who were arrested off campus for acts of civil disobedience. The university would be "hands off" on the fate of students arrested in the community, Kerr said, but by the same token students would not be allowed to use the campus as a base for planning and funding such activities.[13]

"It was peaceful, quiet, and rather small (with only about 50 demonstrators), but Slate's picketing outside Harmon Gymnasium on December 15, 1960, was a 'first': the first public, on-campus group protest at Berkeley against a University policy. The rather mild signs 'urged' the Board of Regents to drop the compulsory ROTC requirement for freshmen and sophomore men (which they did—but not until two years later). One student who picketed in uniform was given an 'F' grade, and his appeal stirred controversy in the months ahead." Photograph by Don Keckely for the *Cal Monthly*, from Seaborg with Colvig, *Chancellor at Berkeley*, 1994.

Telegraph and Bancroft, *1970 Blue and Gold.*

The loss of the space outside Sather Gate as an open forum began to spark some protests soon after Glenn Seaborg took office as chancellor in 1958. The instigators were students in a left-leaning organization called SLATE, which wanted to call itself a "political party" but was banned from doing so. SLATE had a kind of gadfly role at Berkeley, taunting the administration and nitpicking about the rules. Without permission from the dean of students, SLATE held a rally at Sather Gate and was threatened with punishment. Seaborg sidestepped that, but it was clear that the loss of space to continue the "Sather Gate Tradition" would be a continuing problem. Was there any solution?

An idea arose to replace the Sather Gate area with a small chunk of the campus next to the city-owned sidewalk along Bancroft Way. This piece of campus property would be ceded back to the city to become a "free speech area." It would become a little "Hyde Park," after the famous spot in London. A kind of minuscule "Roman Forum," as it were, or a "Piazza del Popolo." Vice Chancellor Sherriffs thought it was a good idea, and Chancellor Seaborg agreed. So did President Kerr, who remembered the anti-war demonstrations outside Sather Gate in the 1930s, when he was a graduate student on the campus. Kerr took the free speech proposal to the board of regents in September 1959. Before that, Dean Milton Chernin of the School of Social Welfare, serving part-time as a faculty assistant in the Chancellor's Office, had written a memo explaining the situation, as recorded by Seaborg in *Chancellor at Berkeley:*

> Dean Chernin wrote me . . . to point out that the deed would be rather restrictive and that no formal presentation had to be made to the city manager or the city council. "When the matter is presented to the city manager and the city council," Chernin wrote, "we may be criticized either in the press or by any members of the city council who want to twist our tail once more. This is unavoidable." His briefing continued: "We are not calling this a free speech area. [Actually, that name did persist.] Our approach is that students and speakers will inevitably move down to Bancroft and Telegraph to hold meetings and hear speakers off-campus, and it is wisdom on the part of the University and city to anticipate this by building a little plaza which will avoid vehicular and pedestrian congestion and enhance safety."[14]

At the regents' meeting held at UC Santa Barbara, Kerr reviewed the history of the Sather Gate tradition and the plan to give back a small parcel of land to the city. After answering the concerns of some regents, Kerr made the motion in the closed session of the Committee on Grounds and Buildings:

> That the treasurer be authorized to negotiate and the officers of the regents to execute, a deed granting to the city of Berkeley a parcel of land approximately 23' x 39' lying north of the intersection of Bancroft Way and Telegraph Avenue, Berkeley, for use solely as a public plaza in order to minimize pedestrian and vehicular traffic congestion at the campus entrance; and that it be subject to immediate reversion to the University if not used for this purpose.[15]

The motion carried with two regents voting "no" and two abstaining. The next day, Kerr presented the case again before the full board of regents. He noted that the university's General Counsel, Thomas Cunningham, was "of the opinion that there is no reason to continue the Sather Gate Tradition, as students and others have the right to speak any place on campus." But in his own view, Kerr added, "any such meetings are much easier to

handle if they are all conducted at one place and if that place is on city property." Seaborg also spoke, saying the main problem had to do with "outside" speakers, and that it would be a great help to the administration if the people could hold their meetings off-campus on city property. In their final vote on the proposal, the regents gave their approval with 16 "ayes" and only two voting "no."

So then what happened? Essentially, nothing. Treasurer of the Regents Robert Underhill, charged with the responsibility of working out the land transfer with the City of Berkeley, was obviously skeptical of the proposal and was in no hurry to take the action. At meetings of Seaborg's cabinet, there was talk of "rethinking" the whole idea. Vice Chancellor Alex Sherriffs said that the new university regulations, known as the "Kerr Directives," were being promoted as a liberalizing change, spelling out more freedom for students than they had enjoyed before.

Campus architects, responsible for drawing up the detailed plans for the new mini-plaza, disliked the whole idea. So did the campus police. In *Chancellor at Berkeley,* Seaborg describes the last time the proposal was on the agenda for his cabinet (May 31, 1960):

> [W]e agreed that the "free speech island" should be abandoned "for the time being, since the Kerr Directives seem to have solved the immediate problem." I was also doubtful, in view of other events that were occurring (including student involvement in the so-called City Hall Riot in San Francisco), that the regents would continue to approve giving back property to the city of Berkeley.[16]

After Seaborg left Berkeley in early 1961 to join the Kennedy Administration as chairman of the Atomic Energy Commission, the mini-plaza scheme languished and appeared to be forgotten. Stepping up from vice chancellor, Chancellor Edward Strong, along with Dean of Students Katherine Towle and others, went through the motions of dedicating a "Hyde Park" area in the new Lower Plaza—the area surrounded by the new buildings of the Student Center. A microphone would be available for students and invited speakers to use during noon hour. All students had to do was apply and get approval for the speakers. The place, however, was out of the main pedestrian traffic flow, and no students applied.

Looking back, just common sense would say that the mini-plaza scheme was unworkable and in fact ridiculous. The little parcel of land was just east of the main entrance at Telegraph and Bancroft—where the flagpoles are now—and not "lying north of the intersection" as the regents' item had said. Even SLATE, which was supposed to benefit from the university's "gift," was correct in its assessment of practical effects (as reported in the *Daily Californian*):

> The new entrance to the campus, at the corner of Bancroft and Telegraph, will not be able to serve as a new "Sather Gate." It affords very little off-campus sidewalk space, and vehicular traffic is very heavy, creating a noise problem as well as rendering it impossible for crowds to overflow onto the sidewalk. Far more important than such practical considerations, however, is the fact that an established tradition cannot be uprooted and transplanted. The campus is used to and expects a Hyde Park at the gate, but it would take years to develop the tradition elsewhere."[17]

SLATE was a bit off the mark in that last sentence. The "tradition" did move away from Sather Gate itself, but not very far. Following the tumultuous events of 1964, the tradition

became established in front of Sproul Hall, in the widest area of Sproul Plaza. The steps there are now officially named "The Mario Savio Steps."

As for the little Hyde Park that never was, even a small crowd there to hear a speaker would have spilled into the street and blocked traffic at one of Berkeley's busiest intersections. Besides, what the students wanted was not just a "soapbox" platform, but a place to set up tables and promote their causes.[18] When a new wave of activism came along in early 1964, after the relative quiet of the Kennedy years on campus, students did set up tables outside the cement posts at the campus entrance but inside the portion of the sidewalk (which stretches out to the street) that remained the property of the university. With their activities, they were breaking rules that were enforced elsewhere on campus. On orders of Vice Chancellor Sherriffs, Dean of Students Katherine Towle sent a letter to student organizations. Henceforth, the rules would be enforced in the "Bancroft Strip"; the tables and the politicking must go or the students would be punished.

Howls of protest were quick to arise, and within two days there were acts of deliberate defiance by students and non-students. Campus police arrived. Students and others sat down around the police car. More sat down. Soon there were a thousand and more. A young man with tousled hair, wearing shoes but no socks, stood on the police car and began a harangue. The Free Speech Movement was off and running.

ENDNOTES

1 For more on all that happened at Berkeley during Seaborg's time as chancellor (1958-1961) see *Chancellor at Berkeley,* Glenn T. Seaborg with Ray Colvig (Berkeley: Institute of Governmental Studies Press, University of California, 1994). See also Glenn T. Seaborg, Journal of Glenn T. Seaborg, Berkeley Chancellor (Berkeley: Lawrence Berkeley Laboratory, 1987).

2 *Chancellor at Berkeley,* 416-17.

3 Ibid., 418.

4 Ibid., xix.

5 Ibid., 235-36.

6 For a full account of those scandal-plagued years and Seaborg's role in forming a new conference, see *Roses from the Ashes: Breakup and Rebirth in Pacific Coast Intercollegiate Athletics,* Glenn T. Seaborg with Ray Colvig (Berkeley: Institute of Governmental Studies Press, University of California, 2000).

7 *Chancellor at Berkeley,* 253.

Ibid., 394.

9 Ibid., 395.

10 Ibid., 395-96.

11 Ibid., 439.

12 Ibid.

13 Clark Kerr made this point emphatically when he delivered a UC Charter Day Address in May 1964, at the Davis campus. His statement was circulated widely, including publication in the June-July issue of California Monthly (the magazine sent to all members of Berkeley's Alumni Association). Even after large-scale student protests began in late September, opening the brief era of the Free Speech Movement, Kerr held with his "balanced" rules. (Personal note: On one occasion, I was with several reporters outside the regents' Meeting Room in University Hall when Kerr stopped for a brief conversation. In answer to a question, I heard him answer, in a sad voice, with his own rhetorical question: "Why can't they just go across the street to do those things?"

14 *Chancellor at Berkeley,* 176-77.

15 Ibid., 177.

16 Ibid., 179.

17 Ibid., 174.

18 The University of California was behind many other institutions in recognizing that free speech extended to politicking and should be widely permitted under "civic center" decisions by the courts. A campus committee at Berkeley had recommended steps in that direction more than four years earlier, but the committee's views were effectively swept under the rug. After the main events of the FSM, and with the regents' decision pending, some comparisons began to appear. Both the *Daily Californian* and *San Francisco Examiner* reported that several community colleges and California's state colleges, for example, offered more freedom than UC Berkeley. Then *Time* magazine, in the issue of December 18, 1964, went farther, saying the University of California was out of step with the most prestigious universities in the nation: "By and large, restrictions are a mark of small, church-affiliated colleges intent on serving in loco parentis, while freedom for students, defined roughly as the rights and curbs of ordinary civil law, is the goal at big, old, and scholastically high-ranking state and private universities." Berkeley, it seemed, was in the same category as Bob Jones University.

John Galen Howard's preliminary plan for new students' union. *1920 Blue and Gold.*

FERTILE GROUND: THE BERKELEY CAMPUS AND DISABILITY AFFAIRS

Susan O'Hara

THE BERKELEY CAMPUS POLICE FISHED DONALD LORENCE and his wheelchair out from Strawberry Creek one autumn day in 1968. Lorence had only recently obtained his first electric wheelchair and had decided to take full advantage of it. In his exuberance, he overestimated his skills and inadvertently rolled down a hill into the creek, which fortunately was low that day. No major harm done. In fact, he was exhilarated. Fellow student Ed Roberts said in an oral history much later, "He just got this incredible smile on his face . . . and said, 'I didn't know I could get into so much trouble so fast'."[1]

As legendary as Lorence's creek escapade came to be, the little residence program for students with significant disabilities in Cowell Hospital where he lived would become even more so. He was merely living out its unconventional credo.

Before arriving on campus, Lorence had lived his life in his parents' home, barely able to manipulate his manual wheelchair and considered too disabled by amyasthenia gravis to go outside his home. His electric wheelchair at Cal was a new experience, and he loved the feeling of going where he wanted to go, controlling his own destiny, so to speak. The creek incident was exhilarating, not because he had ended up in the water, but because for the first time, perhaps in his life, he had experienced the liberation of making his own decision. He had decided to take a stroll. He would (and could) go alone. He chose the path along the creek. He had tested his limits. He had taken a risk. Coupled with his state-of-the-art electric wheelchair, this kind of self-determination signaled a reversal of the traditional view of people with disabilities as needing custodial care, charity, and complete protection from responsibility and its consequences.

Frequently credited as a major springboard for the independent living movement nationally, the residence program at Cowell foreshadowed a deep campus involvement in disability affairs over the next half-century. The history of this involvement is rich and complex. At its best, the campus has provided fertile ground for initiatives related to disability. At critical moments, ranking faculty members and administrators unlocked doors, quietly lending their reputations and influence. The campus accorded long-term endorsement and financial support to some of the ensuing programs. Other programs have diminished over time, challenged by subtleties of finance or personnel. Legal mandates, external funding, and other forces on and beyond the campus have further shaped the course of this relationship. Two federal laws in particular, the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990, influenced campus and systemwide policies, both prohibiting discrimination on the basis of disability and mandating reasonable accommodations for qualified students, staff, and faculty.[2]

Three arenas illustrate the trajectory and challenges of this history: services to students with disabilities, campus architecture, and the new academic minor in disability studies. Each continues to evolve.

The Early Idea: Opening the Campus to Students with Disabilities

People with disabilities are not new to the campus. As far back as 1896, Newel Perry,

a blind man, graduated in mathematics and went on to found the California Council for the Blind.[3] Jacobus tenBroek, also blind, received his doctorate in jurisprudence at UC Berkeley in 1940 and became a full professor in the departments of speech and political science in the 1950s.[4] Prior to 1962, there had been a few students who used wheelchairs on campus, and although there was no formal program of services, individual staff members did their best to help out informally when a student ran into a snag.

It was in 1962 that Dr. Henry Bruyn, medical director of the campus hospital, perhaps unwittingly opened a door that would ultimately lead to a far-reaching system of services and a much larger population of students with disabilities. That year the campus had been stymied at least momentarily about where to allow prospective student Edward Roberts to live. Roberts had had polio at age fourteen and was more significantly disabled than previous wheelchair users on campus. He was paralyzed in all four limbs and slept in an iron lung, a narrow bed-like structure which forced air into his weakened respiratory system. He needed several hours of assistance each day to help him with a routine of showering, getting dressed, and other activities of daily living.

20 Wednesday, Dec. 5, 1962—Zones 2, 3, 4—**NEWS**

Ed Roberts, 22, a polio victim, is shown studying in his Cowell Hospital bed for his classes at the University of California. He turns pages of his books with a wand held between his teeth.

Helpless Cripple Attends UC Classes Here in Wheelchair

Ed Roberts' enrollment at Berkeley was marked by the local paper with a now outdated and ultimately ironic description of Roberts as a "helpless cripple." *Berkeley Gazette,* December 5, 1962.

After three years at a community college, he along with his mother convinced Dean of Students Arleigh Williams that Ed should have an opportunity to study at Berkeley. Williams referred them to Bruyn, whose extensive experience with polio epidemics during his medical career left him "eager to do it," that is, to offer Roberts a room on the vacant third floor of the hospital.[5] A charismatic fellow, Roberts found people to work on an hourly basis to help him with his daily personal care. This practice of employing assistants, being an employer rather than an object of charity, became a basic tenet of the independent living movement in Berkeley. Two years later in 1964, John Hessler, in custodial care at Martinez State Hospital, got wind of Roberts living at Cowell and immediately applied for the same thing. Hessler, then twenty-two, had been living at Martinez for six years following a diving accident and a spinal cord injury at age sixteen.

Word got out. By 1969, ten students with disabilities, including two women, lived on the third floor of the hospital. Each student hired assistants, often conscientious objectors to the Vietnam War or antitraditionalists of the 1960s who had a distaste for the traditional nine-to-five workday and saw this new independent living movement

Thirteen years after he enrolled at Berkeley, Ed Roberts was sworn in by Governor Jerry Brown as director of California Department of Rehabilitation, a position never before held by a person with a significant disability. *Regional Oral History Office.*

as a source of meaningful work. Each student had a separate room, decorated to taste, almost always with the ubiquitous Indian bedspread of the 1960s. Students could come and go at will, although Bruyn had to intervene more than once between medical staff downstairs and disabled students upstairs over what the students should be allowed to do.[6]

Like Donald Lorence, these students rapidly developed skills of independence and took part in the college life of the sixties. All had arrived from either their parents' home or a nursing home and wanted a different life. Enough buildings on campus were accessible, one way or another, to enable them to pursue a degree. Besides attending classes and learning to hire personal assistants, students opened and managed their own bank accounts; they ordered pizza to be delivered; they drank beverages of choice; they sought out new relationships. Almost all acquired electric wheelchairs, an important piece of technology that expanded their range of mobility a thousandfold.

In oral histories thirty-five years later, these students spoke of their extraordinary feeling of liberation at Cowell Hospital. They all recalled their intense camaraderie, sense of community, the thrill of independence, an atmosphere of an-idea-a-minute, and the growing feeling of power, first in their own lives and soon after in organizations designed by themselves.[7] They organized themselves into the "Rolling Quads" and, for starters, harried out a rehabilitation counselor they considered overweening.[8] Several years later the Rolling Quads lobbied the California state legislature in Sacramento for continued funding to cover costs of attendant care. Herb Willsmore, one of the early organizers, remembered that "There had never been at the state Capitol a group of fifteen people in power wheelchairs running through the halls fighting for one specific cause. They could see in our eyes and hear from what we were telling them that these were life-and-death issues for us and people like us."[9]

Founding director of the campus Physically Disabled Students Program John Hessler devised ways to cook for himself when he moved from Cowell Hospital into his first apartment in 1969.

By 1969, some of the students had ventured into the community and rented apartments, creating accessibility as they went. Their constant discussions at Cowell had generated a kind of philosophy of independence and a list of requirements to achieve it. Not unlike the women's and gay movements of that era, the disabled students began to recognize their history of marginalization and to formulate the means to self-determination, consumer control, political muscle, and even pride. The resulting Physically Disabled Students Program, housed in a funky rented apartment above the Top Dog diner on Durant Avenue and directed by the now-graduated John Hessler, provided wheelchair repair and referrals for attendants as well as for readers for the few blind students, found apartments that could be made accessible, guided new students through admission to the university, and generally ran interference and advocated for students' needs.

Through a serendipitous set of circumstances, the students were able to acquire a grant from the federal government for $80,000 to fund this new venture. Betty Neely, the campus director of Student Activities and Programs, was designated as the campus supervisor for the new program. She and Hessler shared a mutual respect, he for her tolerance of rough-and-tumble innovation and his lack of administrative experience, her sense of humor, and appreciation of what PDSP was trying to do, and she for his strong leadership and understanding of the needs of both campus administration and students with disabilities. Neely also remembered being presented with the fait accompli of funding for an accessible van for the program, also procured by the students.[10]

The program hosted hundreds of people from around the country and became a model for independent living. By 1972, the students had helped form the Center for Independent Living in Berkeley for people with disabilities in the community who were not students, using the same model. Within a few years both programs became known throughout the United States and became symbols of the disability movement. Today almost every institution of higher learning has a program for its disabled students, and there are nearly four hundred independent living centers in communities across the United States.

In 1975 Hessler left the Physically Disabled Students Program for Sacramento to become deputy director of the California Department of Rehabilitation, where Ed Roberts had just been named by Governor Jerry Brown to head the agency. With the ensuing gap in leadership and inexperience in finance and management skills, PDSP fell into administrative decline, leading to an audit by the campus and a search for a new type of director. Sharon Bonney was hired in 1979, shortly after the program had moved to a larger and better office at 2515 Channing Way. Bonney succeeded in reestablishing the credibility of the program, putting in place business practices that curbed the freewheeling atmosphere of the earliest days. From the original seventeen students in 1970, the program grew to seven hundred, accommodating the growing numbers of students with hearing impairments and learning disabilities identified after the passage of the federal Individuals with Disabilities Education Act of 1975, which mandated services for children with these disabilities. Staff specialists in hearing and learning disabilities joined the program and increased the type of accommodations for students, ranging from extra time to complete exams, reduced course loads, note takers, secretarial assistance, and interpreters, among others. Other departments on campus, the library and the Career Center, for example, added valuable services for students with disabilities.

Today students with disabilities number 750, down from a peak of 900 in the 1990s. Students with a much larger variety of disabilities now use the services. The largest numbers served are students with learning disabilities, followed closely by students with psychiatric disabilities, each comprising 30 to 35 percent of the total. Approximately ninety students have mobility impairments, fifty have hearing or visual impairments, and nine have an acquired brain injury.[11] In addition to specialists in the new areas, the program now provides real-time captioning for hearing impaired students, a pickup service via golf cart for those with mobility issues, and assistive listening devices. The Disabled Students Program (DSP) staff

Jack Jason, Berkeley's coordinator of Deaf Services, demonstrates the library's first telecommunication device for the deaf for UC President David Saxon, ca. 1982. *University Archives (UARC PIC 9:360).*

and student assistants in the new alternative media lab in the lower level of Wheeler Hall scan more than five hundred class books each semester, at a scan rate of one thousand pages per hour. Software programs then convert the scanned text into speech, larger print, or Braille, providing access to materials for students with visual, learning, and other disabilities. This technology was unheard-of and unimagined in 1970. Gone is the wheelchair repair service, due to the growth of similar commercial services near the campus. The old Cowell Hospital program was long ago integrated into the regular residence halls on College Avenue. DSP itself is now located in the Cesar Chavez building on Sproul Plaza.

The Disabled Students Program (it dropped the word Physically in the early 1980s) now communicates with students extensively through the Internet, a great change from the early days, less personal but more efficient and accessible to students with a wider range of disabilities. Students apply for services, request academic accommodation letters, auxiliary services through the website. Staff review and approve applications and requests the same way. Similarly, faculty read student accommodations letters and receive related information.[12]

The current director, Paul Hippolitus, sees the role of the Disabled Students Program as a change agent, helping all entities on the campus make the shift to providing accommodations to all students, including those with disabilities, to the point where DSP might no longer be needed. He cites campus progress in this shift already: the now-standard accessibility of campus transportation, and the architectural access incorporated into all new construction and remodeling. Hippolitus envisions a future of universal design in learning throughout the campus, similar in concept to universal design used by architects to create new buildings welcoming the widest spectrum of users, including people with disabilities, without the need for later adaptation or specialized design. Universal teaching incorporates flexibility in methods and materials, made possible especially through electronic media, to include all types of learners, visual, auditory, tactile, or other, into the full educational experience.[13]

Architectural Changes

Architectural changes are the most visible evidence on campus of the impact of the disability rights movement. Students in the 1950s and early 1960s vividly remembered being carried up the stairs to classes in inaccessible buildings. Despite a certain nostalgic bravado about this, at least one student recalls sensing that people started to avoid him around stairways.[14]

Ed Roberts was hired by Dean Williams in the mid-sixties to advise him on campus accessibility. Roberts recalled that Sproul Hall was one of the first to be renovated, with a ramp to the lower level to what is now the police department. By the mid-seventies, the campus formed the Committee to Remove Architectural Barriers, an advisory group of facilities managers, the chancellor's and personnel offices, and the Disabled Students Program, intended to be a focal point for review of remodeling and construction plans. Generally a collaborative committee, there were periodic moments of tension over priorities, timing of reviews, and the occasional architect who did not understand new accessibility laws. Heated debate during the renovation of Hearst Mining Building, as late as the mid-1990s, turned on the question of accessibility through a front door, bespeaking a sense of equal rights. The resulting new side door on the west, where it was claimed that eventually 90 percent of traffic would enter the building, felt like a setback to some of the disability advocates.

Controversies notwithstanding, the campus has gradually become more and more accessible in the last fifty years. It has generally heeded access laws and building codes and,

Aesthetics can be integrated into the design for accessibility of campus buildings, as in this landscaped ramp at the Haas School of Business. Author is using ramp. Photograph by Ann Lage.

to its credit, has been attentive to the aesthetics of this redesign. The beautifully renovated north entrance of Doe Library and the well-integrated ramps to the front door of Dwinelle Hall are both good design and testimony to the principle that all individuals may enter through the front door. The newly remodeled Bancroft Library includes a ramp to the front door facing the Campanile, replacing a circuitous system of telephones and buzzers through a back door not used by the general public. Where structural barriers or hills have prevented construction of ramps, the campus has installed electric lifts, for example, in California Hall and the Northgate Hall School of Journalism. Other older buildings have required extreme ingenuity to make them accessible: South Hall has had a door installed under the main staircase; Haviland Hall has a ramp below ground level. Seating for people in wheelchairs has improved in theaters and at Memorial Stadium. Zellerbach Hall and Wheeler Auditorium now have level spaces for wheelchair users, with the option of sitting next to another person in a wheelchair or to a person in a standard seat. Students in the 1950s and 1960s remember sitting on the side of the playing field in the stadium, occasionally being

Joe Roth drops back to pass in a 1975 Cal football game, with Brian Kelly, '81, Larry Gardner, and other wheelchair users on the sidelines. Today, wheelchair users sit at the fifty-yard line above the stands. *Cal Athletics.*

whacked by a football.[15] Now, wheelchair seating is at the fifty-yard line, in the stands above the student section, where wheelchair users are able to see over a standing crowd, not an easy design feat, but a welcome one.

The first major impetus for architectural change was Section 504 of the Vocational Rehabilitation Act of 1973, whose regulations were signed in 1977. Under the leadership of Vice Chancellor Robert Kerley, the campus immediately formed a transition team, as was required by the regulations, and established a plan to begin to make the 111 campus buildings accessible. This includes wheelchair-accessible entrances and restrooms, lowered and Braille elevator buttons, accessible drinking fountains, and other features to provide equal access for people with a range of disabilities. The state legislature provided the bulk of the funding over the years. Much was accomplished by 1990 but much remained to be done. That year the Americans with Disabilities Act triggered another transition committee and further access work on the campus.

Most recently, spurred by a lawsuit filed by a graduate student in 1997 and settled in 2005, the campus is now committed to the most comprehensive plan yet for building accessibility, fully accessible pathways, appropriate signage, accessible parking and transportation, as well as maintenance of all disability access features, to be accomplished over the next twelve years. To that end, a website access guide in map form now highlights entrances and interiors of campus buildings, paths of travel, and nearby disabled persons parking locations.[16]

Disability Studies

According to English professor and lead faculty of UC Berkeley Disability Studies Georgina Kleege, the presence of students with disabilities is part of the natural diversity of the campus. She sees the field of disability studies, slowly gaining standing on the campus, in a similar way.[17] The history of the study of disability as a field of inquiry again shows the campus as fertile ground for testing an idea. It also points up the distance between concept, on the one hand, and the institutionalization of it, on the other. Disability studies has at least left the starting block, but as a new field of study it has a long stretch ahead to achieve full academic and financial security.

Several university faculty have played a pioneering role in research and teaching on disability. Professor Jacobus tenBroek in 1966 published the groundbreaking law review article, "The Right to Live in the World: The Disabled in the Law of Torts," one of the earliest legal writings to place disability rights squarely within the civil rights framework.[18]

Courses of outstanding reputation on disability issues were offered as far back as 1971. Professor Raymond Lifchez taught accessible design in studio classes in architecture in the early 1970s.[19] Professor Frederick Collignon, a specialist in policy research in City and Regional Planning, set up the first studio class on the social policy of disability at that

Professor Raymond Lifchez led the earliest architectural studios on accessible design in Wurster Hall in the early 1970s, enlisting people with disabilities as "user clients" to comment on student efforts to design appropriately accessible buildings. *Courtesy of the author.*

same time.[20] He emphasizes, as do many others in the history of campus and disability, how much had to be invented as he went along. His studio students, for example, for the first time examined the training of rehabilitation professionals from the perspective of clients with disabilities, and proposed a model educational program.[21]

The University of California School of Law has offered courses on disability law for twenty years, taught by the directing attorney of the Disability Rights Education and Defense Fund (DREDF), a local organization focusing on disability policy and law. Here again the courses are based on the viewpoint of people with disabilities, a rights-based perspective. DREDF was founded and is directed by people with disabilities, a core principle of what has become known as the disability rights movement.

Now offered at a growing number of universities, disability studies on the Berkeley campus got its start at the instigation of the World Institute on Disability (WID), an Oakland "think tank" cofounded by Ed Roberts in 1983 to strengthen the disability movement through research, training, advocacy, and public education. According to one of the researchers at WID, by the mid-1990s Berkeley students flooded their office "to pick our brains and to do independent studies, thesis work, and internships with us," on the subject of disability as a social and political construct. All of the staff researchers at WID had been involved in the independent living movement, eight had doctorates and wanted to teach but had not been hired for teaching positions. All had disabilities.[22]

In 1994 WID broached the idea of teaching classes at Berkeley. Through the good offices of professors Leonard Duhl, Fred Collignon, and Meredith Minkler, WID staff began to teach at least one course a semester, in disability policy research, anthropology and disability, and others. According to instructor Devva Kasnitz, they managed to "keep a presence on

Professors Susan Schweik and Fred Collignon receiving award from Chancellor Birgeneau, 2007. (Professor Caroline Kane on right.) Photograph by Peg Skorpinski. *UC Berkeley Public Affairs.*

campus, teaching classes for free or funded by WID." They saw the study of disability as an interdisciplinary area of inquiry, examining disability from a social, cultural, and political point of view, rather than the traditional medical and therapeutic standpoint.[23]

Kasnitz credits English professor Susan Schweik for pivotal support of the concept of disability studies on campus. The origins of Schweik's interest were in the parallel fields of women studies and ethnic studies and as she said, "just being a human being in Berkeley."[24] She also had had an early interest in the poetry of Josephine Miles, the Berkeley English professor severely disabled by arthritis. Awarded the three-year Presidential Chair in Undergraduate Education with Professor Collignon in 2000, the two succeeded in formalizing a disability studies program and elevating it to the level of minor in Undergraduate Interdisciplinary Studies by 2004. Reluctant to be called the champion of disability studies, Schweik along with Collignon nonetheless received the Chancellor's Award for Advancing Academic Excellence in 2007, having "demonstrated decades of pioneering work locally and nationally on behalf of disability-related research, curriculum development and teaching, mentoring and public service leading to a variety of significant institutional reforms on campus."

Lecturer Marsha Saxton, who teaches Introduction to Disability Studies and Women and Disability feels that despite funding struggles and other barriers the field of disability studies has made progress. She has observed that more and more faculty members are valuing the inclusion of disability in fields such as art, anthropology, computer science, public health, economics, and public policy, to name a few. Saxton taught a course on the intersection of race, ethnicity, medicine, and disability in American cultures, and was pleased that the class attracted 160 students.[25] Professors Schweik and Kleege regularly teach courses on the representations of disability in literature. The Department of Architecture has sponsored courses in universal design. Professor Katherine Sherwood's syllabus for the practice of art course, Art, Medicine, and Disability, ranges from ancient Tibetan medical paintings, the

black plague in Western art, Toulouse-Lautrec, Frida Kahlo, and Chuck Close to modern artists John Killacky and Neil Marcus, to an examination of plastic surgery as art.

On a final note, the Bancroft Library houses a remarkable collection of oral histories, documenting the now international independent living and disability rights movements that had a substantial part of their incubation in Berkeley. This is not to say that Berkeley was alone in the origins of this movement. Recognizing that fact, more than ten thousand transcribed pages of more than one hundred in-depth interviews include narratives from leaders in Boston, New York, Texas, Chicago, Los Angeles, and Tokyo, as well as Berkeley.

Begun under the aegis of Willa Baum, late director of the Regional Oral History Office, the collection records the recollections of individuals who have made significant contributions to the origins and achievements of these movements, especially in the 1960 to 1980 era. Now in print and online, the oral histories have become an important research tool for historians and other scholars. The histories are supplemented by more than three hundred linear feet of the papers of related organizations and individuals, also indexed and available for research.

The campus is involved in disability affairs far more than is noted here. The website of the recently created position of vice chancellor for equity and inclusion includes a large section on all campus resources for people with disabilities, not only a useful page, but a promising implication of future commitment, a long way from the day Ed Roberts secured his room at Cowell Hospital in 1962.[26]

ENDNOTES

1 Edward V. Roberts, "The UC Berkeley Years: First Student Resident at Cowell Hospital, 1962," an oral history conducted in 1994 by Susan O'Hara in *University of California's Cowell Hospital Residence Program for Physically Disabled Students,1962-1975: Catalyst for Berkeley's Independent Living Movement,* Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2000, 25. This oral history is part of a series entitled "Disability Rights and Independent Living Movement" at the Bancroft Library. The collection is a major source of information on the Residence Program and on the Physically Disabled Students Program in this article. Most of the series is available online at http://bancroft.berkeley.edu/collections/drilm.

2 Introduction, 140.00 "Guidelines Applying to Nondiscrimination on the Basis of Disability," in "Policies Applying to Campus Activities, Organizations, and Students, University of California," revised August 15, 1994. http://www.ucop.edu/ucophome/coordrev/ucpolicies/aos/uc1400.html.

3 Newel Perry, "The California Council for the Blind and Other Activities of the Blind, 1881-1956," an oral history conducted in 1955-1956 by Willa Baum, Regional Oral History Office, 1956. http://bancroft.berkeley.edu/ROHO/collections/subjectarea/ics_movements/blind.html

4 "Jacobus tenBroek," *In Memorium: University of California* (Berkeley; Academic Senate, 1969), 99-101.

5 Henry Bruyn, "Director, Student Health Services, UC Berkeley, 1959-1972," an oral history conducted in 1994 by Susan O'Hara, in *University of California's Cowell Hospital Residence Program: Key Administrators and California Department of Rehabilitation Counselors,* Regional Oral History Office, 2000, 5.

6 Ibid., 11-12.

7 Cathrine Caulfield, Herbert R. Willsmore, Billy Charles Barner, interviewed separately, *University of California's Cowell Hospital Residence Program for Physically Disabled Students, 1962-1975: Catalyst for Berkeley's Independent Living Movement,* oral histories conducted in 1996-1999 by Kathryn Cowan and Susan O'Hara, Regional Oral History Office, 2000.

8 Roberts, 35-38.

9 Willsmore, 177-178.

10 Betty Neely, "UC Berkeley Administrator, Supervisor of Physically Disabled Students' Program, 1970-1976," an oral history conducted in 1984 by Herb Wiseman in Arleigh Williams and Betty H. Neely: *University Administrators Recall Origin of Physically Disabled Students' Residence Program,* Regional Oral History Office, 1987, 14.

11 Paul Hippolitus, director, Disabled Students Program, personal communication with author, July 2009.

12 Ibid.

13 Ibid.

14 Interview with Russell Bohlke, conducted by Sharon Bonney in 2007, Regional Oral History Office, in process.

15 Ibid., 18.

16 http://dsp.berkeley.edu/access.html.

17 Georgina Kleege, personal communication with author, September 2007.

18 *California Law Review,* 54:2 (May 1966), 841-919.

19 Raymond Lifchez, "Educator in Architectural Access, University of California, Berkeley," an oral history conducted by Susan O'Hara in 2000, in *Architectural Accessibility and Disability Rights in Berkeley and Japan,* Regional Oral History Office, 2004, 71-73.

20 Frederick C. Collignon, "UC Professor of City and Regional Planning: Policy Research and Funding Advocacy," an oral history conducted by Mary Lou Breslin in 1997-1998, in *Builders and Sustainers of the Independent Living Movement in Berkeley: Volume IV,* Regional Oral History Office, 2000, 78.

21 Larry Biscamp, Judy Taylor, Herbert Willsmore, with Charles Cole, "An Evaluation of Rehabilitation Counselor Training Programs from the Perspective of Disabled Clients," Working Paper no.176/RS006 (Berkeley: Institute of Urban and Regional Development, University of California, May 1972).

22 Devva Kasnitz, personal communication with author, 2007.

23 Ibid.

24 Susan Schweik, personal communication with author, 2007.

25 Marsha Saxton, personal communication with author, September 2007 and July 2009.

26 http://diversity.berkeley.edu/Disability_Resources.php

Photograph from
http://bancroft.berkeley.edu/collections/drilm.

TEACHING ECOLOGICAL RESTORATION OF RIVERS AND STREAMS[1]

G. Mathias Kondolf, Louise A. Mozingo, Shannah Anderson, Joe R. McBride

THE RECENT PROLIFERATION OF UNIVERSITY-LEVEL COURSES and commercial short courses dedicated to river restoration reflects increasing interest and a wide variety of perspectives and approaches. Ecological river restoration is really not a field unto itself, but rather an application of traditional disciplines, each with its own philosophical underpinnings and methods of investigation. Successful restoration, therefore, requires interdisciplinary integration. The diverse nature of the contributing fields is reflected in the river restoration literature, with the widely different approaches evidenced in engineering, ecology, and landscape architecture.[2] Students attracted to river restoration also reflect this heterogeneity, which makes teaching the subject rewarding but challenging.

Ecological restoration of rivers and streams requires that we understand the physical and ecological functioning of the system well enough to know how to instigate ecosystem recovery, and to know what level of restoration can be realistically achieved given often irreversible historical changes and other constraints. Moreover, successful restoration requires an understanding of the social, political, economic, and institutional context of the social decision to "restore" a river.[3] In teaching students how to approach ecosystem restoration we try to imbue a respect for the complexity of ecosystem functions and processes, and a degree of humility in face of uncertainty in outcome of human interventions. Similarly, we encourage students to learn from completed projects and to take an interdisciplinary approach to restoration planning.

As always in higher education, the goal is to train professionals to understand underlying principles and approaches to problems, rather than simply learning to apply currently popular techniques. The latter have increasingly short "shelf lives" because of rapid technological innovation and changing tactics. The optimal restoration context of adaptive management also requires the ability to engage an iterative process of new data collection and a consequent adjustment in the means and goals of restoration projects. Effective professionals in the field should have sound technical training, be prepared to adjust to changing societal priorities and new regulatory requirements, and have the capacity to integrate information from new technologies into site assessment and restoration planning.

At the university level we aim to train students to undertake the background work needed to understand a particular site's history, physical and ecological processes, and constraints (at watershed scale as well as site scale), so that the restoration design can respond to these. To use a medical analogy, this requires understanding the patient's individual and family medical history before diagnosing the problem, rather than reacting to the surface manifestations of an apparent problem with a standard prescription. Training courses emphasizing "how-to" topics such as installing structures, designing stable and "natural" channel forms, and using vegetation to stabilize banks are widely available, for instance, from commercial sources, government agencies, and extension programs. What has been generally lacking are courses of study that step back and ask more fundamental questions about what we are trying to restore and why, what are the underlying causes of the perceived problem, and what sort of interventions are likely to be truly sustainable

given the irreversible landscape changes that have occurred in the catchment. Moreover, students should understand the societal context, and recognize that the restoration movement developed only after water quality improvements made ecological restoration and greater human contact with rivers possible. Outside the developed world, water quality —even for human consumption—is commonly marginal at best. Thus, many of the activities we associate with river restoration (aquatic habitat enhancement, planting with native species, and developing urban parks along stream banks) would not be appropriate in many countries until more basic water quality concerns are addressed.

Because of the interdisciplinary and applied nature of the topic, river restoration does not fit neatly within the traditional academic model. While courses on river management or fluvial geomorphology at many universities might include a lecture or two on restoration, historically there have been relatively few university courses devoted to river restoration (although the number is increasing). An informal search found the following long-running university courses on river restoration. Bob Newbury (now at Okanagan University College, British Columbia) has taught a week-long short course on hydrology, geomorphology, and ecology applied to river restoration since 1968 to professionals in US and Canadian government agencies and consultants, and he has taught regular university courses on restoration at University of Manitoba and Simon Fraser University.[4] From 1988 to 1997, Tom Wesche taught Stream Habitat Management at the University of Wyoming to graduate students in fisheries, range/watershed, geology, geography, civil engineering, and botany. The class focused on structural and flow restoration after introductory lectures on hydrology, hydraulics, channel form, and habitat. Since retiring in 1997, he has presented much of this material in an annual week-long shortcourse.[5] Robert Wissmar has taught Restoration of Fish Communities and Habitats in River Ecosystems since 1994 at the University of Washington, Seattle, open to graduate and undergraduate students, and to outside professionals.[6]

At Berkeley, we have taught semester-long courses devoted to river restoration since 1992 in the Department of Landscape Architecture and Environmental Planning (LAEP). In this article, we share some experiences gleaned from course instruction. We review the origins of restoration pedagogy at Berkeley, report our experience in teaching two courses focused on river restoration, summarize the range of courses that have been offered at Berkeley, and close with a description of some of the graduate theses devoted to the topic.

Teaching Ecological Restoration and Planning at Berkeley

UC Berkeley faculty and students have been actively involved in environmental planning and restoration for nearly four decades. In 1968 Robert Twiss and colleagues modeled environmental data, such as soil type, slope, vegetation, to produce a land use suitability map of the Lake Tahoe basin.[7] This model, a very early Geographic Information System (GIS), was run from stacks of computer cards in an IBM 360 mainframe computer. These analyses provided a scientific basis for the land use classification and regulation system still in place in the Lake Tahoe basin and for the subsequent stream and wetland restoration programs in the basin.[8] Ecological management and restoration of rivers and streams has been a persistent theme in courses at Berkeley, with treatments ranging from bio-engineering of wastewater treatment systems along streams to analysis of social factors influencing river restoration.

The Berkeley Department of Landscape Architecture hired Robert Twiss as a faculty member in 1968, expanding its mission from its previous focus on design and planning of discrete sites such as parks, gardens, public spaces, university campuses, housing developments, and recreation areas. Environmental planning extended the department's concerns

to include environmental policy governing whole regions, assessment and analysis of environmental science data, and the physical planning of extended geographic districts such as counties or drainage basins. During this period the department established both a Master's in Landscape Architecture and a PhD in Environmental Planning. The context for this expansion was the influence of McHarg,[9] the passage of the National Environmental Policy Act in 1969, and, at the state level, the California Environmental Quality Act in 1972.

To insure in-house expertise in forest ecology, Ed Stone (1970-1972), and Joe McBride (1972-present), have held joint appointments in the department, actively contributing in teaching, student advising, and research. Upon leaving the US Geological Survey, hydrologist Luna Leopold joined the department (with a joint appointment in the Geology and Geophysics Department). He began teaching Hydrology for Planners in 1972, and the course has been offered annually ever since. This course emphasizes understanding of hydrologic processes, with an emphasis on field observation and measurement, and with applications to the field of environmental planning. It attracts a mixed group of students from the fields of ecology, geography, earth sciences, natural resource policy, energy and resources, and engineering, in addition to landscape architects and planners. After Leopold's retirement, Matt Kondolf was hired to fill the position in 1988, teaching the hydrology course, and since 1992, a new course on river restoration.

What distinguished the curriculum and reflects its legacy as a landscape architecture department is the emphasis on field-based research in seminars, studio courses, theses, and dissertations. The highly diverse geographic context of the San Francisco Bay region presents many opportunities to supplement theory with field applications, and most courses require students to complete field-based projects. This has been particularly conducive to the teaching of restoration as the particularities of site and context are crucial to success. In particular, the studio, a standard course format in landscape architecture, requires an analysis of a project site and a proposal for intervention developed in both text and graphic format, including renderings that display the three-dimensional alterations on the ground. Restoration studio projects require students to grapple with spatial constraints, property and jurisdictional boundaries, visual impacts, the limits of restoration technology, and the presentation of complex site alterations. The studio format is distinct from restoration courses in science-based departments and, we believe, highly effective in preparing restoration professionals.

Our approach to integrating science into a landscape architecture curriculum has been to 1) appoint scientists to positions in the department, often jointly with other departments, 2) encourage students to take classes from allied departments, and 3) involve scientists (natural and social) from other departments in teaching, research, and our thesis committees. Likewise, our faculty teach and serve on thesis committees in other departments as well. Having some scientists within the department is critical to getting adequate involvement of science in the studio environment, and benefiting from the physical presence of scientists on the faculty, not only for the specific disciplinary contribution offered by the scientists, but the scientist actively engaged in research "provides a more honed intellectual approach to that material"[10] which provides a rigor for the students.

For over a decade, the LAEP curriculum has included two courses devoted to stream restoration. Restoration of Rivers and Streams (Landscape Architecture or LA227) evolved out of the demand to reassess the accomplishments and limits of restoration in research and pedagogy. Ecological Factors in Urban Landscape Design (LA201) evolved out of the increasing relevance of restoration as a goal of urban open-space design and management. These courses are discussed in detail below. In addition, other courses offered in the department and within the university, as well as dissertations and theses, offer further opportunity to engage restoration from a range of disciplinary viewpoints.

Students on a field trip to a Bay Area stream for LA227, 2005. Photograph by Matt Deitch.

Restoration of Rivers and Streams (LA227)

Along with the courses offered at Manitoba, Simon Fraser, Wyoming, and Washington (described above), this course was one of the first at a major university explicitly dedicated to river restoration. First offered in 1992 and 1993 under Topics in Environmental Planning, it has been taught under its own permanent course designation since 1994. The course goals are to encourage students to approach river restoration critically, gain knowledge of the scientific basis of restoration strategies and actions, provide opportunities to learn from the actual performance of built projects, develop realistic project goals, and gain experience conducting and writing up original research. By virtue of being taught in California, the course tends to draw most heavily on restoration projects in rivers of Mediterranean-climate California, but examples are drawn from around the globe, and the general principles and literature review are broadly based.

The course was originally designed to have Hydrology for Planners as a prerequisite, but since the hydrology course is taught in spring (the rainy season) and river restoration in the fall, many students could not take the prerequisite, but had other relevant background for the course. Thus we have offered a catch-up training session on field survey and assessment techniques, which eventually expanded from one afternoon to two days. The course has evolved considerably over the years, as new literature has appeared and as practice has evolved, but a number of elements have stood the test of time. After first asking students in small groups to consider what they mean by restoration, what should be in an effective project and plan, we review critical issues in the field and the range of projects undertaken as "restoration," many of which are ecologically ineffective[11] and some ecologically detrimental. Drawing lessons from successful and unsuccessful projects, the course emphasizes evaluating and learning from built projects. Two sessions are devoted

to a review of key physical and ecological processes in rivers, emphasizing the ecological importance of variable flow regimes and dynamic channels. In the first four weeks of the term, the students critically review two river restoration proposals or plans (from a large collection in the California Water Resources Center Archives), an exercise that provides a glimpse of the state of the art, as well as showing the challenges in giving tangible form to the broad concepts in the literature.

The course also emphasizes the process of setting realistic objectives and approaching restoration within an adaptive management framework.[12] The course presents strategies for restoring natural processes as an alternative to the more common (and usually less sustainable) attempts to restore "natural" form.[13] Guest lecturers and panels present examples of recent projects and large-scale ongoing restoration programs, including the Calfed Bay-Delta Ecosystem Restoration Program, which has been the single largest funder of river restoration in California. The course addresses social issues in urban stream restoration, drawing heavily on research conducted by students and faculty at Berkeley. An international perspective is provided in many examples of restoration projects from Europe and Asia throughout the course, and a class session is devoted to important river issues in the developing world, where river restoration (as we know it in North America) is far off in the future. The course includes two field trips to completed restoration projects that illustrate key issues.

The principal course requirement is a term project involving original research, usually done in teams of two or three, and involving a minimum of two well-organized days of field data collection (or the equivalent original compilation and analysis of archival data). Most projects are post-project appraisals[14] of completed restoration projects, as these are straightforward studies to undertake. These studies provide good learning experiences for the entire class when the students give their final reports and can be important contributions to the field. Since 1995, all term projects for this class (and Hydrology for Planners) have been added to the permanent collection of the University of California Water Resources Archives.[15] As of 2008, these term projects constituted a resource of over 300 original restoration-related studies. Since the projects went online in 2002 through January of 2008, they have been accessed over 27,500 times.[16] In many cases, data collected for projects in past classes have been used as baseline data by students in subsequent years, to document changes from the conditions originally documented.

To improve the quality of the projects and enhance the learning experience for the students, students peer review each others' term projects, and revise their own papers in response to the peer review comments. After critical review of the (revised) second drafts by the instructor, the students revise once again before submitting their final drafts to the library collection. In addition, students make oral presentations of their projects to the Berkeley River Restoration Symposium, an all-day Saturday event that draws an audience of from 80 to 100, consisting of fellow students, guest lecturers in the class, other interested professionals, local creek groups, and members of the public.[17] A parallel symposium in the Hydrology for Planners class (spring term) also includes many river-restoration-related topics, many of which are also available on-line. The student presentations are followed by a panel of outside professionals, who share reflections on key issues and challenges in the field, drawing upon themes raised in student presentations.

Ecological Factors in Urban Landscape Design (LA201)

This design studio emphasizes effective integration of natural science in environmental design. It is an intensive course, required of all landscape architecture and environmental planning masters students. Several city planning and architecture students typically enroll

in the class as well. The course originated in the early 1970s as a class based on McHarg's regional suitability analysis articulated in his landmark text *Design with Nature* of 1969. By the early 1990s the effectiveness of such static spatial analyses came into question, and Louise Mozingo reshaped the course to focus on urbanized ecological systems and their restoration. The principal instructor is a landscape architect (Mozingo 1994 to 2001, Jennifer Brooke 2002 to 2005, Rob Thayer 2006, Rob Thayer and Michelle Dubin 2007), supported by a riparian ecologist (McBride) and hydrologist (Kondolf), who teach students how to conduct field surveys, analyze and interpret data, and who serve as consultants to the class as the planning and design projects develop.

Because stream restoration in urban areas integrates so many issues and requires an interdisciplinary approach, most years the course has focused on restoration of an urban creek in the San Francisco Bay region (with the focus one year on a more rural stream, Redwood Creek near Muir Beach). Most small urban creeks in the region have been put in underground culverts, and while efforts to "daylight" these creeks (to restore open channels) constitute an exciting area of restoration, the course has focused on larger streams (drainage area 10 to 100 km^2) with reaches (8 to 20 km-long) of open channel in urban areas (e.g., San Leandro, Marsh, and Wildcat Creeks). These open, urban reaches of stream are at a scale that can be grasped by the students and are suitable for data inventory and analysis. Urban creeks are vivid and knowable: as ecological systems that cut through cities, they interact with urban infrastructure and activity in multiple ways. In our experience, it is impossible to walk one of these urban creeks from the hills to the San Francisco Bay and not be impressed with the conflicts and juxtapositions created by the edge between stream and city.

The class is organized in three distinct phases: inventory/analysis, planning, and design. First, students survey longitudinal profiles and cross sections; measure bed material size; conduct vegetation transects and map distribution of native and exotic species; document sightings and traces of wildlife; and map extent of artificial banks, human trails and occupation sites, access points from surrounding neighborhoods, and distribution of shopping carts and large rubbish. An essential task in the analysis phase is to locate and map the street drainage system, storm sewers, and drain inlets into the creek based on field research and archival sources (engineering maps of public works departments, etc.) to understand the form and function of the urbanized drainage basin. Students also conduct interviews with creekside residents, and in some years have undertaken systematic surveys of neighborhood attitudes towards the creek. From the inventory, distinct reaches are delineated and characterized, and with input from city staff, wildlife agencies, nonprofits, and other knowledgeable locals, key issues are identified.

A large-scale master plan and small-scale site design phase follows. Teams of three or four students (usually consisting of students from different disciplines) tackle issues of particular interest to them, at the scale of the entire study reach (8 to 20 km) and sometimes upstream, depending on the topic. Themes typically include environmental education, developing an integrated trail system, linking open space along the length of the stream, improving public access, restoring native vegetation, restoring habitat for wildlife species, and restoring hydrologic processes through stormwater management or modifying operation of upstream dams. Concurrently, students develop individual projects for specific sites that fit within the master plan, to make tangible the overall concepts. For example, students seeking to restore hydrologic processes and improve water quality may design treatment wetlands for stormwater from a particular area of the city by diverting flow from the storm sewer into a constructed wetland park. Students seeking to improve habitat for native salmon have developed conceptual designs for removing small dams blocking upstream passage.

Master plan for Marsh Creek confluence developed by LA201 student Maryanne Noble, 2001.

Students seeking to improve environmental education have proposed re-designs for public school grounds to take advantage of educational opportunities along the stream.

The urban context of the restoration projects makes exceedingly plain the connection between urban form and use and the quality of riparian ecosystems. This is often a eureka moment for students. Students from the natural sciences often come into the class seeing the built environment and the ecological landscape as separate, while students from the humanities and arts may see ecological systems as irrelevant to the aesthetic choices in design. Urban runoff ties both the built and ecological environment into one system where both environmental planners and landscape architects have important roles to play. This integrative pedagogy responds to the challenges presented by non-point source pollution[18] and urban run-off management that have been a primary environmental and regulatory concern since the 1972 Clean Water Act.

In addition, the analysis-master plan-site design sequence allows students to recognize the connections between site and system. Some students, particularly those focusing on design, need to begin their comprehension at the site level and move outward; for other students, particularly the environmental planning students, the opposite is true. Regardless, the project strategy facilitates this indispensable cross-scale learning and the underscores that all scales have interrelated cultural, social and political contexts.

Early in the class, students take field trips to the streams and learn about ongoing issues from nonprofit groups, such as the "Friends of" the creek, and from public agency staff. Students make interim presentations to juries of professionals, government agency

Surveying for fish with Rob Leidy, EPA Fisheries Biologist, as a component to an LA227 term project on San Pablo Creek, Richmond, 2004. Photograph by Lorraine Maldague.

staff, and community groups, who bring real-world concerns to the often creative solutions proposed, such as "How are you going to maintain that?" "What might that cost?" "Is that safe?" After revising and refining their work, the students present to outside juries on campus, and subsequently to community groups in the neighborhoods affected. The quality of the presentations is high, as indicated by the awards that have been won by these projects, such as the first and fourth place awards in the 2001 *Metropolis* international student competition for environmentally sustainable design. In addition student analysis and projects have been assembled into reports delivered to city councils and nonprofit advocacy groups.

Other Course Work in Restoration

Over the last decade, the restoration of rivers and streams has been integral to the broader course work in the Department of Landscape Architecture and Environmental Planning. Faculty have frequently included river and stream restoration projects as a class topic, such as an undergraduate landscape design studio (LA102), which used Temescal Creek (Oakland) as a site; the core graduate studio in the Master's of Urban Design program, which has focused on Wildcat Creek (Richmond), the Truckee River (Lake Tahoe), and the Visitacion Valley watershed in San Francisco; the graduate Environmental Planning Studio (LA205), which used Arroyo Seco (Los Angeles), Lagunitas Creek (Marin County), and Rio Villalobos (Guatemala City). In the course Mediterranean-Climate Landscapes (International and Area Studies 229/LA229), Berkeley graduate students conducted research and developed restoration plans for streams in California and Portugal, working with graduate students at the University of Lisbon in 2005 and 2007.

Courses in other departments have also enriched the restoration course offering at Berkeley. At the undergraduate level, Bill Berry's class San Francisco Bay Area Environments (Environmental Sciences 125) has been involved in restoration-related studies of Tennessee Hollow Creek in the Presidio of San Francisco since 1998. Of the 80 students in the class, typically 8 to 10 do their term projects on Tennessee Hollow each year. Over a period of years, students have created a data set of water quality measurements (e.g., temperature, turbidity, pH, nitrates and phosphates) and aquatic macroinvertebrates. Perhaps of equal importance, the visibility of the students' annual creek studies has helped to put Tennessee Hollow "on the map" as a potential restoration site, and probably influenced the National Park Service and the Presidio Trust in the decision to restore the creek. Since 2001, field studies at Tennessee Hollow with Berkeley students have been a component of the curriculum at an inner-city San Francisco high school. In 2004, Berry broadened the term project scopes to include watersheds throughout the Bay Area, so that students could draw comparisons between creeks and land use impacts. Students refer to the disciplines of historical ecology and urban design to develop restoration strategies for urban creeks impacted by channelization, urban runoff, and invasive species.

The foundation course Introduction to Environmental Sciences (Environmental Sciences 10) is taught both spring and fall terms. In 1999, instructors Bill Berry and Matt Kondolf redesigned the course to include weekly field and laboratory studies of Strawberry Creek on the Berkeley campus. The creek's interface with Berkeley exemplifies the integration of the physical, biological, and social components of science-based approaches to environmental management. During the field laboratories, students conduct macroinvertebrate surveys, assess the channel's geomorphic features, and observe restoration interventions. Lectures feature University of California faculty and staff who are conducting research on urban watersheds, including Bob Charbonneau and Vince Resh's case history of urban stream restoration using Strawberry Creek as a basis.[19] About 150 students from diverse departments, including non-science majors, enroll in this course each fall.

Alex Horne, an ecologist in the Berkeley civil engineering department, included components on river restoration in his limnology courses until his retirement in 2003. Horne and Kondolf jointly taught a seminar Restoration of Aquatic Ecosystems, offered through both civil engineering and landscape departments alternate years from 1996 to 2002. Open to students who had previously taken either River Restoration or Lakes and Wetlands, the course compared and contrasted restoration strategies for different systems. The course also emphasized oral presentation skills, offering specific guidance on effective presentations, in practice and final presentations.

Kara Nelson, also of Berkeley's Civil and Environmental Engineering Program, began using Strawberry Creek as a study area for teaching the fundamental processes that govern the effectiveness of complex natural treatment systems in Ecological Engineering of Water Quality Improvement (Civil and Environmental Engineering or CEE113N). Students enrolled in this course develop campus applications for managing urban runoff to Strawberry Creek, such as constructed wetlands, waste stabilization ponds, and stormwater bioretention basins.

Kondolf has also taught a shortcourse on fluvial geomorphology in river restoration through University of California Extension since 1995, with the course currently held at the University of California's Sagehen Creek Field Station and parallel courses now offered at Utah State and University of Maryland. In 1998, Ann Riley taught a one-time course offering hands-on experience in stream restoration to eleven Berkeley students and seven students from UC Davis, who took the course as independent study supervised by regular faculty members. The course involved introductory lectures in community involvement,

fluvial geomorphology, hydraulic engineering, and plant ecology, and site visits to restoration projects, illustrating steps in designing a restoration project.

Conducting cross-section surveys as a field work component for LA227, 2004. Photograph by Shannah Anderson.

Theses and Other Independent Research Projects

Besides restoration-related classes and faculty research, many Berkeley students conduct theses and other independent research projects on river restoration-related topics. Among the alumni active in river restoration is Ann Riley, founder of the nonprofit organization Waterways Restoration Institute, river advocate and activist, and author of Restoring Streams in Cities. Robert Charbonneau has been a knowledgeable and tireless advocate for restoration of Strawberry Creek, helping implement many of the actions to restore water quality in the creek. Another, more recent example is Alison Purcell's study of a small urban stream restoration project and residents' attitudes towards it.[21] Jenny Yang's innovative study of "spontaneous uses" has injected a new dimension into understanding of how people, especially children, relate to neighborhood creeks.[22]

At a larger, less urban scale, alumni of LAEP's master's program have conducted historical-geomorphic studies of major tributaries to the San Joaquin River. Jennifer Vick documented effects of dams and gravel mining, changes in sediment budget, and historical channel changes for the Merced River, work she later built upon as lead author on a restoration master plan for the river.[23] John Cain conducted a similar analysis on the San Joaquin River, which was heavily relied upon in subsequent planning documents and in negotiations to settle a legal case to restore flow to the river. A similar analysis of the Stanislaus River by Anthony Falzone and Katrina Schneider provided a basis for subsequent planning efforts.[24] A review of gravel augmentation projects on Clear Creek, the Stanislaus,

and Tuolumne Rivers by Erin Lutrick provided insights for subsequent project planning, and a study of oxbow lakes along the Sacramento River by Ingrid Morken provided the basis for additional studies and development of oxbow habitat conservation strategies by the national organization, the Nature Conservancy.

Some Lessons Learned: Involvement of Practitioners

At Berkeley, we are fortunate to be located in a region with a high concentration of firms and agencies active in river restoration, and practitioners are often willing to take time to present guest lectures and to critique student presentations and projects. Practitioners can bring a great deal into the classroom as guest lecturers and jurors, providing invaluable, real-world feedback to students. Many have reported that they enjoy the opportunity to step back and reflect on the field and their experiences. Participating in our classes provides a distinct change from their work environment of project-imposed deadlines, and they frequently comment on the high quality of the questions posed by students. Probably half or more of the graduate students have had some experience in the field prior to graduate school, working in government agencies, consulting firms, or nonprofits. This enormously enriches the class discussions and the quality of student term projects. We often invite former students (now active practitioners) to give guest lectures and critique student projects. Not only can they share their technical knowledge, but they can also reflect on how their perspectives have changed since graduating and working in the field. Strong links between the university and the community of practitioners help students obtain data for their term projects, help with technical issues, and in some cases leads to job offers.

For practitioners and agency staff, attending student presentations and interacting with students on their projects can be an important mechanism to recruit new employees or to attract students to work on problems important to the agency by suggesting topics for student research projects. A leading practitioner in the San Francisco Bay region, Jeffrey Haltiner of Philip Williams and Associates, who has been a frequent guest lecturer and has taught hydrology courses on campus in both the landscape and civil engineering departments at Berkeley, has remarked that he can get to know students well in the class environment, and he has hired several students this way over the years. Knowing that the audience for their oral presentations will include potential employers provides additional motivation for students to do outstanding work in their term projects and to present it effectively in their talks. The exposure to real-world problems and the opportunity to make a contribution in applied research is a very strong motivation for students. Haltiner remarked that many students expressed enthusiasm for assignments, class projects and field trips to actual study sites throughout the Bay Area, as these provide more tangible expression for the application of theory and textbook examples that students are normally exposed to in the academy.

Working With Public Agencies and Community Groups

As part of the field-based education emphasized at Berkeley, the restoration pedagogy engages public agencies, nonprofits, and community groups as much as possible. The purposes of this are threefold. First, to expose students to the regulatory and political context of restoration. Second, to draw from these constituents needed information and data. Third, to expose public agencies, nonprofits, and community groups to innovative ideas generated in the academic environment. Often the political constraints of public agencies and the resource limitations of nonprofits and community groups make systematic critique of projects and innovative approaches to restoration very difficult. The inventive quality of student research and proposals can present new, enlightening ideas from an academic

perspective conducive to open-minded discussion. Public agency staff remark that they benefit from the refreshing, out-of-box perspectives of students. Nonprofits and community groups get much-needed technical support and creative insights.

For example, after presentation of student work in LA201 to the San Leandro Park Commission and the city council, the document *Re-Envisioning San Leandro Creek* served to inspire future advocacy of the Friends of San Leandro Creek and guide city policy. Similarly, with the sponsorship of the Natural Heritage Institute, a nonprofit facilitating local restoration efforts, LA201 students presented work on Marsh Creek to a special session of the Brentwood City Council. The subsequent document *Envisioning Brentwood's Creeks: A Green Resource for the Future*[25] became an official appendix to the City of Brentwood's General Plan and significantly influenced city policy. Modest grants from departmental research funds supported the production of these documents based on student work and ensured their dissemination to key interest groups.

This exposure to public agencies, nonprofits, and community groups both seasons students and primes the pump for innovation in their future employers. Clark Wilson, a design student who had a "eureka" insight in Ecological Factors in Urban Landscape Design (LA201) went on to be the lead author of *Green Streets: Innovative Solutions for Stormwater and Stream Crossings* for Portland Metro, a regional planning authority. In his class project, Wilson was exposed to and engaged many of the concepts he subsequently incorporated in *Green Streets*.[26] *Green Streets* has become a national model of urban runoff management policy and established Wilson within a few years of graduation as a nationally recognized leader in the field.

Teaching Students with Different Educational Backgrounds

Students in ecological restoration classes come from wide range of backgrounds, and this is certainly true of the Restoration of Rivers and Streams and Ecological Factors in Urban Landscape Design courses at Berkeley. Students range in experience from recent graduates to experienced professionals, and in discipline from engineering geology to architecture. The diversity of backgrounds adds immensely to the course experience, and enriches the interactions among students, especially in small group teamwork. However, it also creates challenges in teaching, as the instructor cannot assume a common knowledge base among the students. To remedy the lack of common knowledge base, synthesis or summary reviews for given topics may be presented, such as an overview of physical processes in rivers or an overview of riparian vegetation establishment. However, these presentations will inevitably be too simplistic for those with background in the field if presented at a level comprehensible to those without such background.

The Restoration of Rivers and Streams course was designed to build on the Hydrology for Planners course, so that some basic concepts and language could be assumed. However, to meet demand from students without this background but with strengths in allied fields (such as ecology and engineering), we have developed an intensive two-day weekend training session in hydrologic and geomorphic field methods. Most years at least one student is enrolled from other campuses in the region, such as Stanford, UC Davis, or San Francisco State. Since 2001, the class has been at least half civil engineers, reflecting increased interest on the part of engineering students and a perception that taking the course may help them find a job that is personally rewarding.

Group Work and Collaborative Learning

Ecological Factors in Urban Landscape Design and other studio courses, as well as Restoration of Rivers and Streams, involve group work with other students. Working in

teams on data collection and analysis, and developing plans and designs with colleagues from different disciplines provides models for the sort of teams on which they are likely to work in their careers. Organizing these student teams and managing them through the inevitable issues that arise requires substantial faculty input, but the experience is valuable for the students, especially in an interdisciplinary field such as river restoration, where actual projects are nearly always designed by teams. Moreover, such teamwork provides the well-documented benefits of collaborative learning, such as more effective retention of course material and greater satisfaction with the learning process .

As noted above, the influential *Green Streets* grew out of Wilson's eureka moment in studio class. The context for this was a group project team that consisted of Wilson, an accomplished designer with excellent rendering skills very focused on site, Keith Litchen an environmental planning student with an undergraduate degree in civil engineering with a commitment to reshaping standard engineering practices, and Leora Salazar, a city planning student focused on water resource policy in California. Each respectively contributed something essential to a proposal for a storm water management retrofit of an ordinary neighborhood that drained into San Leandro Creek: site design that respected and enhanced neighborhood qualities, compellingly rendered; calculation and engineering of swales and drainage features that convincingly accommodated expected flows; and expertise in the regulatory impetus for urban runoff management that achieved both detention and water quality. All three students were transformed by the experience that would not have occurred in other than a collaborative learning setting. They have gone on to become accomplished and highly regarded professionals as a consultant, as public agency staff member, and in academia respectively.

Scientific Analysis in Planning and Design Studios

Design (and some planning) students commonly begin studio classes with an implicit expectation that science is certain and that it will lead directly to answers. After devoting much time and energy into data collection and analysis, they may be disappointed to find that scientific analyses can, at best, explain the problem and constrain the set of possible solutions. Design students may fear that science will be prescriptive, but generally find that taking results of their scientific analyses into account still leaves room for creative design.

For the environmental planning (and some design) students the process of data collection and analysis highlights the relative inexactness of environmental science. They confront the fact that given the resources that environmental data collection requires, obtaining all possible data is never realistic. The lack of certitude, especially in regards to predicting outcomes of intervention, can be frustrating. The analysis and proposal process requires them to deal with this incertitude and become astute about the limits of analysis in generating policy and proposals. This process also teaches them to decipher what data are most essential in any given project.

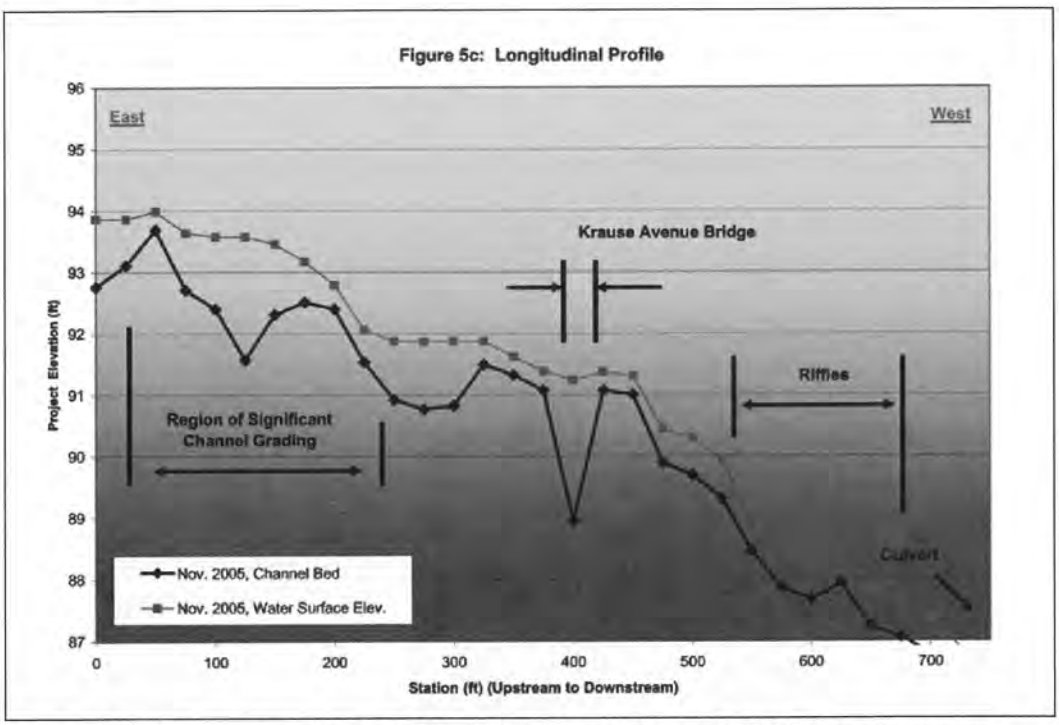
The process of generating their own data from field measurements and explicitly incorporating them into the design process benefits planning and design students in at least two ways. By knowing the limitations under which their data were collected, students can be critical of the data quality and understand the scale of likely error or imprecision. This fosters critical thinking on the part of students who were not necessarily trained in scientific method, making them less likely to accept environmental data as gospel in the future. Moreover, the students can work with their data on the computer, testing different interpretations and providing different ways of plotting, analyzing, and otherwise seeing the big picture. For many design and planning students, the direct experience with col-

lecting and analyzing environmental data, and integrating them into their proposals, may get them accustomed to such approaches and make them more likely to seek out scientists to provide input in the future.

Independent Research and Opportunities for Original Contributions to Knowledge Base

As the field of river restoration has developed, it has been dominated more by seat-of-the-pants implementation than solid theory or rigorous evaluation.[28] The lack of objective post-project appraisal in river restoration has long been identified as preventing the field of restoration from improving through learning.[29] Of 38,000 river restoration projects across the United States catalogued in 2005 by the National River Restoration Science Synthesis study, only 10 percent reported monitoring or evaluation *of any kind* (much less objective post-project appraisal) that could ultimately feed into adaptive management and improvement of project planning and design.[30] Thus, the over 300 term projects (including many post-project appraisals) from Restoration of Rivers and Streams and Hydrology for Planners in the Berkeley library constitute one of the largest collections of restoration-related studies currently available for any region.

In some cases, these term projects have directly influenced river restoration programs. For example, student term projects provided field data that were the basis of an evaluation of the performance of salmon habitat enhancement projects in the Merced, Tuolumne, and Stanislaus Rivers,[31] which revealed weaknesses in the design of these projects and probably contributed to the improvements in such projects in subsequent years. Similarly, field surveys for student term projects were an important basis for a post-project appraisal of a channel reconstruction project on Uvas Creek,[32] which since has been widely cited as an example of a failed project design.[33] In the Owens River Gorge, a restoration of river flows



Long profile of Arroyo Viejo Creek, Oakland, plotted by students in LA227, Mary Cousins and Rune Storesund, 2005.

occurred due to field research conducted for term projects and a thesis.[34] A term project assessing restoration potential in Mitchell Creek in Mount Diablo State Park[35] became the basis for the restoration plan adopted by the state park system.

Besides the influence of projects on restoration decisions and their value as a source of information readily available to the public, the experience of conducting an independent term project can be important to students. In selecting topics, students are urged to clearly define a very specific topic, then to do a very good job on it, and finally to revise their paper twice so that the results are accurately presented. For some students, this is the first such field-oriented project for which they are responsible. For most students the experience of collecting data and drawing conclusions (e.g., about the performance of a built restoration project) gives them insights into the challenge of river restoration that could never be gained through lectures, reading, and discussion alone. For most students, the process followed in the course of peer review, instructor review, and further revision is unique in the educational experience.

The Big Picture Internationally

The field of river restoration as practiced in North America tends to be highly insular, with common, popular approaches widely employed, and without awareness of different approaches elsewhere, and usually without deep reflection about the applicability to a particular situation. Simply being exposed to contrasting restoration approaches as practiced abroad (such as in Europe and Asia) can help students think more creatively about restoration issues. While of less practical value in terms of job-market skills for graduates in North America, it may ultimately be more important that students step back from the privileged perspective of the developed world to understand why river restoration is not happening in most of the world, where water quality in rivers is often too poor to support much life, drinking water may not be much better, and water-borne disease is rampant. Many students choose to do their independent thesis research in the developing world, such as Shay Boutillier's thesis exploring measures to mitigate for sedimentation of coral reefs in French Polynesia.

Conclusions

We have found it especially rewarding to have the opportunity to train bright, highly motivated students in this field, many of whom ultimately carry the concepts of river restoration forward to a broader audience and implement restoration projects and programs. The challenges and complexity of river restoration requires an interdisciplinary pedagogy and a commitment to working with students of diverse backgrounds. Instructors have to be nimble in the classroom to communicate across disciplines and open to extending the directions of research and project work as students bring their particular viewpoints to bear.

While our experience could take place in other programs, as an offering in a landscape architecture and environmental planning department, this coursework has been especially welcomed and nurtured. Environmental science can often seem limited to a documentation of decline. The traditions of American landscape architecture impel a redirection of technology and science to improvement and amelioration of the environment through creative application. While sometimes a forgotten model, river restoration has its roots in the nineteenth century work of Frederick Law Olmsted in Boston's Emerald Necklace.[36] The courses build on a long and distinguished legacy in landscape architecture.

Admittedly, this kind of pedagogy stretches teaching resources. Curriculum assignments have to allow for the involvement of multiple faculty members in a single class,

a commitment that not every department can make. Instructors have to be prepared to continuously seek new project sights, find new base materials, contact new practitioners, develop relationships with public agencies, nonprofits and community groups, organize forums for student presentations, and arrange for documentation of student work. To be most effective, these classes cannot be "canned." Not every department or instructor can support this obligation, and, to be honest, we have sometimes reached the end of a semester with a more than normal case of faculty fatigue.

We persist because we recognize that the field of river and stream restoration is an essential, growing, and vital enterprise in the environmental field. The enthusiasm of the students, the fine quality of their work, and the dialogue it generates with groups outside the university is, quite simply, an ecologically constructive endeavor. There is a "can do" spirit that links students, faculty, professionals, agencies, and members of the community replacing traditional insularities. Former students are now active and influential professionals—and new resources for the class. It is heartening and hopeful, and a privilege we do not take for granted.

ENDNOTES

We have benefited from stimulating conversations and exchanges on this topic with Alex Horne, Jennifer Brooke, Bob Newbury, Tom Wesche, Bob Wissmar, and Jack Schmidt. Manuscript preparation was partially supported by the Beatrix Farrand Fund of the Department of Landscape Architecture and Environmental Planning, University of California, Berkeley. Matt Deitch, Lorraine Maldague, and Kathryn Gaffney provided photos of field work.

1 We dedicate this paper to the memory of the late Luna Leopold, professor in the Departments of Landscape Architecture and Environmental Planning and Geology and Geophysics. Luna devised and began the class Hydrology for Planners (LA222) in 1972, and throughout the past three decades continued to guide students, other scientists, practitioners, public officials, and civic leaders on maintaining and restoring healthy rivers.

2 For instance, R. W. Newbury and M. N. Gaboury, *Stream Analysis and Fish Habitat Design: A Field Manual* (Gibson, British Columbia: Newbury Hydraulics, Ltd., 1993); *River Channel Restoration,* ed. Andrew Brookes and F. Douglas Shields (Chichester, England; New York: John Wiley and Sons,1996); Federal Interagency Stream Restoration Working Group, *Stream Corridor Restoration: Principles, Processes, and Practices* (Washington, DC: The Group, 1998); *Handbook of Ecological Restoration,* ed. Martin R. Perrow and Anthony J. Davy (Cambridge, England: Cambridge University Press, 2002).

3 Paul H. Gobster, "Restoring Nature: Human Actions, Interactions, and reactions." in *Restoring Nature: Perspectives from the Social Sciences and Humanities,* ed. Paul H. Gobster and R. Bruce Hull (Covelo, CA: Island Press, 2000), 1-20.

4 B. Newbury, personal communication, 2004.

5 T. Wesche, personal communication, 2004.

6 R. Wissmar, personal communication, 2004.

7 Robert G. Bailey, *Land Capability Classification of the Lake Tahoe Basin, California-Nevada: A Guide for Planning* (South Lake Tahoe, CA: US Forest Service, 1974).

8 R. H. Twiss, "Planning and Land Regulation at Lake Tahoe: Five Decades of Experience," in *Big Places, Big Plans,* ed. Mark B. Lapping and Owen Furuseth (Aldershot, England; Burlington, VT: Ashgate, 2004) 83-95.

9 Ian McHarg was a landscape architect whose 1969 book *Design with Nature* (Garden City, NY: Natural History Press, 1969) pioneered the concept of ecological planning.

10 K. Tamminga, L. Mozingo, D. Erickson, and J. Harrington, "Interweaving Ecology in Design and Planning Curricula" in *Ecology and Design: Frameworks for Learning*, ed. B. R. Johnson and K. Hill (Washington, DC: Island Press, 2002), 357-95.

11 M. A. Palmer, E. S. Bernhardt, J. D. Allen, P. S. Lake, G. Alexander, S. Brooks, J. Carr, et al., "Standards for ecologically successful river restoration," *Journal of Applied Ecology* 42:9 (2005), 208-17.

12 Adaptive management, or "learning by doing," treats policy and management interventions in natural systems as experiments from which to learn.

13 We spend a considerable amount of time in class discussing how restoration projects are more likely to be successful if the design is based on an understanding of physical and ecological processes, rather than an imitation of channel forms based on classification schemes.

14 Post-Project Appraisals (PPAs) are systematic assessments of built restoration projects designed to utilize existing data, and where necessary, collect additional data, to document changes in the river system resulting from restoration projects.

15 All projects from LA222 and LA227 are archived at the Water Resources Center Archives in hard copy, and are searchable on Melvyl. Since 2003, most of these papers are available online at http://repositories.cdlib.org/wrca/.

16 Paul Atwood, e-mail message to authors, February 4, 2008.

17 Previous symposium descriptions are available at http://lib.berkeley.edu/WRCA/restoration/term.html.

18 Non-point-source pollution is pollution which cannot be traced back to a single origin or source, such as runoff from urban areas.

19 Robert Charbonneau and Vincent H. Resh, "Strawberry Creek on the University of California, Berkeley, Campus: A Case History of Urban Stream Restoration," *Aquatic Conservation* 2 (1992), 293-307.

20 See http://lib.berkeley.edu/WRCA/restoration/theses.html for a comprehensive list of dissertations, theses, and professional reports on river-restoration-related topics.

21 A. H. Purcell, C. Friedrich, and Vincent H. Resh, "An Assessment of a Small Urban Stream Restoration Project in Northern California," *Restoration Ecology* 10 (2002), 685-694.

22 G. M. Kondolf and Chia-Ning Yang, "Planning River Restoration Projects: Social and Cultural Dimensions" in *River Restoration: Managing the Uncertainty in Restoring Physical Habitat*, ed. Stephen Darby and David Sear (Chichester, England; Hoboken, NJ: Wiley, 2008); Chia-Ning, *Inviting Spontaneous Use into Urban Streams* (PhD diss., University of California, Berkeley, 2004), available online at http://www.lib.berkeley.edu/WRCA/restoration/theses.html.

23 Stillwater Sciences, *Merced River Corridor Restoration Plan.* (Berkeley, CA: Stillwater Sciences, 2002).

24 K. S. Schneider, G. M. Kondolf, and A. Falzone, "Channel-floodplain Disconnection on the Stanislaus River: A Hydrologic and Geomorphic Perspective" in *California Riparian Systems: Processes and Floodplain Management, Ecology, and Proceedings, Restoration Riparian Habitat and Floodplains Conference*, ed. P. M. Faber (Sacramento: Riparian Habitat Joint Venture, 2003), 163-68.

25 Natural Heritage Institute, *Envisioning Brentwood's Creeks: A Green Resource for the Future* (Berkeley: Natural Heritage Institute, 2002).

26 Portland Metro, *Green Streets: Innovative Solutions for Stormwater and Stream Crossings* (Portland: Portland Metro, 2002).

27 B. G. Davis, *Tools for Teaching* (San Francisco: Jossey-Bass Publishers, 2003).

28 National Research Council, *Restoration of Aquatic Ecosystems* (Washington, DC: National Academy Press, 1992).

29 See P. W. Downs and G. M. Kondolf, "Post-project Appraisal in Adaptive Management of River Channel Restoration," *Environmental Management* 29 (2002), and G. M. Kondolf, "Five Elements for Effective Evaluation of Stream Restoration," *Restoration Ecology* 3:2 (1995), 133-36.

30 E. S. Bernhardt, M. A. Palmer, J. D. Allan, G. Alexander, K. Barnas, S. Brooks, J. Carr, C. Dahm, et al., "Synthesizing US River Restoration Efforts," *Science* 308 (2005), 636-37.

31 See G. M. Kondolf, J. C. Vick, and T. M. Ramirez, "Salmon Spawning Habitat Rehabilitation on the Merced River, California: An Evaluation of Project Planning and Performance," *Transactions of the American Fisheries Society* 125 (1996), 899-912.

32 G. M. Kondolf, M. W. Smeltzer, and S. Railsback. "Design and Performance of a Channel Reconstruction Project in a Coastal California Gravel-bed Stream," *Environmental Management* 28:6 (2001), 761-76.

33 D. Malakoff, "The river doctor," Science 305 (2004), 937-39. Also, P. W.Downs and K. J. Gregory. *River Channel Management: Towards Sustainable Catchment Hydrosystems* (London: Arnold. 2001).

34 Matthew Wade Smeltzer, "Prospects for Restoring the River Ecosystem and Public Trust Resources of the Owens River Gorge" (PhD diss., University of California Berkeley, 1998).

35 S. Brownell and M. Herrin. "Evaluation of Rainbow and Steelhead Trout Habitat and Impedances to Fish Migration in Mitchell Creek as a Basis for Barrier Removal," Term project for LA227, 2001. University of California, Berkeley, available through the Water Resources Center Archives.

36 Karl Haglund,. *Inventing the Charles River* (Cambridge, MA: MIT Press, 2003).

REVIEWS

The Rise and Demise of the UCSC Colleges

Carlos G. Noreña

Berkeley: Berkeley Public Policy Press, Institute of Governmental Studies, University of California, 2004. 367 pp., illus., tables, and appendices.

In April 2007 UC Berkeley's Center for Studies in Higher Education issued the results of a two-year study that focused upon the need for research universities to give renewed attention to general education, "A Report of the University of California Commission on General Education in the 21st Century." How best to educate students, especially undergraduate students, has been a matter of recurring interest and concern in American higher education. Carlos Noreña's *The Rise and Demise of the UCSC Colleges* provides a striking example of one such effort.

In *The Gold and the Blue: A Personal Memoir of the University of California,1949-1967* former UC President Clark Kerr cites a number of major changes that occurred in American higher education following World War II. The Cold War and the rise of the "military-industrial-scientific complex" elevated the status of fields like physics and chemistry. The perceived importance of the humanities and the less quantitative aspects of the social sciences declined. Funding for research in the physical sciences grew, and attention became focused upon graduate education. Within the University of California system efforts were begun to turn "all of its campuses, old and new, into research universities." Some faculty became concerned that undergraduate education was being neglected. While Kerr was chancellor plans had been initiated to build new residence halls at Berkeley. It was suggested that each might become the focus of a residential college somewhat like those that existed at Oxford, Harvard, and Yale. These matters would influence the vision that emerged for the new UC campus at Santa Cruz, which opened in 1965 (Kerr, *The Gold and the Blue,* vol. 1, 2003).

Plans to build in the foothills of the Santa Cruz mountains a campus composed of residential colleges that would house most of the students began in the 1950s. Kerr, who became UC president in 1958, asked Dean McHenry (with whom he had worked in developing the Master Plan for California Higher Education) to serve as the first chancellor. The regents approved the appointment in July 1961 and planning

was initiated to "create a liberal arts and collegiate campus at Santa Cruz for those faculty members and students who might be attracted to it."

In *The Rise and Demise of the UCSC Colleges* Noreña (who joined the faculty at UCSC in 1967) provides detailed, and intriguing, information about successes and failures to create and sustain these individual colleges from the time that planning began until 1996. The reader is made aware of many of the disagreements within the faculty and struggles between the faculty and the administration that occurred over the years. Glimpses of the growth of the physical campus, the "hippie culture" that emerged during the 1970s and other aspects of student life, and strained relations between the campus and the local community also are discussed.

Book One, which consists of three parts, examines the years from 1945 to 1974. Part I provides a brief overview of The University of California in the Postwar Period (1945-1961). Part II The Planning of the UCSC Colleges (1961-65) sets forth such things as experiments that were made with "various patterns of learning and living" and the desire to make the campus "seem small as it grows larger," which is said the have been a favorite Kerr expression. The creation of Cowell College, the first of several residential colleges that emerged under the McHenry Chancellorship (1965-74) constitutes a major portion of Part III.

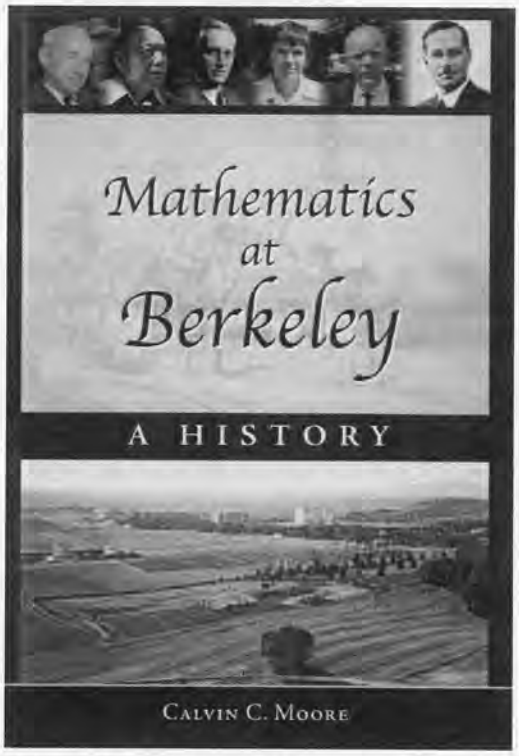
From the outset there were differences of opinion—and sometimes contentious debates.. For example, McHenry believed that there should be one centralized library; Kerr favored "decentralized library resources." The 1965 plan had projected an "intellectual charter" (e. g., humanities, social sciences, natural sciences, fine arts) for each of the colleges. McHenry preferred that each be a "multipurpose" liberal arts college organized around a particular problem." Conflicts between the colleges and Boards of Studies (disciplinary groupings that usually are called departments) were a constant source of frustration. The decision to "have no grades beyond a simple pass/fail" and where practical have faculty provide "'written comments' on student performance" launched what Noreña has described as a "long (and divisive) debate that has not yet been entirely resolved."

The story of developments and difficulties is continued in Book Two aptly titled "The Dismantling of the Colleges as Academic Units." (This also divided into three parts.) A brief introduction sets the stage for events that occurred between 1974 and 1996. Major difficulties included administrative instability (two chancellors within a three year period) and heated debates about the future of the colleges as academic units. Part IV A Period of Tumultuous Debate and Administrative Instability (1974-77) examines ongoing dissensions within the faculty and adversarial relationships between the faculty and the administration. Part V The Sinsheimer Revolution (1977-87) is concerned with events that occurred during the ten year term of Robert Sinsheimer (the first Santa Cruz Chancellor from outside the UC system). Among many changes that his tenure brought about, the experimental and collegial campus was converted into "a conventional campus of the University of California system."

A 1987 report compiled by a twelve-member Student Union Assembly task force suggests that there was continuing support for much that was part of the original vision. The author (who seems to be of a similar persuasion) states in the last section of Part III: "What was forever lost (so far) was the enthusiasm and idealism of the early years and the high quality of the student body." (SAT scores, apparently, had not regained the heights of the mid-1960s.) Part VI The Post-Sinsheimer Era (1987-95) offers a brief account of the chancellorships of Robert Stevens and Karl Pister, the continuing implementation of changes initiated during the Sinsheimer era, and the "sad history of the demise of the UCSC colleges.

—Roberta J. Park

Mathematics at Berkeley: A History
Calvin C. Moore
Wellesley, MA: A.D. Petrs, 2007. 341 pp.



In 1968, the Berkeley mathematics faculty numbered 75 full-time equivalents (FTE). Thus, the department was larger than nearly every other department, college, and school in the university; in fact, only the law and business faculties were comparable in size, and only the engineering faculty was significantly larger. The department's phenomenal growth occurred from 1955 to 1968, a result of the post-World War II era when, of course, the entire university was expanding; even so, while Berkeley's faculty in general increased on average 50-60% during that period, the mathematics faculty quadrupled.

How this happened, and why, is but one of many interesting stories in Moore's comprehensive history, *Mathematics at Berkeley,* which he sets against the larger, equally interesting story of academic mathematics in the history of higher education in the United States. For instance, Moore recounts that mathematics research was not recognized as an academic activity until the time of Benjamin Peirce, who taught mathematics at Harvard, 1831-1880. Before then (and for years after at Berkeley) math provided only a "service" curriculum for astronomy, geology, chemistry, and physics. The struggle of the Berkeley department to gain its footing as other disciplines achieved international reputations makes for still more engaging reading. At least three times the department languished as leadership waned, positions remained vacant, and the attention of the regents and administration wandered. In Berkeley fashion, the struggle for distinction was often against outside adversaries–chiefly the private eastern universities–with seemingly greater advantages for recruiting top faculty. Yet Berkeley often prevailed. One big success (against Harvard) in this arena was the recruitment of Griffith Evans as chair in 1933, under whose leadership a solid foundation for the department was laid. Evans is most memorably commemorated in the minds of current Berkeleyans by the monstrous Evans Hall; Moore's account of its planning and construction history is yet another good story.

Members of the department played key roles in major academic, social, and political events on campus, and across the country, such as the loyalty oath controversy, the recruitment and retention of women and minority faculty and students, and the struggles of campus activists in the 1960s and 1970s. Julia Robinson's fascinating story is one example. The first woman mathematician elected to the National Academy of Sciences (1976), Robinson was not a member of the faculty at the time of her election due in part to campus nepotism policy; she had married her professor, the faculty member Raphael Robinson. With her signal achievement, the campus quickly moved to appoint her a full professor. She later was elected the first woman president of the American Mathematical Society in 1983, the same year she was named a MacArthur Fellow. Stephen Smale, another faculty member, co-chaired the national Vietnam War Day Committee with Jerry Rubin in 1965,

and was heavily involved in protests on and off campus, gaining the opprobrium of Berkeley colleagues and Sacramento politicians alike.

But why was the department so favored after 1955? It was Clark Kerr, Berkeley chancellor, then university president (1952-1967), who made the critical decision to boost mathematics to its peak of growth and prominence. As he explained in his memoir: "I was convinced . . . that mathematics should and would be as central a department in a great research university of the future as philosophy had been in the past . . . Thus, if a campus were to have one preeminent department . . . it should be mathematics."

The result was that, by the end of Moore's history (roughly 1985), Berkeley boasted a department widely acknowledged to be in the first rank nationally, with Chicago and Princeton; eight current and former members of its faculty had received the Fields Medal (considered equivalent with the Nobel Prize, which is not awarded in mathematics); and department leaders—Moore among them—had established the NSF-funded Mathematical Sciences Research Institute (MSRI) directed by S. S. Chern. MSRI's prestigious fellowships brought 70 to 80 additional mathematicians to campus each year, which must have given Berkeley one of the densest concentrations of academic mathematical genius in the world.

Moore's account is a strong addition to the history of the campus and the university and, as indicated in these examples, it includes material that would hold the interest of general readers. Much of the book, however, describes the recruitment and research interests of mathematicians and would appeal primarily to their fellow specialists. It would have been very useful for the work to have included a glossary of mathematical terms, in particular, definitions of mathematical problems that often have intriguing names like Polya's Conjecture, the Sloping Beach Problem, and the Banach-Tarski Paradox. As Moore observes, Berkeleyans contributed substantially to the resolutions of such problems and most laymen reading this book would wonder what they are and what is their significance.

—David Farrell

Teach Yourself Malkielese in 90 Minutes

Jan Cosinka
Berkeley: Ian Jackson Books, 2006. 160 pp.

The field of Romance Philology probably seems somewhat esoteric to most people, and Yakov Malkiel himself would probably seem equally esoteric to most people. As someone who in the distant past took a couple of courses from Malkiel, I was completely in awe and somewhat unnerved by his ability to lecture without any notes whatsoever, providing extensive bibliographic citations—verbal footnotes—as he went along. *Teach Yourself Malkielese* reveals his precise and yet somewhat unusual writing style, his favorite phrases and his somewhat arcane use of words.

The "booklet" "bids fair" to reveal the "many-splendored" nuances of Yakov Malkiel's writing style, which perhaps stems from the "connubium" of his Kiev origin and Berlin education "subsoil." "Small wonder" that Jan Cosinka (an anagram of the publisher's name, Ian Jack-

son) was tempted to document those "hermetic niceties" of Malkielese, now one of the lost languages of this earth, having been used by only one person until his death in 1998.

Born in Kiev and educated in Berlin, Malkiel came to Berkeley in 1942 to join the Department of Spanish and Portuguese as a Lecturer, where among other things he taught the history of the Spanish language. He founded the journal *Romance Philology* in 1946, at the age of 32, which has become one of the two leading journals in the field. By 1952 he was Professor of Romance Philology, and in 1963 he began the Graduate Program in Romance Philology which he guided until his retirement in 1983.

—*William Roberts*

Biology at Berkeley: A Case Study of Reorganization and Its Costs and Benefits

Martin Trow

Berkeley: University of California, Center for Studies in Higher Education, Research and Occasional Papers Series, CSHE.1.99 (Spring 1999), 27 pp.

Universities are stable institutions that, as Clark Kerr once remarked, continue to do the same things in the same places, sometimes over centuries. Changing faculty behavior has been compared to herding cats or sometimes to moving a graveyard. Yet change does take place, most frequently on a gradual and incremental basis, but sometimes quickly and by design.

Martin Trow, sociologist, campus leader, and student of higher education and public policy, commented on such a case of deliberate change and the institutional leadership that brought it about in considering a "deviant" case—that of the reorganization of biology at the University of California at Berkeley in the later decades of the twentieth century. It was deviant, Trow said, because it went against "the general proposition of the powerlessness of university leadership." The assumption that leaders—deans, chancellors, presidents—were essentially powerless and reactive rather than proactive was widespread in higher education around the world for a variety of reasons which Trow sets out succinctly. Whether, and under what circumstances, leaders may effect substantive change is the topic of his examination of the case of biology at Berkeley.

Trow first wrote about it in 1983, when the reorganization had been underway about five years. His articles appeared as an occasional paper at the Center for Studies in Higher Education, in *Change* magazine, and a chapter in a book on higher education organization published in Sweden. He returned to the topic some fifteen years later with a fresh look at the reorganization of biology, the results of the reform with a review of the changes that had been institutionalized and incorporated into the university's structure, and the implications of such reforms for other universities.

In the mid-1970s, biology at Berkeley was falling behind its competitors in other research universities. New fields had opened up that did not correspond to the old departmental structures so that scientists studying the same thing were scattered around the university; young scientists were refusing Berkeley's job offers, choosing to go elsewhere; facilities and laboratories were overcrowded and out of date; and perhaps most telling, Berkeley's reputation and ranking in the field, while still high, appeared to be slipping.

Trow outlines a series of meetings, committees, and reports from both internal and external bodies, led by the campus's vice chancellor, Ira Michael Heyman, and the Dean of the College of Letters and Science, Roderic Park, the latter himself a botanist. During the

process, campus leadership changed when the vice chancellor became the new chancellor and appointed the former dean to the vice chancellorship. The reports and consultations resulted in the appointment of a chancellor's Advisory Council on the Biological Sciences made up of distinguished biological scientists drawn from a variety of disciplines, but excluding department heads who, however, were consulted all along. This Council exercised widespread authority based both on the scientific expertise of its members and the force of the chancellor's support for its actions. In effect, as Trow describes it, the various biological sciences departments were put under a sort of "receivership" that could override parochial departmental interests while looking at the problems of biology across the entire campus.

Trow's conclusions in 1983 regarding the role of leadership in the process of making major change in the way biology was practiced at Berkeley were as follows:

> First, changes which a university president or chancellor initiates and coordinates are more likely to be achieved if they reflect shared values within the academic community. . . . The second condition for successful university leadership is that leaders must have some discretionary power in order to be effective: they must have the authority to make decisions, and the resources to implement them.

Trow added:

> These conditions are today rarely found outside the great American research universities—for reasons embedded in the history and development of higher education in the United States and elsewhere. (*Change*, 1983.)

In his later 1999 interpretation, almost twenty years after the instigation of the reorganization of biology at Berkeley, Trow returned to the topic, stating that the process was "now largely completed and institutionalized." He reiterated his conclusion that "Key to the initiation of change was the appointment of a Chancellor and Vice-chancellor who were committed to the changes, and the enlistment of outstanding biologists already at Berkeley to design the reform and carry it through."

Martin Trow
December 1988

Trow then turned to evaluation of the process on two fronts: first, what happened to biology at Berkeley as a result of the reorganization, and, second, why this "deviant" case was, in his view, not unique in American research universities.

With respect to changes in the structure and practice of biology at Berkeley, Trow concluded that it was a success. Some twenty individual departments were combined into four large departmental groupings, the largest of which was the Department of Molecular and Cell Biology, itself organized into five divisions (biochemistry and molecular biology, cell and developmental biology, genetics, immunology, and neurobiology). Integrative Biology; Plant and Microbial Biology; and Environmental Science, Policy and Management completed the other three major departments—the first two were located in the College of Letters and Science and the latter two in the College of

Natural Resources. In addition, there were numerous other groupings as well as biologists located in other units such as the Graduate School of Public Health.

Speaking more broadly, the reorganization gained broad acceptance among academic scientists on campus; it achieved improvement in hiring and retention of excellent scientists; Berkeley's rankings and international reputation were restored; and the changes evoked widespread interest elsewhere. The former twenty biological departments had been combined into four large departmental groupings, providing both more rational and more flexible ways for academics to collaborate and perform their research.

On the question of the role of leaders in American research universities, Trow believed that the ruling paradigm of powerlessness was mistaken, for several reasons. Looking broadly and internationally, observers had been more impressed with the constraints and pressures on leaders than on their opportunities. While the gloomy assessment may apply widely, the American research university, Trow thought, was a special case. Their faculties and administrations share a consensus on academic values and competitive excellence not found elsewhere. Furthermore, Trow thought that observers had taken a misleading perspective. "I suspect that observers have been looking at the president's role as if it were a cross-section of a thick cable, made up of many differently colored strands or wires, each strand representing another program of activity, and all together in cross-section representing a heterogeneous collection of issues, solutions and problems, showing little coherence or purpose" (1999). Instead, Trow believed we should look along the dimension of time, examining each strand in its entirety and separately from the others. Looking at it this way, "what appears as a random or haphazard set of problems, programs, evasions and solutions in cross-section when viewed at a given moment, looks more like a set of purposeful programs, each being pursued in relative isolation within the boundaries of the same institution, when viewed along the dimension of time" (1999). The variety of strands come together in the office of the president or chancellor, who can mobilize human and financial resources to accomplish change in the interest of the shared academic ethos. The case of biology at Berkeley, as outlined by Trow, is the story of one such effective collaboration among the forces for change within the university, including a strong role for leadership.

—*Marian L. Gade*

Full references

Martin Trow, "Biology at Berkeley: A Case Study of Reorganization and Its Costs and Benefits," Berkeley: University of California, Center for Studies in Higher Education, Research and Occasional Paper Series, CSHE.1.99 (Spring 1999), 1-27.
http://cshe.berkeley.edu/publications/docs/PP.Trow.Biology.1.99.pdf

Martin A. Trow, "Reorganizing the Biological Sciences at Berkeley," *Change*, 15:8 (November-December 1983), 28, 44-53.

Martin A. Trow, "Leadership and Organization: The Case of Biology at Berkeley," a paper for the International Conference on Studies of Higher Education, and Research Organization, Rosenon, Dalaro, Sweden, June 60-10, 1983; also Occasional Paper #33, Center for Studies in Higher Education, University of California at Berkeley. Later published in Rune Premfors ed., *Higher Education Organization: Conditions for Policy Implementation* (Stockholm: Almqvist & Wiksell International, 1984), 148-178.

OTHER ISSUES IN THE CHRONICLE OF UC SERIES

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