

Cambridge University Press, 1999

288 pages

BOMBS, DIAMONDS, AND RADIUM

by Alison Winter
Associate Professor of
History

The curious tourist visiting imperial Berlin in the years before the outbreak of World War I might well have read in the newspaper of “strange things” happening at a quiet house near the center of the city. Situated close to the banks of the Spree, the premises housed a laboratory devoted to the new science of physical chemistry. It had been created in 1905 by the eminent scientist, academician, and privy councillor Hermann Walther Nernst. Here, the press revealed, Nernst and his colleagues were hard at work on a mysterious trinity of products that seemed to encapsulate all that was most exciting and most threatening in contemporary science: “bombs, diamonds, and radium.”

In fact, the aim of Nernst’s work was if anything even more momentous. He was developing the first-ever systematic program of experiments in low-temperature physics, with the purpose of understanding what he called the “heat death” of diamond. Nernst and his assistants succeeded in producing suc-

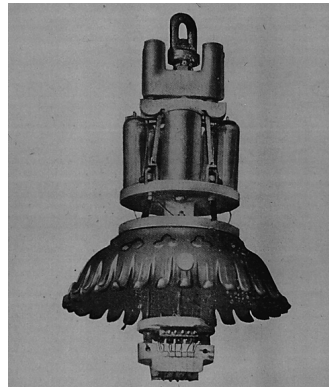
cessively lower temperatures in their extraordinarily sensitive equipment, until they reached about -250°C . At this point there was a dramatic change in the diamond’s character: no longer could heat be extracted from it. It was, as Nernst said, “frozen,” to the extent that “the concept of heat does not exist any longer for the dead body.”

Reducing a substance as symbolically revered as diamond to scientific extinction was a feat that could be expected to capture a reader’s imagination. But its implications extended beyond poetry. Nernst’s efforts were but one stage in an extraordinary career of invention, discovery, and innovation across a range of fields that seem, from the perspective of the modern disciplines of science, extraordinarily diverse—from industrial innovation to the most abstract propositions of theoretical physics. The three substances encountered that day in his Berlin laboratory symbolized Nernst’s creativity in the realms of war, industrial wealth, and physical science: he did indeed contribute to the arsenal of the First World War, though in the form of poison gas rather than bombs; and his studies of thermodynamics took him from phenomena like that of

the diamond’s “heat death” to the vicissitudes of radiation. More lastingly, he played an instrumental role in the establishment of quantum theory in physics and chemistry. His work at the extremes of attainable temperature—high and low—culminated in his formulation of the “heat theorem,” which would eventually be hailed as the third law of thermodynamics. By the time of his nomination for a Nobel Prize in 1921, Nernst would have presided over the emergence of central elements in the modern physical sciences.

Nernst was a key figure in the development of the 20th-century sciences of physics, chemistry, and physical chemistry—indeed, the latter field was virtually his invention. It is therefore puzzling that until now no major discussion of his work has appeared. Diana Barkan’s new book, *Walther Nernst and the Transition to Modern Physical Science*, more than compensates for this earlier deficit. Her monograph discusses and integrates every aspect of Nernst’s various major enterprises, from the invention of an electric lighting device that almost preempted the modern bulb, to his work in electrochemistry, thermodynamics, and quantum theory. She even attends to the electric piano that he invented in the 1920s, which was transformed by Steinway into an early prototype for the electrically powered synthesizer. Each of Nernst’s activities provides a context that helps give meaning to the others. One of Barkan’s more provocative—and entirely persuasive—arguments is the idea that the development of the third law of thermodynamics, long treated as belonging to an abstract history of theoretical physics, must be understood as coeval with the industrial-technological

The heat theorem, Barkan shows conclusively, arose out of a combination of practical and theoretical efforts in problem-solving—efforts that treated disciplinary boundaries as almost entirely insubstantial.



The Nernst lamp had burners of zirconium oxide, which conducted current when heated.

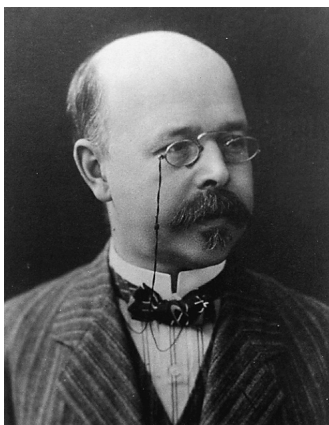
researches that Nernst was pursuing in the development of his electric lamp. Barkan, associate professor of history at Caltech, sensitively restores Nernst's efforts to their historical context, making clear what was at stake, and how he articulated and addressed the most important problems of his science.

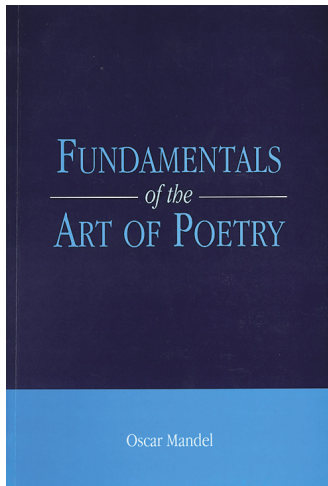
One of the themes that runs through Barkan's study pertains to the history of scientific disciplines—the various territories of science, and the boundaries that are understood to lie between them. It has become customary as we look back at the early days of 20th-century science to see in it distinct endeavors corresponding to the professional disciplines that exist today. Nowadays, we have theorists and experimentalists, industrial scientists and academics; it is therefore natural that we tend to spot these divisions in the past. But in the case of a man like Nernst, Barkan makes it very clear that such divisions were by no means constant, and may not have existed at all. One more portentous consequence of Barkan's work is to show that we have systematically misconstrued the origins of scientific claims that are as fundamental as the third law. The heat theorem, Barkan shows conclusively, arose out of a combination of practical and theoretical efforts in problem-

solving—efforts that treated disciplinary boundaries as almost entirely insubstantial. Nernst's work with electric lamps was as essential to his thermodynamics as was his work with hydrogen liquifiers, and a source of particular pride to Nernst himself (he fell out with his old friend Svante Arrhenius when he insisted on demonstrating the Nernst lamp in an elite Stockholm hotel, only to blow every fuse in the building). Science, then, is a kind of work that can only be understood if we are prepared to look beyond the formal statements that scientists make about their methods and results, to scrutinize the day-to-day practice of research.

Barkan convincingly demonstrates that Nernst played a pivotal role in the creation of modern physical science. The modern field of physical chemistry exists largely thanks to his career. Her central question is, "How are individual and group identities formed?" Her answer is that they are formed through individual and collective work of the kind that she documents in her study. Perhaps Nernst's greatest contribution to quantum theory, in particular, was to organize the first Solvay Conference on Physics, which met

in Brussels in 1911. The conference itself achieved little and solved nothing—but its very existence proved to be a turning point. Nernst was in on the creation of a new form of scientific sociability. Manifested in the international congress, this sociability has underpinned the successes of science ever since. And it has also underpinned the emergence of what we would now say was Nernst's science—physical chemistry. Its identity was fixed publicly by Nernst's elevation to the Nobel laureateship, over the private opposition of Arrhenius. Arrhenius scorned his diplomatic efforts as mere "political flattery," but in 1921 his opposition was unique. And here lies a moral for today. We need to understand the work involved in establishing a technical scientific discipline like physical chemistry, because the boundaries that delimit it, if they become impermeable, can gain the power to bind as well as liberate. Diana Barkan's pathbreaking book helps us to question not only how the divisions between the sciences have developed, but what their status should be today. □





Sheffield Academic Press, 1998

351 pages

COUNTERFLOW OF ONE

by John Sutherland
Visiting Professor of
Literature

For 38 years Professor of Literature Oscar Mandel has been exercising his civilising influence on Caltech undergraduates. During that period some 5,000-or-so students must have encountered in his classes what George Ellery Hale (as quoted in the *Caltech Catalog*) calls “the highest qualities of imagination”—without which, as Caltech’s founding father nobly insists, no great work in science can be done.

Unusual when he was appointed in 1961 as associate professor of English (under the formidable Renaissance scholar Hallett Smith) Mandel is, as the century ends, the rarest of birds in literary studies. The words that best describe him, once terms of praise, are now deeply pejorative: “amateur” (in the sense of “lover of literature”), “dilettante,” “bellettrist,” “connoisseur,” “wit.” Fluent in any number of European languages, Mandel has translated Marivaux, Corneille, and Kotzebue; imitated Calderón; commented on Sophocles and Thackeray. He has written monographs on

How does art work? What is good writing? What can a great picture, piece of music, or poem do for us?

the obscure (in both senses) Renaissance artist Magnasco and on Dutch vernacular painters for whose Flemish glumness he has, as a Belgian by birth, a peculiar fondness.

In an age of specialization, where scholars sit tight in their ring-fenced “fields,” Mandel’s free-ranging sensibility looks increasingly eccentric. Were he a younger scholar, embarking on his career, it would be downright suicidal to skit about as he loves to do. Not that it has ever bothered him being marginal. In his delightful collection of essays, *The Book of Elaborations*, he pictures himself as a graduate student at Ohio State in the 1950s as “the one and only inhabitant of Columbus, who on football afternoons walked *against* the joyous hordes on their way to the game, a counterflow of one.”

Above all, Mandel is a practitioner. His writings about (as opposed to “in”) literature have always been founded on the belief that—as T. S. Eliot put it—the only criticism that matters is that which explains the critic’s own creative writing. Ask Mandel what matters most to him, and he will reply simply “my writing,” by which he means, probably, the play, prose fantasia, essay, or poem

he is currently working on. The poetry, in particular, is marked by a self-deprecation that is sly, charming and wholly characteristic of the man. His best known lyric is “Who’s Diphilus?”. (Who was he? A Greek whose verse has entirely vanished, leaving only a name, some anecdotes, and a reputation for being a half-decent poet.)

Who’s Diphilus? His works are lost.

He was a poet, won some prizes, dented time in Greece among the better men,

And got thrown out one time because

he wrote a stupid comedy. Ten scholars now remember him; that too is immortality.

The plays are grander, indulging Mandel’s Gallic love of high gesture and heroic rhetoric. In another of his many guises, he is the creator of wise and witty fables (see *The Gobble-Up Stories*). The flyleaf of this latest work lists no less than 23 books in 5 genres. Who’s Mandel?

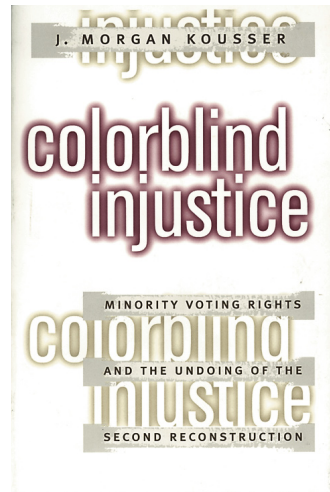
Over the last few years, as he has surveyed the drift in his subject toward specialization and theory (as it is misleadingly called), Mandel has become increasingly convinced of the need to return to what he conceives to be the basics of his discipline—“the rescue operation,” as he calls it. How does art work? What is good writing? What can a great picture, piece of music, or poem do for us? To this end he has taken charge of the music, fine-art, and creative writing classes in the Division of the Humanities and Social Sciences, creating what is, effectively, a foundation course—*Kultur* 101. They are, one deduces from the packed classrooms, popular with students.

This latest book, as the title indicates, is part of the same general project. In one aspect it is what Ezra Pound would

call an “ABC of Reading.” Mandel himself calls *Fundamentals of the Art of Poetry* “an enchiridion—a guide book—for lay readers of any age.” The tone of the book is marked by a kind of humane dogmatism. “What is Art?” his first chapter portentously asks. His answer, for someone so steeped in the grandeurs of European culture, is surprisingly materialistic, Brechtian almost. Art he conceives as primarily satisfying cerebral appetites. What this means is discussed in his second chapter, “Three Brain Centers”—a section of the book which suggests that some influential ideas have drifted across the Court of Man (can we still call it that?—Court of Person?) from biological Beckman to humanistic Baxter.

The body of the book is a “naming of parts” manual—a kind of aesthetic Auto-Ed. The approach is summed up in the breezy titles to chapters 9 and 10: “Practical Pointers for Reading Poetry”; “More Practical Pointers for Reading Poetry.” Practicality goes with the realization that, at the end of the day, poetry will always elude the reader’s grasp, however many pointers are supplied. “If you despair of elucidating all the allusions of a text,” Mandel advises, “console yourself with the thought that we do not yet completely elucidate much of anything in this vale of tears, yet manage to live and enjoy life in that penumbra.”

Enjoyment breathes over and through this volume. In one of its many parts, it is a judiciously composed anthology of the verse that has given Mandel most pleasure over the years—pleasure that he is adept in passing on to the reader and, one suspects, his Caltech students. May he have 5,000 more. □



The University of North Carolina Press,
1999
590 pages

HISTORY MATTERS

by R. Michael Alvarez
Associate Professor of
Political Science

Race relations in America have long posed an enigma for social scientists, historians, and other commentators, in part because the problem has been such a shifting target. While routinely thought of in the context of the political and economic integration of African Americans, the question of race has also at various times and places concerned Asian Americans (especially in California since the Gold Rush) and other nonwhite immigrant groups, as well as Native Americans, Irish Americans, and Eastern Europeans. The analytic

focus of social scientists and historians has changed dramatically in recent decades, however, as studies have become centered largely on how attitudes, beliefs, cultures, and customs shape race relations in America.

In his new book Morgan Kousser, professor of history and social science at Caltech, changes that focus to how *institutions* have shaped race relations in America.

Kousser’s focus on institutions in the context of race relations is quite revolutionary. In recent years, a significant intellectual trend, termed the “new institutionalism,” has swept through many of the social sciences, and Caltech’s social scientists have been among the leaders of this approach. By “institu-

Not a mere observer of the historical events he describes in his new book, Morgan Kousser has actively participated in the judicial processes whereof he speaks. As he explains in his introduction, descriptions of the cases emerge directly or indirectly from his own experience as an expert witness in federal district court cases concerning minority voting rights—always on the side of minorities. Law, political science, and history all have their place in *Colorblind Injustice*, but Kousser considers it primarily a book of history. An understanding of the history of voting-rights policy, he believes, should lead to better public policy in the arena of race relations, an arena that Kousser has made his life’s work.

History defines the Fourteenth Amendment. Its provisions do not mention race, ethnicity, gender, or religion, or single out any particular social group or governmental policy for special emphasis. A visitor from another country who knew nothing of American history could not discern from its words that the equal protection clause was particularly concerned with *racial* discrimination. If told that that clause banned the deliberate placing of significant numbers of some particular group into an electoral district, the visitor would have no less reason to believe, from the plain meaning of the text or from any abstract philosophical notion of equality, that the prohibited classification was of blue-collar workers or city dwellers or farmers or suburbanites or Democrats than that it was of African-Americans or Latinos. Only the history and continuing reality of racial discrimination and the connection of that discrimination with the adoption and development of the equal protection clause make racial differentiations especially relevant to it. Therefore, any gloss on that clause contains an implicit or explicit interpretation of the history of race relations in the country, and, conversely, every substantial difference in the interpretation of the history of race relations has implications for the understanding of the clause. Philosophy offers no guide to the Fourteenth Amendment or, rather, too many. For the equal protection clause, history, and only history, matters. Unless we get the history right, we cannot get the equal protection clause right.

from *Colorblind Injustice*, Chapter 9

tions” Kousser means laws and rules—those contained in the United States Constitution, in state and local laws regulating elections, and in the decisions of judicial bodies regarding political and electoral laws. *Colorblind Injustice: Minority Voting Rights and the Undoing of the Second Reconstruction* is a sweeping study of how these institutions shape race relations in both productive and unproductive ways.

In Chapter 5, “A Century of Electoral Discrimination in North Carolina,” Kousser offers particularly telling examples of some of this process. He poses a strong challenge to the redistricting arguments that were made in the early 1990s in North Carolina. That state, which from 1898 through 1992 had not elected a single African American representative to the U.S. Congress, produced a districting plan that carved out two oddly shaped majority African American districts. Unsurprisingly, these two districts elected African Americans to the U.S. House of Representatives in 1992.

But almost immediately after taking effect, this plan was challenged in court in the *Shaw v. Reno* (1993) and *Shaw v. Hunt* (1996) cases, and the Supreme Court

overturned the redistricting. Kousser argues that one of the intriguing ironies was the repeated assertions by the political actors in court that “No court or agency has determined that racial discrimination has ever occurred in the creation of congressional districts in North Carolina” (page 243). Kousser nonetheless demonstrates that, just as the newly drawn 1992 congressional districts improved racial balance by electing African American congressmen, similar racial gerrymandering in the post-Civil War era packed African Americans into a single congressional district to *reduce* their ability to achieve widespread political representation.

The rest of this massive study contains numerous other examples of how institutions have changed the shape of society—racial discrimination in the establishment of electoral laws in Memphis (Chapter 3) and Georgia (Chapter 4), and race and redistricting in Los Angeles (Chapter 2) and Texas (Chapter 6). In each of these chapters, Kousser eloquently recounts the historical detail of each example and thoroughly marshals overwhelming quantitative support for his arguments.

Kousser’s extensive use of

quantitative data in his historical analysis strengthens his arguments; it also provides a significant and interesting counterweight to recent trends in research. Unfortunately, in my opinion, traditional historical research has come under strong attack in recent years from the same postmodern and linguistic fads that have swept through the humanities, especially literature. These trends have infected historical research in many areas, including the history of race relations. By shifting the analytical focus away from interpretations of facts and data, these postmodern historical studies have sharply reduced the impact of historical studies in academic research and in current political debates about issues such as affirmative action, bilingual education, and immigration reform.

Colorblind Injustice constitutes a powerful statement to historians, demonstrating that quantitative and factual historical research is not a methodology that should be abandoned in the face of postmodern attacks. Instead, the book is a call to arms for historians—exactly the type of well-documented, well-argued, and strongly quantitative historical study that

can serve as a counterpoint to postmodern critiques of contemporary historical research.

Kousser has written an important book on the history of race relations in America, clearly documenting the progress made in developing a more politically egalitarian society. *Colorblind Injustice* is also significant for its analytic focus on how institutions shape that society. Given the lessons learned by previous attempts to use laws, rules, and regulations to mitigate or enhance racial political equality, policy makers now have important information at their fingertips to use in devising institutional changes. And, finally, this book is important for Kousser’s passionate offensive aimed at regaining the intellectual high ground for factually and quantitatively driven historical research. □