

Alfred Bader Fonds

Correspondence

Kauffman, George B.
1994-1996

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CALIFORNIA STATE UNIVERSITY • FRESNO

SCHOOL OF NATURAL SCIENCES
Department of Chemistry

2555 East San Ramon Avenue
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(209) 278-2103

File: G. Kauffman



July 22, 1996

Sister Mary Virginia Orna, O.S.U.
Department of Chemistry
College of New Rochelle
New Rochelle, NY 10801

Dear Mary Virginia:

Welcome back from the antipodes! Laurie and I hoped to see you again at the 14 ICCE at Brisbane, but a recurrence of what we call "chronic fatigue syndrome" for want of a better name (I picked it up during travels in South Africa or China during the summer of 1987) kept us from attending. Our paper had already been accepted, I was scheduled to participate in Ron Gillespie's symposium on the chemical bond, and we had already paid for our reservations at the dormitory. We hope that you had a great time and enjoyed Australia.

As you can see from the enclosed correspondence, in February, 1994 Bob Lyle asked me to write a series of articles on ACS presidents that I had proposed the previous year for *The Hexagon of Alpha Chi Sigma*. I completed the series from 1876 to 1954 (John W. Draper to Harry L. Fisher), whereupon Bob abruptly reneged on his commitment to publish the series and suggested that the ACS might be interested in the series as a short book. The ACS required a \$20,000 subvention (They have lost money on historical books such as Wyndham Miles' "American Chemists and Chemical Engineers," which is probably why Wyn and Bob Gould published Volume 2 privately), so I contacted Alfred Bader, who, on principle does not believe in subvention as a precondition for publication. Alfred contacted Arnold Thackray, who suggested that you might be interested in the series for *Chemical Heritage* (Incidentally, congratulations on your selection as Editor. I'm sure that you'll do a great job.).

Arnold is forwarding to you Part III of the manuscript (1915-1930), but all parts of the manuscript from 1876 to 1941 have been typed (I completed the material on presidents from 1931 to 1954, but I ceased having it typed when Bob Lyle changed his mind about publication). The biographies range in length from less than one double-spaced typed page to several pages. I intended the series as a definitive source and have included extensive references. Its

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publication will require a long-term commitment; there are 109 presidents through Ronald C. Breslow (1996). Since space in *Chemical Heritage* is limited, you may only be interested in short vignettes (a paragraph or two and a portrait) on each president. I will be glad to modify the manuscript in any way to accommodate your needs.

Because the two other American-based journals that publish historical articles (*Journal of Chemical Education* and *Bulletin for the History of Chemistry*) may have more space available and therefore be able to use longer versions of the biographies than you could, I'm sending copies of this letter to John W. Moore and Paul R. Jones to ascertain if they are interested in publishing the series. When I hear from all three of you, I'll let you all know what transpires so that duplication is avoided.

Looking forward to your reaction to my proposal,

With best wishes from Laurie and me,
Cordially,

George B. Kauffman
Professor of Chemistry

xc: Dr. John W. Moore
Dr. Paul R. Jones
Dr. Alfred Bader ✓
Dr. Arnold Thackray



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A Chemist Helping Chemists

May 7, 1996

Professor George B. Kauffman
1609 East Quincy Avenue
Fresno, CA 93720

Dear George:

Many thanks for sending me the copies of your review. This is a wonderful one, and I believe that Isabel's concern that people might not want to buy the book because your review is so wonderfully detailed is unfounded.

I very much look forward to the German version when that appears. It will be interesting to see how competent the translation is - I presume it is not translated by you.

You will have noted that I have written to Arnold Thackray and Ernest Eliel about your manuscript and am also curious to see what their replies will be.

With best wishes from house to house, I remain,

Yours sincerely,

AB/cw



Chemistry Department

CSU, Fresno

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May 3, 1996

Alfred,

Thanks for your second phone
call. I enjoyed your article on
Chlorophobia in The Chemical
Intelligencer. Here's my own
effort on the same topic.

Best wishes,

George

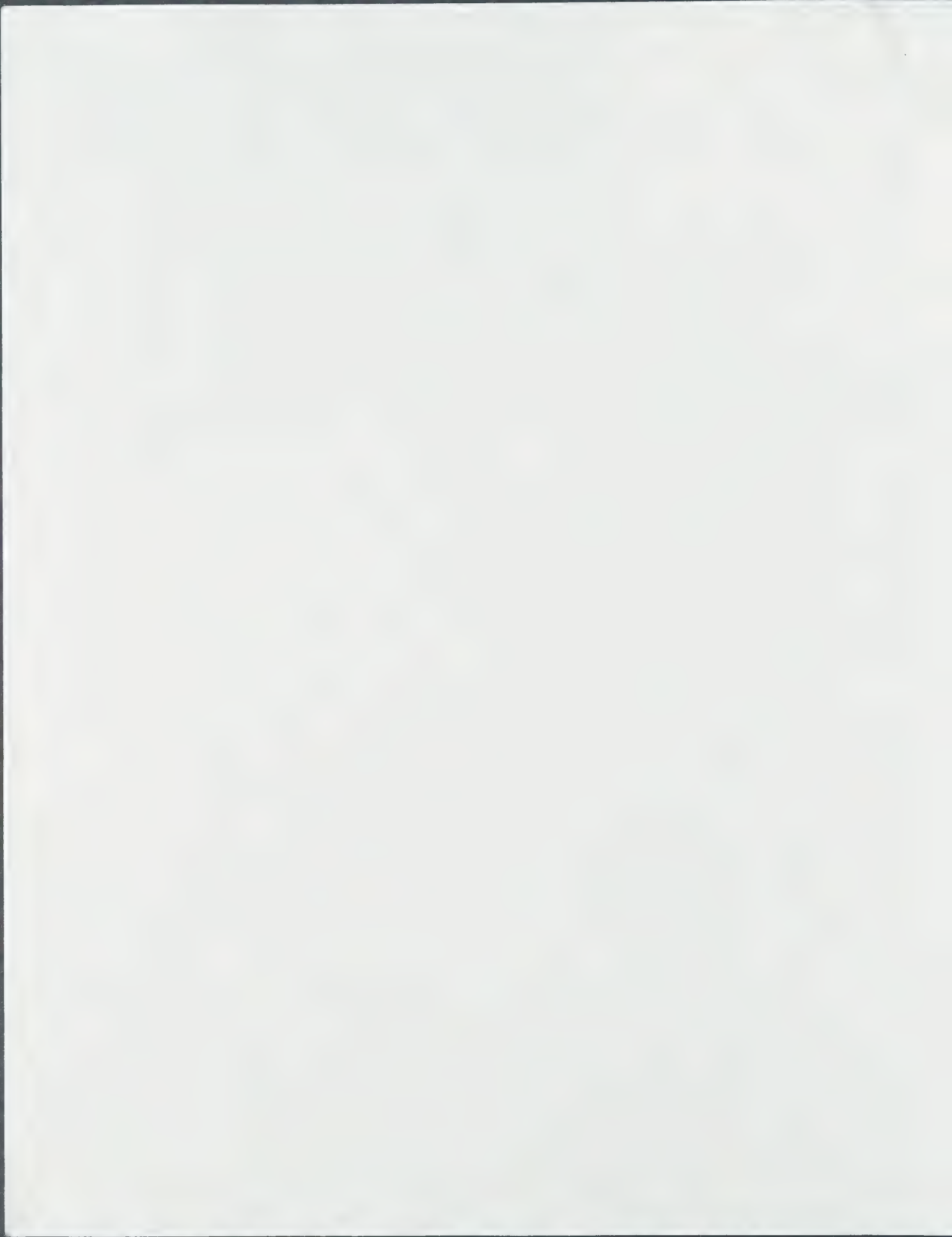
OUR CHEMICAL FAMILY



CHEMISTRY IN BRITAIN



Chemophobia?



Chemophobia

George B. Kauffman



File

Chemists know that their chosen vocation comes in for a lot of criticism from the environmentally conscious, scientifically illiterate public. This 'chemophobia' has developed over the years as a result of false images and perceptions of scientists, fostered by ignorance and mass misinformation. This article traces the evolution of chemophobia and suggests some ways to change the public face of chemistry.

A phobia is defined as 'a fear or anxiety that exceeds normal proportions or that has no basis in reality; an obsessive or irrational dread', and the psychological literature describes dozens of individual phobias. The term 'chemophobia'—an irrational fear of chemicals—is too new to appear in the new *Oxford English dictionary* (1989), the *Barnhart dictionary of new English* (1980), other dictionaries, or even *Chemical Abstracts*, but the phenomenon has its roots in the past.

Don McKinnon, president and chief operating officer of Ciba-Geigy Corporation, has defined chemophobia¹ as 'the almost spontaneous, negative response that occurs when people hear the words "chemicals" and "chemical company"'. He was concerned that the news media's one-sided stories have given the public a poor perception of the chemical industry, resulting in higher costs, reduced productivity, more burdensome regulations and laws, less research and fewer new products. E. Scott Pattison has suggested² that the problem is largely one of the chemists' own making, since we have used the plural noun 'chemicals' without clarifying modifiers. H. Harry Szmant has proposed the formation of an American Antichemophobia Society (A₂CS) to respond to chemophobic statements appearing in the media, on the floor of Congress, and other quarters of society.³ The problem, however, is not limited to the US but is, to varying degrees, a worldwide one—especially in technologically developed countries.

Images and perceptions

In many segments of society today image prevails over reality, and form triumphs over substance. The 'mad scientist' or 'evil genius' image is a long familiar but false stereotype that is fostered and encouraged by films, television, literature, and the mass media.

The scientist has long been viewed as the possessor of forbidden knowledge, which, in the Judeo-Christian tradition, can be traced back to the myth of the 'tree of the knowledge of good and evil'. More than two decades ago, I warned of what is now known as chemophobia and suggested that:⁴

scientists ... exploit every opportunity not only to explain the nature and the strengths of science but also freely ... admit its limitations

My prediction of a backlash against science has come to pass with a vengeance as scientists are blamed for technological disasters such as Three Mile Island, Bhopal, Chernobyl, and current environmental problems such as pollution, the greenhouse effect, acid rain, the erosion of the ozone layer by CFCs, oil spills, and the proliferation of pesticides and nuclear weapons and wastes. Writers such as Alexander Solzhenitsyn, Joseph Wood Krutch, and

Theodore Roszak have accused science of destroying life's simplicity and replacing it with a cold, impersonal, purposeless world. By 1976 the stereotyped image of the scientist had become so negative that the sympathetic portrayal of a scientist—oceanographer Hooper, as played by Richard Dreyfuss in the film *Jaws*—was so rare an event as to be the occasion for an editorial by sociologist Amitai Etzioni.⁵

In recent years studies of the image of science and scientists and its effect on the public perception of science and scientists, scientific policy, and science education, as well as letters and editorials on this subject, have appeared in the literature. From the 16th-century Faust to whatever scientist is depicted in the latest comic strip or film, the scientist has been portrayed variously as sorcerer or Svengali, tyrant, monster, spy, or self-sacrificing saviour or hero, in accordance with the deep ambivalence of the public



© 1979 The New Yorker Magazine Inc

ard science and scientists. One of the influential and prototypical images of the scientist in literature and film is undoubtedly Victor Frankenstein in Mary Shelley's gothic novel of 1818, *Frankenstein*—who, significantly, is confused and identified in the novel with his monster—is depicted as an isolated individual who suppresses his emotions and social relationships in his all-consuming obsession to create life. His presumptuous curiosity and search for scientific truth lead to his downfall as he fails to foresee and take responsibility for the results of his experiments.

Even where scientists are portrayed as human—as in the 1943 Metro-Goldwyn-Movie *Madame Curie*, it is suggested that there is something 'odd' about them. Neither Pierre (Walter Connolly) nor Marie Curie (Greer Garson) was expressing human emotion. In the closing scenes, in a deliberate distortion of historical fact, Marie remains lifeless, frozen, and unable to mourn her husband's death. In reality she clung to his body and had to be dragged from the room, and she died unacceptably. Apparently human behaviour did not conform to the standard stereotype of the 'cold' scientist and had to be suppressed.⁶ These stereotypes have undoubtedly fostered the accelerated spread of chemophobia and antiscientific attitudes.

The apocalyptic

A number of scientists have contributed to the increase in chemophobia and chemophobia; in the US for example, none more influential as the marine biologist and author Rachel Carson. Her book *Silent Spring*,⁷ the best-selling classic environmental book of our time, warned of the dangers of pesticides, herbicides, and other chemicals to all life on our planet. It led to much discussion and controversy among scientists and the general public and resulted in the US Congress's establishment of the Environmental Protection Agency (EPA). Carson's message was reinforced by those scientists such as Paul Ehrlich, Barry Commoner, René Dubos, the Club of Rome, George Wald, and Samuel Epstein, and the author Edith Efron refuses to be an 'environmentalist'; instead she prefers the term 'apocalyptic'. The adjective 'apocalyptic', derived from *Revelation*, the last book of the *New Testament*, is defined as 'presaging imminent disaster and total or universal destruction'.

Efron's book, *The apocalyptic*, although subtitled *How environmental controls what we know about cancer*,⁸ deals extensively with the anti-technology movement, of which what she calls *Cancer and the big lie* is a part. Her meticulously documented book deserves to be read by every scientist or citizen concerned with the effects of science, technology, and governmental regulation on public health and the environment.

We all know that a story about *Man bites dog* rates a headline in the news-



"Cheer up, Wendell. Sooner or later we all come across something that doesn't cause cancer."

paper, while one about *Dog bites man* is no newspaper story at all. Abetted by the public's well known distrust of science, journalists have understandably tended to sensationalise and exaggerate the latest 'scientific' findings, resulting in 'scare of the week' stories. However, Efron does not:^{9a}

indict the lay press for failing to understand what it takes years to understand... Reporters must write swiftly; they cover the daily news. They could not take off several years to do their homework.

Instead, she declares:^{9b}

The press coverage is... a visible symptom of a far deeper problem... [that] of the scientist who rushes into political action as a substitute for scientific endeavour... who seeks to use the coercive power of the state to impose his unproved opinions... in an unabashed pursuit of ideological goals in the guise of a quest for truth

Efron concludes:^{9c}

The critical scientists are in a struggle with the 'new ethics'... of those who righteously proclaim that a threat to public health is so appalling that there is no time to discover if there is a threat to public health... the 'moralists'... have rendered most citizens incapable of differentiating between known and unknown hazards. And that, too, is the meaning of the fable of the boy who cried wolf: The ostensible protector of the community actually *disarmed* the community.

Because original, sensational stories appear on the front page of the newspaper with bold headlines, while later developments or retractions are lost in the back pages, most people were aware of the dire, doomsday predictions of the Club of Rome (1972), but how many heard of the devastating criticism of this study by Gunnar Myrdal, the Nobel prize-winning economist, four UK scholars,

and Lord Zuckerman, former chief scientific adviser to the UK government and a dedicated environmentalist?^{9d,9}

Similarly, the news that almost all of the problems cited by Rachel Carson are currently in some stage of correction has unfortunately not reached the wide audience that it deserves. In 1987 the American Chemical Society published *Silent spring revisited*.¹⁰ This book reported that technologies are now evaluated in terms of benefits versus risks, rather than benefits alone, and that concerns about the effects of pesticides on health have led to improved analytical procedures and instrumentation, and to a carefully managed approach to pesticide development involving chemical design, controlled formulation and use—all with human safety in mind.

Disregard of risk

Another factor contributing to chemophobia is the lack of consideration of benefits versus risk for various chemical substances, and the failure to consider measurable amounts. For example, the Delaney clause included in the Food Additives Amendment enacted by the US Congress in 1958 authorised the Food and Drug Administration (FDA) to prohibit the use of carcinogenic substances in foods, but made no mention of amounts.¹¹

The so-called scientific method requires that, as data change, a scientist should modify his or her hypotheses or even discard them entirely. This ideal scientific behaviour is exemplified by Bruce N. Ames's work, and illustrates not only the importance of risk assessment but also the provisional and tentative nature of scientific findings. It was Ames's test for carcinogens that alerted scientists and consumers during the

1960s and 1970s to the dangers of hundreds of synthetic chemicals. In 1971 Ames proposed what has become known as the 'one-molecule theory' ('one molecule of a mutagen is enough to cause a mutation').¹² By the mid-1970s this idea was being disseminated to the press, the public, and the government by advocates of the Toxic Substances Control Act (TSCA), which the US Congress passed in 1976.

In 1983 Ames published a widely publicised article, replete with 178 references and notes, in which he reviewed the increasing body of evidence that large numbers of potent carcinogens arise from natural products and that:

the human dietary intake of 'nature's pesticides' is likely to be several grams per day—probably at least 10,000 times higher than the dietary intake of man-made pesticides.¹³

Science magazine devoted 34 pages of its 16 April 1987 issue to six articles on risk assessment analyses by a variety of experts. In one of them Ames and colleagues¹⁴ confirmed and extended the *Science* article. Rather than simply labelling a variety of chemicals as carcinogenic or non-carcinogenic, he ranked them by an index relating the potency of each in rodents to the exposure in humans and suggested that carcinogenic hazards from current levels of pesticide residues or water pollution are probably of minimal concern compared to the background levels of natural substances (foods).

Ames now thinks that the cancer scares of the past two decades, which he helped to launch, have been hysterical false alarms and that manmade pollutants generally constitute an insignificant risk to the public, a view that has earned him the wrath of the very environmentalists who once idolised him.

Misinformation

Although Efron refused to indict journalists for their part in fomenting the public's chemophobia and antiscientific outlook and instead blamed the apocalyptic, the media are certainly not guiltless. Almost any scientist who has had contact with the media has his or her own collection of favourite horror stories involving misquotation, distortion, sensationalism, hype, or simple misunderstanding. Part of the problem lies in the difference in goals. Scientists are intent on educating the public; they not only seek to convey information, but they also want to change the public's attitude toward science—to show how much fun, how intellectually stimulating, and how satisfying it is. In contrast, journalists seek to bring their audience up to date, to tell them what is new.¹⁵

Possible solutions

I have already mentioned implicitly or explicitly some of the possible steps to be taken publicly to combat chemophobia—to correct false images of science and scientists whenever and wherever they

occur, to emphasise the contributions of chemistry to society, along with admitting its limitations; to correct the outrageous, distorted, or incorrect statements of 'apocalyptic' scientists; and to make the public aware of the importance of risk assessment and the concept of benefit versus risk.

All these activities lie in the realm of education, but educating the public is a slow, difficult task, and there is no quick solution. The bad news is that, according to a recent (US) national survey conducted by the National Science Foundation, less than 6 per cent of American adults are scientifically literate.¹⁶ Only 34 per cent of Britons and 46 per cent of Americans know that the Earth goes around the Sun once a year, and only 28 per cent of Britons and 25 per cent of Americans know that antibiotics are ineffective against viruses. The good news is that although the public is woefully ignorant of science, at the same time it is largely interested in and would like to know more about science. People generally exhibit a strong confidence in science, but a distorted image of it can result in a public mistrust of science.

In the mid-1970s or early 1980s a number of new popular science magazines such as *Omni*, *Discover*, and *Science 80* appeared in the US, not all of which have survived. Public television series, such as Jacob Bronowski's *The ascent of man* (1973), Carl Sagan's *Cosmos* (1980), James Burke's *Connections* (1978) and *The day the universe changed* (1985), David Attenborough's *The living planet* (1984), Philip Morrison's *The ring of truth* (1987), and Roald Hoffmann's *The world of chemistry* (1990) have brought science and technology into millions of US and UK living rooms.

Complicating matters is the emphasis in the public mind on the 'products' of science—what science makes—and the comparative neglect of the 'process' of science—how science functions.¹⁷ In fact, a science writer has recently suggested that this emphasis on product rather than process in science reporting and teaching is like giving the public only the score of a football game and with-

holding everything about the game or the players.¹⁸ If the public were made more aware of the process of science and the fact that it is a human activity, carried out by human beings, it would realise that it is inherent in the scientific inquiry that contradictory results are obtained by different investigators, particularly in areas that are in the forefront of science,¹⁹ rather than take this temporary lack of agreement as evidence of the failure of science.

Unfortunately, 'hyped' science announced by press conference rather than by publication in peer-reviewed journals—as occurred recently in the Pons-Fleischmann cold fusion experiments—confuses the public with its exaggerated claims and leads to disillusionment and cynicism if these claims fail to be fulfilled. In our adversarially and litigiously oriented society, such claims also lead to polarised reporting, in which science and scientists are alternately regarded as heroes or scapegoats. Such polarisation is common in the cancer scares and many of the other health-related science issues, which have taken on the character of crusades. As a case in point, Jacqueline Warren of the Natural Resources Defense Council has said of the two sides in the recently resurrected water fluoridation controversy:²⁰

They seem to be saying, 'Don't confuse me with the facts'. And that's not the way science ought to be.

The students of today will be the voters of tomorrow, so our task of educating the public must include the education of youth. Unfortunately, in contrast to the situation in other countries, the US's traditional passion for equality has degenerated into a worship of mediocrity and contentment with the lowest common denominator of its citizenry. According to US historian Richard Hofstadter:²¹

American education can be praised ... on many counts; but I believe ours is the only educational system in the world vital segments of which have fallen into the hands of people [graduates of schools of education] who joyfully and militantly proclaim their hostility to intellect and their eagerness to identify with children who show the least intellectual promise.



"We asked the travel-agent to suggest somewhere with quiet beaches."

In 1967 I wrote of the situation:⁴

Despite our current national preoccupation with science and technology, from the most advanced artificial satellite to the latest pseudoscientific television commercial, I maintain that there is no deeper appreciation for science than there existed during the pre-Sputnik era

Today the situation has worsened, and there is still a continued concern with making students scientifically literate. In the US, various programmes have been proposed for accomplishing this, such as the American Association for the Advancement of Science's Project 2061 and the Chemical Education for Public Understanding Program (CEPUP). The American Chemical Society has attempted to improve the image of chemistry with multifaceted activities such as school curricula, magazines, grants, programmes to support economically disadvantaged high school students with summer laboratory jobs, initiatives for improving chemistry exhibits, and National Chemistry Week. The UK's Royal Society of Chemistry has launched many similar initiatives. More books like *The central science*,²² designed to acquaint the public with the contributions of chemistry to society, are also needed.

The best succinct and balanced advice to individual chemists for combating chemophobia, however, was given by the late George C. Pimentel:²³

Engage actively in communicating with the public about the risk/benefit assessment.... Engage actively in communicating with the public about the societal benefits that flow from chemistry.... Help upgrade the presentation of chemistry as part of the education of nonscientists.... Make your views about societal and environmental issues known to local, statewide, and national science policymakers.... Take your turn by finding an active political role

Dr George B. Kauffman is professor of chemistry, California State University, Fresno, California 93740, US. This article is based on a lecture given at the Florida ACS meeting, 1989.

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A Chemist Helping Chemists

March 12, 1996

Professor George B. Kauffman
1609 East Quincy Avenue
Fresno, CA 93720

Dear George:

Thank you for your kind note and those interesting enclosures.

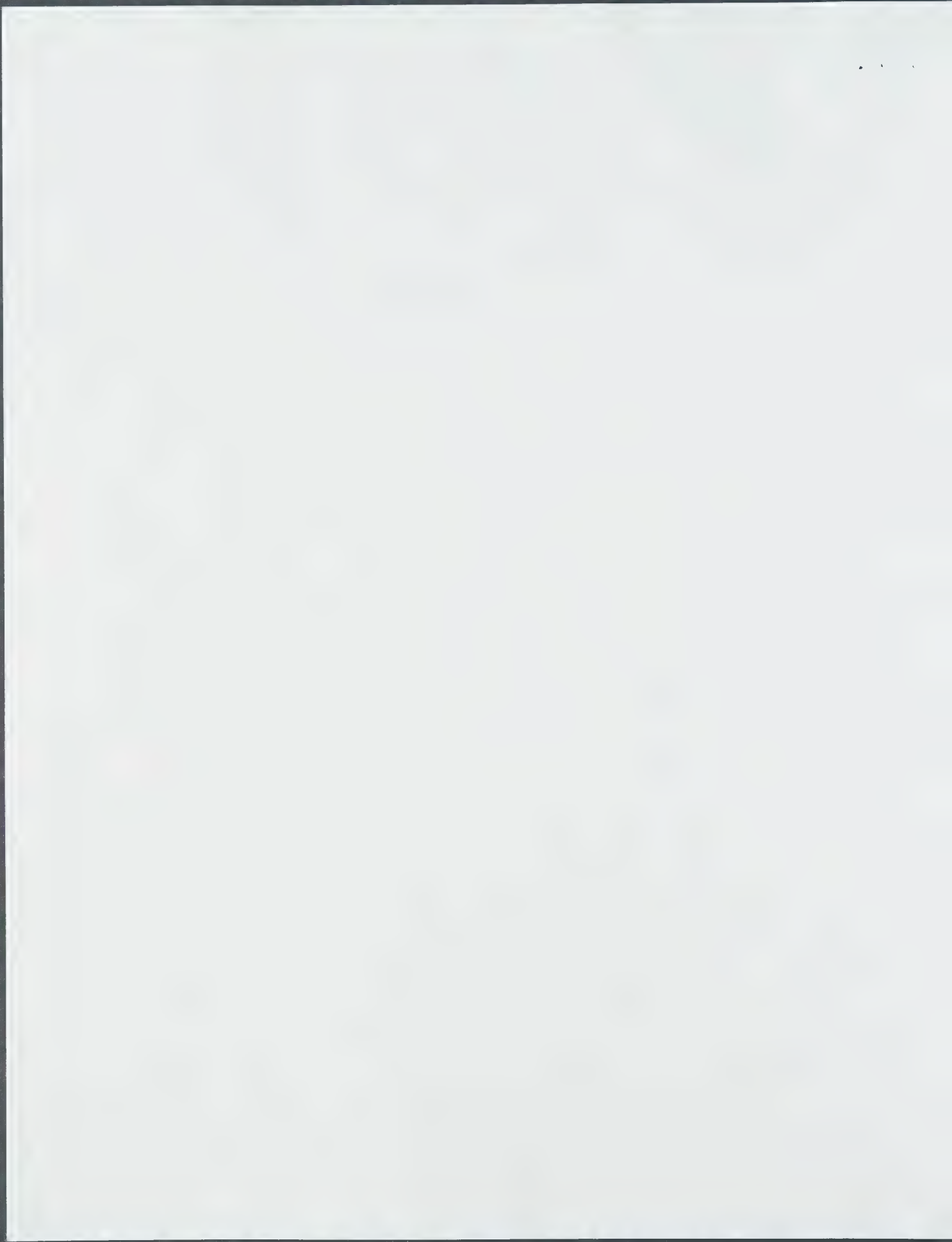
I have talked to a number of chemists active in the ACS about your book on ACS presidents. People tend to be polite and say "Yes", but I am not sure whether they really mean it.

One problem I have is that I don't really know how the book would be structured. Could you possibly loan me your proposed index, the introduction, and an early chapter? I would read this material and return it to you, of course, but then be in a better position to talk about it.

With all good wishes from house to house, I remain,

Yours sincerely,

AB/cw



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*Dear Alfred (we agreed to use first names),
Thanks for your kind phone call and letter of
Jan. 19. It was good to hear from you. Both the English and
German versions of our review of your autobiography should appear
soon in Angewandte Chemie. When they do, I'll be sure to send you copies.*

*Have you had an opportunity to talk to Ron Breslow or someone at the ACS Books
Dept. about my proposed book on ACS presidents? If so, what was the result?
Winter, 1995-1996*

With best wishes from Laurie and me to you and Isabel,

Cordially,

George

Dear Colleague:

Although those of you residing in the United States are well aware of the great State of California Budget Crisis, those of you in other countries may not have heard of this economic shortfall, the worst since the Great Depression of the 1930's, that has severely impacted all state agencies, especially the California State University system. Because of the large cuts in funds available for services such as postage, xeroxing, and secretarial assistance, I have found it impossible this year to send you the usual annual collection of copies of my publications. Instead, in order to keep costs at an absolute minimum, I am sending you a list of my latest publications with the request that you mark those publications of which you desire copies, return the list to me, and I will try to comply with your request. Please request copies of only those publications that you really need because I do not have copies available but will have to xerox only sufficient copies to comply with your individual requests. I appreciate your patience and look forward to your cooperation during these economically trying times.

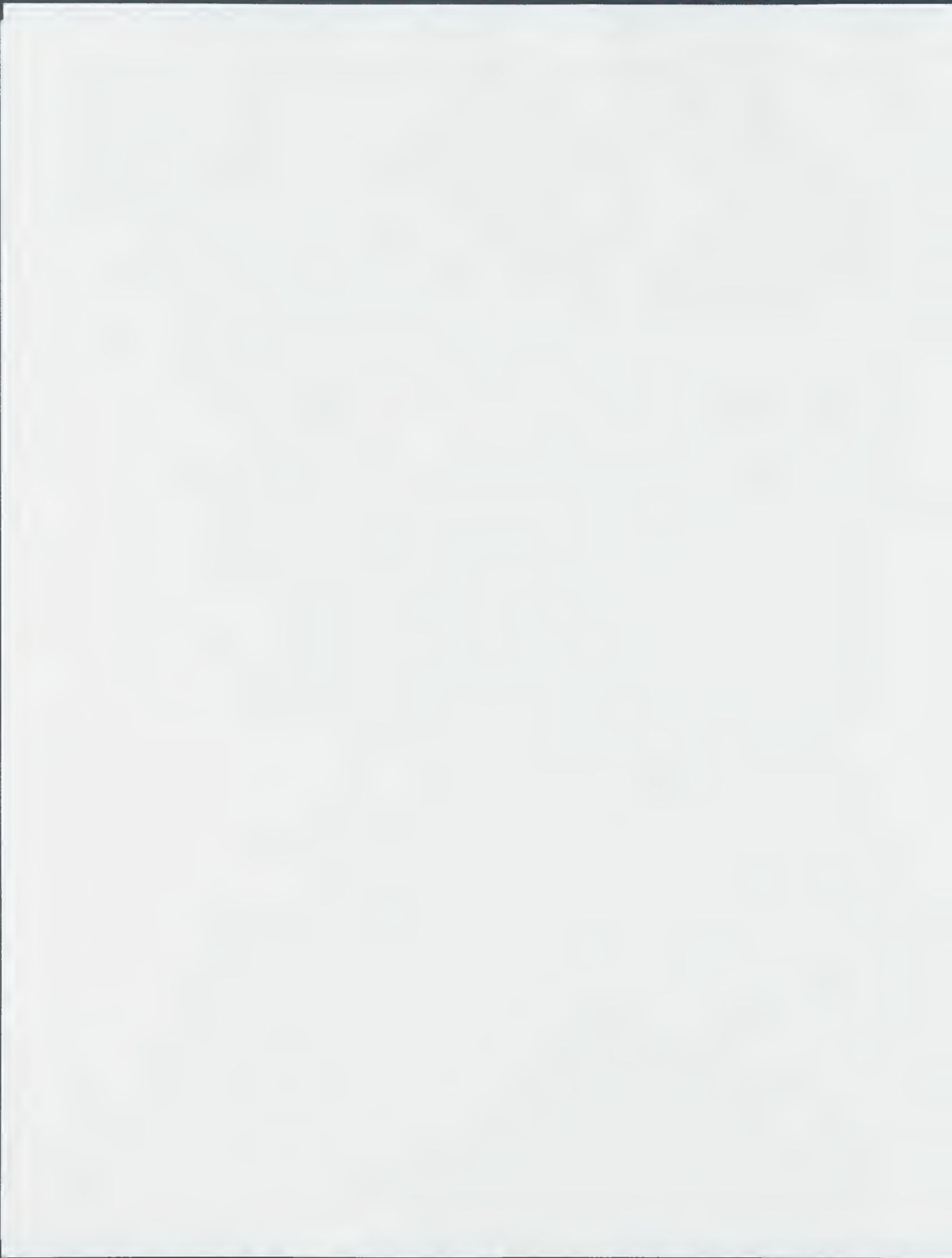
With best wishes for a

Happy New Year,

George

George B. Kauffman
Professor of Chemistry

GBK:sg



VISION

Fresno's link to Chemistry Week

■ Week's activities commemorate many contributions of the science.

By George B. Kauffman

Mayor Jim Patterson has proclaimed the week of Nov. 5-11 as Chemistry Week in the city of Fresno.

National Chemistry Week, an outreach program sponsored by the 150,000-member American Chemical Society, the world's largest organization devoted to a single scientific discipline, is designed to enhance the public's awareness of the contributions chemistry makes to society and our everyday lives. It is celebrated annually, early in November, by local sections of the chemical society, educators, practicing chemists and individuals dedicated to this goal.

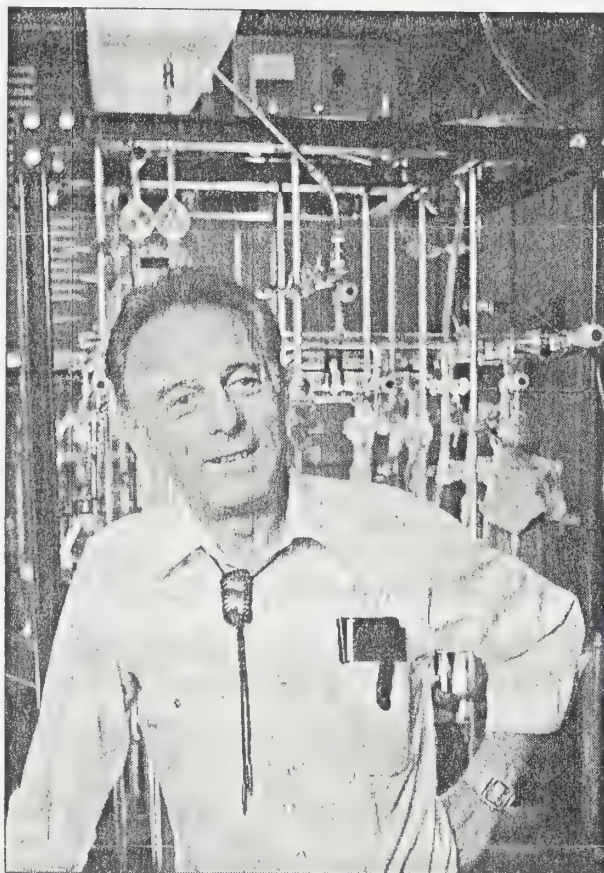
It is unfortunate that the word "chemical" has acquired a bad connotation because the beneficial uses of chemistry are all around us. Chemistry is in the food we eat — fresh fruits and vegetables available year-round, packaging that stops spoilage and super-productive farms are all the result of modern food chemistry. It's in the clothes we wear — long-wearing materials, bright colors, protection from heat and cold, absorbent diapers, space suits and even bulletproof fabrics all come to us through chemistry.

Other uses

It's in the sports equipment we use — high-tech athletic shoes, basketballs, tennis rackets, sailboats, skis and goggles are all triumphs of modern chemistry. It's in the medicine we take — medicines such as aspirin, insulin, antibiotics such as penicillin and streptomycin, and vaccines that have eliminated many childhood diseases such as polio and smallpox are all made using chemistry.

Chemistry is also the solution to problems brought by technology and industrialization: It protects our planet by cleaning the environment, developing less polluting and more efficient sources of energy, and inventing new processes for recycling materials. Chemistry makes our life healthier, easier and safer. Chemistry is in everything we see, touch, taste, or smell. It's not only all around us — it's even within us — our bodies are complex chemical factories that carry out the complicated chemical reactions we call life.

But in addition to the obvious importance of National Chemistry Week to our society as a whole, it has a special significance for Fresnoans. National Chemistry Day began as the brainchild of the late George



George Pimentel, a professor at UC Berkeley, had roots in Fresno.

'It is unfortunate that the word "chemical" has acquired a bad connotation because the beneficial uses of chemistry are all around us.'

Claude Pimentel, a Fresnan and award-winning professor of chemistry at the University of California at Berkeley, whose research activities included the discovery of the first chemical laser and the design of an instrument carried on the Mars Mariner 6 spacecraft.

He was deputy director of the National Science Foundation, the recipient of the National Medal of Science (the nation's highest scientific award), a dedicated teacher and a lifelong advocate of scientific literacy among the public at large. As president of the American Chemical Society in 1986, he launched the initiative that became a congressional resolution designating Nov. 6 as National Chemistry Day.

Few people knew that George Pimentel was from Fresno. He was born on May 2, 1922, on the Pimentel family ranch in Rolin-

da. His mother, Lorraine Alice Pimentel (née Laval) was a member of one of Fresno's prominently early families. Her brother, from whom Pimentel received his middle name, was Claude "Pop" Laval, the famous photographer who took more than 100,000 photographs of the area between Stockton and Bakersfield starting in this century's first decade. His work, exhibited at the 1915 Pan Pacific Exposition in San Francisco, attracted the nation's attention to Fresno, and he continued to record the character and growth of Fresno and the San Joaquin Valley until his death in 1966.

Pop's grandson, the late Jerome D. Laval, assembled many of his pictures in the three-volume set, "As 'Pop' Saw It" (1975-85). A 1996 pictorial historical calendar, "Valley Times Remembered," has been produced by Bonnie Simonian of Si-

'National Chemistry Day began as the brainchild of the late George Claude Pimentel, the award-winning professor of chemistry at the University of California at Berkeley ...'

monian Farms, from photos in Pop's collection.

Pimentel and his brother, Joe, spent their early years in Fresno before moving to Los Angeles during the Depression; they frequently visited the Laval family house at 656 Van Ness Ave., where his mother, a court reporter in the Fresno County District Attorney's Office, had lived. Decades later, on a trip to Fresno, George saw that the Christmas tree he had helped plant in the front yard was higher than the house and pushing up the foundations.

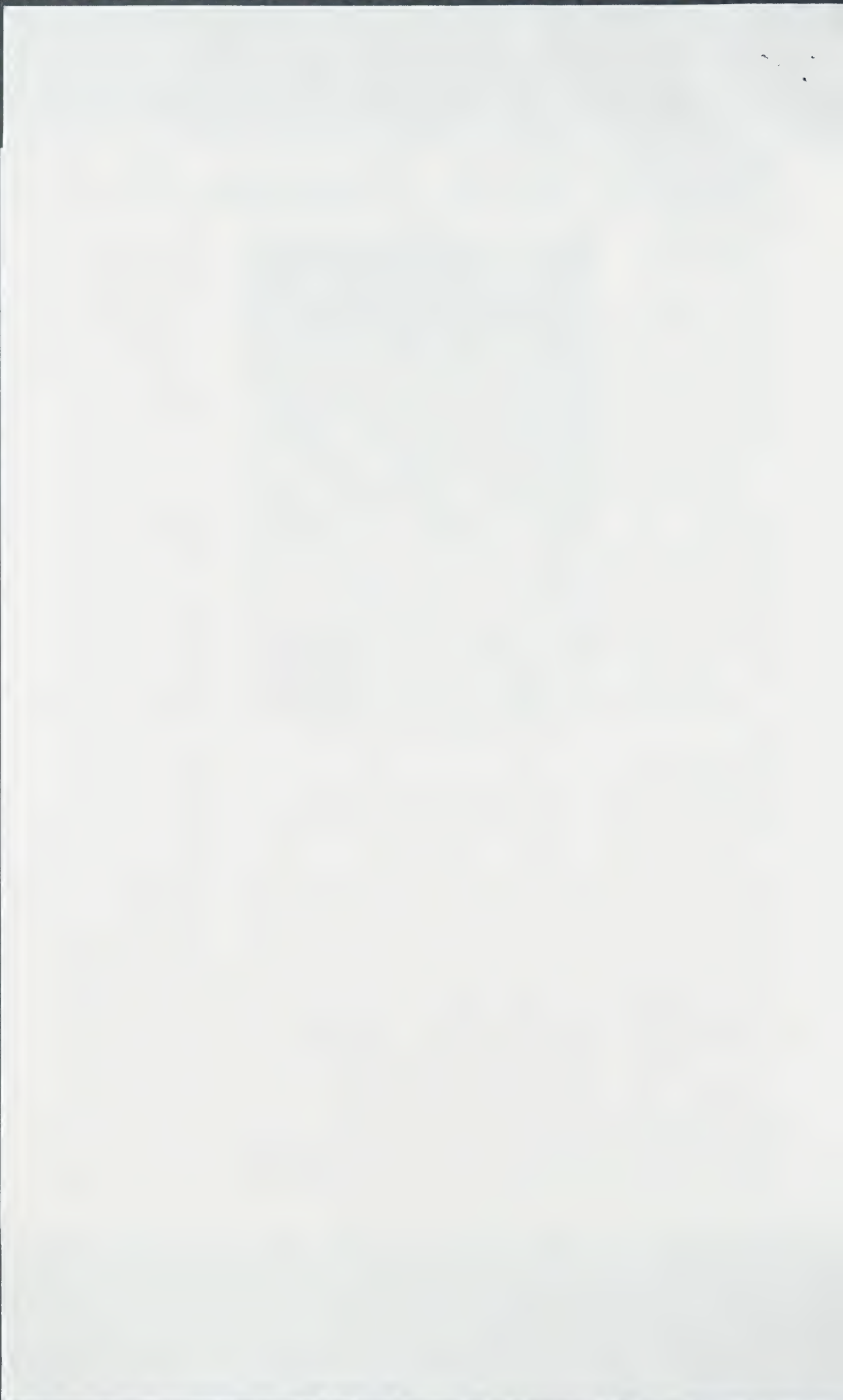
Pimentel realized that citizens who are increasingly called upon to make decisions on political, scientific and technological issues need to understand that chemistry is essential for meeting our basic needs, improving the quality of our lives, and maintaining a strong economy. His efforts helped America's chemists and chemical engineers to communicate more effectively with the public about the many benefits chemistry brings to our society and to respond to public fears about the risks associated in the popular mind with chemistry and chemicals.

'Positive messages'

National Chemistry Week is celebrated throughout the United States and Puerto Rico with an array of activities including chemistry demonstrations, hands-on activities, contests, lectures, open houses, workshops, exhibits, radio and TV broadcasts and billboard displays. A recent National Chemistry Week campaign reached more than 7 million people with positive messages about chemistry.

Persons interested in local National Chemistry Week activities should contact the American Chemical Society's Fresno section coordinator, Jerry Tamura, at 498-1734.

George B. Kauffman is chemistry professor at California State University, Fresno.





FAX FROM

DR. ALFRED BADER
Suite 622
924 East Juneau Avenue
Milwaukee, Wisconsin 53202
Telephone: 414/277-0730
Fax: 414/277-0709

April 30, 1996

Page 1 of 2

TO: Professor George B. Kauffman
Department of Chemistry
FAX: 209/278-7139

ETA 209/323-9123

Dear George:

I have been traveling around the country quite a bit, and so can deal with Arnold Thackray's response to my previous letter only now. A copy of Arnold's query is enclosed.

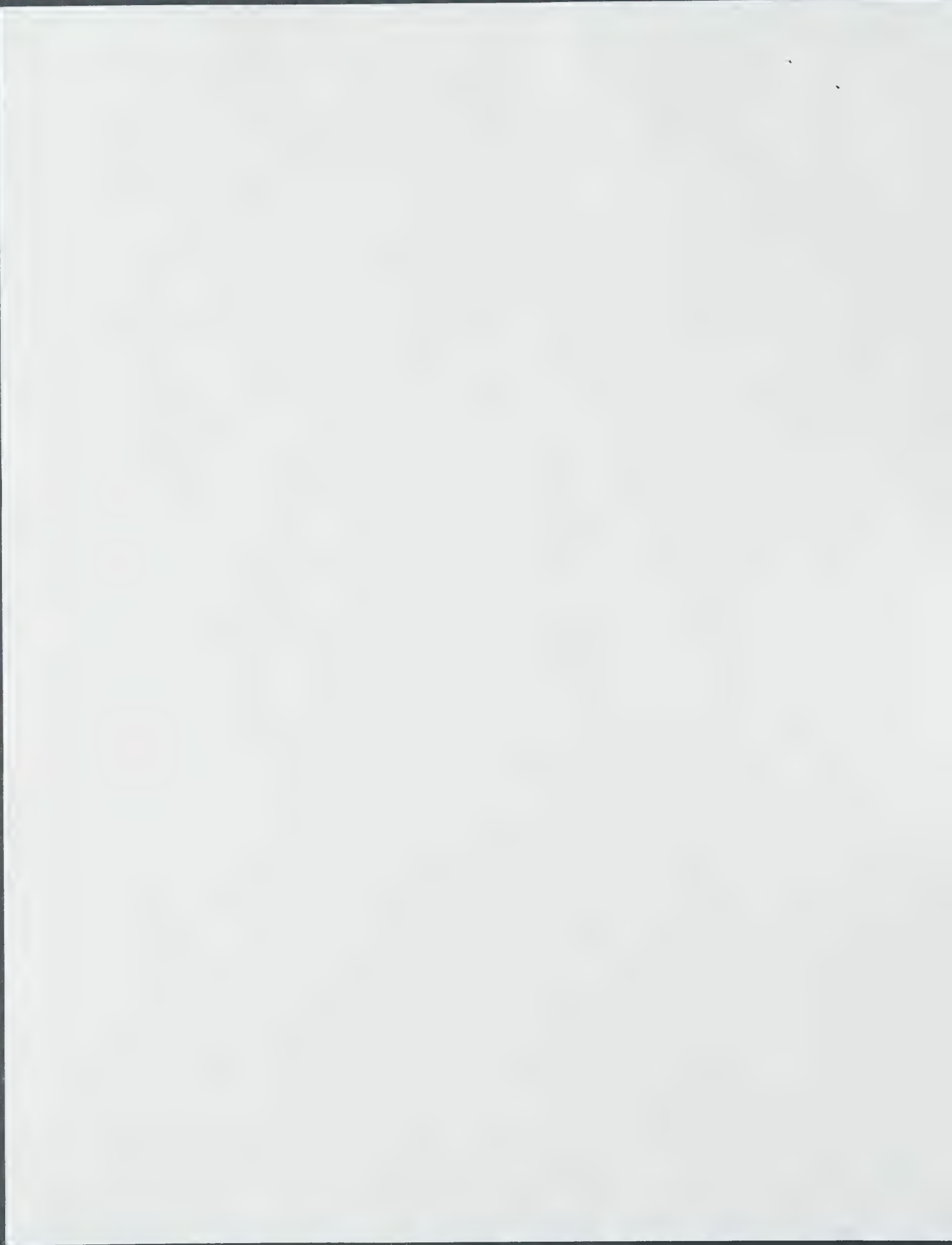
Unfortunately, I don't know what Skolnik's and Reese's book, A Century of Chemistry, is like; could you please guide me?

With all good wishes from house to house, I remain,

Yours sincerely,

AB/cw

Enclosure



TRANSACTION REPORT

FOR: ALFRED BADER PIPE WFTS 4140710709

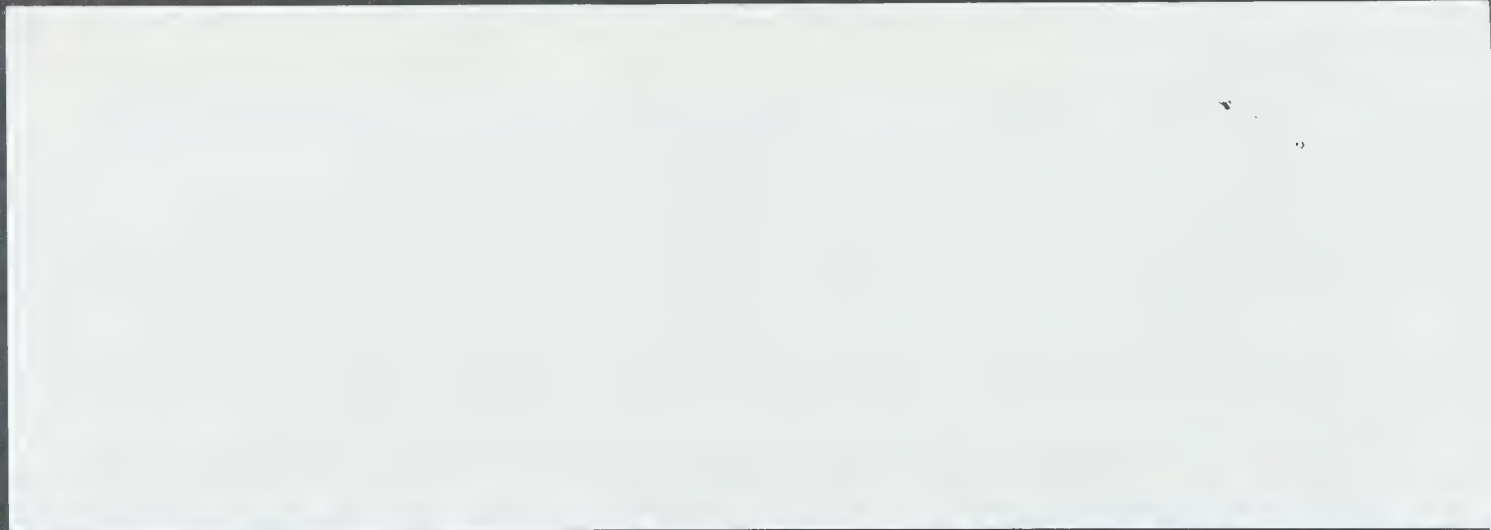
END

RECEIVER

AMOUNT

NOTE

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CHEMICAL HERITAGE FOUNDATION

315 Chestnut Street Philadelphia, PA 19106-2702 USA
Telephone (215) 925-2222 Fax (215) 925-1954

THE BECKMAN CENTER FOR HISTORY OF CHEMISTRY THE OTHMER LIBRARY OF CHEMICAL HISTORY PUBLIC EDUCATION

Sent by FAX to 414:277 0709

15 April 96

Dear Alfred,

So nice to hear from you!

To respond to your good thoughts:

- (1) CHF is developing its own series of books...
- (2) CHF is co-publisher of a series with ACS...

Hence ACS history is of interest to us...

How does George Kauffman's MS differ from Herman Skolnik
& K M Reese, A Century of Chemistry (ACS, 1976)?

Please call me (ext 265) so we can chat, when you
have a minute

Fascinated by the continuing Brande - Forward saga ... as
you know Chemical Heritage is going to color printing: are there
possibilities here for reproduction of the painting, plus an article
by you? Our new editor, Mary Virginia Orna, may be after you!

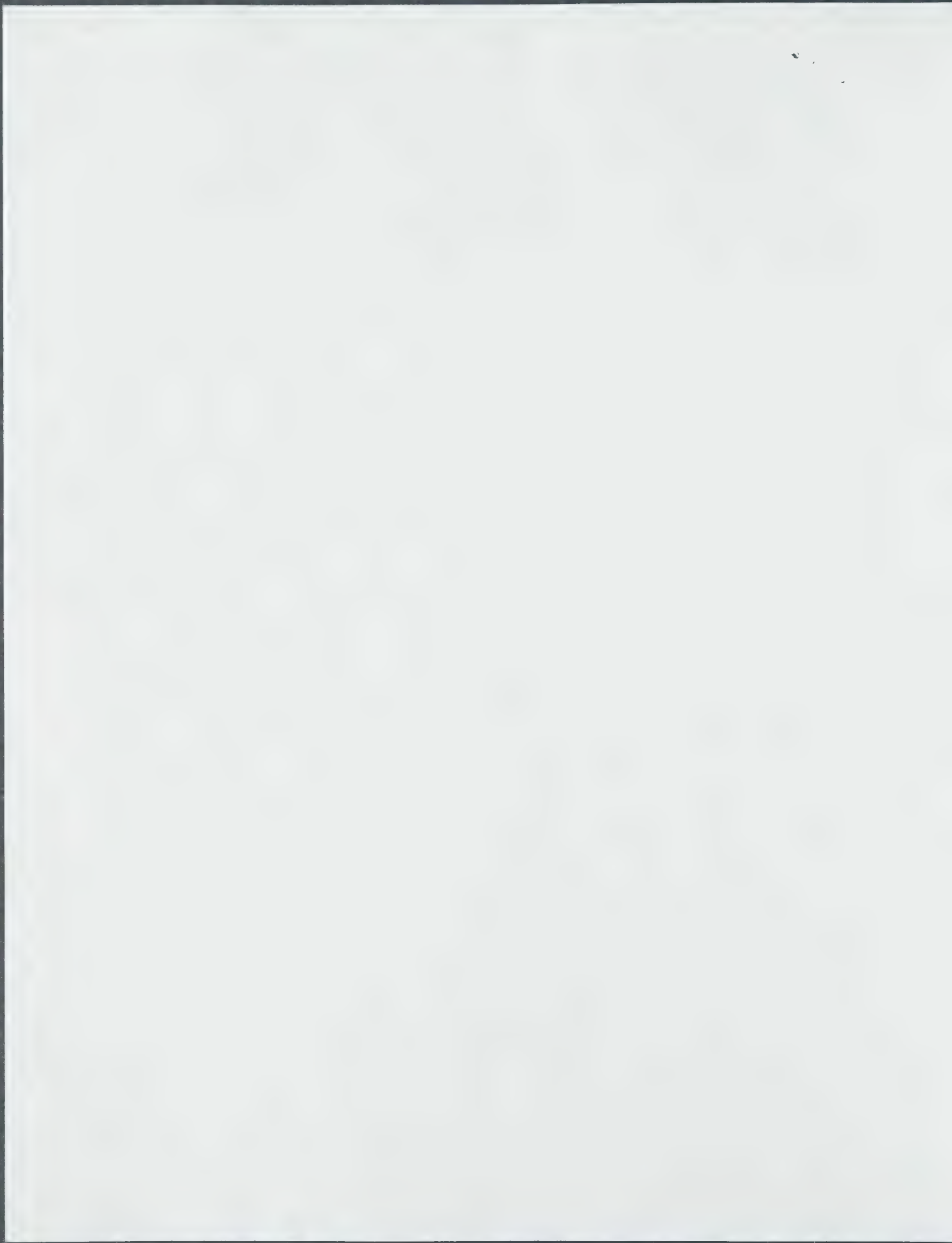
Sincerely

Arnold

cc F. Kohler; MV Orna

FOUNDING MEMBERS: AMERICAN CHEMICAL SOCIETY AMERICAN INSTITUTE OF CHEMICAL ENGINEERS

AFFILIATED SOCIETIES: ALPHA CHI SIGMA FRATERNITY THE AMERICAN ASSOCIATION FOR CLINICAL CHEMISTRY, INC.
AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS AMERICAN INSTITUTE OF CHEMISTS, INC. AMERICAN OIL CHEMISTS' SOCIETY
AMERICAN SOCIETY FOR MASS SPECTROMETRY CHEMICAL MANUFACTURERS ASSOCIATION THE CHEMISTS' CLUB THE ELECTROCHEMICAL SOCIETY, INC.
FEDERATION OF SOCIETIES FOR COATINGS TECHNOLOGY INTERNATIONAL SOCIETY FOR PHARMACEUTICAL ENGINEERING
THE NORTH AMERICAN CATALYSIS SOCIETY SOCIETY FOR APPLIED SPECTROSCOPY SOCIÉTÉ DE CHIMIE INDUSTRIELLE





Dr. Alfred Bader
924 East Juneau, Suite 622
Milwaukee, Wisconsin 53202
Phone: 414/277-0730
Fax: 414/277-0709

A Chemist Helping Chemists

January 19, 1996

Professor George B. Kauffman
1609 East Quincy Avenue
Fresno, CA 93720

Dear Professor Kauffman:

You must have realized how very much I enjoyed speaking with you this morning and learning that your health is improving.

Thank you for giving me carte blanche to talk to ACS directors about the desirability of publishing your book.

The Loschmidt Symposium in Vienna was a great success, and I enclose copies of the program and of the two papers which I gave.

All of the papers will be published in English by Plenum, but don't hold your breath: It may take quite a bit of time. When the book comes out, you might be just the right person to review it.

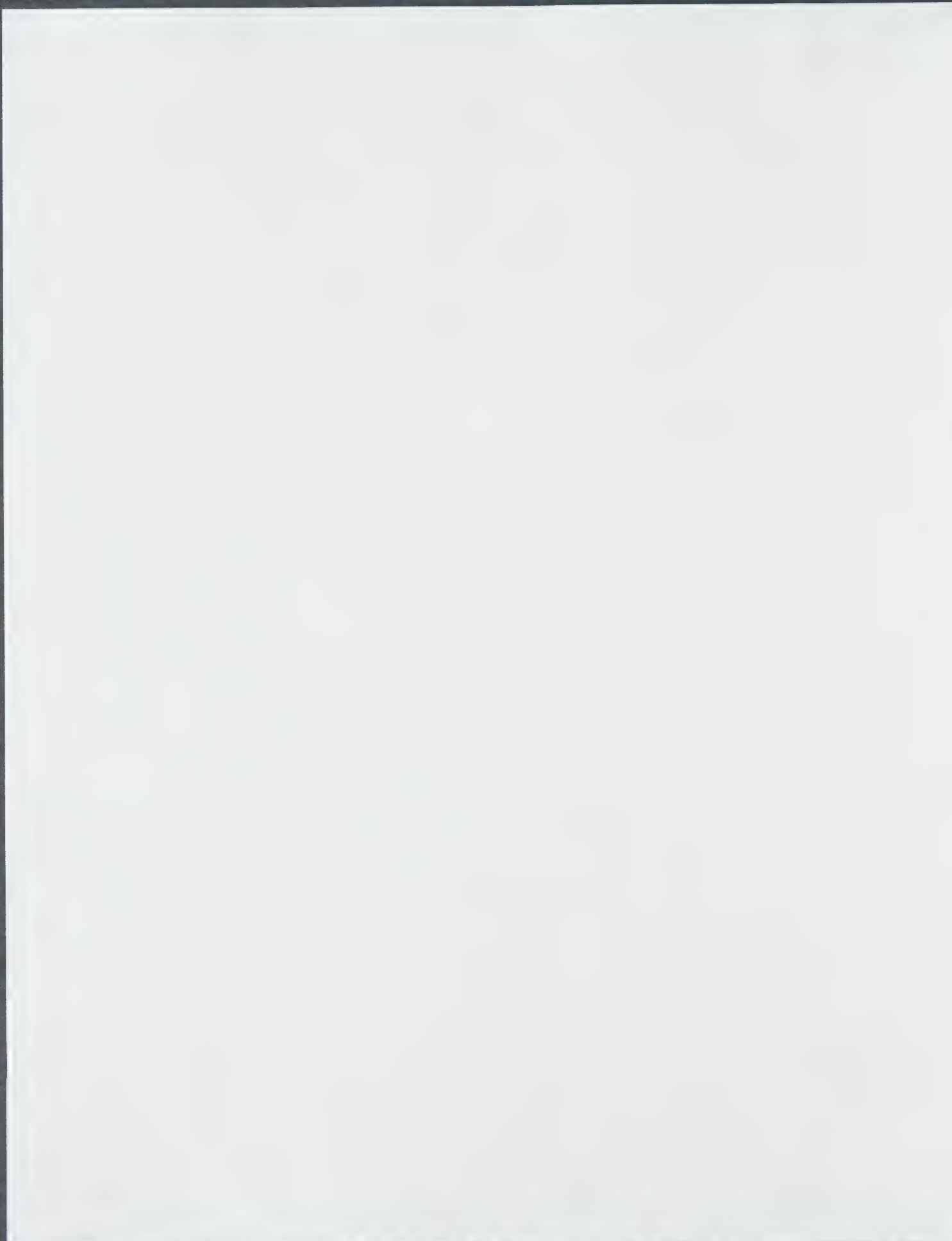
I very much hope to have a chance to come to the ACS meeting in San Francisco in April of 1997 and then visit with you.

With all good wishes from house to house, I remain,

Yours sincerely,

AB/cw

Enclosures



DR. GEORGE B. KAUFFMAN
FEATURE EDITOR

June 1, 1995

Dear Dr. Baden,

Please accept our belated congratulations on your receipt of the 1995 Parsons Award in recognition of your many years of public service.

Thanks for your kind letter of May 16 and for the autographed copy of your book. My wife Laurie and I finished reading it on May 7, but we haven't been able to complete our review (handwritten copy enclosed) until now because I've been suffering recently from a bad attack of chronic fatigue syndrome (CFS), which I picked up in either China or South Africa in the summer of 1987 (This is one of the reasons that I rarely attend meetings; I never know when an attack will occur). Please check the review and return it ASAP with any needed corrections.

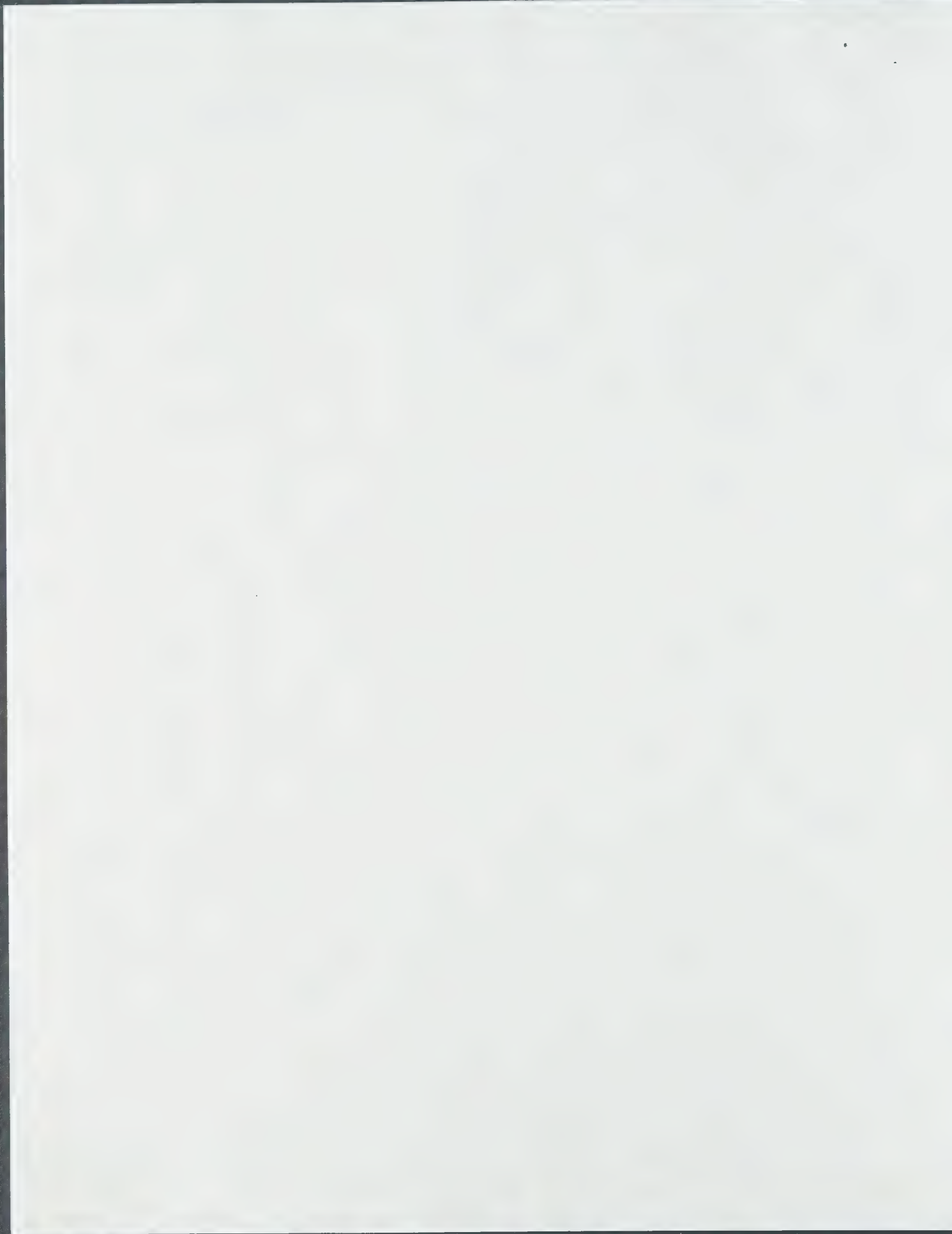
Because C & EN has given you so much coverage in the last year or so, they will probably not review the book - at least they didn't want me to review it (They waived your sending me a copy as a possible conflict of interest). Instead, we're reviewing it for Angewandte Chemie, where it will appear in both English and German versions, which should bring your book to the attention of your many European friends. Our review is a very long one, and we were still unable to include everything that we wanted. To date, Angewandte Chemie has never shortened any of our reviews (Kiretore!), so maybe they'll use all that we've written. We'll hope for the best.

A quick question - Your book contains a fantastic number of details, dates, etc. How were you able to remember these? Do you keep a daily journal as Glenn Seaborg has done since the age of 14?

I was surprised by the number of coincidental similarities in our

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lives - I taught Sunday school at about the same time as you did, I married my first wife in July 1952 and she died of cancer in 1989, my children (Ruth and Judith) were born in 1958 and 1961, etc., all of which engendered a great feeling of empathy with you.

There is another matter on which you could do me a tremendous favor and simultaneously perform another mitzvah for the chemical community. As you can see from the enclosed correspondence with Bob Fyle, Editor of The Hexagon of Alpha Chi Sigma, I've spent considerable time, effort, and money researching and writing what was originally a series of articles on ACS presidents but which has evolved into a short book, which the ACS wants to publish. However, Cheryl Sharke has informed me (FAX enclosed) that a subvention is required to publish the book, which would be a definitive one (I unearthed info that even the ACS itself didn't have). Could you please make such a subvention to the ACS, either personally or through one of your foundations? I will, of course, acknowledge your assistance in the published book, which will include portraits of all ACS presidents. Cheryl will be glad to give you any additional information that you might need.

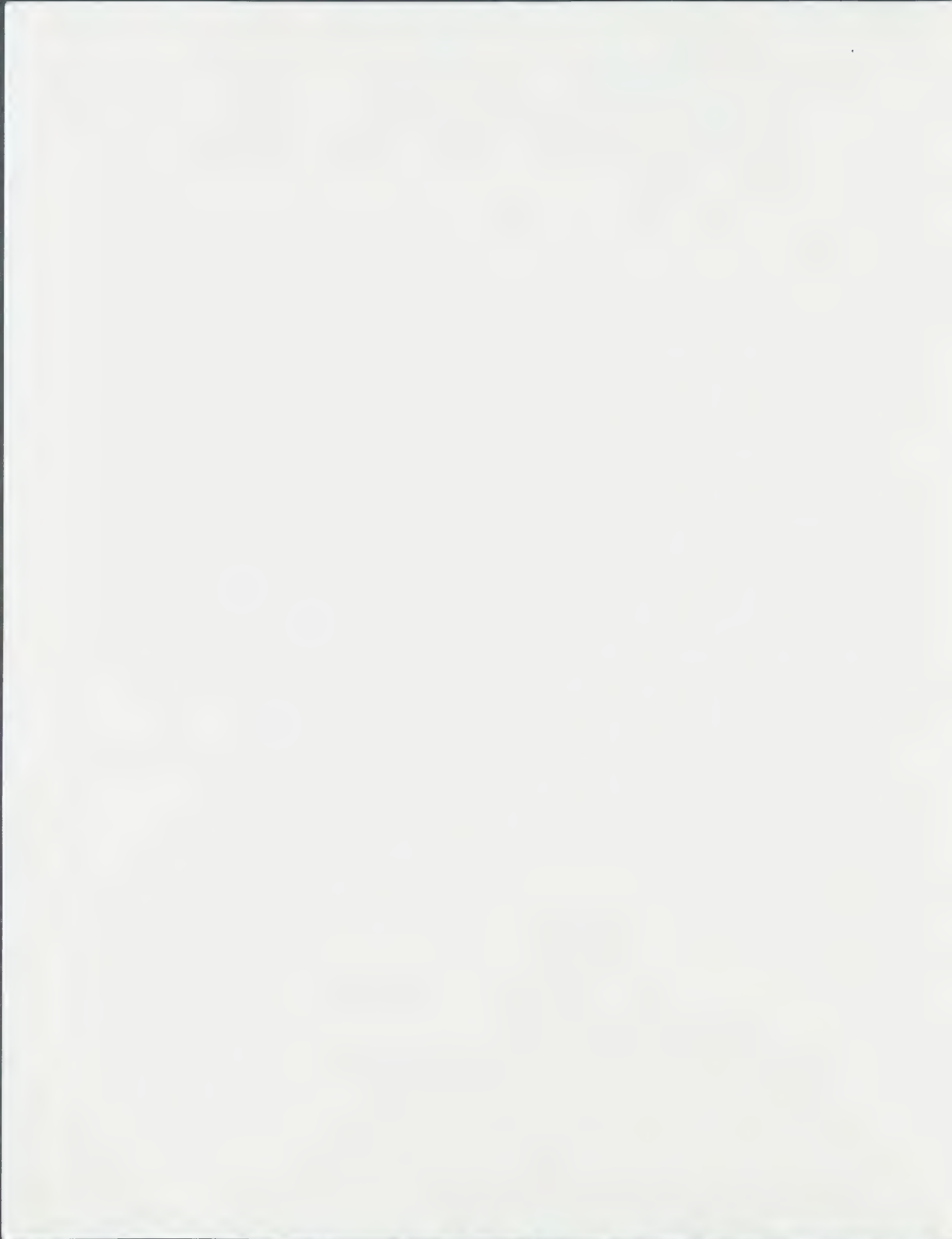
I'm also enclosing some reprints and preprints in which I thought that you would be interested.

Thank you.

With best wishes to you and Isabel for Laurie and me,

Cordially,

George





Dr. Alfred Bader
924 East Juneau, Suite 622
Milwaukee, Wisconsin 53202
Phone: 414/277-0730
Fax: 414/277-0709

Professor George B. Kauffman
1609 East Quincy Avenue
Fresno, CA 93720

A Chemist Helping Chemists

Dear Professor Kauffman:

Thank you so much for your letter of June 1st.

This reply will have to be very much shorter than I would like it to be, but we are just leaving for a long trip to England and the Continent from which we will not return until July 28th. It seems to me that a short reply now is better than a long one so much delayed.

What a terrible disease CFS must be, and I do hope that these attacks do not happen very frequently.

C&E News is likely to have the book reviewed, particularly as the ACS will be distributing it. Perhaps someone very close to them wanted to have a chance.

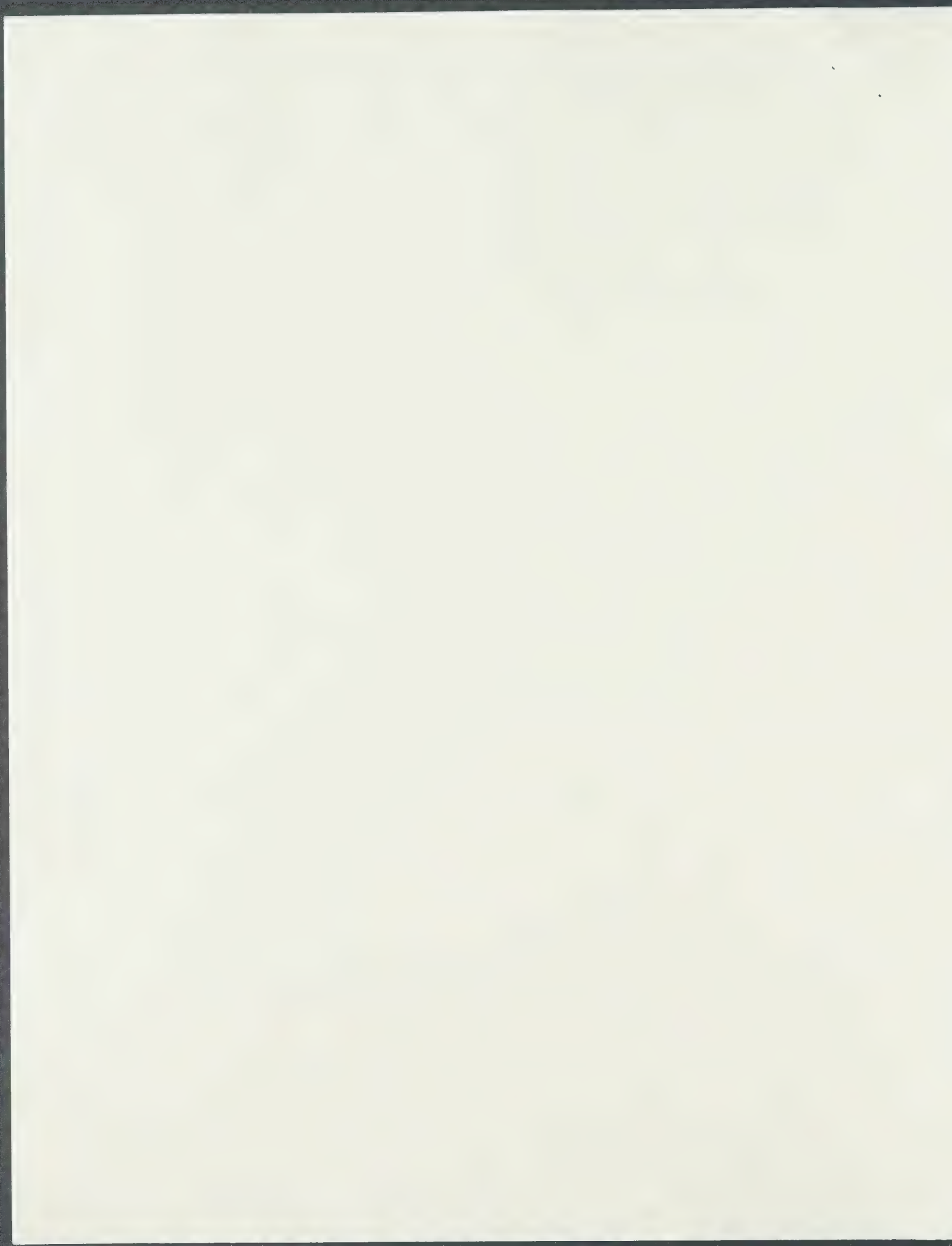
Your review is certainly wonderful, and there are very few improvements I can suggest. These are penciled in in red on your copy, which I return, and detailed on the enclosed.

It would certainly be great if *Angewandte Chemie* published your review in full, both in German and English. I have not kept a daily journal, as Glenn Seaborg has done, but I am a great collector of papers and not just Isabel's 408 letters.

The similarities in the important dates in your and my life are really amazing.

Thank you so much the many reprints which I will study with great care this summer. Many, of course, I have read before, and that is why I so wanted you to review the book.

I must tell you that I was just sick when I looked over your correspondence with Bob Lyle. No one could have put your case any better than you did in the last paragraphs of your letter of September 6, 1994. All I can say is that I am happy that I am not a member of Alpha Chi Sigma.



Professor George B. Kauffman
June 6, 1995
Page 2

You probably know better than I do that the ACS does not do a very good job publishing and marketing books. I have enjoyed reading many of those small autobiographies by eminent chemists of today, but the ACS charges over \$30 for these books. My autobiography is distributed in this country by Trafalgar Square at \$25.00, and Trafalgar is giving the ACS a 50% discount so that I hope that it will do a good job distributing the book, also at \$25.00.

For The Hexagon to turn you down after all the work you did and for the ACS to suggest a \$20,000 subsidy is chutspah².

Our foundations, the Helen Bader Foundation and the Isabel and Alfred Bader Foundation, try to help people, and I enclose the last Helen Bader Foundation annual report. We did give \$300,000 to the ACS for Project SEED II, but this is for disadvantaged people, not for a book the ACS should be proud to publish.

Of course, I know how hard it is to raise money - see pp. 269-271.

Incidentally, I was particularly interested in your two papers on Anschütz.

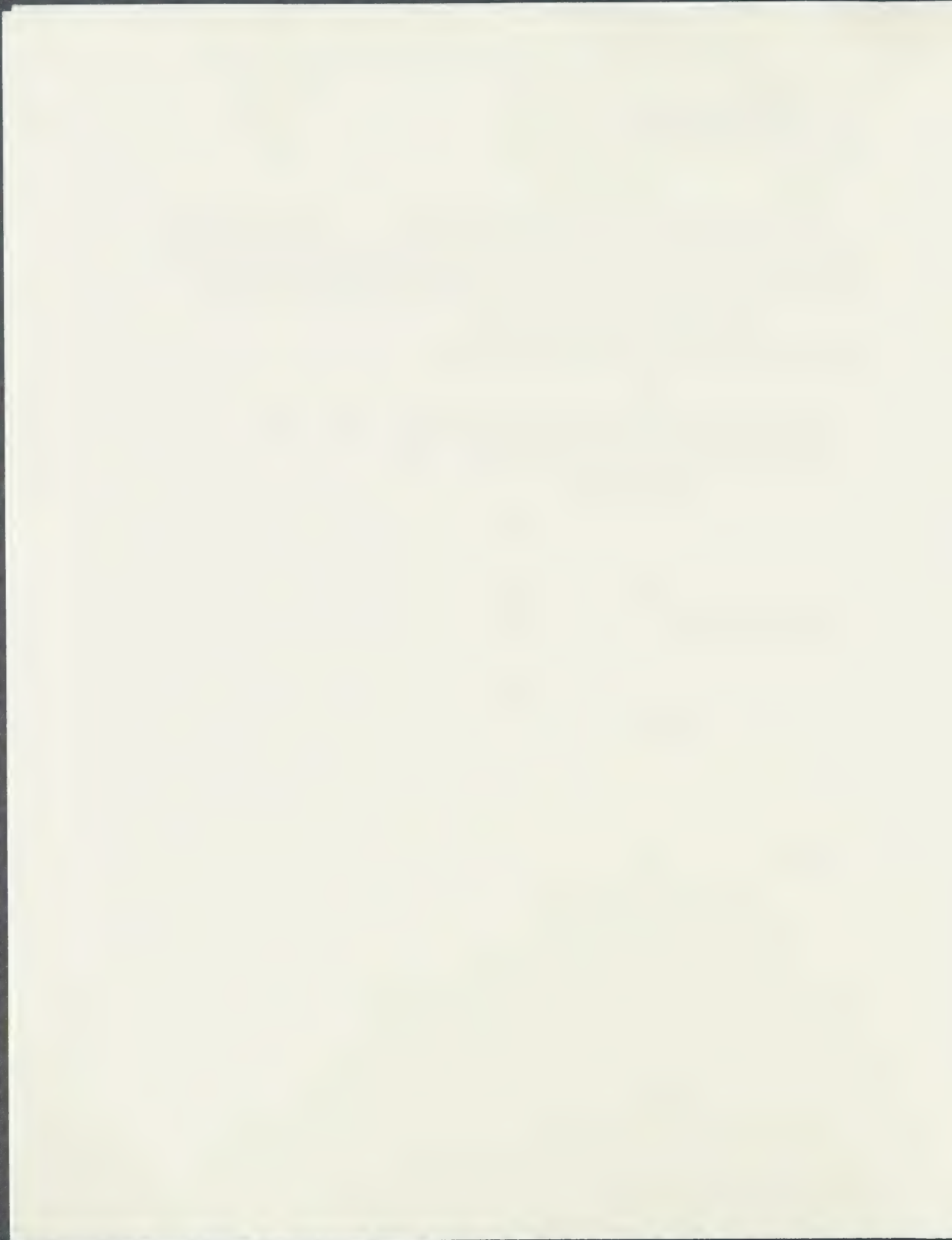
Did you know that there will be a Loschmidt Symposium in Vienna? If not, the enclosed program will interest you.

With many thanks and all good wishes to you and Laurie, I remain,

Yours sincerely and hurriedly,

AB/cw

Enclosures





QUERIES ABOUT YOUR 11-PAGE REVIEW:

Page 1:

Dr. Alfred Bader

924 East Juneau, Suite 622

The book is distributed by Trafalgar Square in the United States, priced at U.S. \$25.00.

I will inquire what the DM price is and let you know.

Phone: 414/277-0720
Fax: 414/277-0709

Four lines from the bottom of P.1:

A Chemist Helping Chemists

Isabel and I were separated between 1949 and our marriage in 1982, more than a quarter of a century.

Page 4:

It took me about two and a half years to get my Ph.D. I started in September 1947, left Harvard in December 1949, and then was awarded the degree, in absentia, in March 1950.

Line 3 of P.4:

"Hatred of Christians" is not quite correct. I don't recall hating a single Christian because he was a Christian, but I did hate the hypocrisy by which Christianity preaches love and did what it did.

Last line of P.4:

\$400 per month was the lowest received by any Harvard Ph.D. in chemistry. In other fields, salaries might have been even lower.

Page 5/Line 6:

Bexhill is spelled with an *i*.

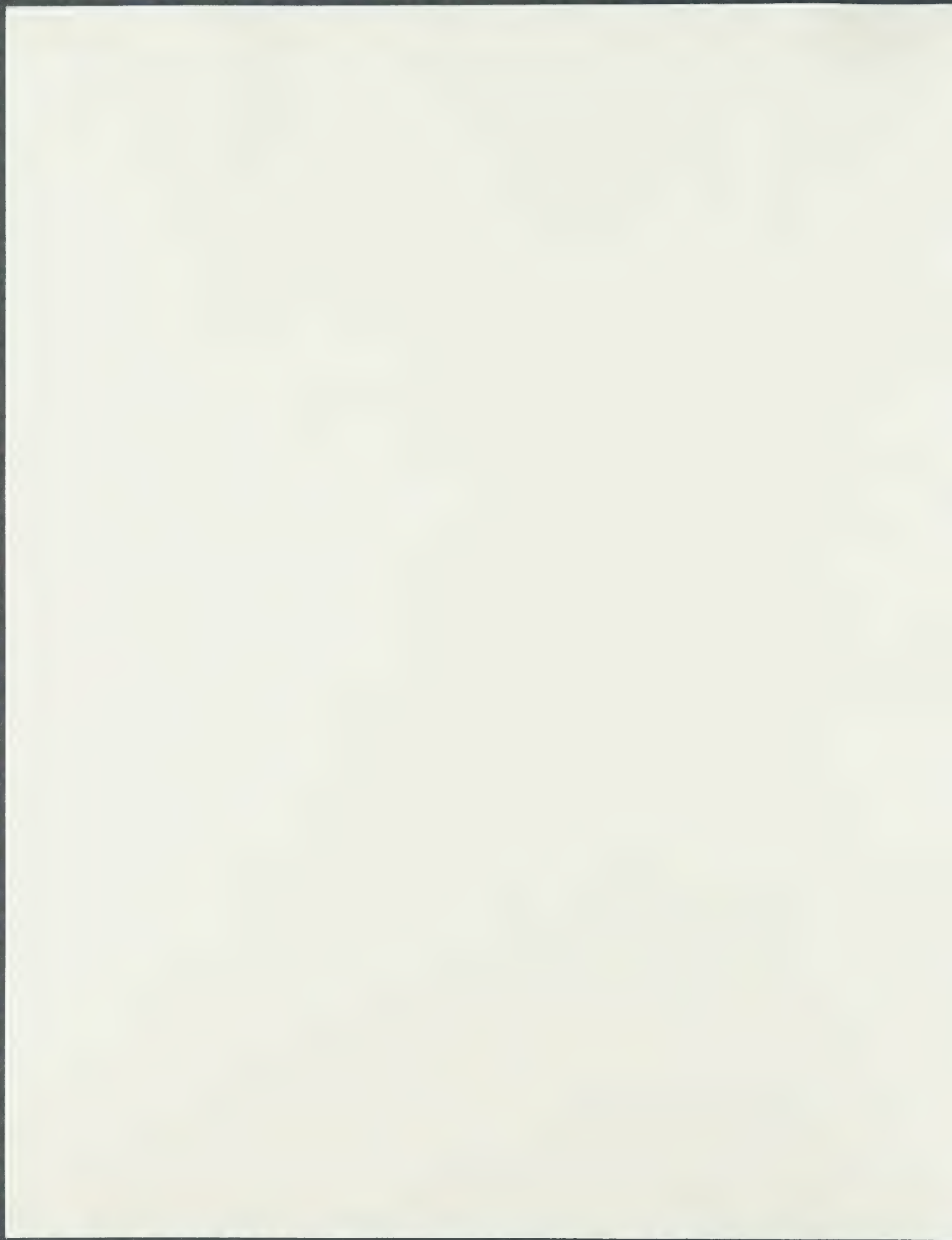
Last line of P.5:

Danny and I were divorced in July 1981, and Isabel and I married exactly six months and one day later, in January 1982. In Wisconsin, one cannot get married within six months of a divorce, and the extra day was added because - for reasons you surely know - we wanted to get married on a Tuesday.

Please consider whether you want to write that "Bader divorced his wife". If Danny had not suggested the divorce, it would not have happened.

Page 7:

The Aldrich catalogue comes out every two years, but the *Aldrichimica Acta* is published three to four times per year.



June 6, 1995

Via Express Mail

Professor George B. Kauffman
1609 East Quincy Avenue
Fresno, CA 93720

RE: Your errata sheet

Dear Professor Kauffman:

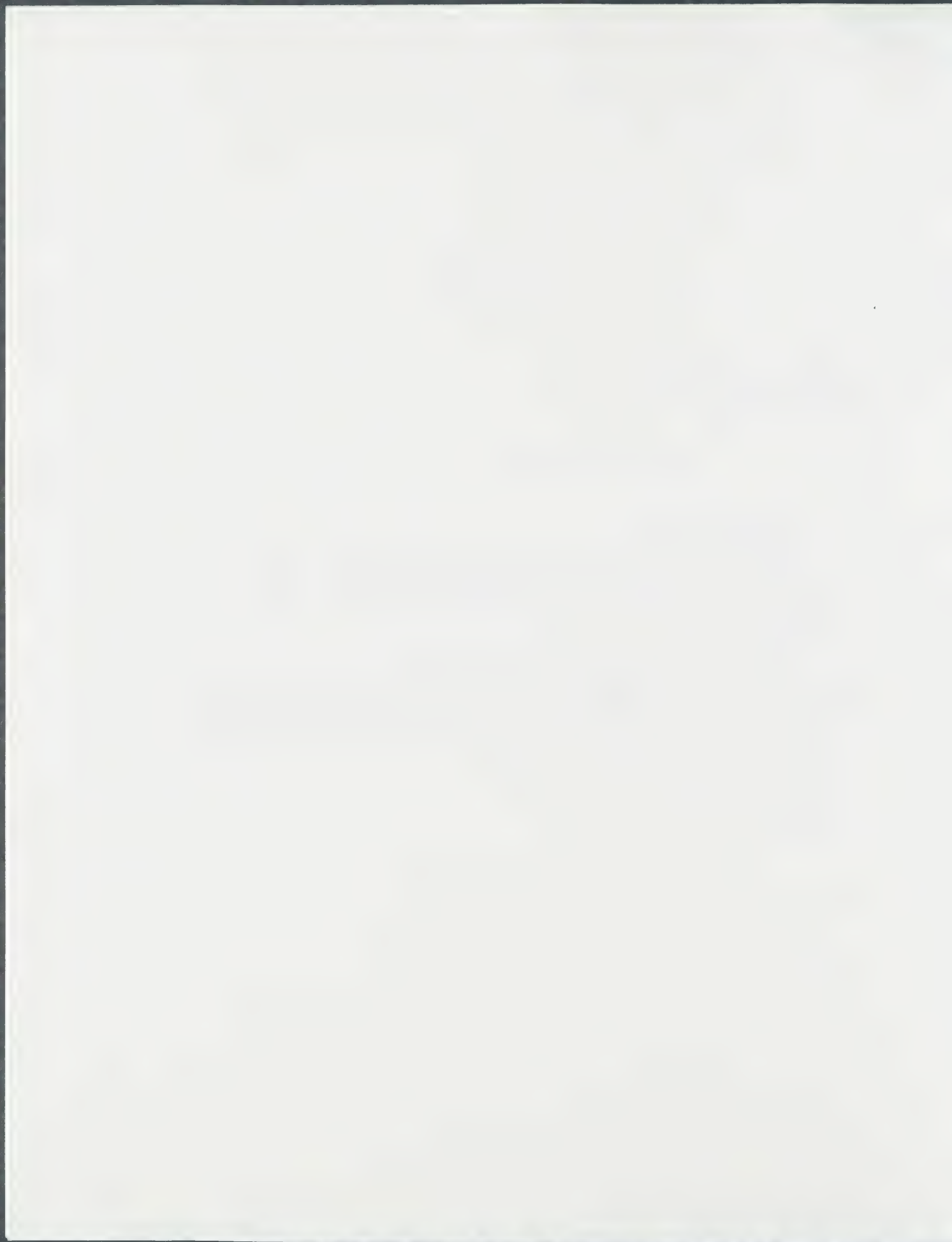
I am embarrassed about the three corrections which I have underlined heavily: Fredericton has no **k**. Glenn in Glenn Seaborg has 2 **n**'s. And of course, I meant *censured* on page 172 and not censored. I should have known better. *Dissintiss* really is spelled with 4 s's, or at least so Mr. Vogel assured me.

Quite a few of the others point to the difference between British and American spelling. Please keep in mind that this was published in Britain. We did opt for American spelling in words like *color* but in the many instances, like in the spelling of *modeling*, *counseled*, *traveling*, etcetera where Webster's Dictionary says that both are acceptable, we opted for the British spelling.

I have seen *anti-semitism* spelled either way.

Best wishes,

AB/cw



May 16, 1995

Professor George B. Kauffman
1609 East Quincy Avenue
Fresno, CA 93720

Dear Professor Kauffman:

Isabel and I had hoped to be able to meet you at the Anaheim ACS convention early last month and then to give you a copy of my autobiography, *Adventures of a Chemist Collector*. I learned there that you hardly ever come to conventions, and so I inscribed a copy and left it with Barbara Pralle of ACS Books, who promised to forward it to you.

Of course, I was delighted to learn that you will be writing a review, because I've always so enjoyed reading your reviews of other books. If you happen to have any questions whatever about the book, please do let me know.

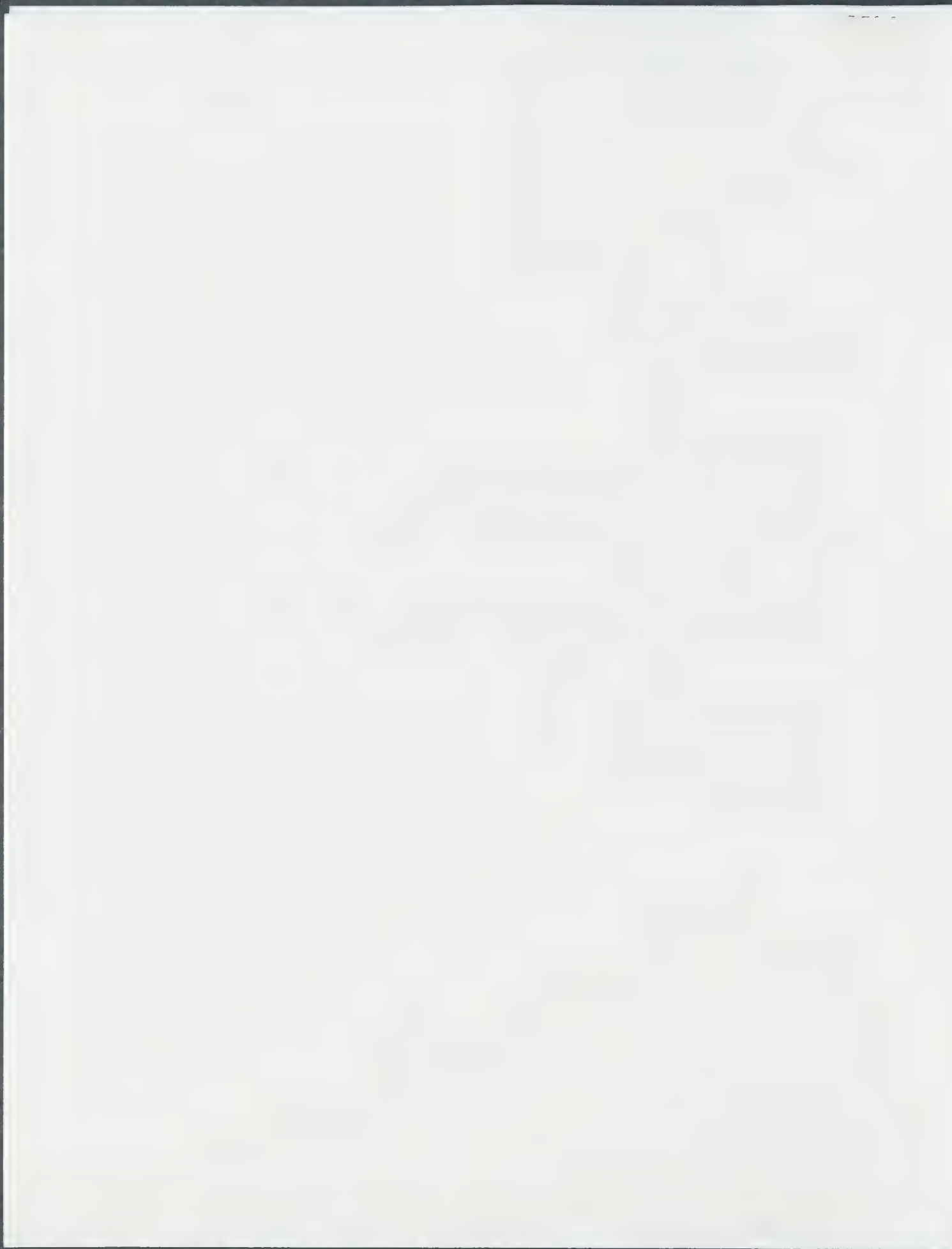
Also, may I impose upon you to let me know where your review or reviews will be published?

With many thanks for your help and best personal regards, I remain,

Yours sincerely,

AB/cw

Enclosure



DR. GEORGE B. KAUFFMAN
FEATURE EDITOR

May 13, 1994

Dear Brother Bob,

I'm enclosing two copies of Part I of the ACS Presidents article. As you can see, I followed your suggestion on including more detail on each president — about 2-3 paragraphs for each (Ray Seymour had provided as little as less than a sentence for some presidents). I've also included useful references to readily available books and journals that should make the series a definitive source paper.

When I sent you Ray's original manuscript, I hadn't read it. I soon found that it was poorly written and contained numerous errors, e.g., he completely omitted the first six presidents ⁽¹⁸⁷⁶⁻¹⁸⁸¹⁾ and started with the seventh president, John W. Mallet (1882), whom he mistakenly proclaimed to be the first president. I didn't know Ray during his prime, but during his last years, when I frequently collaborated with him, I found his writing to be very sloppy (I think that he dictated his manuscripts "off the top of his head" to his secretary and didn't proofread them to catch obvious errors). Because I didn't use any of Ray's manuscript but merely the idea for the article, I didn't include him as coauthor but have dedicated the article to his memory.

Regarding portraits of the presidents, the ones on pp. 383-393 of Herman Stolnik and Kenneth M. Reese's "A Century of Chemistry" (ACS, 1976) seem ideal (xerox enclosed). If you prefer, I can ask the ACS for these portraits but I think that it would be easier for you or Pat Kettle to do so.

Because I'm not sure if you wanted Part I for the Summer '94 issue of The Hexagon (you gave me a June deadline), I'm sending a copy of the paper to Pat in case she needs it in a hurry.

When would you like Part II, which should include presidents from 1901 to 1926?

With best wishes,

Yours in the Double Bond,

George

Contributing Editor, The Hexagon

CC: Pat Kettle

DEPARTMENT OF CHEMISTRY — CALIFORNIA STATE UNIVERSITY, FRESNO — FRESNO, CA 93740

(209) 294-2581 or 294-2105 323-9123

JOURNAL OF CHEMISTRY EDUCATION



DR. GEORGE B. KAUFFMAN
FEATURE EDITOR

September 6, 1994

Dear Better Bob,

To say that I was shocked by your telling me that THE HEXAGON couldn't publish the ACS Presidents series would be a gross understatement. I sent you Ray Sagnon's draft in 1993, and on Feb. 21, 1994 you called me and told me that you wanted to publish the article but that you wanted much more detail on each president. I said that the article would require a number of parts, and when I asked you about length, you replied that you wanted whatever length was required to cover the topic. ~~Because of other~~ At your suggestion I wrote to Pat Karle for AXE info on the presidents on Feb. 25, 1994, and Sue Kieffer responded on Mar. 4, 1994. Because of other writing commitments I was unable to meet your Mar. 20 deadline, but I then dropped my other projects and was able to meet your June deadline. I sent you and Pat Part I on May 13, 1994 and Part II shortly thereafter.

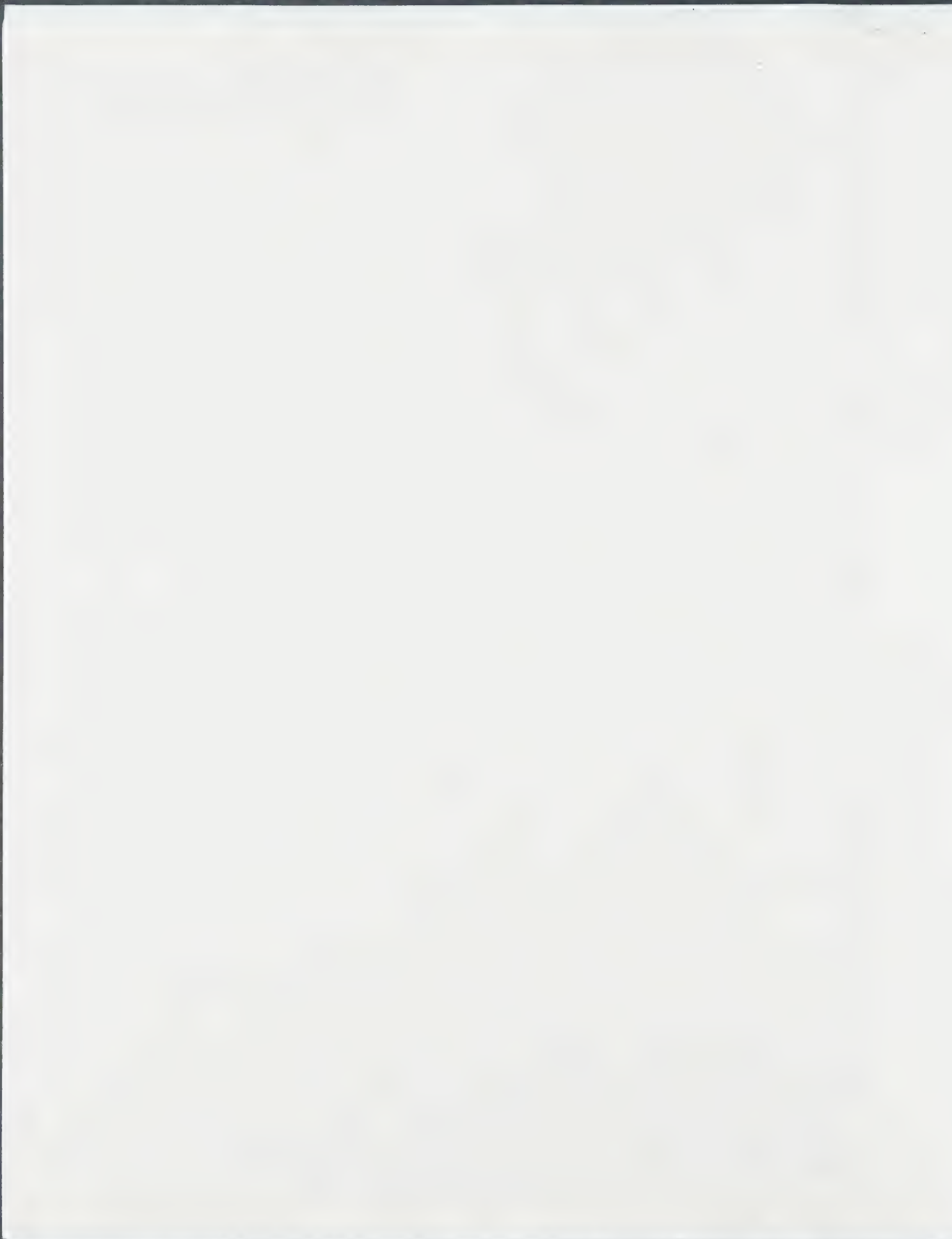
After receiving these parts, you were most enthusiastic, even more so than I, and you agreed to check with ACS for portraits. On every occasion that we spoke, you were "gung ho" on the project and expressed the need for such a definitive series that even the ACS had not compiled. When you requested a diskette I promptly sent one to Pat. On Aug. 15, 1994 I sent you and Pat Part II (corrected) and Parts III and IV. Because I had no departmental typist, I also followed your suggestion of sending Pat (on Aug. 15, 1994) the handwritten manuscript of Part II because you said that she would be able to have the rest of the series typed after the Conclave. I also sent you a form letter to request biographical info to be sent to living ACS presidents. You promised to have the letter typed.

Then, when I called you last week to learn what success you had in finding info on recent ACS presidents in Washington, you suddenly - out of a clear blue sky - told me that you would be unable to publish the series in THE HEXAGON - at a time when I was working on Part III. I had temporarily abandoned my other writing projects and spent half of the Spring semester and the entire summer on a project specifically tailored to your specifications that you had expressly commissioned and on which I had regularly informed you of my progress. Because I had no departmental typist available, I had spent my own funds for typing (85 pages at \$3.00 per page). A

Contributing Editor to 8 journals through the years, I've always made it a point to ~~write~~
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(209) 291-2501 or 291-0100 323-7123

JOURNAL OF CHEMICAL EDUCATION

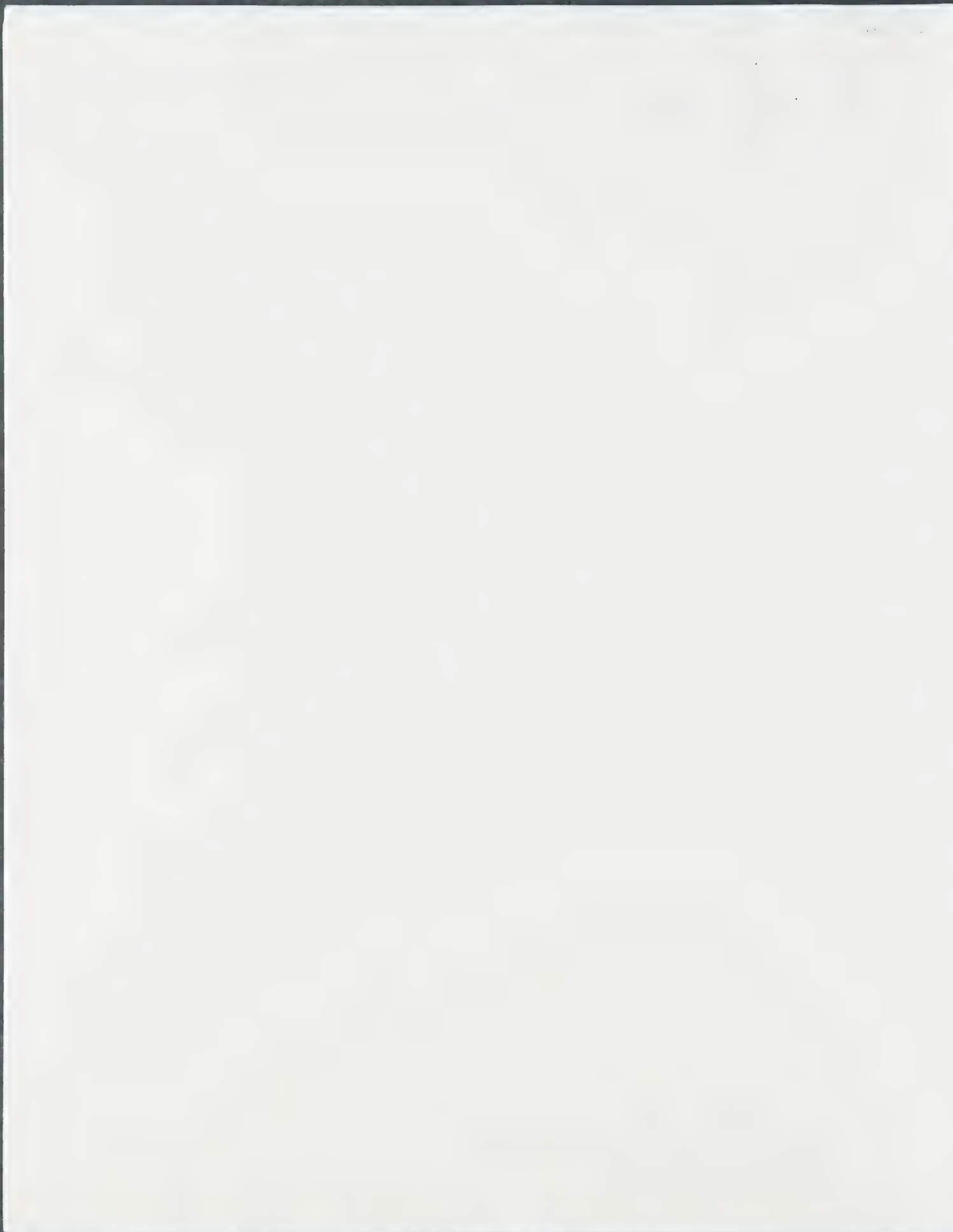


to honor scrupulously all my agreements, verbal as well as written, We had a definite agreement to publish the series, and I have fulfilled my part of the bargain in good faith. I'm asking you to fulfill your obligation, which is not only universally accepted business and professional practice but also a matter of mere common courtesy.

Thank you.

Yours in the Double Bond,

George
Contributing Editor, THE HEXAGON





The Hexagon of Alpha Chi Sigma

12814 Kings Forest • San Antonio, TX 78230-1511 • 210-492-4290 • Fax: 210-492-5330

September 8, 1994

Mrs. M. Joan Comstock
Head
Books Department, American Chemical Society
1155 16th Street, N.W.
Washington, DC 20036

Dear Joan:

Enclosed is a copy of the manuscript "ACS Presidents" written by Dr. George B. Kauffman, Department of Chemistry, California State University at Fresno, Fresno, CA 93740 (209-323-9123). He has covered the presidents up to the 1960's, and is currently writing about the more recent presidents. As you will note, it was being written for an Alpha Chi Sigma publication, so there may be some sections which could be edited to remove references to AXΣ. Also it was being prepared for a series of short articles, so I am sure he has material to expand the discussion, if that is desired.

As I mentioned on the phone, I have Sections I-IV on floppies in Word 5.1 for Mac. After you have reviewed the manuscript, I can send them to George or you as you wish.

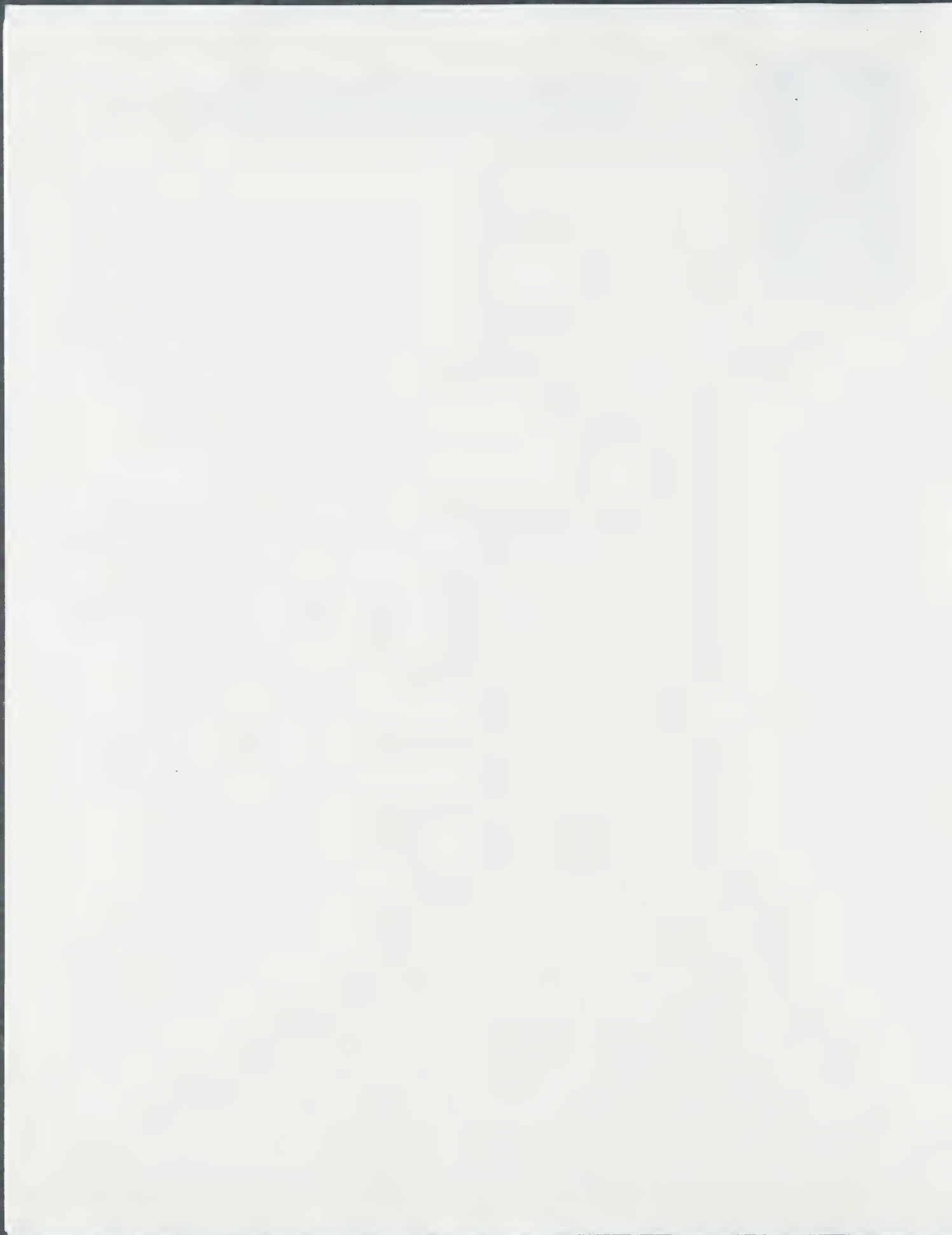
Thank you for taking a look at this material, for I think it would serve a purpose in the ACS history.

Sincerely,



Robert E. Lyle
Editor

cc: Prof. George B. Kauffman ✓





THE HEXAGON of Alpha Chi Sigma

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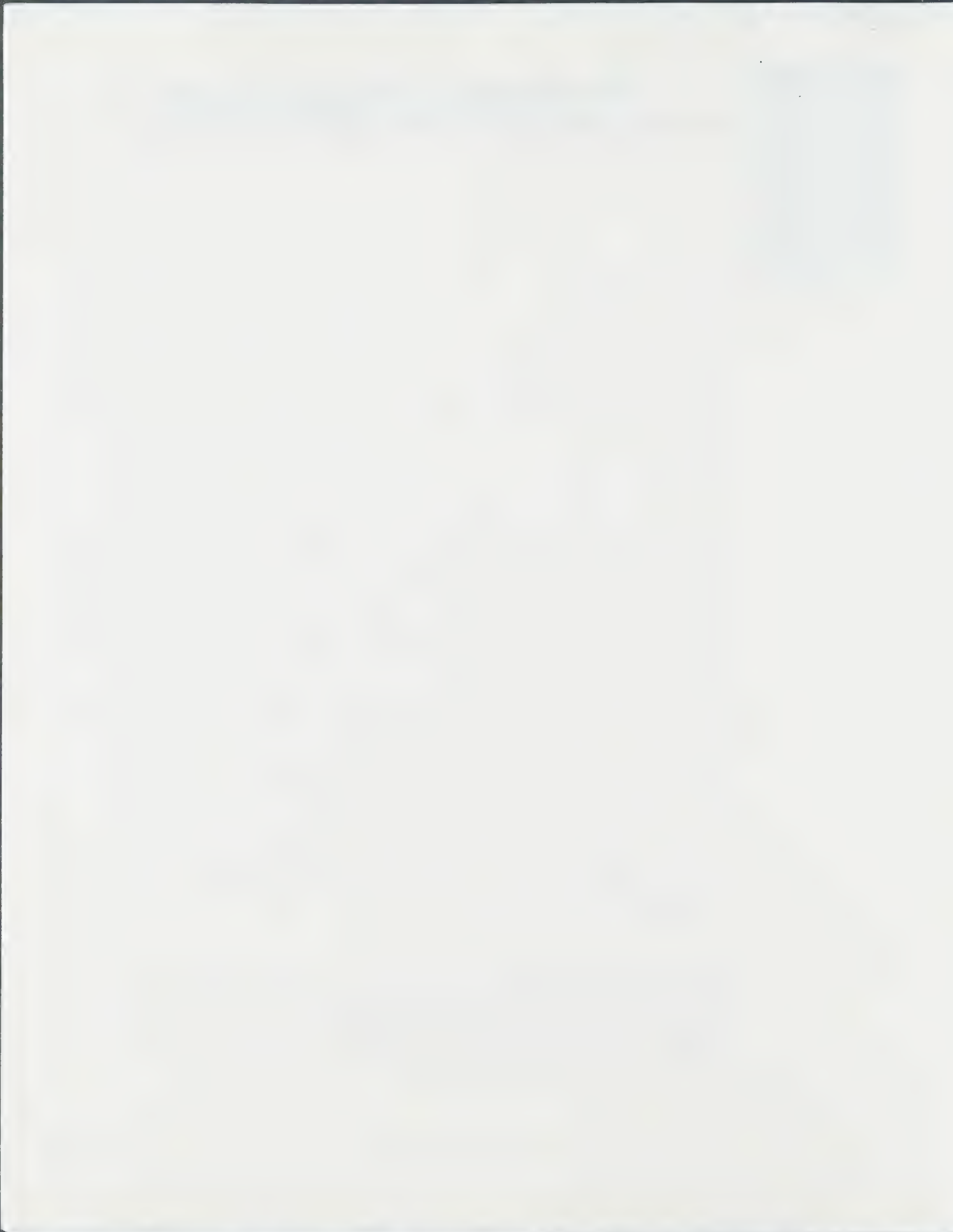
September 13, 1994

Dr. George B. Kauffman
Professor of Chemistry
Department of Chemistry
California State University at Fresno
Fresno, CA 93740

Dear Brother George:

I received your letter of September 6th, and I can appreciate your disappointment at hearing that we could not publish the ACS Presidents in THE HEXAGON. I too was disappointed when I realized I could not publish it. When we originally discussed the project I envisioned about 3 to 4 printed pages per issue for about four issues including all the pictures and references. This would have been the complete "article" budget for a year, but I felt the project was worth it. When I received the first Chapter, I was a little worried. I did not check the dates covered, and I expected two or three times that amount of material in all. Then when the next manuscript arrived, with 1960-1994 left to cover, I realized that only by severe editing could we possibly afford it in THE HEXAGON. My estimate is that the article with pictures would require at least two *complete issues* of THE HEXAGON. This was further confirmed by the material I found at the ACS that was still to be covered. In order to make it possible for THE HEXAGON to publish this article we would have to remove the guts of the article you had prepared. I decided to offer two courses of action: try to get a publisher for a book and/or include an article for THE HEXAGON containing *ONLY* Brothers. My recommendation is to do both.

Other less important but serious problems were related to the manuscript. Pat and her staff were reluctant, if not negative, about providing typing of this magnitude in view of their other responsibilities. The floppy you provided could not be used by them on IBM computers and could have been used by me only by working with the computer center at Trinity University.



Dr. George B. Kauffman
Page 2
September 13, 1994

I agreed that I would help you get information from the living ACS Presidents, but I could not have sent the letter you provided. To ask them to provide more than a resume or reference to a biographical article would have been an imposition. I appreciate the fact that you do not have secretarial assistance. Since my retirement two years ago, I have not had any assistance, so I type all THE HEXAGON articles that are not sent to me in DOS as well as all my correspondence.

I could honor my commitment to publish your article, but I do not believe you would be at all happy with the hatchet job that would be essential. I honestly believe that the two courses of action I proposed provide the best solution.

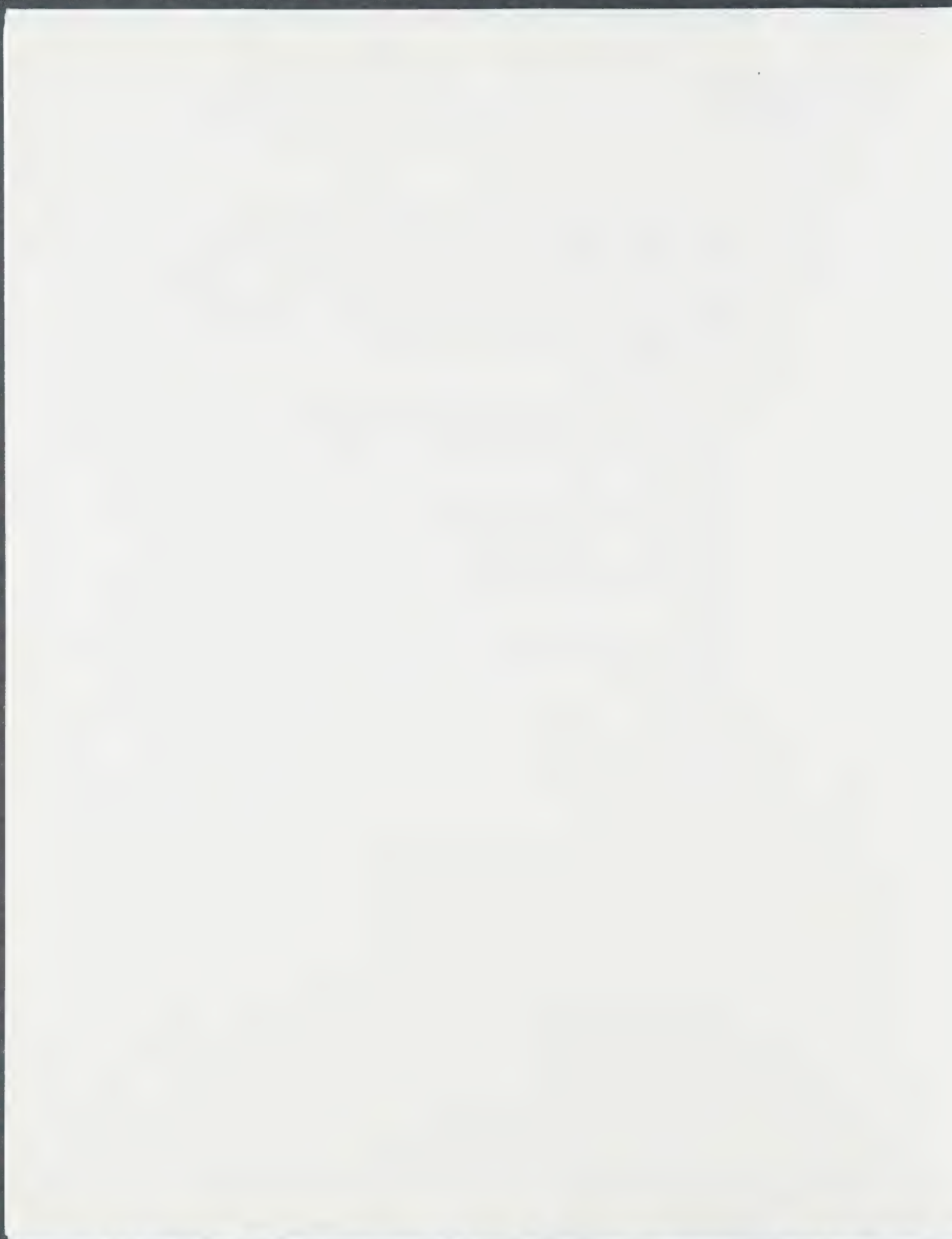
It is unfortunate that I did not describe the limitations I face on page space, but I strain the Alpha Chi Sigma budget each year as it is.

Best wishes on working with Joan, and I hope you reach a satisfactory agreement.

Yours in the Double Bond,

A handwritten signature in cursive script, appearing to read 'R. Lyle'.

Robert E. Lyle
Grand Editor



FAX**Date** *May 16, 1995***Number of pages including cover sheet****TO:** *George Kauffman***FROM:** *Cheryl Shanks
Books Department
American Chemical
Society
1155 16th Street
Washington DC 20036***Phone****Fax Phone** *209 278 7139***Phone** *202 872 4566***Fax Phone** *202 452 8913***CC:****REMARKS:** *Urgent* *For your review* *Reply ASAP* *Please Comment*

Hi George:

Following are figures for a 250-page volume. Obviously, press costs vary depending on the press run. As I mentioned, the proposed volume would need to be marketed at an attractive price, and the project would not be financially viable without subsidy. The following costs relate to actually producing the volume, but do not include the price of marketing, distributing, and maintaining inventory.

Materials (include all press costs such as printing, binding, paper) \$9360

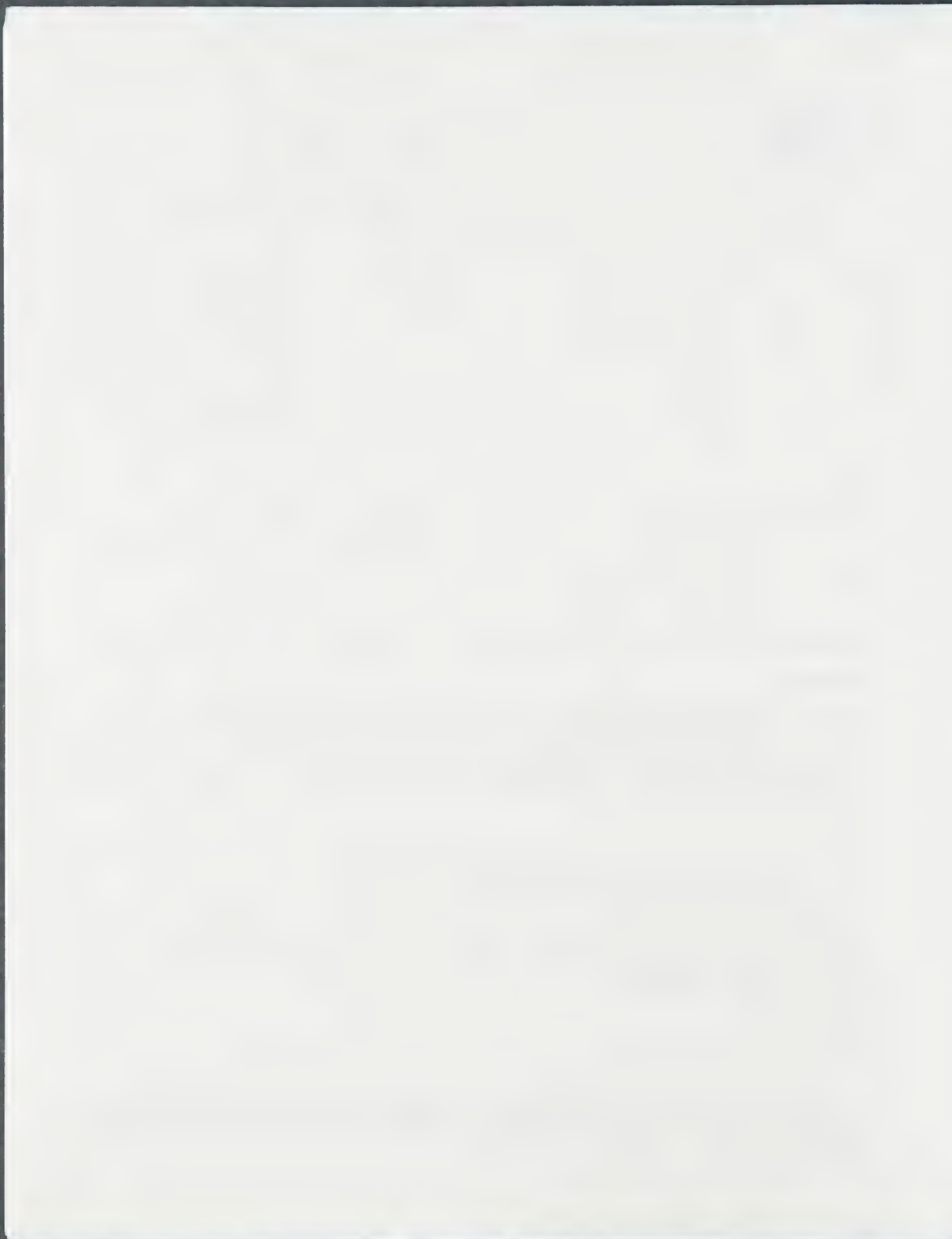
Labor (includes editorial and production costs such as copyediting, indexing, text and cover design) \$12890

A \$20,000 subsidy would cover the majority of the direct costs and allow us to market the volume at a reasonable price.

Give me a call.

Cheryl 

P.S. Barbara Pralle asked me to tell you that she heard from Bader yesterday regarding your review of his volume --- she said he seemed quite pleased that you were interested in reviewing the book.

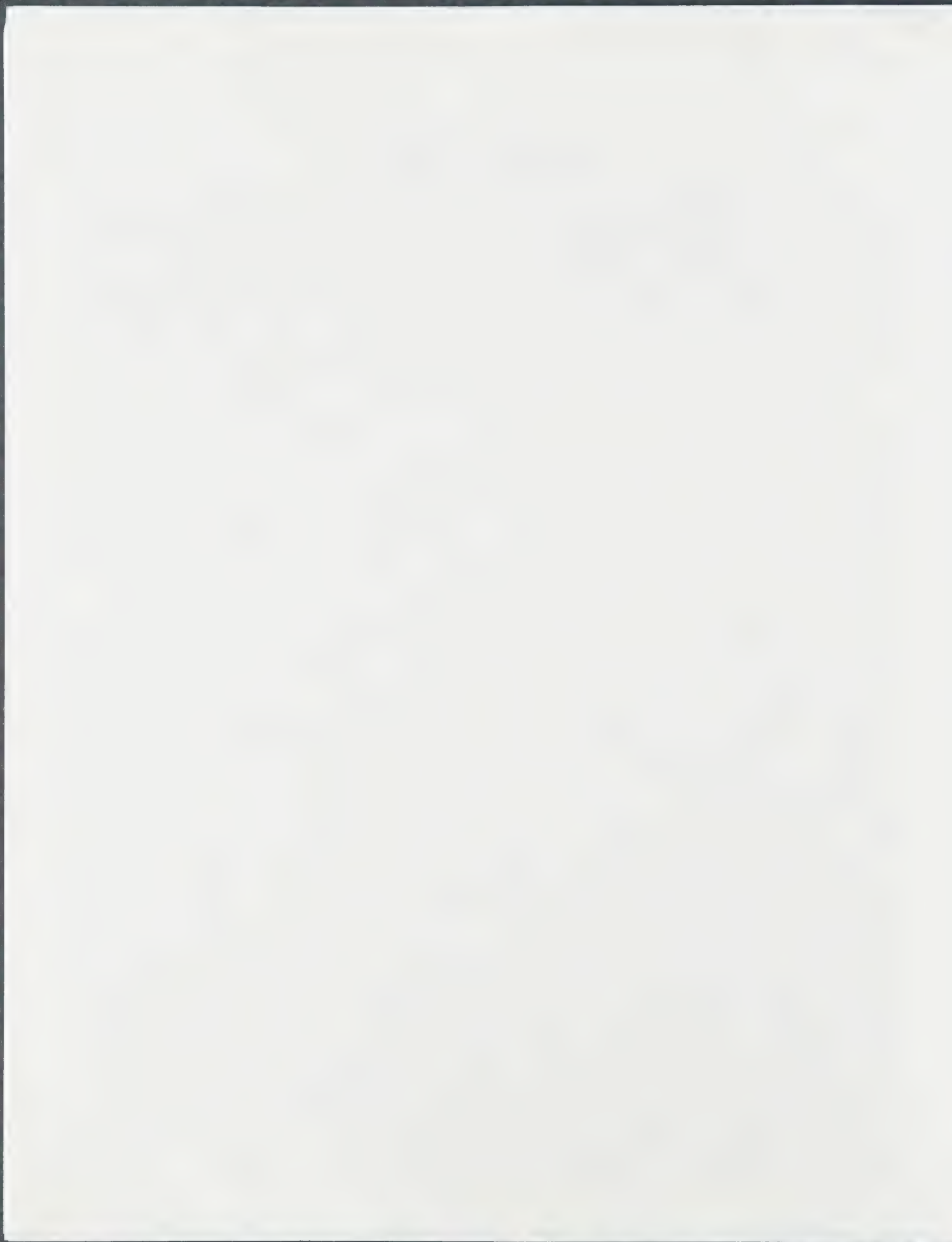


DR. GEORGE B. KAUFFMAN BIOGRAPHICAL SKETCH

Dr. George B. Kauffman, Professor of Chemistry at California State University, Fresno since 1956, was born in Philadelphia, PA on September 4, 1930. He was a Science Talent Search winner in 1948 (placed second in the City of Philadelphia). Receiving his B.A. with honors in chemistry from University of Pennsylvania (1951) and his Ph.D. from University of Florida (1956), he has been Research Participant at Oak Ridge National Laboratory, an Instructor in Chemistry at University of Texas, and Research Chemist for Humble Oil and Refining Company and General Electric Company. Long active in both local and national American Chemical Society affairs, he was Chairman (1969-70), Symposium Chairman (1966, 1968, 1970), and Program Chairman (1967-69) of the ACS Division of the History of Chemistry; Northwest tour speaker (1971); and Editor of History of Chemistry Series, ACS Audio courses (1975-81).

Dr. Kauffman is the author of 15 books and more than 1,200 papers, reviews, and encyclopedia articles on chemical education, chemistry, and history of science, a number of which have been translated into foreign languages. In 1969 the USSR Academy of Sciences invited him to contribute two articles on relations between Mendeleev and American chemists to a volume celebrating the centenary of the periodic system, the only Western scientist to be so honored. In 1971 he was invited to present a paper and preside at the 13th International Congress on the History of Science in Moscow, being the only Western scientist to preside at the Congress. In 1972 he was named Director of the CSUF National Science Foundation Undergraduate Research Participation Program and John Simon Guggenheim Memorial Foundation Fellow. In 1973 he was one of two faculty members chosen from among 16,000 in the 19-campus California State University System to be named Outstanding Professor in recognition of his "creative teaching and scholarly endeavor."

Since 1973, 1980, 1987, and 1989 he has been a Contributing Editor of *Journal of College Science Teaching*, *The Hexagon*, *Journal of Chemical Education*, *Today's Chemist*, and *The Chemical Intelligencer*, respectively. In 1976 he was one of the four national winners of the Manufacturing Chemists Association Catalyst Award for Excellence in College Chemistry Teaching. The N.S. Kurnakov Institute of General and Inorganic Chemistry, USSR Academy of Sciences awarded him its Chugaev Medal (1976), Kurnakov Medal (1990), and Chernyaev Medal (1991). He was a Visiting Scholar at the University of California, Berkeley (1976) and the University of Puget Sound (1978). In 1978 he received the Dexter Award in the History of Chemistry "for meritorious services over a long period of time which have resulted in the advancement of the history of chemistry," the first American to receive this international award since 1973. He was a member of the Editorial Board of *Polyhedron* and Editor of this international journal's quarterly feature "Historical Sketches" (1982-85). He was Contributing Editor of *Industrial Chemist* (1985-88). The recipient of 55 research grants, he made a chemical-historical study of Werner's coordination theory under a National Science Foundation grant at the Universität Zürich (1963-64). He spent 1983 in Europe under grants from the National Endowment for the Humanities and Svenska Institutet (the Swedish Institute) gathering material for his research project, "A Humanist Genius as Amateur Scientist: August Strindberg's Chemical and Alchemical Studies and Their Influence on His Literary and Dramatic Productions." He is listed in 40 biographical dictionaries, including "Contemporary Authors" (1968-), "Who's Who in America" (1978-), and "Who's Who in the World" (1980-). He received the Exceptional Merit Service Award (1984) and the Meritorious Performance and Professional Promise Award of the California State University System (1986 and 1988). He was awarded the Marc-Auguste Pictet Medal of the Société de Physique et d'Histoire Naturelle de Genève (1992) and the George C. Pimentel Award in Chemical Education (1993), the ACS's top award in the field. He organized the international Coordination Chemistry Centennial Symposium (205th National ACS Meeting, 1993), where 51 papers were presented by speakers from 17 countries; 37 papers appeared in the resulting volume under his editorship (ACS Symposium Series, 1994). On Oct. 12, 1994 he became the first recipient of the President's Medal of Distinction, "the highest non-degree award presented by CSUF...to citizens of the region, state or nation whose contribution in the area of professional achievements or public service are of national or international significance, or represent a contribution of great significance to the university."



REVIEWS

items in the text, figures, and annotations). Thus, modern technology comes to the aid of the muse Clio. The disk is available on request from Dr. William J. Wiswesser, 3124 Stoudts Ferry Road, Reading, PA 19605

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ognized toluene as methylbenzene and therefore explained the isomerism of cresol with benzyl alcohol); (3) the first double and triple bond designations (ethylene and acetylene and derivatives); (4) the first representation of vinyl and allyl groups; (5) the first realistic depictions of atomic sizes and bond distances ($C \equiv C < C = C < C - C$); (6) the first representation of cyclopropane; (7) the first diagrams with correct $C = 12$, $N = 14$, $O = 16$ formulas (a year after the Karlsruhe Conference); (8) the first textbook use of functional group symbols (e.g., Hd for hydroxide, Id for imido, Ad for amido); (9) the first use of valence prime marks (Loschmidt used the term *Pollenz*; the term *Valenz* was introduced by Hermann Wichelhaus in 1868); (10) the first proposal of tetravalent and hexavalent sulfur; (11) the first recognition that in alcohols containing several hydroxyl groups each carbon atom can bond to no more than one OH group; (12) the first recognition that ozone consists of three oxygen atoms; and (13) the first line-formula notations (to reduce printing costs). Loschmidt devoted 47 pages to his essay on structures; the remaining six-page essay, "Spannkraft der Gase," deals with the physics and kinetics of gases.

Like Avogadro's hypothesis, published in 1811 in a journal read primarily by physicists (*Journal de Physique* 1811, 73, 58) and neglected by chemists until resurrected by Stanislaw Cannizzaro at the Karlsruhe Conference in 1860, Loschmidt's privately printed opus languished in obscurity for more than half a century. In 1913 Richard Anschütz, Kekulé's successor at Bonn (Kauffman, G. B. *J. Chem. Educ.* 1982, 59, 627, 745), republished it as a volume in "Ostwald's Klassiker der exakten Wissenschaften" series. He made some minor corrections in the structures, incorporated into the text the structures originally depicted on seven original, awkward, easily torn, fold-out plates, and added an autographed portrait and an 11-page biography of Loschmidt and 46 pages of 208 annotations to Loschmidt's text. It was Anschütz's reprint that Bill Wiswesser discovered in the Lehigh University Library in the early 1950's and that inspired him to develop WLN (Wiswesser Line Notation) (Wiswesser, W. J. *A Line-Formula Chemical Notation*; Thomas Y. Crowell: New York, 1954).

Both Loschmidt's original book and Anschütz's reprint have until now been extremely difficult to obtain. Now, thanks to Alfred Bader, Chairman of the Aldrich Chemical Company and Bill Wiswesser, each avid aficionados of the history of chemistry, both these rare historical classics are available at an extremely attractive price. Of the two, Anschütz's reprint is somewhat clearer and will probably be of greater utility to chemical educators and practicing organic chemists. However, the historian of chemistry and the chemist interested in the historical development of chemistry will also wish to make the original pamphlet part of his or her own personal library. As an extra added attraction, for those purchasing either book Wiswesser has prepared an IBM PC floppy disk master with six indexes—(1) authors (Anschütz's as well as Loschmidt's citations), (2) German subjects, (3) German names, (4) German chemical index with Anschütz's modern equivalents, (5) English names, and (6) WLN structures (to all cited

(Continued on page A282)

Chemische Studien, I: A. Konstitutions-Formeln der organischen Chemie in graphischer Darstellung; B. Das Mariotte'sche Gesetz

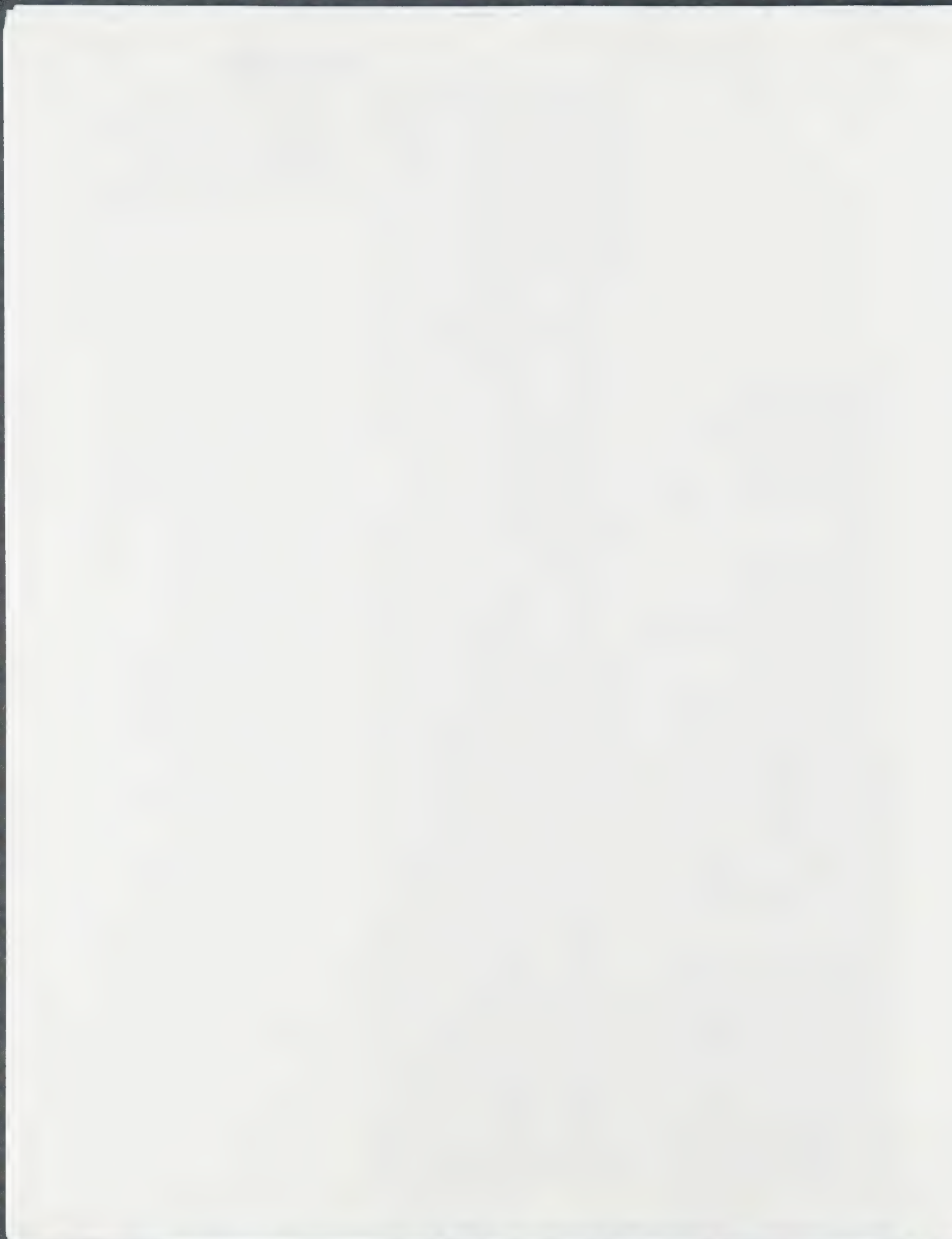
J. Loschmidt. Carl Gerold's Sohn: Vienna, 1861; reprinted by Aldrich Chemical Co., P. O. Box 2060, Milwaukee, WI 53233, 1989. 54 pp. 7 plates. 13 X 20 cm. \$12.00.

J. Loschmidt's Konstitutions-Formeln der organischen Chemie in graphischer Darstellung

Richard Anschütz. Ostwald's Klassiker der exakten Wissenschaften Nr. 190, Wilhelm Engelmann: Leipzig, 1913; reprinted by Aldrich Chemical Co., P. O. Box 2060, Milwaukee, WI 53233, 1989. 154 pp. 13.2 X 20.1 cm. \$12.00.

The shy and self-effacing Johann Joseph Loschmidt (1821-1895) (see Kohn, M. J. *Chem. Educ.* 1945, 22, 381) is best known to chemists and physicists for his 1865 calculation of the number of molecules in 1 cc of a gas (Loschmidt's number) and for the first accurate estimations of the size of gas molecules. However, of equal or even greater importance to chemists was his first scientific work, *Chemische Studien, I* (apparently a part II was planned but never written), published at his own expense when he was 40 years old. In the words of William J. Wiswesser, this "first picture book of molecules" was "the masterpiece of the century in organic chemistry" (*CWIK List News* January 1989, 1; *Aldrichimica Acta* 1989, 22 (1), 17).

Aleksandr Mikhailovich Butlerov, who first proposed the term "chemical structure," declared that "The future task of chemists is to determine the arrangement of atoms in molecules," and Loschmidt's contribution to solving this problem has been sadly neglected. His slim pamphlet of 1861 vividly demonstrates how far ahead of his contemporaries he really was; it contains a veritable cornucopia of chemical "firsts," among which may be listed: (1) the first graphic representation of molecules with atomic domains rather than abstract bond lines (368 structures in seven fold-out plates); (2) the first cyclic structure for benzene and aromatic compounds (121 structures) four years before Kekulé's celebrated hexagonal structure of 1865 (Loschmidt rec-



reviews

1014 R

The Historical Development of Chemical Concepts

Roman Mierzecki. Kluwer Academic Publications: Dordrecht (The Netherlands), Boston, London; PWN—Polish Scientific Publishers: Warsaw, 1991. xi + 281 pp. 15.0 × 22.2 cm. 19 Figs. \$129.00.

This 12th volume in Kluwer's *Chemists and Chemistry* series is a felicitous English translation by Andrzej Diniejko of *Historyczny rozwój pojęć chemicznych* (Państwowe Wydawnictwo Naukowe: Warsaw, 1985) by the Polish physical chemist and historian of chemistry Roman Mierzecki of the University of Warsaw. The aim of the book is "to trace, within the compass of the past centuries, changes in the content of a few chemical concepts that are essential for the understanding of chemical phenomena". After a short introductory chapter, "Division of the History of Science" (27 pp), the author devotes a separate chapter to each of four chemical concepts—"The Element" (65 pp), "The Elementary Particle of Matter" (67 pp, the longest chapter), "The Structure of Chemical Compounds" (48 pp), and "Capacity of a Substance for Transformation" (39 pp). Although Mierzecki does not neglect chronology and biographies, he emphasizes "how chemistry has attained its present-day state of development." Because the formulations of the Ancients form the basis of our modern concepts, he begins each of the chapters from earliest times and devotes considerable space to old concepts, with extensive quotations from many primary texts, often in the original language with translations in parentheses. Interesting derivations of terms as well as fascinating and unusual facts are included. Believing that commentary distorts original ideas, Mierzecki illustrates the development of each chemical concept by letting the authors speak for themselves rather than commenting on their ideas. Thus, he quotes not only the opinions of chemists whose approach was characteristic of the times but also those of chemists who overthrew prevailing opinions. He carefully avoids what Herbert Butterfield has called the Whig interpretation of history, i.e., the distortion that views historical events not in the true perspective of their time but rather in the light of how they contributed to the present state of science. Consequently, he stresses the fact that obsolete theories, e.g., the phlogiston theory—regardless of how absurd they appear today—were quite plausible when viewed in the contexts of their times. Although well-known luminaries of Western chemistry are featured, Russian and Polish chemists usually neglected in Western histories are included in this book. To show the history of chemistry in relation to the general advancement of science and to aid the reader in tracing the history of chemistry through the ages five chronological tables (13 pp) are provided. General and particular references (210 items, 9 pp) and name (six 2-column pp) and subject (six 2-column pp) indexes add to the utility of the volume. With few exceptions, e.g., Werner dealt only with organic compounds not complex compounds in his *Habilitationsschrift* of 1891 (p 197), factual errors are few; most of the several dozen errors are misspellings or lack of diacritical marks in proper nouns. This engrossing book should be of great interest to chemists and historians of both chemistry and of science.

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1015 R

Partnerships in Chemical Research and Education

James E. McEvoy, Editor. American Chemical Society: Washington, DC, 1992. xvi + 159 pp. 15.0 × 22.6 cm. 8 Figures, 15 tables, 10 photographs. \$49.95.

This book, ACS Symposium Series Volume No. 478, edited by James E. McEvoy, Consultant, Industrial–Academic Relations, consists of case studies of recently developed partnerships among industry, academia, and government that are playing an important role in promoting science education for our nation's students at all levels. These imaginative partnerships, both large and small, are described by 26 authors, affiliated with 17 different industrial, academic, and government organizations, who are involved in these multifaceted programs. The contributors examine how such partnerships work and the success that they have achieved. In the first chapter, "Synergy in Chemical Research and Education," McEvoy describes the evolution of positive interactive relationships in chemical sciences and engineering, obstacles to their further development, and the promise for their future progress.

The examples given should serve as models for forming useful partnerships among groups similar to those discussed and, in McEvoy's words, should "provide inspiration to others to develop their own approaches to making science and particularly chemistry more relevant to our nation and provide a basis for a better future for those who will come after us." This up-to-date book (the preface is dated August 6, 1991, and in order to accelerate publication the essays are not typeset but are reproduced as submitted by the authors in camera-ready form) can serve as a valuable "how-to" manual for anyone considering developing a partnership program. It should be useful to all persons or organizations concerned with chemistry, chemical education, and the interdependence of industry, academia, and government in the United States.

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The Meaning of Alchemy 1016 R

Tadeus Reichstein. Isabel and Alfred Bader, Trans. iv + 15 pp. 14.0 × 21.5 cm. Aldrich Chemical Co.: P.O. Box 355, Milwaukee, WI 53201, 1991. Available free with orders from Aldrich.

On February 21, 1931, Tadeus Reichstein, the Polish–Swiss natural products chemist who had received his doctorate under 1953 Nobel chemistry laureate Hermann Staudinger at Zürich's famed Eidgenössische Technische Hochschule, presented his inaugural lecture at the ETH, where he had been appointed assistant to 1939 Nobel chemistry laureate Leopold Ružička. Reichstein's synthesis of vitamin C (1933), which has not been improved upon today, was a pioneering feat of what is today called biotechnology, and his work on the isolation and structure determination of the adrenal cortex hormones led to his sharing the 1950 Nobel Prize in physiology or medicine with Americans Philip S. Hench and Edward C. Kendall.

Reichstein, now a nonagenarian (he was born on July 20, 1897), chose as the topic of his lecture the esoteric aspect of alchemy—a philosophical-psychological quest for self-fulfillment (Swiss psychotherapist Carl Gustav Jung's interpretation)—as opposed to the more familiar exoteric aspect—the venerable materialistic pseudoscience that was a type of primitive chemical technology. Quoting liberally from various alchemical adepts, Reichstein considers the origins and goals of alchemy, the Philosopher's Stone, and the 13 precepts of Hermes Trismegistos' *Emerald Tablet (Tabula Smaragdina)*. Chemical industrialist, chemical and alchemical history aficionado, and art collector Alfred Bader, Aldrich's chairman emeritus, who recently reprinted in facsimile Joseph Loschmidt's classic *Chemische Studien* (Kauffman, G. B. *J. Chem. Educ.* 1989, 66, A281), deserves our thanks for making available in a felicitous English translation Reichstein's hitherto unpublished introduction to alchemy for the general reader, which is graced with a black-and-white reproduction of a 1648 painting of an alchemist by Antwerp artist David Ryckaert and an autographed portrait of Reichstein.

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George Andrew Olah

An interview with the 1994 Nobel
Chemistry Laureate

GEORGE B. KAUFFMAN & LAURIE M. KAUFFMAN

George Andrew Olah, the Donald P. and Katherine B. Loker Distinguished Professor of Organic Chemistry and Director of the Loker Hydrocarbon Research Institute at the University of Southern California (USC) in Los Angeles, was awarded the 1994 Nobel Prize in chemistry for his revolutionary studies of carbocations—elusive reaction intermediates in many organic reactions whose existence had long been predicted but that had not been directly observed in the condensed state. By the use of “superacids,” substances trillions of times stronger than conventional acids, at low temperatures, Dr. Olah has been able to stabilize and characterize these unstable, short-lived, and extremely reactive species which determine the ways that ionic organic reactions proceed. But his pioneering studies are of more than theoretical importance. Among the practical consequences of his work are new methods of converting low-octane straight-chain saturated hydrocarbon fuels to cleaner-burning, higher-octane branched gasoline. His superacid techniques have also permitted chemists to crack heavy oils (readily poisoning metal catalysts) and to liquefy coal under surprisingly mild conditions to yield liquid hydrocarbon fuels. They have also resulted in fundamentally new ways of converting abundant and virtually unreactive methane, the simplest hydrocarbon and the main constituent of natural gas, to higher

hydrocarbons, allowing it to be used as a versatile chemical building block. His various methods of creating more environmentally friendly fuels, plastics, and polymers have helped to transform the field and have made USC a world-renowned center for hydrocarbon research. Because fossil fuels such as oil, natural gas, and coal, our current sources of hydrocarbons, are limited nonrenewable energy sources whose production in nature requires millions of years, the practical significance of Olah's research cannot be overestimated.

Born in Budapest, Hungary, on May 22, 1927, George Andrew Olah received the equivalent of Ph.D. from the Technical University of Budapest in 1949. In that same year, he married Judith Agnes Lengyel, who later was an Adjunct Associate Professor of Chemistry in her husband's institute at USC until her retirement in 1990, and joined the faculty of the Technical University of Budapest. Olah became Head of the Organic Chemistry Department and Associate Director of the Central Research Institute for Chemistry, Hungarian Academy of Sciences (1954–56). When the 1956 uprising failed, the Olahs emigrated first to Canada, where the future Nobel laureate became a Research Scientist at Dow Chemical Company's Exploratory Research Laboratory at Sarnia, Ontario (1957–64). Transferring to the United States, he continued as Research Scientist at Dow's Eastern Research Labo-

ratory at Wayland, Massachusetts (1964–65). In 1965, he moved to Case Western Reserve University in Cleveland, Ohio, where he held appointments as Professor of Chemistry and Department Chairman (1965–69) and C. F. Mabery Research Professor (1969–77) before joining the USC faculty in 1977. We interviewed him on November 14, 1994, after the announcement of his receipt of the Nobel Prize but before his departure for Stockholm. Here is some of what he had to say.

MOTIVATION FOR RESEARCH: I think that what drives most effective research is curiosity. I don't feel that you think about productivity. You do things because you have some inner drive. It's like a consuming hobby. I consider creative chemistry very much like creative art. I was able to pursue what I loved to do, and I was even paid to do this. I don't consider this just work. I pursue research because it still intrigues me. I love to do it, and if you have a number of ideas, and it turns out that some of them may work out, that is to say, they are productive, it's just a wonderful benefit.

IDEAS: Even if you work hard in a systematic fashion, you still must have novel and workable ideas. Seemingly, I was blessed with having lots of ideas, some of which worked out well. I still have notebooks filled with ideas that I jot down, and we still have not touched many of them. Obviously, anybody who does research knows that many of the so-called good ideas turn out to be flops. But if you once in a while have one that really works out, it is worth all the effort.

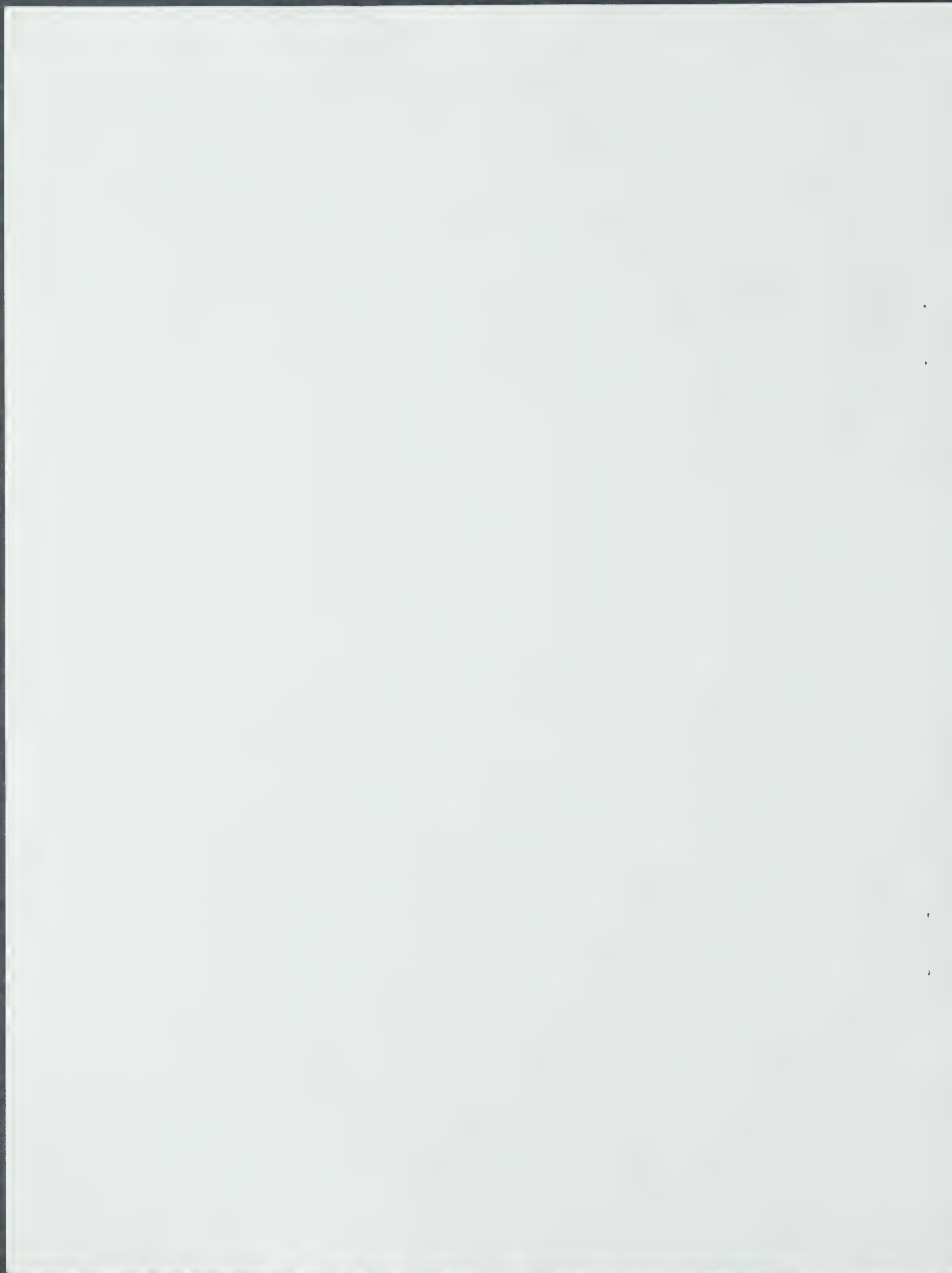
I get lots of ideas in different places. I regularly swim every morning for half an hour. Sometimes in the midst of my swimming I get an idea, and I have to hope that I won't forget it before I have the opportunity to jot it down.

*Dr. Bader,
You and George
Olah have a lot
in common.*

*George
P.S. Would you be
interested in our
interviewing you?*

George B. Kauffman and
Laurie M. Kauffman,
Department of Chemistry,
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93740-0070

George A. Olah
with the Nobel prize
in Stockholm.





TOOLS: Although I am an experimentalist, I use many new tools as they become available. We are living in a wonderful, exciting time in chemistry. So many new methods have come along, even in my lifetime. I remember when infrared spectroscopy was just beginning, and NMR wasn't even on the horizon, or GC, and so on. Another tool that I think is wonderful is theory—by which I mean modern quantum-mechanical calculations—which has become available even to nontheoreticians.



George A. Olah at the blackboard.

INSTRUMENTATION: I started out under very difficult conditions with very little equipment and instrumentation available to me. Even chemicals were scarce in Hungary after the war. Although it is obviously a great advantage to have advanced instrumentation, I sometimes think about the early chemists. They had none of today's spectroscopic and analytical equipment, and still they did amazing pioneering work and made, really, very few bad mistakes.

"BIG SCIENCE" VERSUS "LITTLE SCIENCE": In chemistry, even if you have limited means, you can still do significant work in your lab with some dedicated students. In contrast, for example, in high-energy physics the biggest machine has the last

word. I'm an individualist. I think that I enjoy doing my own work—marching to my own drummer—but, on the other hand, I realize that even chemistry is getting more advanced and sophisticated, and therefore in some areas you find more cooperative projects and, consequently, more co-authors. But I really do believe that discoveries are always made by individuals and not by teams or committees.

THEORY VERSUS EXPERIMENT: These days in our work we increasingly combine theory with experiment. Most frequently for us, the experiment guides the theory; we try to justify or see what theory says about our results. But in recent years, I must confess, it has started to change, and some ideas that we first examined by calculations were subsequently applied in experimental work.

SPECIALIZATION AND QUALITATIVE VERSUS QUANTITATIVE: I don't believe in putting people in narrow subcategories in chemistry. I consider myself a chemist. I was trained as an organic chemist, but probably many of my best results came out of using inorganic reagents, which nobody thought much about, in organic chemistry. Some of the spectroscopy—mostly NMR spectroscopy—we were doing some 50 years ago was considered more or less physical chemistry at the time, so the borderline between qualitative and quantitative studies shifts with time. Certainly, by today's standards the work we are doing is mostly qualitative, but by the standards that existed 50 years ago, when some of my work was done, including some fairly rigorous physical measurements, I thought at the time that we were pretty advanced. Therefore, perhaps it is proper to consider myself simply a practicing chemist with a fairly broad range of interests.

MOST SIGNIFICANT ACHIEVEMENT: I was very much interested from the beginning in reaction intermediates. One of the best ideas that chemists such as C.K. Ingold came up with was that the enormous varieties of reactions can actually be grouped into a limited number of major types according to the intermediates that are involved. I was interested mostly in ionic intermediates—particularly cationic intermediates of carbon compounds. After many decades of frustration, I succeeded in developing methods that made it possible to observe these elusive carbocations in the condensed state in superacidic solutions, and this must be one of my most important contributions. But there were others around this major theme.

I was interested initially in the structural aspects of intermediates, including the so-called nonclassical ions, which were the subject of a rather heated controversy. However, I think that the most important conclusion to come out of this work, in the sense that it probably had a much more lasting influence on chemistry than the structural problems themselves, was the realization of the ability of the single bond—the two-electron, two-center Lewis bond—to act as a nucleophile in electrophilic reactions. In other words, we were the first to discover the ability of single bonds such as C—C and C—H bonds to undergo typical electrophilic reactions, and we started to develop the practical chemistry of saturated hydrocarbons, hydrocarbon chemistry having previously been limited to unsaturated acetylenes, olefins, and aromatics. Saturated hydrocarbons were once called paraffins, from the Latin *parum affinitas* (little affinity), but these days the term has lost most of its significance. Al-

kanes have been proven to have high reactivity not only in free-radical reactions such as combustion or chlorination but also in a whole multitude of electrophilic substitution reactions and conversions.

SUPERACIDS: The idea that carbocations could be observed in superacid solutions wasn't a stroke of inspiration; it came out of very hard systematic work. I was fascinated with and searching for ionic reaction intermediates, and, when I started out, the giant in the field was Hans Meerwein in Germany. He really pioneered the use of kinetic measurements in following an organic

The idea that carbocations could be observed in superacid solutions wasn't a stroke of inspiration; it came out of very hard systematic work.

reaction, and this approach was then pursued by Ingold in England and many others. Meerwein first came up with the idea that reactions which start with neutral compounds and end up with neutral products can go through ionic intermediates. Meerwein used BF_3 quite extensively in his work. He was, however, never able to prepare, isolate, or study carbocations such as alkyl cations under long-lived conditions, although he pioneered the study of oxonium and carboxonium ions, etc. Early in my career—still back in Hungary—I had the realization that if you want to generate a carbocation, that is, a strong acid, you can't do this in the presence of basic, nucleophilic solvents or media.

Finding suitable solvents was very difficult, so I had the idea that maybe we could use the excess of the Lewis acid itself as the solvent. We thus tried liquid BF_3 , but it has a limited temperature range, and handling it turned out to be very difficult. Later on, when I came to North America, and my working conditions improved, I carried out a fairly systematic screening of other possible Lewis acid fluorides, and in the course of this work I came across SbF_5 .

PURE VERSUS APPLIED RESEARCH: I must confess that it never crossed my mind when I started this research that it might someday have practical applications or uses. For many years, we were doing chemistry that we were interested in and that nobody considered of much practical use.

Obviously, my interest and curiosity were always the driving force, and therefore the work was always basic in its nature. I spent nearly eight years with the Dow Chemical Company when I first came to North America, and it was a very productive time. It taught me that basic chemistry may frequently be of practical use. Whenever we came across findings or observations in our research that also could be of practical significance, we pursued that aspect too.

CONTROVERSIES IN SCIENCE: There is nothing wrong with having disagreements or even controversies in science as long as the underlying facts are solid. These disagreements can be resolved by experimental evidence. That's the wonderful thing about science. Political, economic, or philosophical controversies can go on forever, but in science the facts eventually speak for themselves. That's what happened in the so-called nonclassical carbocation controversy, which

started between Saul Winstein and Herbert C. Brown and was brought to a conclusion by direct observation and study of most of the controversial ions using my stable-ion superacid chemistry.

HOBBIES: Chemistry is really my full-time hobby. I have very little time for much else, but my wife and I do some traveling. We have two married sons and a wonderful grandson, whom we baby-sit.

EARLY ACADEMIC INTERESTS: I remember an outstanding science teacher in high school (gymnasium), but his field was really physics. I wasn't much interested in the sciences or chemistry before I finished high school. My interest was in literature and history, but this was not something you could have relied on to make a living in postwar Hungary, so I started to think in more serious terms about some profession that would be more practical. I got fascinated by chemistry, probably by its wide scope and versatility, and once I started to study chemistry, I became very much interested in organic chemistry, and one thing led to another.

SCIENTIFIC HEROES: In my own field I have already mentioned Hans Meerwein and Christopher Ingold in London, who pioneered the development of modern mechanistic organic chemistry in the 1930s. In the United States, Frank Whitmore, who unfortunately died early, generalized Meerwein's and Ingold's ideas to many organic reactions. He really was never fully acknowledged as a pioneer in the development of mechanistic concepts of ionic organic chemistry. But my main hero remains Meerwein because he was a chemist who did not categorize himself as a physical, organic, or synthetic chemist. He was doing chemistry across what we now call subdisciplines and that's some-

thing I'm trying to do too.

PUBLISHING: I think that I've published more than a thousand research papers by now. The number of graduate students and postdocs that I have supervised must be nearing 200. Some people obviously say that I have too many publications. I have very strong feelings about this. My ego was satisfied long ago, so whether I publish so many papers a year or not doesn't really matter much to me. However, no research is ever complete until the results are written up and made available in proper refereed scientific journals to the world community of your colleagues and peers, who can look at it, criticize it, or extend it. I have also a very strong responsibility toward my students and my younger colleagues, who spend some of their best years in my laboratory, either working on a Ph.D. or doing postdoctoral research. They deserve to have their efforts published in a timely fashion so that they can get credit for their work. Therefore, I try very hard to get our work published in a reasonable period of time.

TEACHING: I'm now teaching only a graduate course, mainly an advanced organic course on structure and mechanism, and I still greatly enjoy it. I also feel, however, that teaching is not just done in the classroom. The young people who work in your laboratory, doing research, are really getting the best hands-on education they could get. In our group meetings and day-to-day discussions, we continuously learn much from each other about chemistry, and I am no exception. My office door is never closed. I'm not readily available for administrative problems, but I'm always available to discuss chemistry or personal questions with any of my students.

ADMINISTRATION: I think that I did

a good job when I was Department Chairman (at Case Western Reserve) and felt that it was my obligation to take my turn. However, the best department chairs and deans are those who are willing to serve their turn but are eager then to get out and do only scholarly work and teaching. As director of our Loker Hydrocarbon Research Institute, I always try to do my best, mostly to ensure that my colleagues and students have good working conditions and a pleasant research atmosphere, but this duty is secondary to my research and teaching.

COMMITTEES: I have a fairly fool-proof system for avoiding committees. If I'm asked, I always serve; however, if you go to the first meeting and speak your mind freely, which does not always please the majority, in my experience it ensures you that you are hardly ever asked back again.

QUALITY OF STUDENTS: I have found that when you stimulate young people, and if you can arouse their interest, they will work hard and surprise even themselves. This is particularly true in institutions that don't traditionally get the best of students. It is still a tremendously rewarding experience for me to see that young people can go way beyond their own expectations. Of course, you must also work very hard with them, but this is a pleasure not a burden.

SCIENCE EDUCATION: Chemical education, like science education in general, is a pyramidal structure. You can't start with science fairly high up the pyramid. You must have a solid foundation. That's where our major problem lies in the United States—in providing in our elementary, middle, and high schools the type of education that gives a reasonably solid foundation. These days perhaps some of the brightest students are discouraged from go-

ing into the sciences, and when they do, they tend to prefer the biological area and other areas that appear more glamorous and interesting than chemistry. Nevertheless, I feel that chemistry has a bright future, because there always will be talented, young people who have a curiosity about chemistry and will go into chemistry and do well.

LEAVING HUNGARY: What happened in the fall of 1956 in Hungary was a completely spontaneous, unplanned process that resulted in an explosion. Nobody in my generation had any notion that the uprising was coming, but when it happened and was subsequently defeated, it became obvious to many of us that the foreseeable future was rather dim. If you wanted to live in a free society and, as a scientist, to pursue your profession under conditions that offered you the freedom to be in contact with the rest of the world's scientific community and to do your work, there was very little choice but to leave. The Soviets let 200,000 Hungarians out, basically with nothing but the shirts on their backs, believing that those who chose to remain would be much easier to handle. I came out without any preplanning, without any preparation whatsoever, but have never regretted it.

Today Hungary is trying very hard to reenter the Western world. It's very necessary, particularly for the younger generation, to learn what's happening in other countries. So it's logical that one of the ways in which those of us who were born in Hungary and grew up there but now live in different parts of the world can help to support science in our native land is through exchange projects and by making it possible for young scientists to come for a visit to our laboratories.

EMIGRATION TO CANADA: In the win-

ter of 1956–57 we spent some months in England, where my wife had family, and then in the spring of 1957 we went to Canada, where my mother-in-law lived. At the time, most of the large American chemical companies—Cyanamid, Monsanto, Union Carbide, etc.—were establishing basic research laboratories in Europe. At the same time, Dow established an exploratory research lab at its

these things. We came out, as I said, with only the shirts on our backs. We started a new life, and we never looked back. I'm really grateful to have found a new country which gave me a wonderful opportunity. For all its difficulties, the United States is still a country where immigrants can arrive and in a few years reestablish themselves, bring up their children, and become completely integrated in-

concept is that you can activate electrophiles—electron-deficient compounds—to a very large degree by diminishing what chemists call neighboring-group participation, that is, the electron-donating effect of groups adjacent to the electron-deficient center, by using highly acidic reaction media. This approach is equivalent to electrophilic solvation (or protosolvation) of the neighboring groups, thus diminishing their effect and enhancing the reactivity of the electrophilic center. Until now, only solvation by electron donors (nucleophiles) was considered to be possible, and what we have demonstrated is the principle of electrophilic or protic solvation. This, I believe, opens up new horizons for what electrophilic reactions can achieve. So I'm still stepping in new directions.

MARRIAGE AND FAMILY LIFE: The best thing that ever happened to me was marrying my wife, Judith, who is not only a wonderful person but also a lifelong partner in my work. She is a chemist and worked with me as an adjunct professor until she retired in 1990. She sacrificed her own career to look after our children when they were growing up, as the major burden of raising our family was always carried by her. European husbands are frequently not too good around the house, and I am no exception. To a large degree, she left me free to pursue my scientific career. She rejoined me in research work only years later.

JUDITH OLAH: I had a job as a laboratory technician in Budapest, and George was already an assistant professor. He came home one night with a few books, and he was radiant. He said, "I enrolled you into the university in chemistry." I said, "What?" and that's how it started.

GEORGE OLAH: I think it is a wonderful thing in a marriage



The award ceremony in Stockholm.

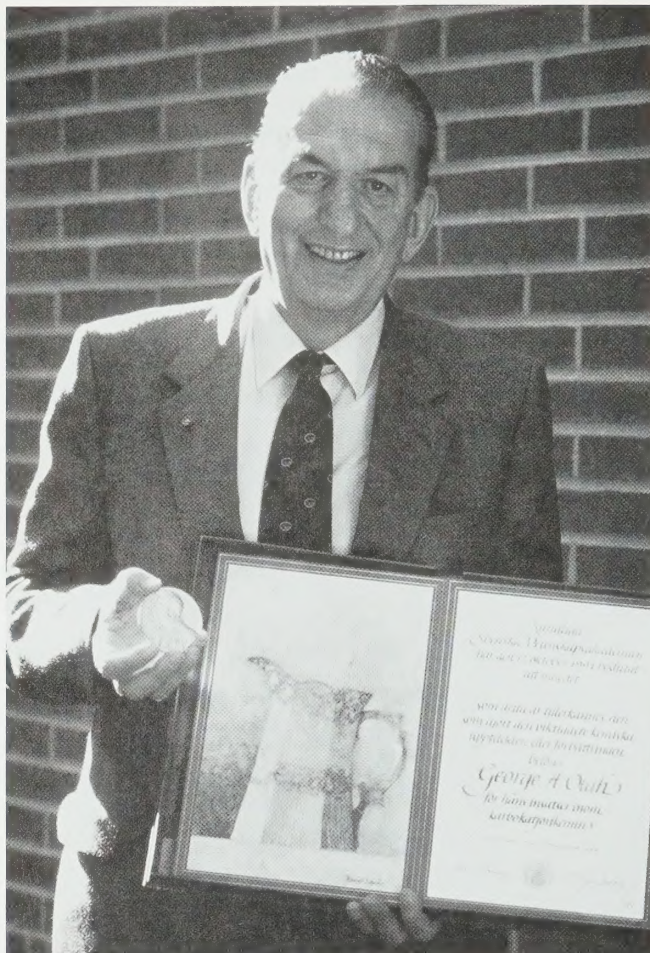
Canadian location in Sarnia, Ontario, just across the border from its headquarters in Midland, Michigan. I was offered a position in this newly established lab and was given a chance to continue my work, for which I am very grateful. Subsequently, Dow established a similar, larger basic research lab in the Boston area, under Fred McLafferty's directorship. Fred invited me to join him, and I moved to the Dow Eastern Research Laboratory, first in Framingham, Massachusetts, and then in Wayland, a short distance from Harvard and MIT.

ADJUSTING TO A NEW COUNTRY AND NEW LANGUAGE: I was thrown out into the world by unforeseen events and had no time to think about

to their adopted country. I hope that this will remain so for a long, long time. The United States still offers a new home and nearly unlimited possibilities to the newcomer who is willing to work hard. It is also where the "main action" in science and technology remains.

NEW DIRECTIONS IN RESEARCH: I am lucky that my research field is a very broad one. I'm not locked in a narrow corner of chemistry. Within this broad area I've frequently changed the focus of my work. I even did it fairly recently. We are very much involved in developing what I think is an interesting and challenging new aspect of this broad field, which I call super-electrophilic activation. The

George A. Olah with
the Nobel prize.



when both partners are involved in something that they mutually understand; it helps greatly to overcome some of the pressures of life. Chemistry, too, is a demanding life. When you both understand it, it makes it a little easier.

We met when we were very young—in the summer of 1945, when we were both spending our summer vacations with our parents at a resort near our hometown, Budapest. We got married six years later, on July 9, 1949, and we have been happily married for 45 years.

My older son, George John, is an MBA (Master of Business Administration) and is the treasurer of a local insurance company. My younger son, Ronald Peter, is an MD (Doctor of Medicine) and is practicing internal medicine here in Pasadena.

We have two outstanding sons, which is a great blessing, and it is all to my wife's credit that they were brought up so well.

OLAH'S "TRADEMARK": Louis and Mary Fieser always had their cats' photographs in their books. As a dog lover, I thought that dogs deserve equal time, and I put our dogs' picture into my books. Our first dog was Jimmy. Muki (Hungarian for "fellow" or "chap") is our second-generation cocker spaniel.

EFFECT OF THE NOBEL PRIZE: This was a tough month. I'm really a hard worker, and I'm trying to cope with all this to the best of my ability, but since the announcement of the Nobel prize on October 12, I have been overwhelmed. Nobody is prepared for this, particularly because, as you know, scientists generally lead fairly sheltered lives and

are not used to much publicity or media interest. I have been inundated by requests for interviews on TV, in the press, and so on, not only from the United States but from Europe (Sweden, France, England, and, not least, my native country, Hungary). As nice as it is to get hundreds of letters of good wishes and phone calls from all your old friends and former students and acquaintances, you also find that you have acquired a large number of new friends and acquaintances. Trying to answer all these is quite a chore, but I am coping.

As you know, getting research funding is not easy these days. We are all fighting for it, and I don't know how much impact the Nobel Prize will have on all this. I work very hard on my research grant proposals, and I will continue to do so. Perhaps my "batting average" may be slightly improved in the future, but I really don't think my having received the Nobel Prize will make much difference.

Obviously, the Nobel Prize is the most gratifying recognition, and anyone who tells you that he or she is not overwhelmed by it isn't really telling the truth. At the same time, I consider it not just a personal recognition, but a recognition of all my former students and associates and friends and colleagues in this field whose work contributed so much. Maybe this awarding of the Nobel Prize for chemical research in such a field as hydrocarbon chemistry will emphasize the fact, which I strongly believe, that chemistry in its own right is one of the fundamental core sciences. As much as I admire the biological and health sciences, to which chemistry is making major contributions at the molecular level, I don't think that chemistry should ever be considered just an appendage of biology. Chemistry on its own has al-

ways made and continues to make major contributions. We must understand the simple systems before we can really claim to understand the wonderful, complicated systems of nature. So, recognition for what some of my friends call simple, "real chemistry" is very rewarding, and it may even encourage more young people to consider a career in chemistry itself by showing them that chemical research, and not just research in biochemistry or biology, can be challenging.

CURRENT AND FUTURE WORK: First, I would like to get back to my normal life. I still have lots of ideas and many projects going on; some of them involve pursuing fundamental work on hydrocarbons and their reactions, but others are in the domain of synthetic chemistry, and some are concerned with mechanistic structural chemistry. There is much to be done, not only for myself, but for future generations, and I wish them as much fun and success in their work as I have had in mine.

NO THOUGHTS OF RETIREMENT: I love to teach and to do research. I think it's wonderful to be a university professor and to continue to interact with students, who, I hope, are getting something out of me. Certainly, I am continuously getting a great deal of inspiration and stimulation from them, and I fully intend to continue my work for the foreseeable future.

CHEMOPHOBIA: Obviously, chemistry has its down side too. Many of our chemical plants and refineries are not considered to be the most attractive neighbors; they may be dangerous and pollute the environment too. On the other hand, chemistry has done miraculous things for mankind. If you look

around, practically everything in our life is touched by chemistry and chemistry's results. Chemists are the only people who can make materials. Almost everything, man-made, from plastics to pharmaceuticals, is the product of chemists. Our modern technological society greatly enjoys these benefits of chemistry. Everybody wants to drive a car and put high-octane gasoline in it. People want to fly to get around, heat their homes, and have all these products that chemistry has provided. I haven't seen anybody who has suggested that he or she is really willing to give up all this. I believe, however, that we certainly should try to live in better equilibrium with our environment and safeguard it to the best of our ability. Modern chemistry can indeed contribute to this too by developing safer and more adaptable processes, allowing our plants and refineries to operate with considerably less infringement on the environment and much more safely. This, I think, is going to be a continuing challenge for chemistry in the future—to provide a good balance between nature and modern society.

Mankind will need to continue to rely on chemistry, whether some people like it or not. Take oil and gas; what Mother Nature gave us over the eons is increasingly being depleted. Thus, for future generations, some of these essential materials will have to be made, and only chemists can make them. Chemistry will clearly remain a benefactor in mankind's survival. Of course, there is nothing on Earth that cannot be misused. Albert Szent-Györgyi, who was a Nobel Prize winner and a fellow Hungarian, once said in an after-din-

ner talk that he had strongly believed that his discovery of vitamin C could only benefit mankind, but after the war he learned that the Germans gave vitamin C pills to their U-boat crews, making it possible for them to stay out at sea for prolonged periods of time and thus sink more ships and kill more people. Take the work of Alfred Nobel as an example; explosives have killed many people in wars, but they are also of great benefit in mining, construction, and so on; it's up to people to decide how they want to use the achievements of chemistry, but, overall, I think I'm very positive about the future.

THE BIG PROBLEM: The population of the Earth can't grow in an uncontrolled way. This planet cannot provide a reasonable standard of living, including food, energy, and materials, for an unlimited population. I hope that people everywhere will realize that we have common goals. If you look at the very short-term perspective, we have all these tremendous problems—discord between Arabs and Jews, the situations in the former Yugoslavia and the former Soviet Union, all the conflicts and wars we have, and so on—but these are relatively short-range problems. Mankind as a whole must survive, and when it's a question of mankind's survival, I hope we can get together and face the real problems. Not what divides us now but what should unite us to achieve our common goals is important. We are all in the same boat, citizens of the same planet Earth.

HIS POSITIVE OUTLOOK ON LIFE: Life is too short to be a pessimist. If you want to have a productive life, you'd better concentrate on the positive.

GEORGE B. KAUFFMAN, Professor of Chemistry at California State University, Fresno, recently became the first recipient of the President's Medal of Distinction, the highest nondegree award presented by CSUF.

LAURIE M. KAUFFMAN, his wife and frequent collaborator, is a retired schoolteacher with an interest in the humanistic aspects of science.

