9. Quoted in Kogan, reference 6, p. 21. Burns was referring to the second edition of *Britannica*. Elliot was a local bookseller.

10. Reference 4, v. 1, p. xiii.

11. *Ibid.*, p. xiv.

12. Reference 1, pp. 81 and 100.

13. The most complete biography of Tytler is J. Fergusson, *Balloon Tytler*, Faber and Faber, London, 1972. Others are found in: H. Kogan, Reference 5, pp. 16-22; *Dictionary of National Biography*, Vol. 19, Oxford University Press, London, 1922, p. 1379; *Appleton's Cyclopedia of American Biography*, Appleton, Vol. 6, New York, 1889, p. 204.

14. Quoted in Fergusson, reference 13, p. 44.

15. *Ibid.*, p 63.

16. *Ibid.*, p. 85.

17. Quoted in Kogan, reference 6, p. 21.

18. Quoted in Fergusson, reference 13, p. 108.

19. *Ibid.*, p. 137.

20. *Encyclopaedia Britannica*, Bell and Macfarquhar, Edinburgh, 1769-71. Facsimile Edition, Encyclopaedia Britannica, Inc., Chicago, 1968. The chemistry article is reviewed in R. Gable, "Encyclopaedia Britannica: A Neglected Phlogistonist Textbook", *J. Chem. Educ.*, **1979**, *56*, 375-376.

21. W. Williams, "Mystery Editors of Early American Chemistry Texts", *Bull. Hist. Chem.*, **1988**, *2*, 6-7.

22. The engraving of Tytler is taken, with permission, from Kogan, reference 6, unpaginated illustrations at center of book. Another likeness is found in Fergusson, reference 13, p. 145.

William D. Williams is Professor of Chemistry at Harding University, Searcy, AR 72143. He collects and studies early American chemistry texts.

BOOK NOTES

From Caveman to Chemist, Hugh W. Salzberg, American Chemical Society, Washington, D.C., 1991. xix + 294 pp. (Typeset). $14.95 (Paper), $24.95 (Cloth).

There has never been a shortage of books dealing with the history of chemistry. In a 1974 bibliographic study, Jost Weyer listed no less than 71 general histories of chemistry written between 1561 and 1970 - a number which excludes specialized histories of subdisciplines, such as organic and analytical chemistry, and the equally voluminous literature dealing with the history of alchemy. Of these histories, 29, or roughly a third, are written in English or have appeared as English translations.

Upon examining the current edition of *Books in Print*, the chemist looking for a suitable text to use in a history of chemistry course, or just for personal study, will find that a surprisingly large number of these titles are still in print. Excluding, for obvious reasons, modern reproductions of the classics by Thomas Thomson, Adolphe Wurtz, Ernst von Meyer, and M. M. Pattison Muir (originally published in 1830, 1868, 1889, and 1907, respectively), this list includes 20th-century works by James Partington, Henry Leicester, Aaron Ihde, Isaac Asimov, and Cecil Schneer.

Of these, Ihde's 1964 volume, *The Development of Modern Chemistry*, is by far the most detailed. Now available in an inexpensive Dover paperback reprint, its 851 pages cover the period from the 18th century to around 1950. It also has the best selection of portraits and illustrations ever to appear in a general history of chemistry. Though its size and detail make it difficult to effectively use in a one-quarter course, it is the best single-volume reference still in print and belongs on the shelves of every serious collector of chemical literature.

A more manageable overview is the Dover reprint of Leicester's 1956 volume, *The Historical Background of Chemistry*. Unlike Ihde's more detailed work, it gives equal treatment to alchemy and pre-18th century chemistry, though at the expense of terminating its treatment of modern chemistry around 1920. At 260 pages, it is less than a third the length of Ihde's work, but purchases its brevity with a lack of detail and the absence of the fine selection of illustrations found in Ihde.

The most recent addition to Dover's list of quality paperbacks is their reproduction of Partington's classic 1937 volume, *A Short History of Chemistry*. Despite the fact that it is 20 years older than Leicester's work, it is quite similar in both its length (386 pages) and period of coverage (prehistory - 1920).

Asimov's 1965 book of identical title, *A Short History of Chemistry* (263 pages), was originally issued as an inexpensive paperback as part of Doubleday's Science Study Series. While it is certainly the most accessible account for the layman, it has no references and appears to have been based solely on secondary sources and encyclopedia articles. These problems, coupled with the fact that it is now only available as an expensive hardcover reproduction, largely preclude its use as a text in a serious history of chemistry course.

Perhaps the most iconoclastic history currently in print is Cecil Schneer's 1969 volume, *Mind and Matter* (305 pages). While primarily a history of chemistry, it attempts, as its title suggests, to inject sizable doses of the history of physics and materials science. Though at first glance this integration appears desirable, it actually produces a distortion of the history of chemistry itself. Thus, for example, the history of chemical thermodynamics, as developed by chemists, followed a very different path from the development of thermodynamics in physics, which is the version given by Schneer.

Despite this abundance of choices, the perceptive reader will have noticed that even the most recent of these volumes is now over 20 years old. As a result, historians have increasingly felt the need for a new history of chemistry that will not only cover the history of the last half century but also effectively integrate the new interpretations of the older periods developed by historians since the 1960s. It is thus with high expectations that one approaches this new history of chemistry, *From Caveman to Chemist*, by Hugh W. Salzberg, and just as quickly comes away disappointed. The problem is not that what Salzberg has written is particularly incorrect but rather why he has bothered to write it in the first place.

The book contains no new interpretive insights - a not surprising defect given that the author appears to have read little of the recent literature in the history of chemistry. It is not a contribution to original scholarship - no new information is uncovered, no new periods are evaluated. Though the author lists the titles of a few original chemical papers in his references, his direct quotes from these papers are taken secondhand from earlier histories of chemistry and one strongly suspects he has never examined most of the primary chemical literature whose content and importance he purports to explain.

The book does not update earlier histories. If anything, it is a step backwards since Salzberg terminates his coverage at 1900. Even then, over half the book deals with ancient technology and alchemy and Salzberg's treatment of 19th century chemistry is little more than a sketchy afterthought which completely ignores the development of chemical thermodynamics and kinetics.

The book does not address a new audience. The earlier accounts by Partington, Leicester, Asimov and Schneer are just as brief and just as accessible to the layman (and all are more thorough in their coverage).

One cannot even compliment the book on its illustrations. Ignoring the large collections of chemical portraits and prints available at the Universities of Pennsylvania, Wisconsin and Cincinnati, the 20 rather murky illustrations in the book were obtained mostly from the Bettmann Archives. None of the captions indicate the original books from which these illustrations were taken and the drawing of Hale's original pneumatic trough on page 189 has been altered by an unknown artist and printed backwards. The book contains no portraits of famous chemists, despite the explicitly biographical approach used in many sections and, though large portions of the book are devoted to alchemy, few of the illustrations reflect its rich symbolic and pictorial literature.

In short, whatever criterion is used, there is a history of chemistry currently in print which does the job much better and one is left wondering why this book was ever published. And, unhappily, one is also left with the unanswered question of how to write a history of chemistry that will effectively incorporate recent historical research on pre-20th century chemistry while simultaneously providing an integrated overview of the last 90 years, not to mention the question of who is best qualified to write such a history (chemist or historian or a team of both). The only thing that is certain is that *From Caveman to Chemist* is regrettably, but most emphatically, not the answer. *William B. Jensen, Department of Chemistry, University of Cincinnati, Cincinnati, OH 45221*

Robert Robinson: Chemist Extraordinary, Trevor I. Williams, Clarendon, Oxford, 1990. 201 pp. Cloth (Typeset). $49.95.

As a chronicle of Robert Robinson's rise from middle-class provinciality (his mother was one of the Cheshire Davenports) to the 1947 Nobel Prize for Chemistry and the Presidency of the Royal Society of London, this pedestrian and, at times, repetitive book just passes muster. As an analysis of what it was that made Robinson an extraordinary chemist, it must be accounted absent-on-parade. In fairness, the author denies any such obligation:

> In particular ... they [Lord Todd and Sir John Cornforth] lay more emphasis on his professional achievements than on his personal life. Because of this gap in the literature, I was responsive to a wish of Dr. Marion Way, Robinson's daughter, to write an extended biography of her father.

In short, this is an authorized biography with all of the warts and most of the chemistry omitted. For whom is such a book intended? As Abraham Pais has admirably shown, even a phenomenon such as Einstein deserves a biography that squarely faces his immortalizing science.

In spite of his genuine contributions to the early development of physical organic chemistry, Robinson represents the end of an old tradition rather than the beginning of a new one. He came to maturity when the gray eminences of Oxford and Cambridge used Colonial, Scottish, and the lesser English universities as components of an involuntary academic farm system. In rapid succession, Robinson held chairs in Sydney, Liverpool, Saint Andrews, and London before succeeding his mentor, W. H. Perkin, Jr., at Oxford in 1930. Like Perkin, Robinson's genius lay in natural product chemistry: structural determinations followed by larger-scale, short-sequenced synthesis. Williams notes Robinson's uneasiness when availability dictated a micro-scale approach to the structural work on penicillin. Strangely, Williams does not discuss Robinson's synthetic approach to the steroidal ring system. Robinson was an avid mountaineer and his methods seem more analogous to the knickerbockered gallantry of Mallory and Irvine than the nylon-clad laying-siege-to-the-mountain approach of R. B. Woodward. In spite of the 30-year age difference, there was much respect between the two and there is an agreeable historical resonance in that Woodward joined Robinson as founding co-editor of *Tetrahedron*.

As a former student of Hughes and Ingold, the reviewer turned eagerly to Chapter 7, "The Electronic Theory of Reaction: the Ingold Controversy". Even the title sounds slightly off-key and the ensuing discussion is equally unsatisfactory. In his lectures to undergraduates, which had a substantial historical component, Ingold gave scant recognition to Robinson (though rather more to Lapworth and Lowry) even though Robinson was earlier in the field and up to about 1930 had contributed as much mechanistic insight. Unlike Ingold, however, "[Robinson] had little feeling for physical chemistry". With Hughes' help, Ingold quickly seized on kinetics as the key to reaction mechanism. Later he was to embrace spectroscopy, radioactive labelling, transition state theory and *ad hoc* quantum mechanics. Strangely, it was a Robinson student, M. J. S. Dewar, who was to pioneer in the application of molecular orbital theory to physical organic chemistry. Ingold had a highly ratiocinative mind and his landmark 1934 article in *Chemical Reviews* reads like a legal brief as to how God should have fashioned physical organic chemistry if only He had listened to the best advice. In spite of its aridity, the 60-year old review holds up remarkably well. By contrast, Robinson's two 1932 publications and even the 1947 Faraday Lecture are historical relics. Of the latter Williams writes:

> ... though basically a lucid exposition, its old fashioned terminology must at points have baffled some of the younger members of the audience.

During that lecture, a much younger version of the present reviewer was sitting across the aisle from Ingold. As Robinson floundered on, a thin Gioconda smile became permanently fixed on Ingold's face. Robinson never gave up on his claims and even after Ingold's death, he could write "the development of these ideas constituted, in the writer's opinion, his most important contribution to knowledge". Today few would agree with this self-assessment, but there is no doubt that in this regard history (and Ingold) treated him a trifle scurvily. Perhaps some redress can be made when the Division of History of Chemistry sponsors a symposium on the early history of physical organic chemistry at the 1993 Fall ACS meeting in Chicago - a symposium prompted by the centenary of Ingold's birth!

After more than 500 years of practice, one would have expected the Clarendon Press to honor one of its own with fewer proof-reading errors and with better structural formulas than those found on page 74. *Derek A. Davenport, Department of Chemistry, Purdue University, West Lafayette, IN 47907*

Michael Faraday and the Royal Institution: the Genius of Man and Place, John M. Thomas, Hilger, Bristol, 1991. xii + 234 pp. Paper (Typeset). £12.50. *Selections and Reflections: The Legacy of Sir Lawrence Bragg*, John M. Thomas and Sir David Phillips (Editors), Science Reviews, Ltd, Northwood, Middlesex, 1990. 308 pp. Cloth (Typeset). $57.00.

In these two very different books, Sir John Thomas, the Fullerian Professor of Chemistry at the Royal Institution in London, pays tribute to two of his illustrious predecessors. Their common benefactor, John Fuller, "lounged in Faraday's lectures in an old-fashioned blue coat and brass buttons, grey smalls and white stockings". Of him, it was said that:

> ... the feebleness of whose constitution denied him at all other times and places the rest necessary for health could always find repose and even quiet slumber amid the murmuring lectures of the Royal Institution and that in gratitude for the peaceful hours thus snatched from an otherwise restless life bequeathed to the Royal Institution the magnificent sum of £10,000.

Such indolence is clearly not permitted to his beneficiaries. With the bicentennial of Faraday's birth and the sesquicentennial of The Royal Society of Chemistry, Sir John has yet found time to pay superb tribute to both Michael Faraday and Sir Lawrence Bragg.

The Faraday book shares much of the grace and insight of John Tyndall's *Faraday as a Discoverer* while benefitting from the historical perspective of a further 120 years. While Faraday remains the central figure, the results for the forces he and Davy set in motion are admirably delineated. As the title correctly implies, The Royal Institution is as much the hero of Thomas' story as is Michael Faraday himself. The book is generously and imaginatively illustrated and is directed to the general reader "especially young people in the arts and in all branches of the sciences who are about to enter tertiary education". Faraday would surely have approved.

As benefits one of Silurian ancestry, Thomas writes with eloquence and grace:

> Part of the magic of Faraday's writing is that it elicits admiration and conveys information in equal measure ... He tells of his failures as well as his successes, so that the reader is tempted to believe that if he had access to a laboratory, he too might become a discoverer and be admitted to the privileged circle of those who have enlarged the bounds of human knowledge. Reading his work, one senses an unique amalgam of compelling immediacy and Chekovian timelessness, mingled with an abundance of optimism (even elation), self-control and self-criticism. There is no hunger after popular applause, no jealousy of the work of others, no deviation from his self-imposed practice of "working, finishing, publishing". His versatility, originality and stamina leave us in awe.

Later, having given an impressive list of immortals who have graced the large lecture room in Albemarle Street, Thomas slyly continues, "Proceeding to the second letter of the alphabet, we note that ..." The reader then realizes that only those whose names began with the letter "A" have been cited so far. As one who has assumed Faraday's mantle, though no doubt with a certain amount of trepidation, Thomas is unique amongst recent biographers in having intimate knowledge of the day-to-day workings of the Royal Institution. His discussion of the management of the Evening Discourses and of the Christmas Lectures for a "juvenile auditory" are fascinating, though Faraday's daunting statement that "A truly popular lecture cannot teach, and a lecture that truly teaches cannot be popular" comes as something of a shock. The Royal Institution has been blessed in its history and in its servants. It has also been blessed in those who have chronicled that history and those people. The present small volume is an admirable addition to the canon.

The second book is of a totally different character, primarily intended for those who know something of the younger Bragg's life and achievement. Approximately one half of the book is devoted to Sir David Phillip's official yet graceful obituary reprinted from the *Biographical Memoirs of the Fellows of the Royal Society* and to short personal reminiscences of Bragg by a veritable galaxy of illuminati, including ten Nobel Laureates. The remaining half of the book contains a selection of Bragg's writings ranging from the seminal papers on X-ray crystallography to *The Art of Talking About Science*. At the age of 25, Lawrence Bragg shared the 1915 Nobel Prize for Chemistry with his father. More than 50 years of active scientific life were yet to come. It is a tribute to Bragg's genius that he lived them to such good and generous effect. Having been present at the creation of X-ray crystallography, he fostered its growth and was to live to see the triumphs of molecular biology. Along the way, he contributed many of the advances in structure determination that made those triumphs possible. Equally importantly, as Cavendish Professor of Experimental Physics at Cambridge, he used his influence to nurse Perutz and Kendrew through their locust years and his patience to tolerate Watson and Crick in their salad days. All four contribute character tributes.

In his book on Faraday, Thomas describes the Royal Institution as "the foremost repertory theatre for the popularization of science in the world". In his later years, Lawrence Bragg was to devote much of his time to the popularization of science, particularly, via radio and TV, for school audiences. For this he was sometimes patronized by his more collimated colleagues. But to inherit the popularization-of-science torch from Davy, Faraday, Tyndall, Dewar, and William Bragg, to run with it to such good effect, and to hand it on to a George Porter and a John Thomas, is an enviable achievement. This is an admirable book about a most admirable and likeable man.

Derek A. Davenport, Department of Chemistry, Purdue University, West Lafayette, IN 47907

Wissenschaftliches Jahrbuch 1990, Deutsches Museum, Munich, 1990. 154 pp. Cloth (Typeset). DM 48.

The Deutsches Museum, familiar to most tourists to Munich, is arguably the finest science and technology museum in the world. What few visitors notice, and even fewer have occasion to enter, is the imposing Bibliotheksbau across the courtyard from the Museum's main entrance. Within this structure is Germany's finest dedicated collection of printed and archival materials related to the history of science and technology. Several scholarly institutes are also housed there, where much excellent historical research is carried out.

Readers seeking a sampling of this research can do no better than to pick up the present volume. We have here seven essays written by scholars connected with the Museum or its associated institutes, covering subjects ranging from ancient water clocks to Sommerfeld's role in the origin of solid state physics. Other topics include William Thomson, Werner von Siemens and the gyrocompass; the story surrounding a six-ton lead sphere with the help of which Philipp von Jolly measured the density of the earth; the history of the Deutsches Museum itself; and J. H. Mädler's 19th-century maps of the moon's surface. Of the greatest interest to historians of chemistry in particular is Elisabeth Vaupel's intriguing paper on the rise and fall of the 19th-century Sicilian sulfur industry, which explores various political, technical and economic implications of the story.

This is the second such yearbook produced by the Museum, and we look forward to a continuation of the series. One worries, however, about fine papers being lost in volumes such as this whose contents are too miscellaneous; the editors might be well advised in future to follow the model of the revived journal *Osiris*, whose annual issues are usually organized under such topical rubrics as "Historical Writing on American Science" or "The Chemical Revolution".

This small book is nicely produced in glossy paper and is richly illustrated. It may be obtained from the Museumsladen des Deutschen Museums, Museumsinsel 1, D-8 München 22.

Alan J. Rocke, History of Science and Technology Program, Case Western Reserve University, Cleveland, OH 44106

Das Tagebuch des Erzherzogs Leopold, Josef Vozár (Editor), Osveta Publishing House, Marin, Czechoslovakia, 1990. 192 pp. Cloth (Typeset and Photoreproduction. 20 Czech Crowns.

The English translation of the title of this book would be "The Diary of Archduke Leopold". Prince Leopold (1747-1792) was the youngest son of Empress Maria Theresa (1717-1780) of Austria. His mother sent him with his older brother, Crown Prince Joseph (1741-1790), to tour the mining district of Schemnitz-Kremnitz-Neusohl in Upper Hungary (part of the Austrian Empire - now the Slovak Republic). These are the German names of the towns known today by their Slovakian names of Banska Stiavnica, Kremnica and Banska Bystrica, respectively.

The visit took place from 19-31 July 1764. The two princes were accompanied by a group of court officials and specialists. Leopold, who was 17 years old at the time, took notes during his visit and made sketches of what he saw in a travel diary. He eventually became Leopold II, Emperor of Austria and King of Hungary, upon the death of his older brother, Joseph II, in

1790. When he also died, two years later, he was succeeded to the throne of Hungary by his son, Franz II (1768-1835), whose daughter, Marie Louise (1791-1847), was to marry Napoleon Bonaparte in 1810.

The diary was discovered by Professor Josef Vozár of the Slovak Academy of Science in Bratislava while visiting the Austrian National Library in Vienna and the published version contains both the original text of the diary and a Slovak translation. Printed on a high-quality paper, it contains numerous important historical remarks by Dr. Vozár. The editor had to solve numerous difficulties in order to produce such an excellent book. For example, the handwritten journal was not always clear and the paper used by Leopold was not of high quality; writings from the back side of pages sometimes were visible on the front side and confused the reader; the ink in some places was washed away with water; the Prince used many abbreviations which were difficult to resolve; and he gave dimensions of equipment without identifying the units, etc. However, Leopold made many useful sketches of the machines, tools, and technical installations and described the social life and jobs of the miners of that time.

The diary is divided into four parts:

* Part 1: "Diary of Our Trip to the Mines of Hungary in the Year of 1764 in the Month of July", consisting of 57 pages written in French by an unknown author. As implied by the title, this has the character of a diary and contains the names of the participants, those who received the Prince in Schemnitz, and an itinerary of the trip.

* Part 2: "Some Remarks on the Work in the Mines" consisting of 21 pages written in German and containing remarks on the operation of the mines, their importance, problems of mine water, salaries of miners, and the blasting of rocks. The first attempt to use gunpowder as an explosive to break rocks in mines was conducted on 27 February 1627 in Schemnitz. The practice spread to other mines in the Austrian Empire; then in 1635 to the Harz Mountains in Germany; in 1643 to Freiberg; in 1650 to the Rhine region; and in 1670 to England. This section also categorizes the miners (who totaled around 6,000) and describes their various jobs.

* Part 3, consisting of 24 pages written in German, and giving a description of the mines themselves, the transport of ores, the people in the mines, and the removal of mine water. This, together with Part 2, can be considered as a small encyclopedia on 18th-century mining.

* Part 4, consisting of 13 pages written in German, giving a short description of the mines, the main machines, and the mining statistics for Schemnitz, Kremnitz and Neusohl. It also enumerates the profits of the Emperor and those of the the labor union.

The book is a welcome addition to the mining and metallurgical library, and an English translation would be desirable.

Fathi Habashi, Department of Mining & Metallurgy, Laval University, Quebec City, Canada G1K 7P4

The American Synthetic Rubber Research Program, Peter J. T. Morris, University of Pennsylvania Press, Philadelphia, PA, 1989. 203 pp. Cloth (Typeset). $34.95.

The U.S. Government began a comprehensive program of synthetic rubber research in 1942 to compensate for the wartime loss of natural rubber supplies and continued the strategy for a decade after World War II was over because of concerns related to the Cold War. This program represented a major attempt to develop cooperation among government, industry, and university laboratories, and so is of special interest not only to historians of science, but also to policy makers concerned with government support of research and industrial development.

There is still considerable disagreement on the key question of whether or not the rubber research project was successful. Those involved are very enthusiastic, but more recent analyses have questioned its usefulness. This is not just a historical issue, since the rubber program was used as a model for President Carter's energy program and may offer justification for similar government-sponsored efforts to support U.S. industries.

The breadth and depth of Morris' research are impressive. His many references include a wealth of primary resources, commentaries on the program, and interviews with many major participants. Based on this broad perspective, Morris concludes that the project achieved its goals during World War II, but the attempt to continue the work following the war was not as successful. He offers a variety of reasons for this diminished productivity, including failure to identify clear goals, lack of strong leadership, and inconsistent support from Washington.

A closely related question is whether there was effective interaction between industrial and academic laboratories. The author suggests that, although university-based researchers did make some valuable contributions, many of the problems cited above were also present here. Academic research did develop new fundamental information and make possible incremental improvements in the process, but it didn't produce radical innovations. In part, then, evaluating the success of this aspect of the project is related to the relative importance one places on incremental in opposition to radical changes.

Morris concludes that the best way to promote radical technological innovation in peacetime is commercial competition rather than government-sponsored efforts to demand cooperation. One of his most interesting asides points out that if this is true, the result of industrial mergers may be reduced competition and, therefore, fewer major innovations by U.S. companies.

The new series on *The Chemical Sciences in Society* is intended to present the best scholarship dealing with the importance to society of the chemical sciences. Peter Morris not only does a thorough analysis of an important technological development, but also offers some valuable advice for current policy makers. His book is an excellent beginning for this new series. *Harry E. Pence, Chemistry Department, SUNY-Oneonta, Oneonta, NY 13810.*

Steroids Made It Possible, Carl Djerassi, American Chemical Society, Washington, D. C., 1990. xxiv + 205 pp. Cloth (Typeset), $24.95.

How many interesting, articulate individuals have written intriguing autobiographies? Carl Djerassi has succeeded in accomplishing this goal with gusto. As a person who has straddled a variety of careers and environments, Djerassi has much to say about the so-called "Golden Age" of organic chemistry. The breadth of his interests and his achievements have allowed him to produce lasting work in pure academic science, to be involved in flourishing industrial ventures, and to have carried out projects which have had significant social impact.

Arriving in the United States from Europe in his teens, shortly before the outbreak of World War II, Djerassi rapidly completed his formal education. He then became involved with industrial research in medicinal chemistry; was instrumental in the establishment of several major chemical corporations, including Syntex and Zoecon; produced more than 1000 refereed articles, with the majority focusing on various aspects of steroid chemistry; published several well-received books; and taught generations of undergraduate and graduate students while serving on the faculties of several prestigious universities. Carl Djerassi has had an enormous leadership influence on the development of the post-World War II pharmaceutical enterprise in this county. He has also become a major spokesperson for the balanced importance of both science and art in contemporary culture. Part serious scientist, part striving artist, part social critic, and part reflective teacher, this man far transcends the Ivory Tower.

Perhaps the first prerequisite for the multi-faceted accomplishments so characteristic of Djerassi was the juxtaposition of both intelligence and ego. In characteristic fashion, he often attempted activities for which the outcome might have been embarrassing failure. Instead, his combination of basic talent, courage, and persistence led, in remarkably consistent fashion, to highly favorable progress.

Constructing this book on several levels, the author has managed to weave together many aspects of his personal life alongside a running commentary on his scientific endeavors. Given the sheer volume of Djerassi's journal publications, his autobiography, by providing a historical review of his research interests, goes a long way toward orienting and redirecting the reader back to the body of his published science. One might conclude that there may actually be something of a disadvantage for a scientist to have so many publications, since many readers will be somewhat distracted from seeing the main themes. To miss the forest for the trees would be particularly sad given Djerassi's significant and imaginative work in organic chemistry. In many respects, this book is an atlas of that work with no apologies for its sophisticated chemical specialization, but also written in a crisp and interesting style that holds the casual reader's interest by its many asides into the associated players who were important in Djerassi's intellectual adventures.

Djerassi's recognition that steroids could provide a platform for numerous scientific investigations was deeply perceptive. Entering a subdiscipline of chemistry that already had many skilled experimentalists, Djerassi strove to emerge as a broadly-based generalist who utilized steroids for fundamental studies in such areas as spectroscopy, medicinal chemistry, synthetic methodology, and biosynthesis. Inevitably, the natural outcome of this approach was for him and his group of colleagues to become "lightning rods" for the whole field.

Djerassi's wide-ranging curiosity led repeatedly to excellent science. Thus, considering just one area he explored, using available natural products as a practical backdrop, his seminal studies on spectroscopy yielded hundreds of papers running the gamut from the background tabulations needed to establish fundamental principles (e.g., the octant rule) to publications that probed how artificial intelligence might be applied to the vast amounts of data generated by modern spectroscopic techniques. His insight that artificial intelligence might allow virtually automated structure elucidation was a daring concept when he first began yet it has all but been accomplished today.

Djerassi also recognized the enormous social implications of organic chemistry. He has lectured and written extensively on the impact of safe, reliable contraception on the emancipation of women from stereotypical role-playing and all that implied for the liberation of our species. As an outgrowth of his interest in mammalian contraception, he also became intrigued by the necessity to limit the population of harmful insects but to do so in an environmentally unthreatening way. As a result of his interactions with individuals and institutions in the Third World, he was led to make real efforts at strengthening the scientific infrastructure of these areas so that their further technological and economic development might be assured.

What comes across in his autobiography is an image of Carl Djerassi as an extremely complex, creative individual with both strengths and weaknesses. He is a very special breed of intellectual. In many respects, Djerassi appears to be an archetype of the "Scientist as Artist", a 20th century Renaissance Man in his restless quest for new frontiers to conquer. Through his writing, Djerassi illustrates how a charismatic individual can create a personal dynamic that arguably stimulated those who worked closely with him to accomplish much more than they might have thought possible. Perhaps another valid description for Djerassi also consistent with his autobiography is "Scientist as Catalyst".

At the close of his book, Djerassi confides to us how he believes that his life is about to undergo a phoenix-like rebirth wherein he will conclude his activities in the laboratory and now embark on a very strong artistic focus with special emphasis on serious literary works. One senses that he may be an almost unique individual able to bridge C. P. Snow's two cultures. Already, his first major effort in this direction, the novel *Cantor's Dilemma*, has attracted critical acclaim, with more novels in the works.

In this reviewer's opinion, by taking serious risks involving candor and self-expression (in a way that mirrors his own life history), Djerassi has managed to write an intensely personal document that not only describes his own career, but also manages to orient the reader toward the significant struggles that have gone on at the interface between organic chemistry and society at large. In effect, this book provides thought-provoking reading for contemporary scientists who are troubled with the controversial image that so much of society has of the chemical enterprise. *John Belletire, Department of Chemistry, University of Cincinnati, Cincinnati, OH 45221.*

LETTERS

The Mines of Schwaz

Readers of the review of the *Schwazer Bergbuch* (Issue 8, Winter 1990) may like to know that the old mine workings at Schwaz can be visited. Silver was mined there for about 500 years, until 1900, and several of the many kilometers of galleries inside the mountain are accessible to the public in complete safety. The entrance is just above Schwaz, about 35 kilometers east of Innsbruck in the valley of the River Inn, and as the route is itself attractive and Schwaz has some fine old buildings, a visit makes a good excursion by car or bus for anyone on holiday in that part of Austria. The *Silberbergwerk* is open from 9 am to 5 pm every day except from 1 November to 26 December each year, and there are frequent guided tours, for a small charge, lasting about an hour.

William A. Smeaton, University of London

The Nascent State

The article on the nascent state (Issue 6, Spring 1990, pp. 26-36) cited Priestley in 1790 as an early user of the term, antedating an *Oxford English Dictionary* citation for Kirwan of 1796. I have often wondered if the term was not part and parcel of phlogistic doctrine; both Priestley and Kirwan were phlogistonists and I have the impression that the theory was much involved (in ways that are hard for me to understand) with ideas of birth and death. I have never checked Becher or Stahl to discover if they, perhaps, worried about "nascent" (*freiwerdend*) materials. I have also been struck with how often the term "nascent" appeared in areas other than natural philosophy in 18th century England. Perhaps one reason it caught on so firmly in chemical literature was because the same term found such frequent use in general speech. Readers might also be interested to know that Davy first discussed the ability of the voltaic pile to generate "nascent" hydrogen in 1800:

> If the ratio between the quantities of the oxygen and the hydrogen produced from different wires be always the same, whatever substances are held in solution by the water connected with them, this nascent hydrogen will become a powerful and accurate instrument of analysis (*Nicholson J.*, **1800**, *4*, 281).

June Z. Fullmer, Ohio State University

FROM THE CHAIR

Conventional wisdom has it that scientists seldom show an interest in the history of science until their active research careers are over and then only because they are interested in securing a place for themselves in the historical record. Were this really true, one would expect that histories of chemistry would be written only by chemists in their 60s and 70s and that the Division of the History of Chemistry would be largely populated by retirees. As Colin Russell has recently shown (*Brit. J. Hist. Sci.*, **1988**, *21*, 3-13), the first of these premises is definitely false and, in fact, many of the outstanding histories of chemistry written in the 19th century were authored by chemists at the beginning, rather than the end, of their active research careers. Similarly, the results of a recent demographic study by the ACS fail to show any preponderance of sexa- and septuagenarians in the Division. Indeed, the age profile is about what one would expect for any group of scientists, with a maximum for chemists in their 40s and 50s and smaller numbers as one moves toward both younger and older age brackets. About 14% of the Division is between the ages of 21-30, 17.2% between the ages of 31-40, 19.4% between the ages of 41-50, 20.9% between the ages of 51-60, 14.9% between the ages of 61-70, and 9.8% above 70 (these figure do not total to 100% because not everyone reported this information). The data also show that 23.3%, or nearly a quarter, of the Division has joined since 1986, reflecting our rapid growth in recent years, spurred in part by the decision to begin publication of the *Bulletin*.

Other statistics are less surprising. 81.5% of the Division is male, reflecting the general preponderance of males in all fields of chemistry; 91.1% of the Division is domestic; 52.6% hold doctoral degrees in chemistry, with 82.2% holding chemical degrees of some sort. The single largest occupational group in the Division is university and college teachers,