

ACS National Meeting

Oxygen

by Carl Djerassi and Roald Hoffmann

There is a play coming your way soon. We've written it, and it's called *Oxygen*. Yes, it's about the discovery of oxygen. But no, it is not just for chemists—though chemists will learn a lot from our play about the history of the epochal discovery of the life-giver element. *Oxygen*, whose world premiere will take place in San Diego, April 2–7, 2001, during the week of the ACS meeting (and will be later broadcast over the BBC World Service as well as performed in the UK, France, Germany, and Sweden) is a play that will touch everyone.

Science is inherently dramatic, at least in the opinion of scientists, because it deals with the new and unexpected. But does it follow that scientists are dramatic personae? Or that science can become the stuff of drama? Until now “science-in-theater” has proved to be a rare genre, although playwrights of the caliber of Brecht, Dürrenmatt, Whitemore, and Stoppard have on occasion chosen scientists or scientific themes as protagonists of major plays.

A more recent phenomenon is the appearance of “pure” science-in-theater plays by prominent playwrights who are not scientists. Steven Poliakoff's *Blinded by the Sun* attempted to illuminate some of the idiosyncratic aspects of a scientist's drive for name recognition as well as the competitive aspects of a collegial enterprise through a theatrical version of the “cold fusion” debacle of the early 1990s. The playwright's brother (Martyn Poliakoff) is a superb physical chemist. Michael Frayn's *Copenhagen* uses quantum mechanics and the uncertainty principle for much of the scintillating interplay during a crucial and mysterious wartime encounter between Werner Heisenberg and Niels Bohr, under the skeptical eye of Margarethe Bohr. Frayn made no concessions to scientific illiteracy, yet the play became a major success on both sides of the Atlantic.

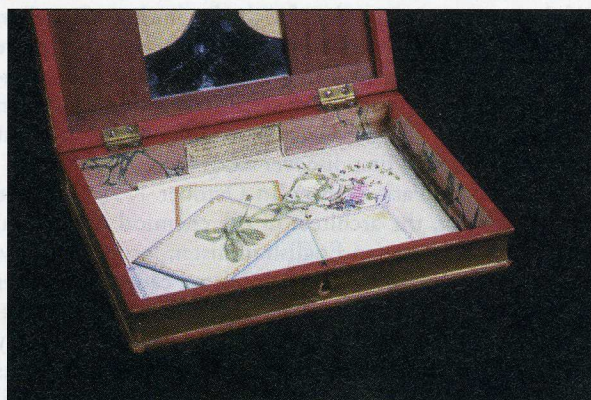


Photo by Charles Harrington

Mme. Lavoisier's nécessaire, a travel chest. Now in the Cornell University Library, it figures importantly in Djerassi and Hoffmann's play, *Oxygen*.

We've written a play on the Nobel Prize—the ultimate reward in the kudos-driven culture of science—as well as on a chemical theme, the discovery of the element oxygen. What is discovery? Why is it so important to be first? These are the questions that trouble the people in this play. *Oxygen* alternates between 1777 and 2001—the Centenary of the Nobel Prize—when the Nobel Foundation decides to inaugurate a “Retro-Nobel” Award for those great discoveries that preceded the establishment of the Nobel Prizes one hundred years before. The Foundation thinks this will be easy, that the Nobel Committees who select the laureates can reach back to a period when science was done for science's sake, when discovery was simple, pure, and unalloyed by controversy, priority claims, and hype....

Cast of Characters

Stockholm, 1777

ANTOINE LAURENT LAVOISIER, 34 years old (French chemist, tax collector, economist, and public servant).

MARIE ANNE PIERRETTE PAULZE LAVOISIER, 19 years old (wife of the above).

JOSEPH PRIESTLEY, 44 years old (English minister and chemist).

MARY PRIESTLEY, 35 years old (wife of the above).

CARL WILHELM SCHEELE, 35 years old (Swedish apothecary and chemist).

SARA MARGARETHA POHL (FRU POHL), 26 years old (became MRS. SCHEELE three days prior to Carl Wilhelm's death).

COURT HERALD (off-stage male voice).

Stockholm, 2001

Prof. BENGT HJALMARSSON, member of the Chemistry Nobel Prize Committee of the Royal Swedish Academy of Sciences (same actor as ANTOINE LAVOISIER).

Prof. SUNE KALLSTENIUS, member of the Chemistry Nobel Prize Committee of the Royal Swedish Academy of Sciences (same actor as CARL WILHELM SCHEELE).

Prof. ASTRID ROSENQVIST, chair of the Chemistry Nobel Prize Committee of the Royal Swedish Academy of Sciences (same actress as MARY PRIESTLEY).

Prof. ULF SVANHOLM, member of the Chemistry Nobel Prize Committee of the Royal Swedish Academy of Sciences (same actor as JOSEPH PRIESTLEY).

ULLA ZORN, a graduate student in the History of Science and amanuensis to the Chemistry Nobel Prize Committee (same actress as FRU POHL).

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The Chemistry Committee of the Royal Swedish Academy of Sciences decides to focus on the discovery of oxygen, since that event launched the modern chemical revolution. But who should be so honored? Lavoisier is a natural choice, for if there ever was a marker for the beginning of modern chemistry, it was Lavoisier's understanding of the true nature of combustion, rusting, and animal respiration, and the central role of oxygen in each of these processes, formulated in the period 1770–1780. But what about Scheele? What about Priestley? Didn't they first discover oxygen?

Indeed, on a Paris evening in October 1774, Antoine Laurent Lavoisier, the architect of the chemical revolution, learned that the Unitarian English minister, Joseph Priestley, had made a new gas. Within a week, a letter came to Lavoisier from the Swedish apothecary, Carl Wilhelm Scheele, instructing the French scientist how one might synthesize this key element in Lavoisier's developing theory. Scheele's work was carried out years before, but remained unpublished until 1777.

Scheele and Priestley fit their discovery into an entirely wrong logical framework—the phlogiston theory—which Lavoisier is about to demolish. How does Lavoisier deal with the Priestley and Scheele discoveries? Does he give the discoverers their due credit? And what is discovery after all? Does it matter if you do not fully understand what you have found? Should it count against you if you do not let the world know?

In a fictional encounter, the play brings the three protagonists and their wives to 1777 Stockholm at the invitation of King Gustav III (of *Un ballo in maschera* fame). The question to be resolved: “Who discovered oxygen?” In the voices of the scientists' wives, in a sauna and elsewhere, we learn of their lives and those of their husbands. The actions of Mme. Lavoisier, a remarkable woman, are central to the play, as is a missing letter. In the Judgment of Stockholm, a scene featuring chemical demonstrations, the three discoverers of oxygen recreate their critical experiments. There is also a verse play within a play, on the “Victory of Oxygen over

The world premiere of *Oxygen* will take place at the San Diego Repertory Company's Lyceum Theatre, April 2–7, 2001. There will be performances at 8:00 p.m. on April 2, 5, 6, 7 and at 5:00 and 8:30 p.m. on April 3 and 4. The Lyceum Theatre is conveniently located in downtown San Diego near the Convention Center and the heart of the historic Gaslamp Quarter. Order tickets online at <http://www.sandiegorep.com> or telephone the box office at 619/544-1000. Special discount rates of \$25 apply to ACS convention attendees.

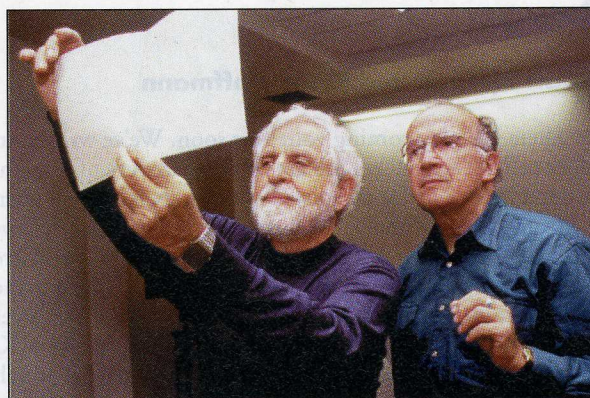


Photo by Frank DiMeo

The authors, Djerassi (left) and Hoffmann (right), examining an important Lavoisier document in the Cornell University Library History of Science Collection.

Phlogiston”. Such a play, now lost, was actually staged by the Lavoisiers for their friends and patrons.

Meanwhile, in the beginning of the 21st century, the Nobel Committee investigates and argues about the conflicting claims of the three men. Their discussions tell us much about whether science has changed in the last two centuries, and about the role of women in science, then and now. The chair of the Nobel Committee is Astrid Rosenqvist, an outstanding Swedish theoretical chemist. A young historian, Ulla Zorn, serves as a recorder for the committee's proceedings. But with time, her role changes.

The ethical issues around priority and discovery at the heart of this play are as timely today as they were in 1777. As are the ironies of revolutions: Lavoisier, the chemical revolutionary, is a political conservative, who loses his life in the Jacobin terror. Priestley, the political radical who is hounded out of England for his support of the French revolution, is a chemical conservative. And Scheele just wants to run his pharmacy in Köping and do chemical experiments in his spare time. For a long time, he—the first man on Earth to make oxygen in the laboratory—got least credit for it. Will that situation be repaired 230 years after his discovery?

To find out, come and see our play.

Carl Djerassi is a novelist and playwright as well as a member of the Department of Chemistry at Stanford University, Stanford, CA 94305-5080; djerassi@stanford.edu; <http://www.djerassi.com>. Roald Hoffmann is a member of the Department of Chemistry, Cornell University, Ithaca, NY, 14853-1301; rh34@cornell.edu. Both are recipients of the American Chemical Society's Priestley Medal, named after one of the main characters in their play. Caveat lector!