

C. Djerassi & R. Hoffmann, "Oxygen" (Oxygen-10A version)
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OXYGEN

(A play in 2 acts)

By Carl Djerassi and Roald Hoffmann

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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 Committee 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....

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 an evening in October 1774, Antoine 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, the life-giver oxygen. Scheele's work was carried out years before, but remained unpublished until 1777.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—that 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? Or 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. 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 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. The chair of the Nobel Committee is Astrid Rosenqvist, an outstanding Swedish theoretical chemist, while 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?

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Expanded description of 1777 Cast of Characters
5 November 2000

Expanded description of 1777 Cast of Characters

ANTOINE LAURENT LAVOISIER, 34 years old. (French chemist, tax collector, economist, public servant, and debunker of mesmerism. Lavoisier was wealthy and self-assured—certain that he was constructing the proper framework for all of chemistry).

MARIE ANNE PIERRETTE PAULZE LAVOISIER, 19 years old. (Born and married into wealth, Mme. Lavoisier was educated to help her husband in his scientific and public endeavors. On one 1794 day she lost her husband and father to the guillotine of the Jacobin terror. She recovered, with effort, his estate, published his science, and in a second, most unhappy marriage was united briefly with an American-British-Bavarian scientist and adventurer, Count Rumford.)

JOSEPH PRIESTLEY, 44 years old. (English minister, political activist, and chemist. Priestley was one of the founders of the Unitarian church, a dissenter in religion and in politics. After teaching at several dissenter academies, he entered the service of Lord Shelburne. Eventually his radical political views led to a mob assault on his home; Priestley fled to the US, where he lived out his life in Northumberland, PA, defending the phlogiston theory to his death. Priestley discovered several gases, including oxygen, nitrous oxide, and carbon monoxide; he also perfected a popular machine for carbonating water.)

MARY PRIESTLEY, 35 years old. (Daughter of the well-know ironmonger John Wilkinson and sister of one of Priestley's students, she married the young minister in 1762 and partook in his academic and religious life. Mary Priestley is said to have written beautiful letters, but none survived the Birmingham fire in which Priestley's laboratory and home were sacked. In 1794 with the help of Benjamin Franklin, the couple and their children settled in America).

CARL WILHELM SCHEELE, 35 years old. (Swedish apothecary, born in a German family in Stralsund, Pomerania, then Swedish. He was early apprenticed to an apothecary, and pursued that calling all his life. A dedicated and skillful experimentalist, he discovered not only oxygen, but chlorine, manganese, hydrofluoric acid, hydrogen sulfide, oxalic and citric acids, and many organic molecules. Scheele also invented a very good green paint containing arsenic that may have contributed to Napoleon's demise. Scheele's dearest wish was to own his own pharmacy and toward the end of his brief life, he achieved that aim in provincial Köping).

SARA MARGARETHA POHL (FRU POHL), 26 years old. (Became MRS. SCHEELE three days prior to Carl Wilhelm's death. Prior to that she had been married to a German pharmacist, Hindrich Pascher Pohl, the father of her only child (who died at 14). The Köping pharmacy eventually was sold to Scheele, and Fru Pohl became his housekeeper. After Scheele's death in 1786, his widow sent some documents to the Royal Swedish Academy of Sciences, among them the draft of Scheele's letter to Lavoisier. She wrote that she gave Scheele the most respectable funeral that Köping had ever seen. She then married a third German pharmacist).

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Cast of Characters

Stockholm, 1777

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

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

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

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

CARL WILHELM SCHEELE, 35 years old. (Swedish apothecary; discovered oxygen).

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 MRS. 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*).

Technical Details

The staging can be sparse (*sauna bench; conference table; laboratory demonstration table*). All audiovisuals, provided by the authors, are to be projected on a large screen, preferably by rearward projection. To provide for rapid alternating costume changes between 1777 and 2001, the 1777 dress code should be distinctive yet simple (e.g. use of wigs, long coats with easily attachable ruffled collars for men; distinctive (buckled) shoes; wigs, mobcaps, scarves, long dresses for women, etc).

Scene 1. (*Sauna in Stockholm, Sweden, 1777*). The three women sit on a sauna bench, their bodies covered to various extents by bathing towels or appropriate sheets—Mrs. Priestley most decorously and Mme. Lavoisier most daringly. Each is wearing a different, typically 18th century, mobcap to cover her hair or wig).

MRS. PRIESTLEY
(*Fanning herself with her hand*)

I cannot breathe, the heat....

FRU POHL
Mrs. Priestley, have no fear. Soon we'll go outside where an attendant will invigorate us—

MME. LAVOISIER
A man? How *avant garde*!

FRU POHL
A woman, Mme. Lavoisier! She will beat us with birch branches—

MME. LAVOISIER
(*Giggles*)
Ô la la!

MRS. PRIESTLEY
(*Shocked*)
What? Beat us?

FRU POHL
(*Soothingly*)
Just to bring the blood to the surface. It is much better than leeches.

MRS. PRIESTLEY
(*As towel slips off her shoulder, she quickly pulls it up*)
The immodesty of the sauna disquiets me.

MME. LAVOISIER
(*Deliberately lowers her towel while addressing Mrs. Priestley*)
Mrs. Priestley... we are just women. (*Aside*)... Now, were there men here...

MRS. PRIESTLEY
Oh, you are young, Madame!

MME. LAVOISIER

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Nineteen!

FRU POHL

I was twenty before I married.

MRS. PRIESTLEY

So was I.

(Turns to Fru Pohl)

How many children do you have?

FRU POHL

A young son. And you?

MRS. PRIESTLEY

Three sons and a daughter.

(Turns to Mme. Lavoisier)

And you, Madame Lavoisier?

MME. LAVOISIER

None.

MRS. PRIESTLEY

Ah! I presume you married only recently?

MME. LAVOISIER

Six years ago.

FRU POHL

And no children?

MRS. PRIESTLEY

My first child was born when we were married but ten months—

MME. LAVOISIER

As we say in France, *chacun à son goût*.

MRS. PRIESTLEY

So you think it was a matter of taste? I took it as an obligation when I married.

(A touch of sarcasm)

But then, of course, I was twenty...

MME. LAVOISIER

Perhaps women mature faster in France... especially those brought up in convent schools.

MRS. PRIESTLEY

A convent?

MME. LAVOISIER

Not to become a nun. And when my mother died, I left the convent to serve as my father's hostess. I was twelve. (*Pause*). I even studied chemistry... "Butter of arsenic"... "Sugar of lead"... "Flowers of zinc." What wonderful words, I thought: First chemistry in the kitchen... then chemistry in the garden...

MRS. PRIESTLEY

A child of twelve would find it charming.

MME. LAVOISIER

A child who also studied mathematics... and learned to play the harpsichord. (*Pause*). At thirteen, I escaped the attentions of a Count—much older than my father—by marrying Monsieur Lavoisier. (*Proudly*). He is active in the tax collection agency for the crown. He heads the Discount Bank...

MRS. PRIESTLEY

A tax collector? A banker?

MME. LAVOISIER
(*Amused*)

And a lawyer at twenty-one!

FRU POHL

Yet your husband was invited to Sweden because of his chemical discoveries?

MME. LAVOISIER

So was Mrs. Priestley's husband.
(*Disingenuously to Mrs. Priestley*).
He is a priest, is he not?

MRS. PRIESTLEY

A minister. Whom people call "Dr." Priestley.
(*Suddenly agitated*)

When you marry a man of God, you know you will find riches greater than money. But our Unitarian ideas are opposed by the Church of England. We cannot hold government office, we cannot go to Oxford or to Cambridge. (*Catches herself*). I beg your pardon... I was carried away.

MME. LAVOISIER

When I spoke of the chemistry I learned in the convent... my husband asked me to assist him in his endeavors.

FRU POHL

He asked you that... at age thirteen?

MME. LAVOISIER

(Proudly)

He told me something very useful. "The product of science is knowledge... but the product of scientists is reputation." *(Pause)*. Reputation is important to him... and when I married him, it also became important to me.

MRS. PRIESTLEY

(Suddenly compassionate)

Is that why you have no children?

MME. LAVOISIER

Bien sûr... There was chemistry to study. Art too. I took lessons with Jacques-Louis David... all to help my husband.

(She muses)

Each day in the laboratory, I made a list of what experiments were to be done. Antoine called out the numbers, I wrote them down. I drew the plates for his books... I etched them...I corrected them. *(Pause)* There was Latin to learn, and English too. It is I, Mrs. Priestley, who translated Dr. Priestley's *Experiments on Different Kinds of Airs...* and his writings on phlogiston—

MRS. PRIESTLEY

(Quickly interrupts)

The principle of fire... an explanation for all chemistry.

MME. LAVOISIER

His explanation.

MRS. PRIESTLEY

What do you mean?

MME. LAVOISIER

We are not convinced—

MRS. PRIESTLEY

We?

MME. LAVOISIER

My husband is not convinced... and therefore, I am not convinced.

FRU POHL

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Herr Scheele is convinced. He says so in his book...

MME. LAVOISIER
(*Very curious*)

What book?

FRU POHL
The only book he has written. On the chemistry of air and fire.

MME. LAVOISIER
My husband never mentioned it.

FRU POHL
It will come out soon... perhaps while you are still in Stockholm.

MME. LAVOISIER
(*Relieved*)
So this is your husband's newest work?

FRU POHL
Apothecary Scheele is not my husband...

MME. LAVOISIER and MRS. PRIESTLEY
(*Shocked*)

Oh!

FRU POHL
But ladies... it is time now to go out. A surprise awaits us.

(Ladies exit, except for Mme.Lavoisier, who tarries behind, speaking to audience; she is left downstage, very dark, spotlight solely on face)

MME LAVOISIER
(*Mimics Fru Pohl's voice and intonation*)

"And no children?"

(Resumes normal voice and accent)

What gives Fru Pohl the right to ask?... Not even married to Apothecary Scheele!
(Pause)

I helped Antoine in the laboratory... as in the salon. But when he reasoned out how we breathe... how sulfur burns... how to make better gunpowder... he spoke to men: to Monsieur Monge... to Monsieur Laplace... to Monsieur Turgot. *(Pause)*. But not to me.

(Pause)

I helped Antoine...in ways he doesn't know about... and never will.

(Pause)

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But I must be careful with Mme. Priestley... and now, I see, also with Mme. Pohl. We did not come to Stockholm to make mistakes. So... we talk women's talk. About our husbands, of course. How good they are. How we help them.

(Pause)

Wearing the woman's mask... her husband's face on it... smiling politely.

(Pause)

But will the men go on smiling when their discoveries are disputed?

(Pause)

Will we?

(She moves after the other ladies)

MUSICAL INTERLUDE (SAUNA AND BIRCH WHIPPING MUSIC)

MME. LAVOISIER

(Dreamily)

I have never been beaten before... not like that. Can we do it again?

MRS. PRIESTLEY

Madame! In England the birch is used for chastisement.

FRU POHL

Ladies! The secret of sauna is moderation.

MME. LAVOISIER

Swedish birch branches... are they special?

FRU POHL

The skill of the attendant is more important than the quality of the birch.

MRS. PRIESTLEY

And you, Mrs. Pohl? You have practice... with the birch?

FRU POHL

Herr Pohl taught me.

MME. LAVOISIER

Herr Pohl?

FRU POHL

My husband.

MRS. PRIESTLEY

I thought Pohl was your father's name...