

Die heilende Wirkung eines Medikaments oder eine mögliche Nebenwirkung, der Schutz der Welternte vor Schädlingen oder Pflanzenschutzmittel-Rückstände in Nahrungsmitteln, Kunststoffe, die das Alltagsleben leichter machen, oder nicht abbaubare Abfälle? Was ist charakteristisch für die Chemie: Erfolgsmeldungen oder Skandalberichte?

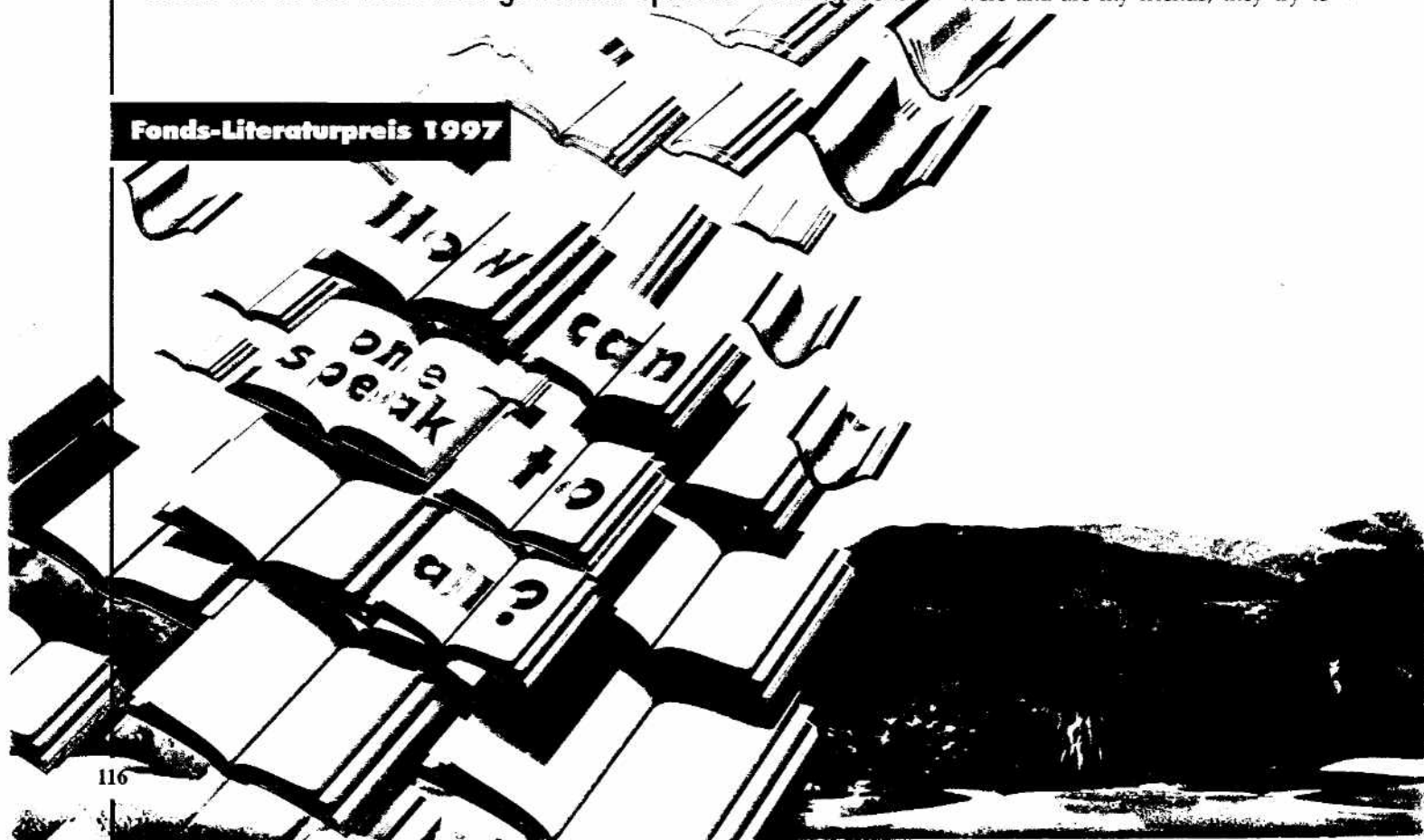
Nobelpreisträger Roald Hoffmann fordert in seinem Buch „Sein und Schein – Reflexionen über die Chemie“ („The Same and Not the Same“) auf, beide Gesichter der Chemie zu sehen und schlägt dabei Brücken zu Kunst, Kultur und Philosophie. Die vermeintlichen Widersprüche der Chemie sind das zentrale Thema des Buches, für das Hoffmann mit dem Literaturpreis 1997 des Fonds der Chemischen Industrie ausgezeichnet wurde. Ein Novum in „Chemie heute“: Seine Reflexionen über das Zustandekommen seines Buches veröffentlichen wir in der vom Autor gewählten Sprache – in Englisch.

I have another career, writing poetry. To put it mildly, it's not a good way to make a living. So it's just as well that my chemistry has gone well. You might imagine that I came to poetry by a progression from doing and writing science, then writing about science for the public, finally making the transition to imaginative writing outside of science.

This was not my way. Inspired by a wonderful teacher at Columbia University, Mark Van Doren (himself a poet), I read much poetry thereafter, but dared to begin writing it only in midlife, about twenty years ago. Another ten years passed before I began to write about science. The struggle to write (and publish) poetry, somehow, in a way I cannot explain, gradually freed me to write of science more generally.

Contact with writers and artists also gave me a sense of the frame of mind of the creator community. These shapers of the spirit of our culture (and I assure you there is inherently less respect for that culture in the US than in Europe) were and are my friends; they try to

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understand the world in ways I find both intriguing and sympathetic.

The attitudes to science of my friends in the arts are a curious melange. Often they turned (or were turned, a failure of the educational system) away from science early on in their lives. They perceive a loss, almost a wound, in not being able to partake of the wondrous way of knowing of science, arguably the most creative achievement of this century. Sometimes our friends in the humanities voice an understandable (to me) negative reaction to the wealth and occasional arrogance of modern science and technology. More often, they just want to know.

I began to write for that audience, and for others. I believe that we must speak out, as broadly as possible, of science. Not because we need more chemists, or even to counter chemophobia. No, I think more important reasons for reaching out are first that lack of understanding of how the world works leads to impoverishing alienation, and second that ignorance of science poses a deep barrier to the workings of the democratic process.

So many audiences, how can one speak to all? I have tried – I participated in the making of the first American video-course about chemistry “The World of Chemistry”, which has been seen by millions and is in every secondary school in our country. For scientists other than chemists I write a column about chemistry for American Scientist. And for my friends in the arts and humanities, I write occasional articles, published in their venues, literary journals often with limited circulation.

All this took hold of me in the late eighties. After I gave a series of public lectures at Brookhaven National Laboratory, lectures scheduled to be published by Columbia University Press, I was faced with a question – should I just write up the lectures? Or should I write a coherent book (well, as coherent as my digressive style would allow), fundamentally changed from the lectures? I did the latter. I was helped immensely by Columbia University Press, who understood an important feature of my literary style – that my integration of science and culture (and the fact that I almost

studied art history instead of chemistry) necessitated the substantial use of imaginative illustrations. Much as chemistry does itself.

So “The Same and Not the Same” came together, as life does, from pieces. Pieces, held together by a deep conviction that everything in the world is connected to everything else. I found a theme in pondering the following: In our time, as never before, thinking people see the benefit of chemistry, and yet they find pollution morally repulsive and are fearful of the potential harm of chemicals to our bodies and our earth. The Janus image is emblematic of these perceptions of chemistry; for that matter of all of science.

I accept that image, and the duality of harm and benefit that is behind it. Not because I am a Manichean, but because I accept human beings for what they are – not angels, and not machines, capable of good and of evil. And Janus was the god of doors, the ultimate symbol of passage, from here to there, with a choice implied. I like doors.



Another reason why I am not perturbed by the public's conflicted perception of our field, is that I see the seeds of that ambiguity in the very nature of the subject. Chemistry is about substances or molecules and their transformations. It is deeply and fundamentally about change. And while human beings have a romantic spiritual valuation of change, the reality is that change is inherently fraught with danger, therefore often resisted psychically by individuals. And even more so by societies. No wonder the science of change will be viewed in ambivalent ways by thinking and feeling human beings.

The harm-benefit duality in the public perception of chemistry actually renders chemistry interesting. The last adjective is not usually applied by outsiders to chemistry – after all the molecular science doesn't deal with the infinitely small and the infinitely big, nor directly with life. But let me remind you of the etymology of the word "interesting". It comes from "inter" + "esse", to be in-between. Chemistry is interesting because it's on a human scale. We worry about what chemicals do for us, and to us. Concern is not something to bemoan, it's good. In love or science, the only tragedy is true disinterest, the cessation of caring whether someone, something can hurt you, or help you...

Polarities, dualities, and choices inherently empower human beings, give them life. And chemistry is chock-full of dualities – not only utility/harm, but also pure/impure, natural/unnatural, creation/discovery, synthesis/analysis, quiescent/dynamic, to reveal/to conceal. But to me the most fundamental duality in chemistry is the one of being the same and not the same, the problem of identity.

Imagine a table. On it are vials with four white powders. One is salt, the next one is sugar, another one is sodium cyanide. The fourth one is penicillin. The substances all look alike. In

fact, many chemicals are white crystalline powders. But it's a matter of life or death – and on a trivial level of taste – that these four substances are different from each other, that they are alike or not alike. The fundamental tension is one of identity. When it resonates in our psyche with our own concerns about our own identity – how we are different from our parents and siblings, from people of another city, another country, another gender, another religion – it cannot but make the objects whose identity is in question, interesting.

Yes, this is a vaguely Jungian view of chemistry. And it is also one with deep roots in the Judaeo-Christian tradition. For what moved God to labor as He did for the six days of His creation? Perhaps it is not for us to know, for the question of motive is a very human one. But I perceive a hint in the marvelous story of creation, in the insistent theme of separation – of light from darkness, of water below from water above by the sky, of day from night, of woman from man. Difference, the necessary consequence of separation, is at the root of interest, and ultimately of beauty.

In reaching out to educated people who are not chemists, "The Same and Not the Same" tries out a psychological and cultural tack. Let me explain: Understanding, even a bond, between human beings grows so much quicker when each shows his or her vulnerability. The quickest way to make sure that science is seen as abnormal and inhuman is to claim that it is rationality incarnate, and to assert its ethical neutrality. Some of my colleagues may disapprove, but I do not shy away from writing of the problems of chemistry. That's my way of voicing a vulnerability. Out of it I reach out to our friends, by placing the difficulties firmly in the context of culture – be it semiotics, Athenian democracy or Fritz Haber's Germany. And I also don't hesitate to get excited about the beauty of synthesis, or the adventures of a diatomic.

"The Same and Not the Same" is being translated into Spanish, Korean, Japanese, and Chinese. It has just appeared in German under the title "Sein und Schein – Reflexionen über die Chemie". Indeed, for a work written by an American, the book contains an extraordinary concentration of German material – an Angewandte Chemie page, Fritz Haber's agony, the synthesis of indigo, the thalidomide (Contergan) story. There are reasons for this, which I try to confront in a preface to the German reader.

In its American edition, the book is dedicated to my teachers at Columbia University. Some of whom almost lured me away from chemistry. And left me, forever, in my science and in art, with Goethe's theme: "Wie alles sich zum Ganzen webt – Eins in dem anderen würt und lebt." ■

Der Literaturpreisträger 1997

Der Fonds-Literaturpreisträger Roald Hoffmann wurde 1937 im polnischen Zloczow geboren (heute Zoloczew, Ukraine). Als Überlebender des Holocaust wanderte er 1949 zusammen mit seiner Familie in die USA aus. Nach seinem Chemiestudium an der Columbia University und seiner Promotion an der Harvard University arbeitete er drei Jahre in Harvard. Seit 1965 lehrt er an der Cornell University in Ithaca/New York. Dieser Universität hält er noch heute die Treue. Hoffmann erhielt zahlreiche Ehrungen, darunter 1981 den Nobelpreis für Chemie – zusammen mit Kenichi Fukui. Sein Interessengebiet reicht weit über die reine Naturwissenschaft hinaus. Er veröffentlichte mehrere Essay- und Gedichtbände. Ferner moderierte er im amerikanischen Fernsehen die 26teilige Serie "The World of Chemistry", eine allgemein verständliche Einführung in die Chemie.