

ENOUGH

100 Essays

OF

by Philip H. Abelson

PESSIMISM

*Insights into the
imperatives of science
and the modern world*

ENOUGH
OF
PESSIMISM

Philip H. Abelson

George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama
35812

Reply to Attn of: ES01

July 1, 1983

Dr. E. Margaret Burbidge
Center for Astrophysics and
Space Science
University of California at San Diego
C011
La Jolla, CA 92093

Dear Dr. Burbidge:

I have a suggestion that I think would be both an appropriate and useful way to mark the retirement of Dr. Phillip Abelson as Editor of Science. The suggestion is that the editorials of Phillip Abelson be collected and printed in a single volume. I estimate that he will have written something approaching 900 editorials during his 22-year tenure as editor. It ought to be possible to print two editorials to a page. The final product would then be a book with a maximum length of 450 pages.

As pointed out in Williams Carey's editorial of 1 July 1983, Dr. Abelson's editorship spans an age of transition for our nation and its science and technology. His editorials are always entertaining (his style is exemplary); the collected editorials would give the reader a sense of history as seen from the perspective of the AAAS.

Yours truly,



A. J. Dessler
Director
Space Science Laboratory

cc:
Dr. William D. Carey

*American Association
for the Advancement of Science*

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June 3, 1985

Mr. Alex J. Dessler
Director, Space Science Laboratory
George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama 35812

Dear Alex:

A couple of years ago you wrote to Margaret Burbidge suggesting that we publish the editorials of Phil Abelson as a gesture of appreciation.

I thought it a good idea, but I was not prepared to reprint all the editorials that Phil had written. Instead, I had a selection of them made, amounting to some one hundred, and we gave Phil the leather-bound presentation copy at our Board meeting in Los Angeles last week. He was surprised and pleased.

I'm enclosing a copy for your personal bookshelf.

With best personal regards,

Sincerely,



William D. Carey
Executive Officer

WDC:gdr

Enclosure

RECEIVED JUN 6 1985

THE UNIVERSITY OF
ARIZONA
TUCSON ARIZONA

Lunar and Planetary Lab.
901 Gould-Simpson Bldg.
Tucson AZ 85721

March 2, 1994

Dr. Philip H. Abelson
Science Magazine
1333 H Street, NW
Washington DC 20005

Dear Phil,

I've now moved from Rice University to the University of Arizona, and I am finally digging out of the chaos of moving. I suppose it is a character building experience. In the course of straightening out my papers, I ran across a fan letter I wrote you last year (copy attached). The book that was enclosed was the collection of your editorials *Enough of Pessimism*. It had tucked into it the letter Bill Carey sent me with the complimentary copy.

I am writing now because I never got my book back, either autographed or in its natural state. Do you remember getting it? If so, was it mailed (and presumably lost)? As I said, I particularly valued the book. In the course of the move from Houston, I really thinned out my library, but that is one that I really wanted to keep. If it has been lost, I intend to get another copy. It was the sort of book I used to pull out occasionally to read one or two random editorials.

I hope all is going well with you these days. You've had some really wretched weather to put up with.

With best regards,

Yours truly,

A. J. Dessler

Jan. 19, 1993

Dr. Philip H. Abelson
Science Magazine
1333 H Street, NW
Washington DC 200005

Dear Phil:

This is one of the few fan letters I have ever written, and it is inspired by your latest editorial "Regulatory Costs". As I started to read the succession of well-worded, simple declarative sentences, ordered to provide forceful logic, I realized that this must be another of your editorials. A glance at the byline confirmed that, indeed, if the editorial is well-written (with a bit of a Heminwayesque style), is hard-hitting and compelling, then Abelson is its author.

I have always been a fan of your editorials. When you retired as Editor of *Science*, I suggested that your editorials be collected and bound into a single volume. After a bit, the suggestion was acted on in a modified form, and Bill Carey sent me a complimentary copy. I had meant to bring the volume to Washington to get you to autograph it for me, but I have a variety of excuses and explanations as to why I never quite got around to doing it. Now, your latest editorial has inspired me to simply send you the book and ask that you autograph it on the title page (opposite your picture), with perhaps a suitable inscription and send the book back to me.

I am retiring from Rice University and moving to the University of Arizona this summer. It would make things a bit simpler for me if the book could be sent to:

A. J. Dessler
901 Gould-Simpson Building
Lunar and Planetary Lab-West
University of Arizona
Tucson, AZ 85721.

The book is already one that I value. The addition of your autograph would make it even more special. Thanks.

With best wishes for the New Year.

Yours truly,

A. J. Dessler

Testing for Carcinogens with Rodents

The principal method of determining potential carcinogenicity of substances is based on studies of daily administration of huge doses of chemicals to inbred rodents for a lifetime. Then by questionable models, which include large safety factors, the results are extrapolated to effects of miniscule doses in humans. Resultant stringent regulations and attendant frightening publicity have led to public anxiety and chemophobia. If current ill-based regulatory levels continue to be imposed, the cost of cleaning up phantom hazards will be in the hundreds of billions of dollars with minimal benefit to human health. In the meantime, real hazards are not receiving adequate attention.

The current procedures for gauging carcinogenicity are coming under increasing scrutiny and criticism. A leader in the examination is Bruce Ames, who with others has amassed an impressive body of evidence and arguments. Ames and Gold summarized some of their recent data and conclusions in *Science* (31 August, p. 970). Three articles in press in the *Proceedings of the National Academy of Sciences* provide an elaboration of the information with extensive bibliographies. The articles also provide data about other pathologic effects of natural chemicals.

A limited number of chemicals tested, both natural and synthetic, react with DNA to cause mutations. Most chemicals are not mutagens, but when the maximum tolerated dose (MTD) is administered daily to rodents over a lifetime, about half of the chemicals give rise to excess cancer, usually late in the normal life span of the animals. Experiments in which synthetic industrial chemicals were administered in the MTD to both rats and mice resulted in 212 of 350 chemicals being labeled as carcinogens. Similar experiments with chemicals naturally present in food resulted in 27 of 52 tested being designated as carcinogens. These 27 rodent carcinogens have been found in 57 different foods including apples, bananas, carrots, celery, coffee, lettuce, orange juice, peas, potatoes, and tomatoes. They are commonly present in quantities thousands of times as great as are the synthetic pesticides.

The plant chemicals that have been tested represent only a tiny fraction of the natural pesticides. As a defense against predators and parasites, plants have evolved a large number of chemicals that have pathologic effects on their attackers and consumers. Ames and Gold estimate that plant foods contain 5,000 to 10,000 natural pesticides and break-down products. In cabbage alone some 49 natural pesticides have been found. The typical plant contains a total of a percent or more of such substances. Compared to the amount of synthetic pesticides we consume, we eat about 10,000 times more of the plant pesticides.

It has long been known that virtually all chemicals are toxic if ingested in sufficiently high doses. Common table salt can cause stomach cancer. Ames and others have pointed out that high levels of chemicals cause large-scale cell death and replacement by division. Dividing cells are much more subject to mutations than quiescent cells. Much of the activity of cells involves oxidation, including formation of highly reactive free radicals that can react with and damage DNA. Repair mechanisms exist, but they are not perfect. Ames has stated that oxidative DNA damage is a major contributor to aging and to cancer. He points out that any agent causing chronic cell division can be indirectly mutagenic because it increases the probability of endogenous DNA damage being converted to mutations. If chemicals are administered at doses substantially lower than MTD they are not likely to cause elevated rates of cell death and cell division and hence would not increase mutations. Thus a chemical that produces cell death and cancer at the MTD could be harmless at lower dose levels.

Diets rich in fruits and vegetables tend to reduce human cancer. The rodent MTD test that labels plant chemicals as cancer-causing in humans is misleading. The test is likewise of limited value for synthetic chemicals. The standard carcinogen tests that use rodents are an obsolescent relic of the ignorance of past decades. At that time, extreme caution made sense. But now tremendous improvements of analytical and other procedures make possible a new toxicology and far more realistic evaluation of the dose levels at which pathological effects occur.—PHILIP H. ABELSON

American Association for the Advancement of Science
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Regulatory Costs

On 20 January, the Democrats become sole heirs to a phenomenon of regulation gone amok. In April 1992, 59 regulatory agencies with about 125,000 employees were at work on 4,186 pending regulations. The cost during 1991 of mandates already in place has been estimated at \$542 billion. The fastest growing component of costs is environmental regulations, which amounted to \$115 billion in 1991 but are slated to grow by more than 50 percent in constant dollars by the year 2000.

Twenty years ago, costs of federal environmental regulations were not visible to the public. However, the number and stringency of unfunded federal requirements have since increased markedly. New and tighter regulations have drained funds from cities, towns, school districts, and individuals. A result is the beginning of a revolt. There is a growing questioning of the factual basis for federal command and control actions and of the scientific competence of the regulators.

Two examples will be cited. Nine participating cities in Ohio have made an important, detailed study of impacts on them of 14 environmental regulations or issues. They estimate their compliance costs (1992 to 2001) at about \$3 billion.* One of the cities, Columbus, had a budget of \$591 million in 1991, of which \$62 million went to environmental compliance. Projected compliance costs in 1995 are \$107 million (1991 dollars). Faced with difficult funding choices, Mayor Greg Lashutka decided that Columbus should create its own Environmental Science Advisory Committee. The mayor had rich scientific resources including Ohio State University, Battelle, Columbus, and Chemical Abstracts. Edward F. Hayes, Vice President for Research of Ohio State University, was named chairman of the committee.

Hayes has questioned the judgment inherent in some of the federal command and control regulations. As one example he cited the Safe Drinking Water Act, which requires that at least 133 specified pollutants be monitored. Many of the substances are not present in significant quantities in Ohio. In other instances, mandated regulatory levels are extremely tight. He cited the herbicide Atrazine. Although its average level at water intakes is far below 3 parts per billion, the city may be required to install "best available technology" for Atrazine removal at a cost of \$80 million for each of two surface water plants. Hayes has stated that the action level is 3 parts per billion because effects of massive doses to rats are extrapolated to infinitesimal doses in humans, and regulators included a thousandfold factor of safety. If the factor of safety were set at 100, then a major uncertainty would be removed, and Columbus would be more free to address real health problems in the community.

Another example of questioning of the judgment of federal regulators involves the U.S. Environmental Protection Agency (EPA) and its proposal to limit levels of radon in drinking water to 300 picocuries per liter. The EPA estimated that the cost to achieve this standard nationwide would be \$1.6 billion in capital costs and additional annual expenses of \$180 million. The Association of California Water Agencies (ACWA) found that the cost for meeting the radon water standard in California alone would approach \$3.7 billion. National costs were estimated at \$12 to \$20 billion, and only 1 percent of the public radon exposure would be reduced. The ACWA lined up support from 27 California members of the House of Representatives. A letter dispatched to President Bush and signed by them included: "We are deeply concerned about new regulations which place a considerable financial burden on our citizens without providing appreciable public benefit."

Senator Daniel Patrick Moynihan (D-NY) has been aware of deficiencies at EPA. In the 102nd session of Congress he introduced S. 2132, a bill designed "To require the Administrator of the Environmental Protection Agency to seek ongoing advice from independent experts in ranking relative environmental risks; to conduct the research and monitoring necessary to ensure a sound scientific basis for decision-making; and to use such information in managing available resources to protect society from the greatest risks to human health, welfare, and ecological resources." The bill was not acted on, but a modified version will be introduced in the new Congress and should receive widespread support.

Philip H. Abelson

*"Ohio Metropolitan Area Cost Report for Environmental Compliance" (Columbus Health Department, Columbus, OH, 1992). Copies of the report may be obtained from Michael J. Pompili, Assistant Health Commissioner; telephone: 614-645-6181.