



Cornell University

ISE: Who are we? And how did we get here?

Bruce V. Lewenstein
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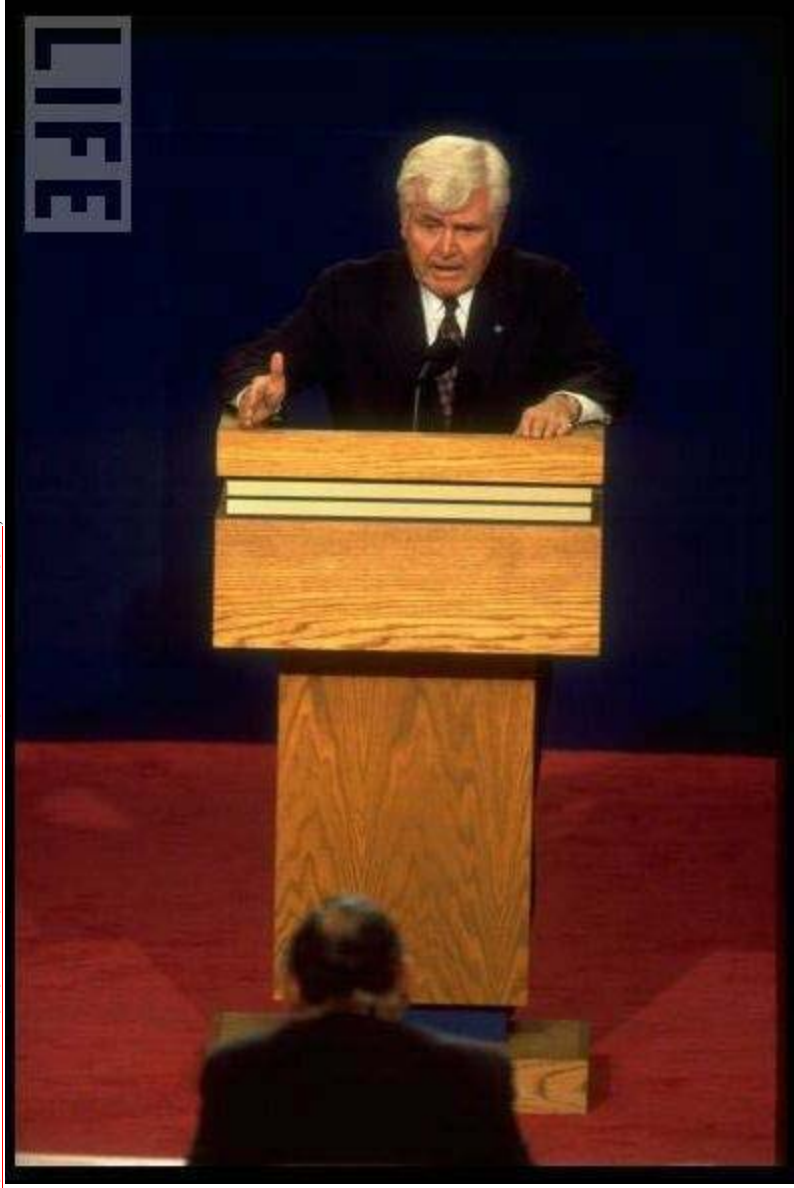
CAISE Summit, Washington DC, 4 March 2010

Credit: Life Magazine

www.life.com/image/50474644

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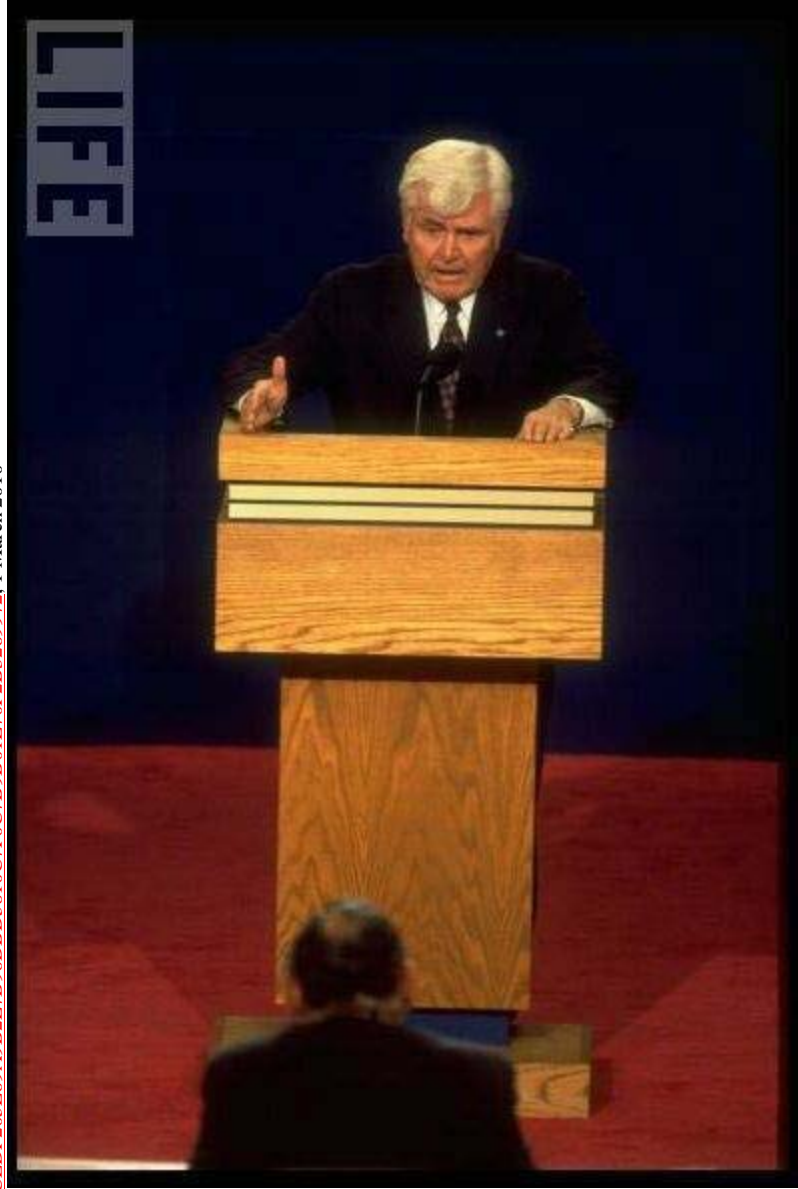
“Who am I?
Why am I here?”

Vice Admiral James Stockdale,
vice-presidential candidate on
Ross Perot’s ticket, 1992

Also 8-year POW in
Vietnam, president
of Naval War College,
one of the most highly-
decorated American
Navy officers in history



Retrieved 1 March 2010 from:
http://upload.wikimedia.org/wikipedia/commons/4/4f/James_Stockdale_Formal_Portrait.jpg



Credit: Life Magazine
www.life.com/image/50474644
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Retrieved 1 March 2010 from <http://www.nationalrecreationfoundation.org/images/trusteeGrants/19.png>

Image: Science Museum of Minnesota

National Science Foundation
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Education and Human Resources (EHR)

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Research on Learning in Formal and Informal Settings (DRL)

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Research on Learning in Formal and Informal Settings (DRL)

Communicating Research To Public Audiences

The funding opportunity for Communicating Research to Public Audiences is now part of the Informal Science Education Program [solicitation](#).

Opportunity for Research on STEM Grad Ed

REESE Program [Funding Opportunity](#) for Research on STEM Graduate Education

Programs and Funding Opportunities

Key: Crosscutting | NSF-wide

[Advanced Technological Education \(ATE\)](#)

[Cooperative Activity with Department of Energy Programs for Education and Human Resource Development \(Request for Supplement\)](#)

[Discovery Research K-12 \(DR K-12\)](#)

[Fostering Interdisciplinary Research on Education \(FIRE\)](#)

[Informal Science Education \(ISE\) \(ISE\)](#)

[Innovative Technology Experiences for Students \(ITEX\)](#)

[Research and Evaluation on Education in Informal Settings \(REIS\)](#)

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EHR Organizations
Graduate Education (DGE)

National Institutes of Health
OFFICE OF
science education

NIH Science Education Nation *A scientist's Guide to Supporting K-12 Education*

SciEd Nation Home | What's Best for Your | Thinking about Your Role | Some Roles for Scientists | Roles for Scientists & Engineers | Ways to Help

Education Needs You | Education Today

Partnerships
Beginning
Sustaining
Changing

Support K-12 Education
Ideas & Resources
References
About This Site

Some Roles for Scientists in Science Education Today (BSCS, 2008)

Support Informal Science Education

Some of the most effective places at incorporating inquiry-based education into their goals are the science museum, children's museum, planetarium, and history museum in your area. Although these informal education settings do a good job of using hands-on activities and other means of exploring science, there is still a role for you in them. Volunteering as a docent may be the first thing that comes to mind, but there are several other ways that you could be involved.

You could participate on the advisory board of one of these museums. If you would prefer to be more involved in the science aspects, you might choose to review the science content of scripts for the science exhibits, planetarium shows, or environ-mental programs. You could even collaborate on the creation and development of a new exhibit at a museum.

Advice

When thinking of informal education settings, we hope that the word "fun" comes to mind. The goal in informal education is to provide current, accurate scientific information to the public. It should complement, supplement, and enhance what is learned in the classroom. Whether you are serving as a docent or planning an exhibit, be conscious of how you are going to engage patrons—both adults and children—and what sort of investigations can occur related to your topic.

Collaboration is key when you are involved with informal education. Be sure you have an understanding of the center and the demographics of the expected visitors. There is an emphasis on appealing to a variety of learning styles, ages, abilities, and cultures, so keep these in mind during your planning. If you might also spend time thinking about ways to make the science accessible. Although the museum will have staff members to work on

NOAA OFFICE OF EDUCATION

Formal & Informal Education Programs

The NOAA Office of Education partners with many education initiatives that support the agency's education mission for an environmental literacy and promote a diverse workforce in ocean, coastal, Great Lakes, weather, and climate sciences encouraging stewardship and increasing informed decision making for the nation.

The JASON Project

The JASON Project, a non-profit subsidiary of National Geographic Society, has committed millions of dollars to great educators and great events to inspire and motivate them to learn science. Using cutting edge research and resources of its longtime partners, National Geographic, NOAA and the JASON Project delivers these educational connections systematically through an inquiry-based curriculum as online global community. JASON believes that once inspired, students internalize the desire to overcome obstacles to improve their proficiency.

Cooperative Program for Earth System Education (CPESE)

CPESE is a partnership between NOAA and the American Meteorological Society designed to enhance our understanding of the field Earth system emphasizing the atmosphere, hydrosphere, and the National Oceanic and Atmospheric Administration.

NOAA Education Resources

NASA HOME NEWS MISSIONS MULTIMEDIA ABOUT NASA CONTACT

NASA Education

Overview

CONTACT US REGISTER FOR NEWS GRANTING DEADLINE

ABOUT THE FOUNDATION APPLYING FOR GRANTS REQUESTING RECENT GRANTS

Working closely with other outreach programs, NASA can engage a new generation of young people.

NOYCE FOUNDATION

INFORMAL SCIENCE

Our goal is to support the informal science community to develop work that addresses the gaps that exist in education requirements, research and evaluation, program scale to reach and sustain, policy issues, and pathways or pipeline design.

MAJOR GRANTS

The Eisenhower (San Francisco, CA)

Science Policy (APR) and Training Science (Washington, DC)

MACARTHUR
The John D. and Catherine T. MacArthur Foundation

UNITED STATES GRANTMAKING

PROGRAM OF FUNDING COMMUNITY ENGAGEMENT

- Affordable Housing
- Community & Economic Development
- Digital Media & Learning
- Health & Information Research Grants
- Grantmaking Guidelines Program Start
- Juvenile Justice
- Mental Health
- Policy Research
- Program-Related Investments

Digital Media & Learning

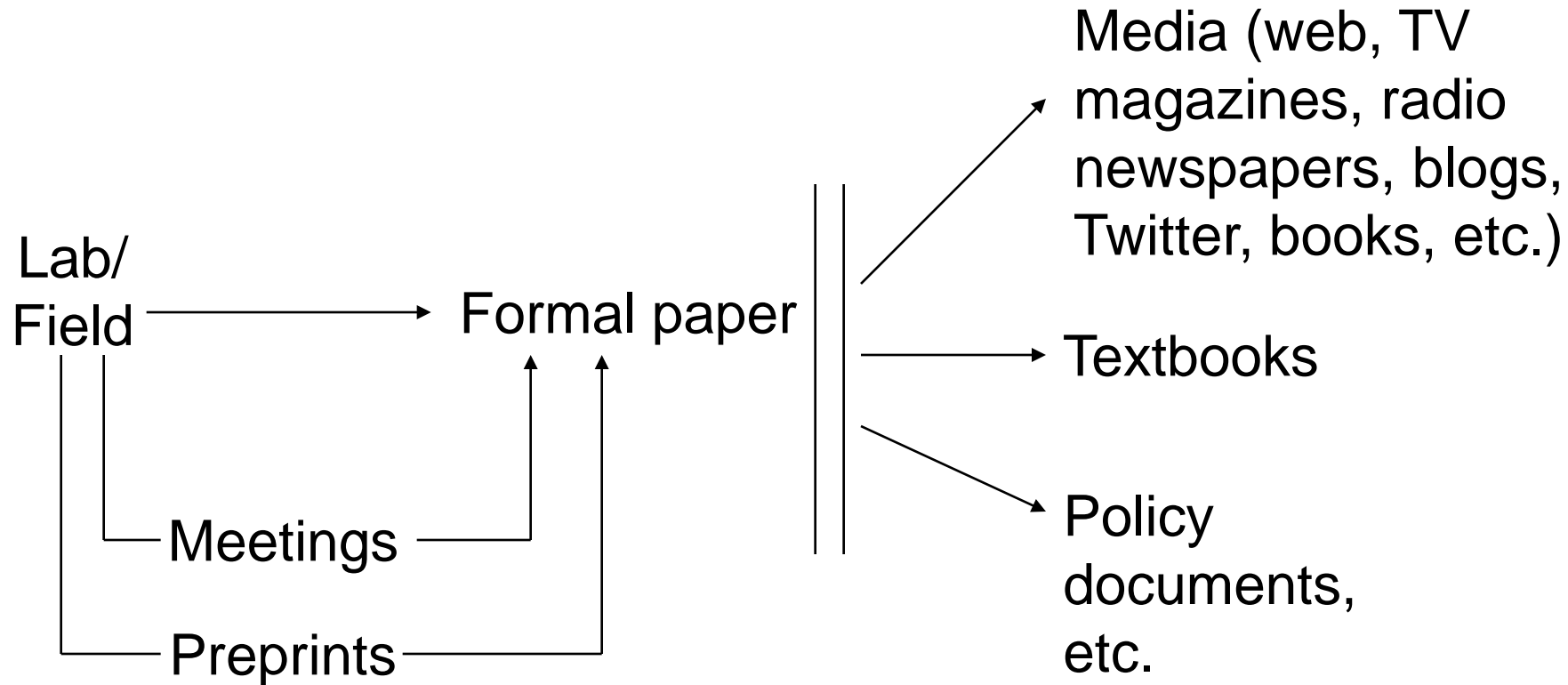
About our grantmaking

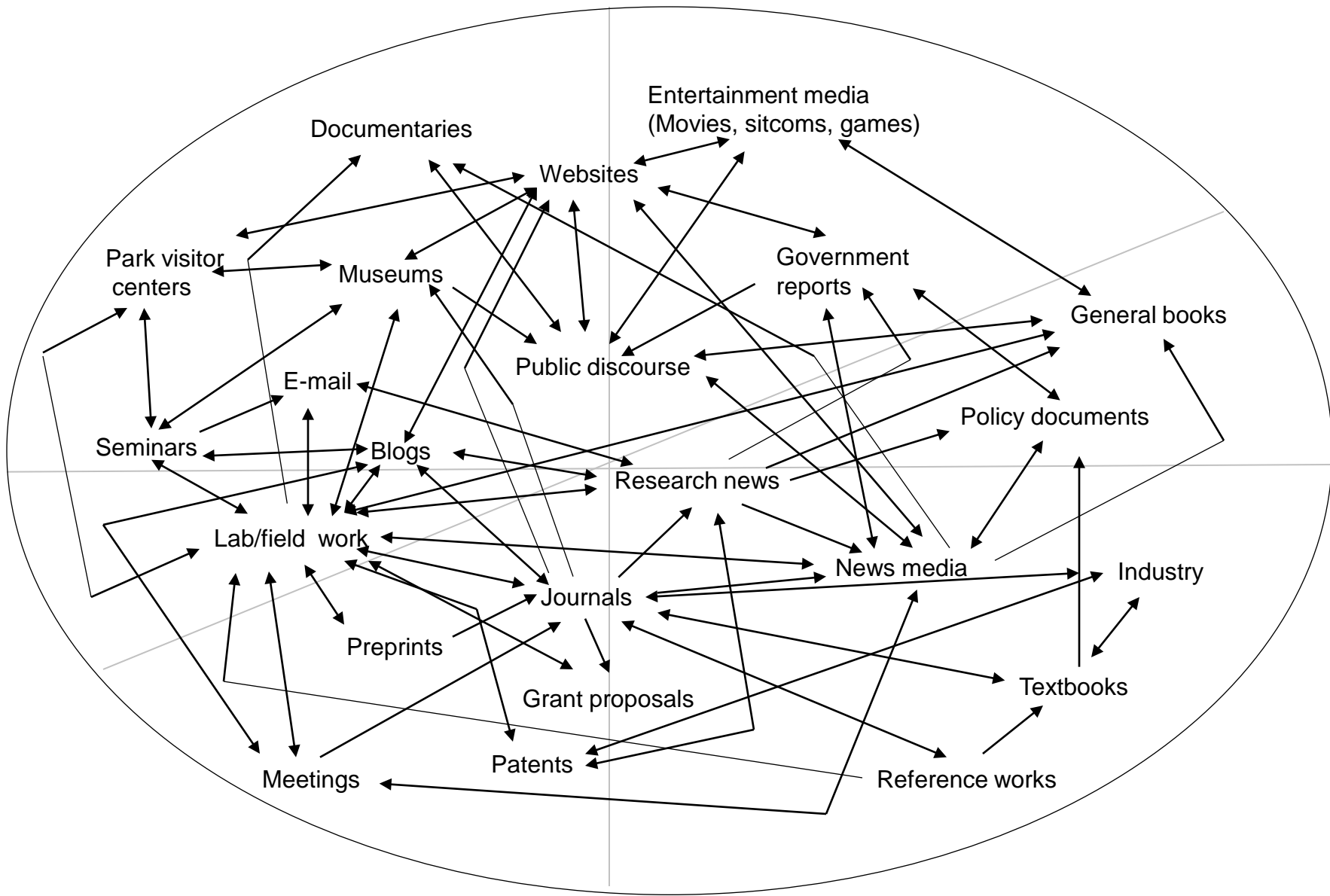
The digital media and learning initiative aims to determine how digital media are changing the way young people learn, play, socialize and participate in civic life. Answers are critical to education and other social institutions that must meet the needs of this and future generations.

For more information

- News & Information
- Press Coverage
- Recent Grants
- Grantmaking Guidelines
- Program Staff

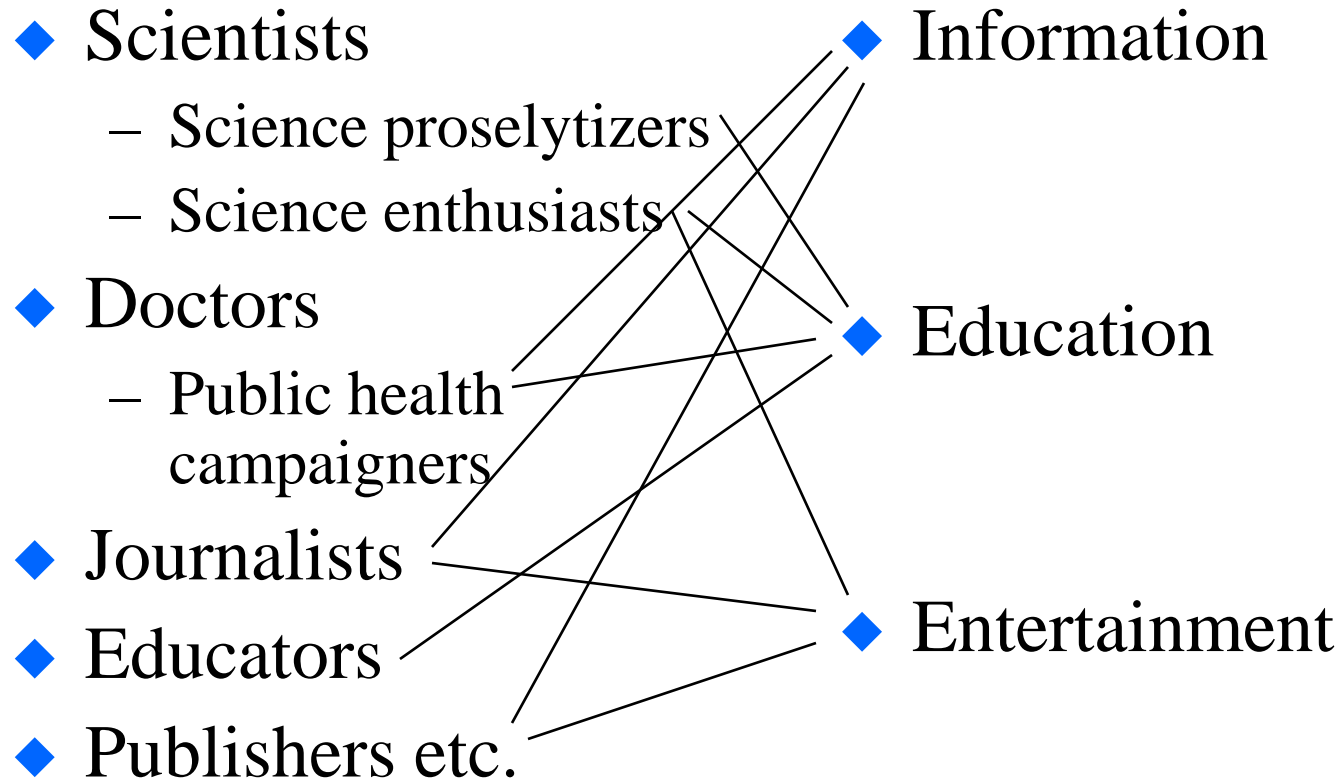
Where does ISE fit into “science communication”?





Sphere of Science Communication

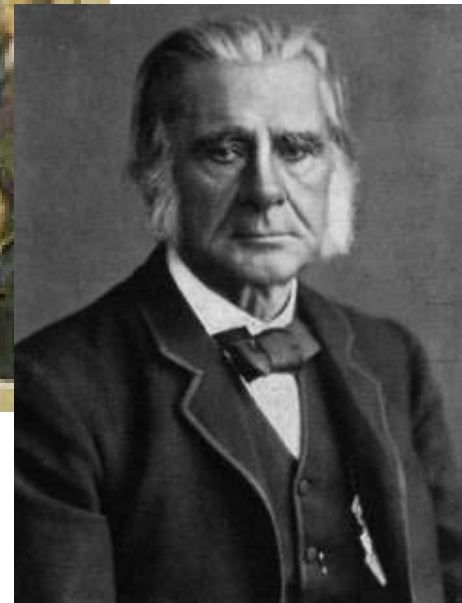
People and purposes



Public communication of S&T, 1

- ◆ The 19th Century
 - The “great men”
 - Education for the masses
 - » Adult schools
 - » Itinerant lecturers
 - Natural history museums
 - Exhibitions
 - Science in magazines and newspapers





Michael Faraday, Christmas Lecture, Royal Institution, 1856

Thomas Huxley, “Darwin’s bulldog”

Images retrieved 1 March 2010 from:

<http://www.newscientist.com/data/galleries/christmas-lectures/003333e30e1.jpg> (Faraday)

http://upload.wikimedia.org/wikipedia/commons/d/d7/Thomas_Henry_Huxley_-_Project_Gutenberg_eText_16935.jpg (Huxley)

A

MEMORANDUM

ON VARIOUS MEANS FOR PROPAGATING SCIENTIFIC AND PRACTICAL
KNOWLEDGE AMONG THE WORKING CLASSES, AND FOR THUS PROMOTING
THEIR PHYSICAL, TECHNICAL, AND SOCIAL IMPROVEMENT.

ADDRESSED TO

LORD HENRY GORDON LENNOX, M.P.,

Chairman of the Council of

THE SOCIETY OF ARTS,

BY

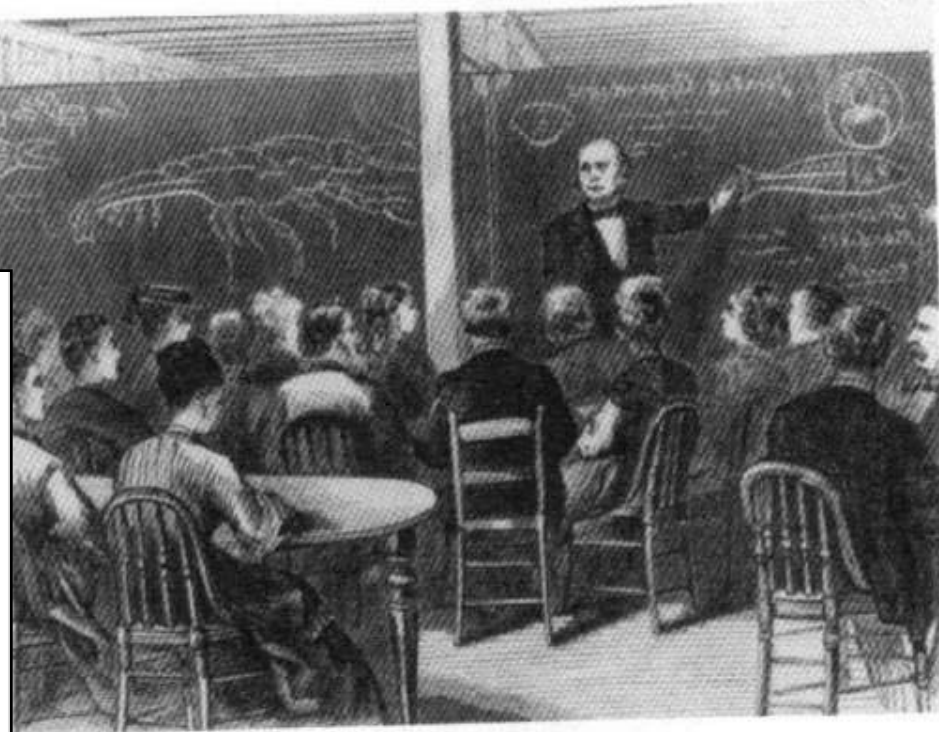
THOMAS TWINING,

One of the Vice-Presidents of the Society.

LONDON:

PUBLISHED BY C. GOODMAN, 407, STRAND, W.C.

1870.



Louis Agassiz lecturing to Anderson School of Natural History, *Leslie's Illustrated Newspaper*, 1873 [from Burnham, J. (1987). *How Superstition Won and Science Lost: Popularizing Science and Health in the United States*. New Brunswick, NJ: Rutgers University Press, p. 117, where it was reprinted courtesy of Carnegie Library of Pittsburgh]



Ball Pettigrew Museum, Univ. of St Andrews , retrieved 25 Feb 2010 from <http://biology.st-andrews.ac.uk/bellpet/index.aspx>, Ball Pettigrew Museum, Univ. of St Andrews



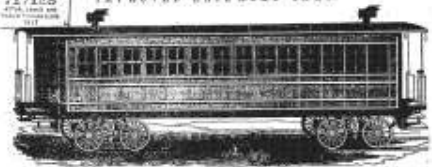
NhM Naturhistorisches Museum Wien, photo by Bruce V. Lewenstein, 2007



THE ASSOCIATE OF INDUSTRY AND ENTERPRISE, AND JOURNAL OF MECHANICAL AND OTHER IMPROVEMENTS

NEW YORK, SATURDAY, AUGUST 11, 1894. VOL. 19, NO. 328.

IMPROVED RAIL-ROAD CARR.



There is, perhaps, no established method, by which improvements have more readily, and for the first time, in the line of railroad passenger cars. For many years past the best of our countrymen have been engaged in the study of the subject, and it is not surprising that the result has been a series of improvements, which are now being introduced into the service of the railroads.

SCIENTIFIC AMERICAN. PUBLISHED WEEKLY. ESTABLISHED 1845. VOL. 19, NO. 328. SATURDAY, AUGUST 11, 1894. NEW YORK: SCIENTIFIC AMERICAN PUBLISHING CO. 23 NASSAU ST. N. Y.

CONTENTS OF AUGUST 11, 1894.

CLASSIFICATION of the new... THE NEW YORK EVENING JOURNAL... THE NEW YORK EVENING JOURNAL, TUESDAY, AUGUST 8, 1894.

With Children and Friends... The children of the world... The children of the world are the children of the future... The children of the world are the children of the future...

THE NEW YORK EVENING JOURNAL... THE NEW YORK EVENING JOURNAL, TUESDAY, AUGUST 8, 1894. THE NEW YORK EVENING JOURNAL, TUESDAY, AUGUST 8, 1894.

THE NEW YORK EVENING JOURNAL... THE NEW YORK EVENING JOURNAL, TUESDAY, AUGUST 8, 1894. THE NEW YORK EVENING JOURNAL, TUESDAY, AUGUST 8, 1894.

THE NEW YORK EVENING JOURNAL... THE NEW YORK EVENING JOURNAL, TUESDAY, AUGUST 8, 1894. THE NEW YORK EVENING JOURNAL, TUESDAY, AUGUST 8, 1894.

New York Evening Post, reprinted from Burnham, J. (1987). *How Superstition Won and Science Lost: Popularizing Science and Health in the United States*. New Brunswick, NJ: Rutgers University Press, p. 119.

Large advertisement for 'NATURE CURES' featuring a hand holding a globe, 'CIGARETTES KILLING A BAD BOY', and 'PADEREWSKI CAN PLAY NO MORE'. Includes text about 'THE NEW YORK EVENING JOURNAL' and 'DISCOVERY A BOON TO MANKIND'.

Public communication of S&T, 2

- ◆ The 20th Century
 - Scientific societies and health associations
 - Specialization in science, journalism, and education
 - New media -- radio, TV, movies, industrial museums, science centers ... the WWW
 - Public interest and concern about implications of science progress



Reproduced from Lewenstein, B. V. (1992). Industrial Life Insurance, Public Health Campaigns, and Public Communication of Science, 1908-1951. *Public Understanding of Science*, 1(4), 347-366, where it was reproduced courtesy of Metropolitan Life Insurance Company

[BOHEMIAN]

A WAR UPON CONSUMPTION

THE NATURE OF THE DISEASE
ITS EXTENT, GROWTH AND SPREAD

ITS CURE AND PREVENTION

Including Friendly Advice to Persons having Diseases of the Lungs



"TAKE CARE OF THE CONSUMPTIVE AT THE RIGHT TIME, IN THE RIGHT PLACE, AND IN THE RIGHT WAY UNTIL HE IS WELL, AND NOT AT THE WRONG TIME, IN THE WRONG PLACE AND IN THE WRONG WAY UNTIL HE IS DEAD."

PRINTED AND DISTRIBUTED BY THE
METROPOLITAN LIFE INSURANCE COMPANY OF NEW YORK.
FOR THE USE OF ITS POLICY-HOLDERS

1909

The Century Books of Useful Science

CREATIVE CHEMISTRY

DESCRIPTIVE OF RECENT ACHIEVEMENTS
IN THE CHEMICAL INDUSTRIES

BY

EDWIN E. SLOSSON, M.S., PH.D.

LITERARY EDITOR OF *THE INDEPENDENT*, ASSOCIATE
IN COLUMBIA SCHOOL OF JOURNALISM

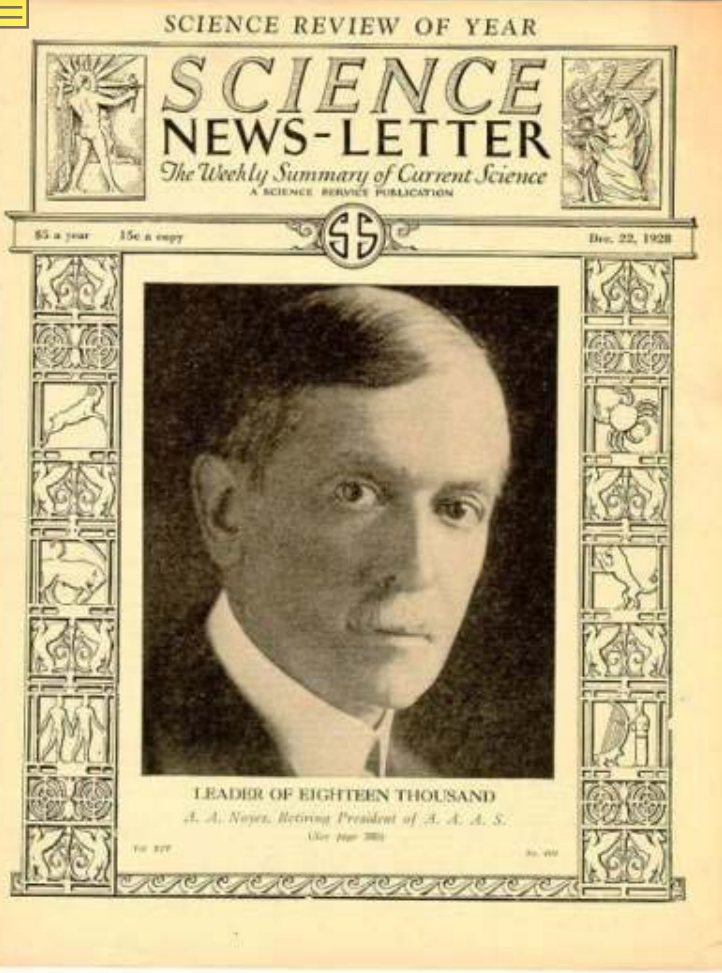
Author of "Great American Universities," "Major
Prophets of Today," "Six Major Prophets,"
"On Acylhalogenamine Derivatives and
the Beckmann Rearrangement,"
"Composition of Wyoming
Petroleum," etc.

WITH MANY
ILLUSTRATIONS



NEW YORK
THE CENTURY CO.

1920



Retrieved 1 March 2010 from <http://scienceservice.si.edu/newsletters/281222c.htm>
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Retrieved 1 March 2010 from <http://siarchives.si.edu/images/findingaids/slossonroof.jpg>
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Jane Stafford, 1937



Emma Red Stevenson, 1935



Retrieved 1 March 2010 from <http://ecg.mit.edu/george/tos/1943-09-Cork-Products-35/box.jpg>

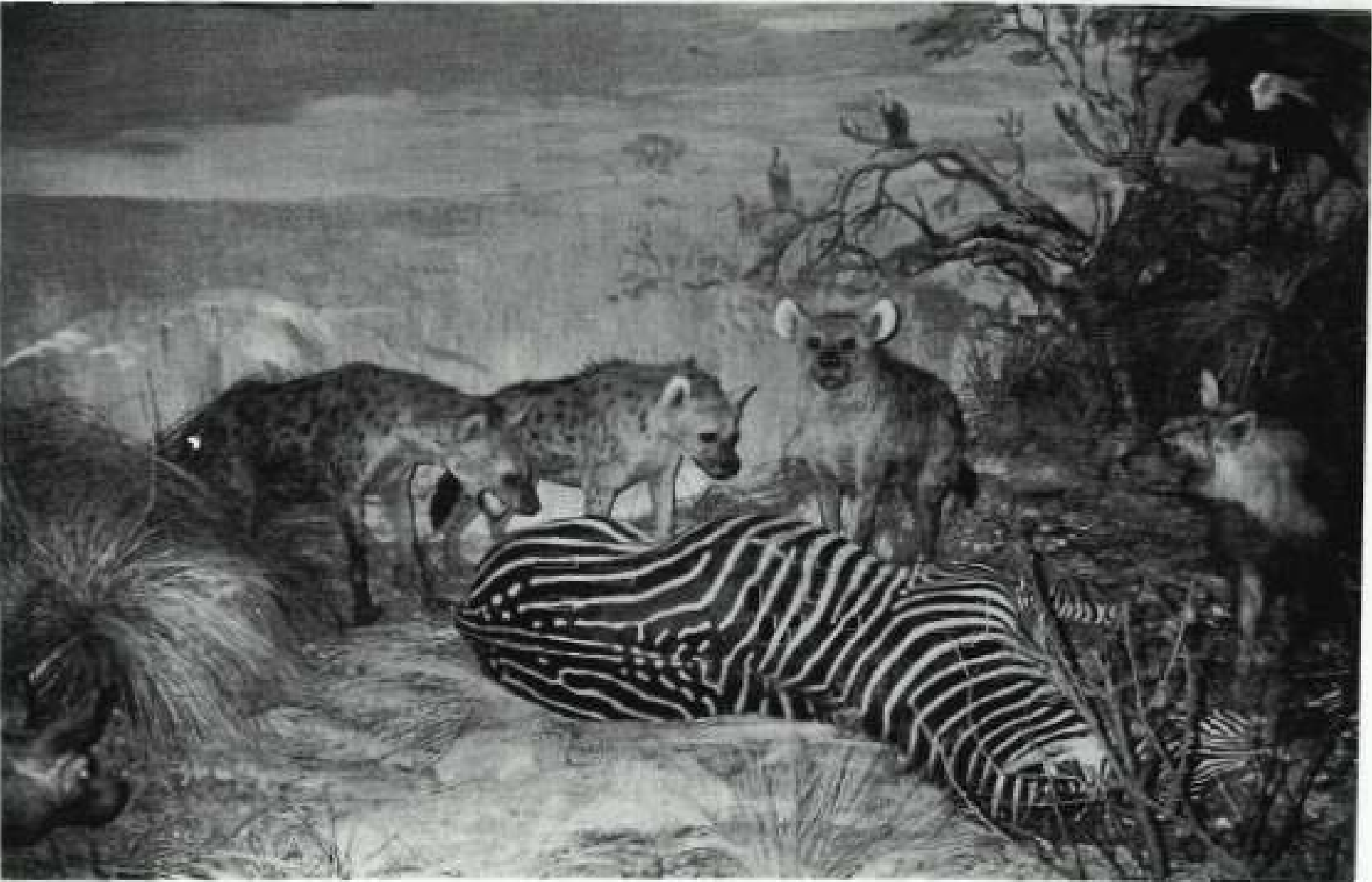


Tick-Tack-Toe brain is invention of 18-year-old Noel Elliott, finalist in the Westinghouse science talent search. After three years' work, involving a study of the 362,882 possible variations, he perfected the machine so that it either wins or ties every game. It responds with a light flash when you pull a switch in any square. Sometimes it's caught cheating a little.

Retrieved 1 March 2010 from http://blog.modernmechanix.com/mags/MechanixIllustrated/8-1950/tick_tack_toe.jpg



Reproduced from Burnham, J. (1987). *How Superstition Won and Science Lost: Popularizing Science and Health in the United States*. New Brunswick, NJ: Rutgers University Press, p. 123, where it was reprinted courtesy of the Smithsonian Institution Archives, Science Service Papers.





Chicago Museum of Science & Industry



Franklin Institute,
Philadelphia



The New York Times Studio

Waldemar Kaempffert



Photo by Gottscho-Schleisner, Inc.
Retrieved from Library of Congress, 7 Mar 2010
<http://hdl.loc.gov/loc.pnp/gsc.5a29419>



Dr. Gerald Wendt



Warren Weaver



Lewis Carroll: Mathematician

Many people who have read "Alice's Adventures in Wonderland" and "Through the Looking-Glass" are aware that the author was a mathematician. Exactly what was his work in mathematics?

By Warren Weaver

Lewis Carroll must be a first-class mathematician, isn't he? This is a typical remark when the name of the author of "Alice in Wonderland" comes up. That Carroll's real name was Charles Lutwidge Dodgson and that his own writing interest was mathematics is fairly common knowledge, in fact, among his literary admirers; there has long been a certain respectability about being known as a completely layman but incomparably witty that Queen Victoria

read often. Most of what he wrote took the form of letters and was not Dodgson's, was special and dry. It took on a slightly humorous character.

Lewis Carroll was no great a logician; that we are actually certain to have the author of his work in mathematics. There is a certain tendency to consider mathematics as strange, whimsical, difficult and deep a subject that it is given to a mathematician to be of

course a "great mathematician" there being, as it were, no small gains. This is very complimentary, but unfortunately it is not necessarily true. Carroll produced a considerable volume of writing on some mathematical subjects, some which we may judge the quality of his mathematics. What sort of a mathematician, in fact, was he?

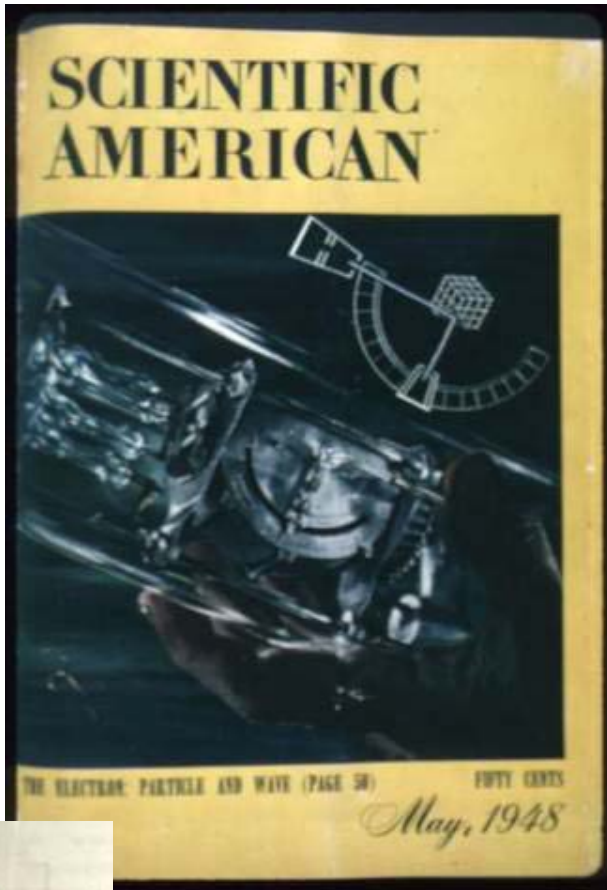
The story of his work has been to quickly told. C. L. Dodgson was born in



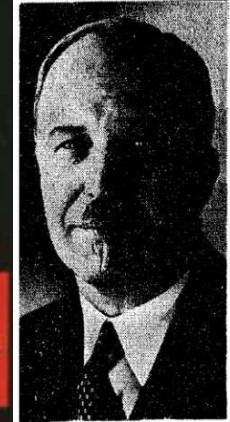
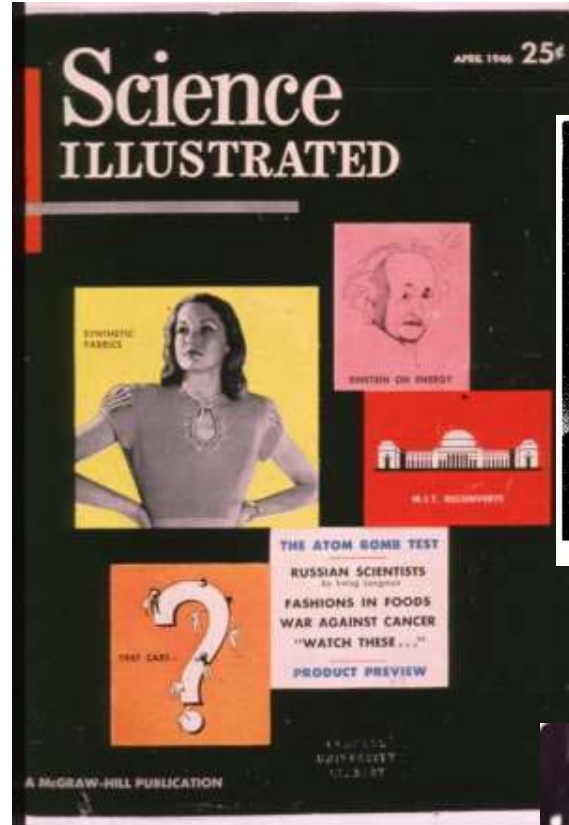
CARROLL AND ALICE appear in these photographs from the Mark T. Pinsky Collection in the Princeton University Library. Alice was Alice Liddell, whom Carroll had a great affection for. She was the Alice of "Alice's Adventures in Wonderland." Later she became Mrs. Rip

psall Bagners. Alice was photographed by Carroll himself in 1858, when she was seven years old. Carroll was photographed, probably by Rippsall Bagners, in 1856, when he was 44. In 1851 he had been made a doctor and a lecturer in mathematics at Oxford.





Gerard Piel



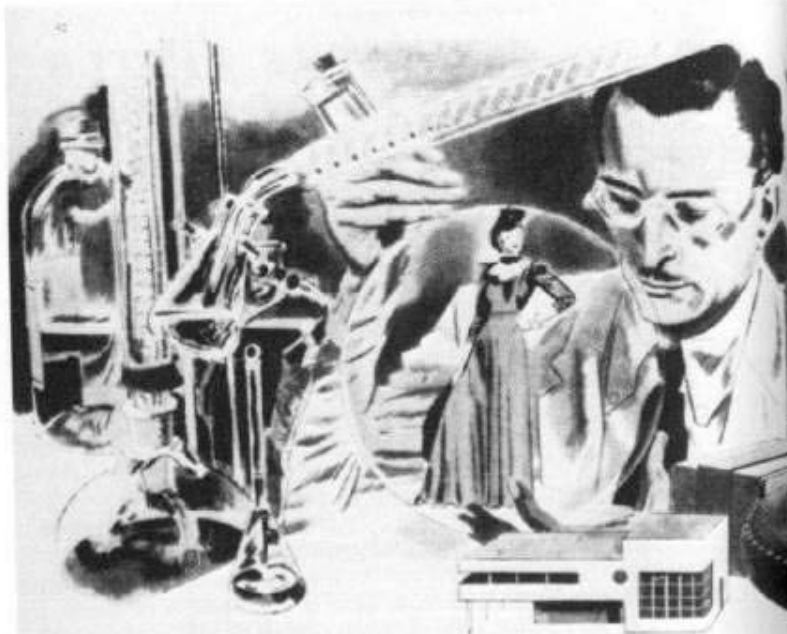
Dr. Gerald Wendt



Barry Commoner

Retrieved 1 Mar 2010 from *New York Times*, 2 Dec 1951

Retrieved 1 Mar 2010 from http://c250.columbia.edu/c250_celebrates/remarkable_columbians/barry_commoner.html



Out of the test tubes comes a shining age of magic, in which you will melt your own silver, dabbed down the drain, try to wear suits of clothes and shove them away uncolored.

Today your toothbrush handle is a laboratory product, invented just when having your

THE alarm clock rings. Seven o'clock. You yawn, stretch, pull out of bed, and make your way to the shower. The curtain that you throw back and forth is—what? Waterproof synthetic fabric. You step out and sit down to dry yourself—on what? A stool invented with a synthetic leg.

The shaving brush and toothbrush have fancy handles. Bore! No! Synthetic. Maybe you use an old-fashioned glass for your breakfast, but if you don't—and the chances are twenty to one that you don't—the tumbler is sure to be a synthetic plastic.

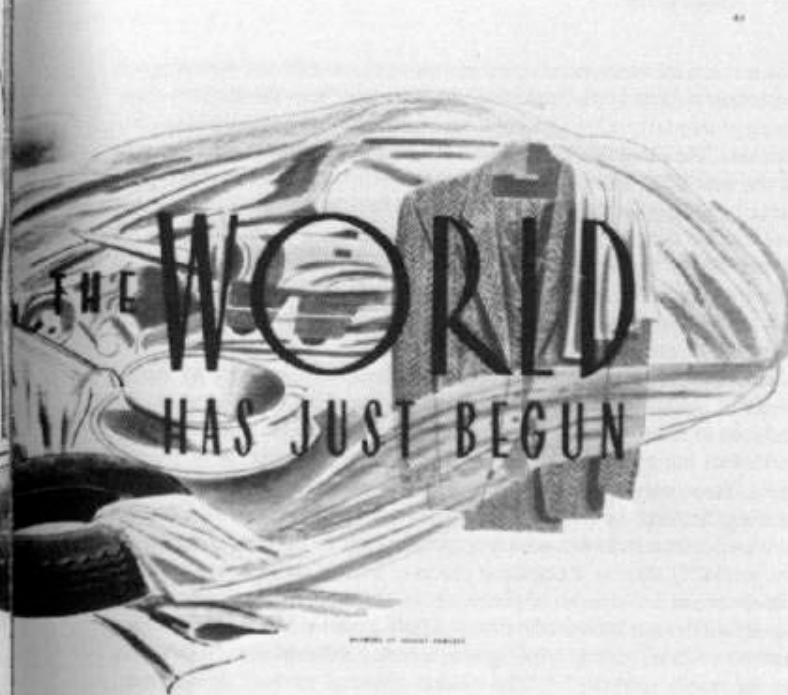
At breakfast you dig into a popovers. What's that? It's, of course, not made by a synthetic in the cook of the kitchen electric refrigerator. Glass

around and take stock of the dining-room. Those curtains at the windows—? They look like silk, and maybe they are. Yet, if your house is furnished with or less five millions of others, they are fairly good of one of a half-dozen types of rayon.

You climb into your car to catch the 9:15 for town and your office. The steering wheel that you clutch is a synthetic cousin of the shaving brush and toothbrush handles and of the tumbler that you gazed at last night. The shot-up windshield through which you keep an eye on the road is a sandwich consisting of two sheets of glass and a transparent synthetic "ham" that prevents splinters from flying if there should be a crash. Even the seatbelt frame that embraces the levers on your seat is

a synthetic product of the laboratory. In this sense women are even more "synthetic" than men. The scuffed coating of their heels, the trimmings of their hats, the lipstick with which they implore on nature, the holder into which they thrust a cigarette, the tumbler in which the usual odds and ends are stored, the razor power or their eyes, the shoe factories that take the place of foot-mock of what they have upon their selves has no counterpart in the animal or vegetable world.

To John Doe "synthetic" means a tricky substitute for something natural—a morning which is an unorthodox relic of prohibition, when raw and unskinned was ineptly dressed to please a patient but unattracting



The moonshining makes chemists very unhappy. To these synthetics means what is always meant—a putting together. A synthetic is one of the oddest words of man, because it is a deliberate and often a very difficult assemblage of materials into a compound which may be entirely new and which always has interesting and sometimes commercially valuable properties.

A synthetic vanilla that cannot be distinguished from the natural extract, a synthetic dye that is a duplicate of the dye once extracted from a plant, a synthetic sorption that has broken the chemical laws for years, a synthetic iron on which a screen relay is planned to delight and thrill millions, in that sense or subsequence, which is being marketed straight with precision. Now are the waves of artificial steel, concrete, horns, and various stuffs that compose had the subjects in a kitchen home.

Think you know all of Earth's who have been made and those prospects

into glass coaches and favelas iron papers. The chemist does not work on a scale quite so grand. Yet his feats in synthesis startle even him. Synthetic stones still called "precious," exquisite fabric on which ink can be poured without leaving a spot; camouflaged in a factory at 45 cents a pound against the \$3.75 now charged for the pure, natural product; synthetic silk, base of all perfumes, at \$7 a pound against \$300 for the very same scents obtained from a Tibetan deer; cement which does away with the necessity of stitching the upper and sides of women's shoes together; fiber that looks and feels like silk but is soaked up from acetylene gas, explosives and fertilizers plucked out of the air—he and we survey his accomplishments and ask: "What next? The answer is never long in coming.

Hardly a month passes but a new compound turns up with amazing properties.

One of the latest is a plastic as clear as glass but only half as heavy. It leaves you wondering if you have not been the victim of a trick, even after you have experimented with it yourself. Throw it against a wall. It bounces back unbroken. Airplane and bus windows are being made of it.

At night on a dark road the beams of your headlights fall on little jewels of it which read road signs and gleams like stars of cats' eyes. Take a thick mark-screw of it ten feet long and hold a light at one end. The rays follow the coil and come out at the other end—cold. Already physicians and dentists are beginning to use this lucite, as it is called.

An optometrist, for example, will thrust a rod of it back of your palate and illuminate your lenses with a bright, cold light. The latest illuminated tongue depressors are made of it, so that they glow like (Continued on page 129)

by Waldemar Kaempffert

Figure 7.2. The opening to "The World Has Just Begun," Waldemar Kaempffert's predictive article in the January 1940 *American*, shows many of the common visual images of scientific

research: test tubes and beakers, a scientist in white coat and glasses, and a cornucopia of new products emerging from the research lab. Drawing by Robert Fawcett.

Origins of field of “PUS/ISE/ PCST/PEST/PLUS”

- ◆ 1930s: First academic publications about science literacy and public communication of science
- ◆ 1945: “Public understanding of science”
- ◆ 1982: “Informal Science Education” (NSF)
- ◆ 1989: “Public communication of S&T”
- ◆ Late 1990s: “Public engagement in S&T”
- ◆ Mid-2000s: “Public Learning and Understanding of Science”



SCIENCE

VOL. 85

FRIDAY, JANUARY 29, 1937

No. 2196

<i>The American Association for the Advancement of Science:</i>	
<i>Science and the American Press:</i> DAVID DIETZ	107
<i>Scientific Events:</i>	
<i>The Lalor Foundation; Gift by the Julius Rosenwald Fund to the Committee on Research in Medical Economics; du Pont Fellowships for Research in Organic Chemistry; Memorial Volume to Samuel C. Hooker; Presentation of the Philip A. Conné Gold Medal to Dr. Van Slyke</i>	112
<i>Scientific Notes and News</i>	116
<i>Discussion:</i>	
<i>A Sex Difference Encountered in the Transplantation of a Carcinoma of the Ovary:</i> DR. LEONELL C. STRONG and DR. ROBERT T. HILL. <i>A New Source of Diphylobothrium Infection:</i> PROFESSOR LYELL J. THOMAS. <i>The Effect of Light on the Vitamin C of Milk:</i> S. K. KON. <i>Fish in the Latah Formation of Idaho:</i> VERNON E. SCHEID. <i>The Protection of Plants:</i> DR. MAURICE COPIAROW	119
<i>Scientific Books:</i>	
<i>Rational Functions:</i> PROFESSOR RUDOLPH E. LANGER. <i>Report of the Association of Geodesy:</i> WALTER D. LAMBERT	121

<i>Special Articles:</i>	
<i>Stimulated Activity of Natural Enemies of Nematodes:</i> DR. M. B. LINFORD. <i>Sex Variations in the Utilization of Iron by Anemic Rats:</i> DR. MARGARET CAMMACK SMITH and DR. LOUISE OTIS. <i>A Catalytic Method for the Preparation of α-pyroabietic Acid:</i> DR. ELMER E. FLECK and DR. S. PALKIN	123
<i>Scientific Apparatus and Laboratory Methods:</i>	
<i>Preserving the Natural Color of Green Plants:</i> PROFESSOR GLENN W. BLAYDES. <i>A Modified Quinhydrone Electrode for Tissues:</i> PROFESSOR JOHN C. KRANTZ, JR., C. JELLEFF CARR and RUTH MUSHER. <i>A Simple Carborundum Pencil:</i> ROY MILTON CHATTERS	126
<i>Science News</i>	6

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SCIENCE AND THE AMERICAN PRESS¹

By DAVID DIETZ

SCIENCE EDITOR OF THE SCRIPPS-HOWARD NEWSPAPERS

THERE was a time when a speaker at a session of the American Association for the Advancement of Science spoke only to those within the sound of his voice. To-day, he may speak to the entire nation.

Even as he stands upon the platform, his words may be going over the telegraph wires to newspapers in every part of the country. In the case of the address of the president or one of the vice-presidents or in the case of an address containing some discovery of outstanding importance, the telegraphed account may run to several thousand words.

Each day of the meeting, the larger metropolitan newspapers of the nation devote from one to five columns to reports of the papers presented. The total amount of space devoted by the newspapers of

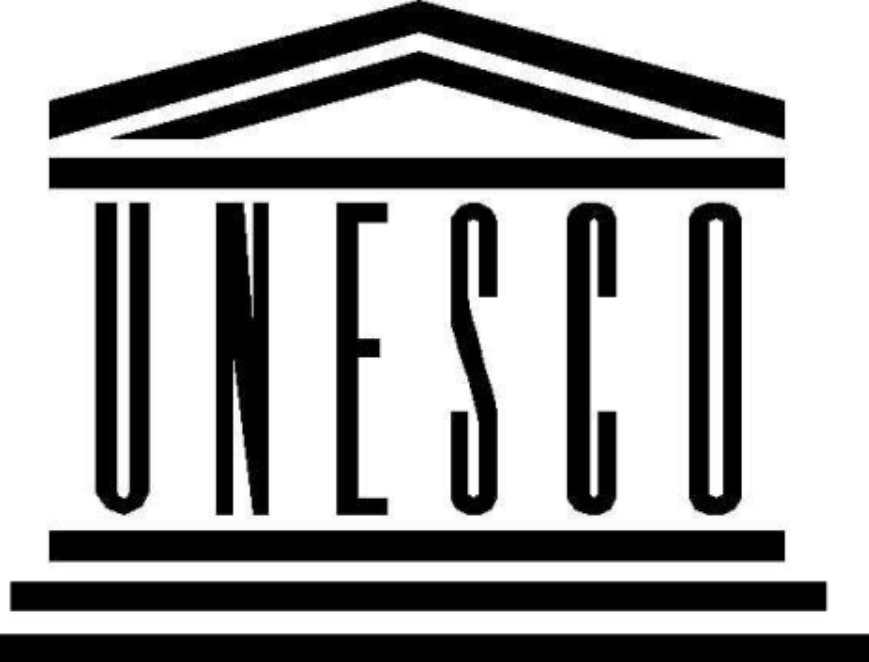
the nation to the meeting is in excess of a thousand columns per day.

This is a fact of major significance in American life. It represents a change of the first order in the character and meaning of these annual meetings. It possesses profound importance for the progress of science, the conduct of journalism and the future of the nation.

The fine and friendly relations which now exist between the scientists and the press is symbolized by the fact that you have invited me to be the speaker of this general session to-day. As the former president of the National Association of Science Writers, I think that I may say that the growth of this accord has been the source of great pride and satisfaction to all its members.

There was a day when the newspapers had no interest in the reporting of science. Those were the days

¹ Address given at the general session of the American Association for the Advancement of Science, Atlantic City, December 29, 1936.



Kalinga Foundation Trust

CERTIFICATE OF REGISTRATION ABOUT TRUST ABOUT FOUNDER ACTIVITIES HISTORY OF KALINGA PRIZE KALINGA PRIZE



HISTORY OF KALINGA PRIZE

The Kalinga Prize was established in 1951 by UNESCO with a generous grant from Late Shri Biju Patnaik, Founder President of the Kalinga Foundation Trust. First awarded in 1952, the Kalinga Prize is presented annually by UNESCO to a person or persons who have made outstanding contributions to the interpretation of science and technology to the general public. The Director General of UNESCO selects the prize winner out of nomination received from Member States on the recommendation of a Member International jury. The Kalinga Prize is regarded as a prestigious international recognition for outstanding science popularization work. It has so far been awarded to 63 brilliant promoters of science & technology since its inception. Some of the great scientists/personalities who have been awarded Kalinga Prize are Louis de Broglie (1952), Julian Huxley (1953), Gamow (1958), Serbrand Russel (1957), Karl von Frisch (1958), Arthur C. Clarke (1961), Fred Hoyle (1967) and Sergei Kap (1979).

The purpose of the prize is to reward the efforts of a person who has had a distinguished career as writer, editor, lecture, radio/television programme director or film producer, which has enabled him/her to help to interpret science, research and technology to the public. He/she is expected to have knowledge of the role of science, technology and general research improvement of public welfare.

The Statutes of the UNESCO Kalinga Prize for the Popularization of Science (NEW)

- Article 1 Purpose
- Article 2 Designation, amount and periodicity of the Prize

unesco no. 144

impact
of science on society

science popularization:
its history, triumphs and pitfalls

Taylor & Francis
London • New York • Philadelphia



Dr. Gerald Wendt



NEWS LETTER

National Association of Science Writers

Mailing Address: 5 Longview Road, Fort Washington, N. Y.

Vol. 3, #1

March 1, 1955

TABLE OF CONTENTS

The Berkeley Meeting
 Report of AAAS Representative
 President's Letter
 Advantages of NASW Membership
 Federal Press Agents
 Coverage of Science News at Harvard
 Science Writing in Canada
 Reports from Chicago, Atlanta, Los Angeles, Cleveland and Great Britain
 Surveys Report
 Flying Saucers and Valkyrie
 Personal Notes, Announcements and Address Changes

NASW ANNUAL MEETING

The annual meeting of the National Association of Science Writers will be held at Atlantic City during the week of June 6, in conjunction with the sessions of the American Medical Association. See the June issue of the Newsletter for further information.

THANK YOU

The NASW wishes to express special gratitude to the Program Committee for the Berkeley meeting. We deeply appreciate the time, thought and effort that went into the preparations for this most successful and pleasant occasion. The NASW extends thanks to the chairman, Daniel M. Wilkes, and to his able committee members, John F. Allen and George Dusheck.

BERKELEY MEETING -- Roland H. Berg

Those of us who were fortunate enough to attend the meeting once again owe thanks to Sid Negus who master-minded the press room. With the help of Dan Wilkes and John Osmundsen, Sid magically produced non-existent copies of papers and, with the expertise of a bird dog, flushed coveys of furtive scientists under the guns of the waiting science writers.



understanding

REPORTS • EVENTS • ACTIVITIES for the improvement of the public understanding of science

A Statement of Purpose

The exponential curve shown above represents the increase in scientific knowledge with time—an increase that will result in the doubling of scientific knowledge redoubling.

The speed equally rapid affecting our life, and in better public both for national status of scientific means that have the best but that he and understandments in so that will to schooling.

Even the known for until recent done about there has been aimed at give more realistic activities as society rather special inter

The increasing many diverse, governmental institutions, education, scientists, writer actively engaged under the improvement science.

The various tion of the

effort. However, this multi-faceted approach has a drawback. Many people working for the same ends are either completely unaware of, or have limited knowledge of, what others are doing.

NSF Program for Public Understanding of Science

In July 1959, the National Science Foundation inaugurated a grant pro-

WINTER 1962-63



understanding

REPORTS • EVENTS • ACTIVITIES for the improvement of the public understanding of science

The Tele-Lecture

by Margaret Mead

The "tele-lecture" or telephone lecture seems to me to be a genuinely new "invention", and I think that much more should be done with it, including applying it in activities directed toward improving the public understanding of science.

Pioneered by the University of Omaha, the tele-lecture is a technique whereby the voice of a speaker at a distance is piped into the loudspeaker system of a lecture hall using a telephone hookup, so that the audience can hear the speaker and the speaker can hear questions from a panel or the audience.

The most dramatic use of this technique of which I know was the participation of Bertrand Russell in a two-way closed circuit conversation for a panel discussion of "The Future of Man", at the lunch given for the opening of the new Seagram building, September 29, 1959. On a platform there was an empty chair, and after a showing of a special film of Bertrand Russell, his voice came in at the appropriate points.

An earlier precursor form was "Answering You", which linked live radio panels of American and English speakers across the Atlantic in World War II. A single later version of this form was a program in which a panel in New York talked with a panel in Edinburgh during the meeting of the World Federation of Mental Health in Edinburgh on August 12, 1960. In this case, large

Scientists' Institute for Public Information

A Scientists' Institute for Public Information has been formed to assist local scientists' information groups to provide the public with objective and understandable scientific information on public policy issues.

"Scientists' information groups" are volunteer groups of scientists organized on a local basis to provide scientific information to the public through lectures, appearances on television and radio, and written materials.

The creation of the Institute marked the close of a two-day national conference for scientific information held in New York City, and attended by more than 100 scientists representing 19 scientists' information groups throughout the country.

The conference approved the adoption of a resolution that the Institute be formed to establish activities which can serve the common needs of the independent groups of scientists in each community. The Institute will undertake to handle technical information and publication services among existing and newly formed scientific information groups, personnel to facilitate liaison among these groups, efficient financing, and periodic conferences.

The conferees agreed on the following guiding principles:

1. Information is presented unencumbered by political or moral judgments, which judgments are the

Exploring the Universe

Exploring the Universe is a three-part adult education program on the issues and problems of modern science, utilizing study-discussion, a book, and a television series. Initiated by the American Foundation for Continuing Education, it was produced in collaboration with the National Educational Television and Radio Center and the McGraw-Hill Book Company, under grants from the National Science Foundation.

The program is the first unit in a long-range project of the AFCE, titled "The Citizen in a New Age of Science." The present unit concentrates on fundamental questions arising from a study of astronomy, cosmology, and physics. Later units will take up the nature of matter, the evolution of man, and the relationship between science and society.

The undertaking is unusual in that the materials were developed so as to permit either integrated or independent use. Thus, the book may be read by itself or used as a reference for the study-discussion program, and the TV series may be viewed independently or also as a part of the study-discussion activities.

Exploring the Universe (Louise Young, editor, McGraw-Hill, New York, 1963, 457 pp., \$6.95) is a set of readings selected by Mrs. Young (a member of the AFCE staff) and an advisory committee of scientists. The selections are from the writings of Plato, Aristotle, Galileo, Pascal, Newton, Hux-

NOVA ends first season; plans 23-week run for fall

Second only in audience pulling power to *Masters of Deceit* on many public television stations for the past three months has been NOVA, the new series of one-hour science films produced by WGBH in Boston with the advice and cooperation of AAAS.

One of the many TV critics to be favorably impressed by NOVA is Arthur Ungar of the *Christian Science Monitor*, who summed up the series' appeal this way: "Watching NOVA, you may be lulled into believing that you are watching 'mere' entertainment. However, almost despite yourself, you will find that a new awareness of certain scientific theories and concepts is creeping into your consciousness as NOVA transports the thrill of discovery from the laboratory to your own living room."

With its first season behind and with funding in hand (from Carnegie Corporation of New York, Corporation for Public Broadcasting, National Science Foundation, Polaroid) for a 23-week run beginning in the fall, NOVA's widespread acclaim is impressive.

Time magazine pointed out that at the beginning of the 1972-73 TV season, science accounted for less than 0.5 percent of prime time network hours (and many of the "science" programs were really "adventure-wildlife travelogues"). Then *Time* called NOVA "a series of innovative, hour-long shows aimed at filling the void between deadly dull educational lecturing and pop-science trivia."

Jerry Bishop of the *Wall Street Journal* said NOVA "is rapidly becoming one of the most versatile series of science programs found on television, public or commercial."

Book reviews please James Butler of AAAS, which has cooperated with WGBH from the outset. "Our intention has been not simply to get more science on television," he says, "but to experiment with new and innovative ways of communicating science, and to demonstrate the vitality and importance of science as program content."

The Nova Science Program Group, under its executive producer, Michael Ambrosino, is now well ahead with planning for its fall series of 23 programs. The intention is that they be as outstanding in subject and style as those in the first season—which reached from intergalactic space with a film on the Crab Nebula to the neighborhood stream and the private life of a sicklecell. Other programs reported such topics as chimpanzees and language, the origin of life, fusion power, and the discovery of anesthesia.

Already planned for the fall is a show on San Francisco Bay, revolving around a team of biologists from the U.S. Geological Survey, which is trying to understand the complex ecological re-

lationships of this highly managed estuarine system so that future decisions as to the fate of the Bay may rest on at least some hard scientific data.

In the planning stages are programs on bombs and bombing (which will discuss, inter alia, the escalating technology of warfare) and—by way of contrast—bird song (in which will be shown research into the deceptively simple question of "why do birds sing?"). Films on artificial intelligence and the world food situation are also under consideration.

NOVA is produced with the advice and cooperation of the American Association for the Advancement of Science

"You do not have to be a scientist to enjoy NOVA," wrote Tom Riste of the *Arizona Daily Star*. "You may even be one of those people who tune out at the very thought of a scientific anything. But if you love mysteries, unraveling a hard puzzle, the excitement of thinking along with a brilliant mind—then the chances are you're going to like NOVA."

Concluded the *Christian Science Monitor*: "[NOVA] is probably one of the most intellectually stimulating entertainments in the annals—and charivari—of public education."

Oppenheimer: Profile of a man and his museum

(Continued from page 13)

an animal behavior exhibit with fish that follow stripes and shadows.

The concept of total experiential learning at the museum is a unique one. So is Oppenheimer's motivating theme of perception. "We used perception because it was a good starting point, from which we could then branch out into areas like optics, and wave motion and other kinds of motion. It very naturally ties together things artists have done about nature with more didactic things." There are pockets of art in the museum from which related didactic exhibits have been built.

"Perception is a very human thing to itself, and very interesting," explains Oppenheimer. "None of us is bored with learning about it, and it is easy to show these effects visually."

Oppenheimer is a man with unusual energy, almost all of which he has invested in the museum over the past five years. Because of that he has lent a good deal of his personality to his creation.

He finds time to talk to visitors, and spends as much time as possible (which is growing to be less and less) working on the exhibits himself. In his characteristic hunched posture, he can often be seen leaning over an exhibit, usually holding a cigarette as he tries to explain the mechanism or that, speaking softly, yet in a measured manner. The intent glare from his buggy eyes is mixed with seriousness, playfulness, and excitement as he talks of his museum.

"So many other museums I saw were very good, but very tightly structured. Most were operated by museum, with the exhibits behind glass. Museums should have more freedom and having push buttons to make things go on! As good as doing things by hand, where the person can see exactly what is happening. A few of the museums I saw had some exhibits that visitors could work themselves but in most museums there was an awful lot that you looked at with your hands behind your back."

To supplement the experiential aspects of the Exploration, Oppenheimer uses high school students to talk to the public about the exhibit in his "explainer program," an idea borrowed from other science museums: three groups of 20 high school students a year are trained and hired to work part time.

The explainer program has worked very well, Oppenheimer says—the interested students are easy to spot, and are always asking visitors if they can be of any help. They are especially helpful as an alternative to using the recordings, says Oppenheimer. "If we are going to appeal to a wide audience, you can't use tapes, because tapes are the same thing to everybody."

The museum tries to involve the entire community. Many exhibits are made by local people, volunteers, but keep them in working order, and college students run tours for school children.

The museum also conducts seminars and concerts for the community, both of which involve audience participation. The concerts got started "because we wanted to do something we would find wasn't just the physics sound," says Oppenheimer. "But it involved the perception and study of sound. You can't do that in an interactive way with a tape recorder."

Musicians come and talk about their music; they take their instruments apart and show how they work, and describe the structure of the piece they are playing. People can ask questions; they can interact more fully with the music. We consider the concert an exhibit."

The museum has been criticized because of its rough construction and environment, characterized by some as "old warehouse." "What bothers a lot of people, and bothers us, is the space is so primitive," Oppen-

heimer says. "I wish the floor and walls were smoother and more inviting, and I hope to rectify that eventually. But we've decided to get the exhibits built first, then hopefully someone will give us some money to build a better environment."

Oppenheimer is very discouraged about raising money. He has spent about \$1 million over four years to run the museum and to develop new ex-

GRANT REQUEST

American Association for the Advancement of Science
1776 Massachusetts Avenue NW, Washington, DC 20036

PROJECT: CORE PROGRAMS TO PROMOTE A CRITICAL AWARENESS OF SCIENCE AND TECHNOLOGY IN AMERICAN SOCIETY

Project Director

Dr. William A. Blanpied
Director of Communications
American Association for the Advancement of Science
Social Security #522-36-5871

THIS IS A NEW REQUEST

Proposed Starting Date:

September 1, 1975

Proposed Duration:

Three (3) Years

Amount Requested:

First Year \$197,897

Second Year \$215,405

Third Year \$204,860

Total \$616,162

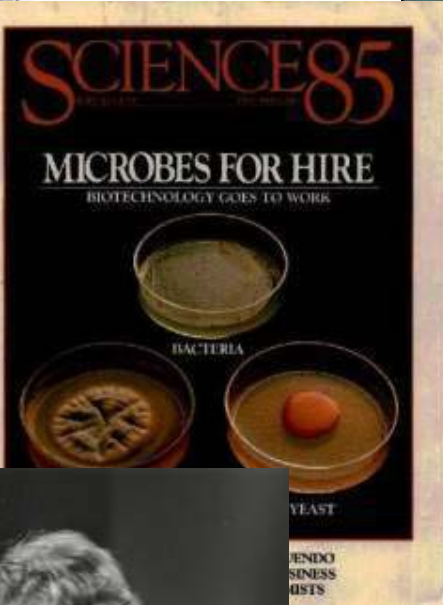
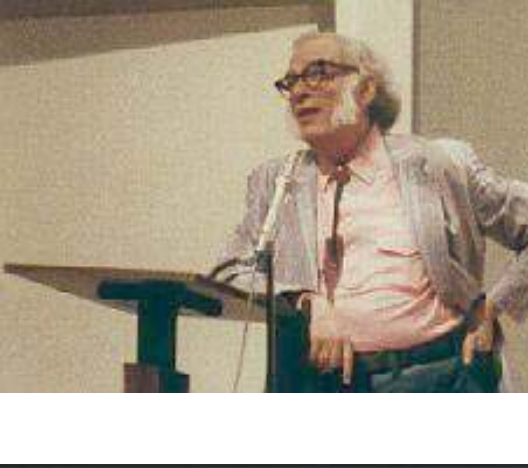
Endorsements:

William A. Blanpied

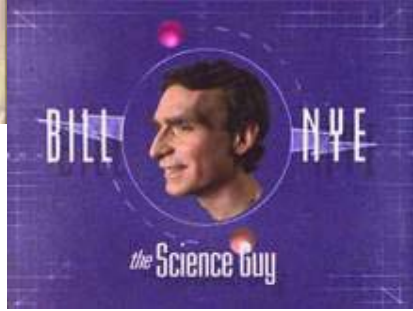
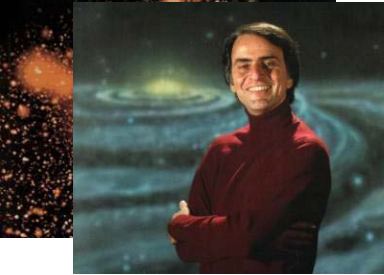
William D. Carey

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Executive Officer
1776 MASSACHUSETTS AVENUE
WASHINGTON, D.C. 20036



**COSMOS
CARL SAGAN**



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Informal Science Learning

What the Research Says About Television, Science Museums, and Community-Based Projects

Valerie Crane • Heather Nicholson
Milton Chen • Stephen Bitgood

$$\Delta = \frac{5bx + c}{1 + (x^*)^2} > 0, \quad \tau = 3(x^*)^2 - 5 - bx^*$$



PUBLIC UNDERSTANDING OF SCIENCE

SCIENCE COMMUNICATION

Linking Theory and Practice

Volume 24 Number 3 September 2006

A Report on the Evaluation of the National Science Foundation's Informal Science Education Program

Prepared under Contract RED 94-52970
by
COSMOS Corporation

March 1998

Mary Sladek
Contracting Officer's Technical Representative

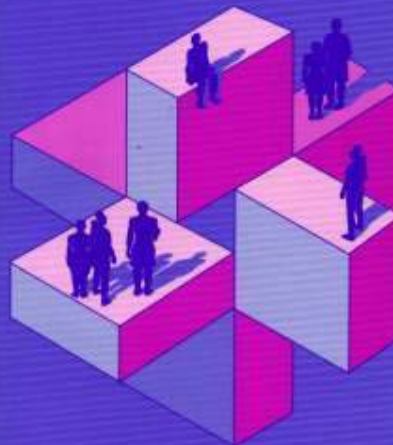
Any opinions, findings, conclusions, or recommendations expressed in this report are those of the participants, and do not necessarily represent the official views, opinions, or policy of the National Science Foundation.

The National Science Foundation

Directorate for Education and Human Resources
Division of Research, Evaluation and Communication

An REC-sponsored

When Science Meets The Public



Bruce V. Lewenstein, Editor

American Association for the Advancement of Science

CREATING CONNECTIONS

Proceedings of the Public Understanding of Science



Edited by

DAVID CHITTENDEN

GRABAR FARMELO

BRUCE V. LEWENSTEIN

Box 1985

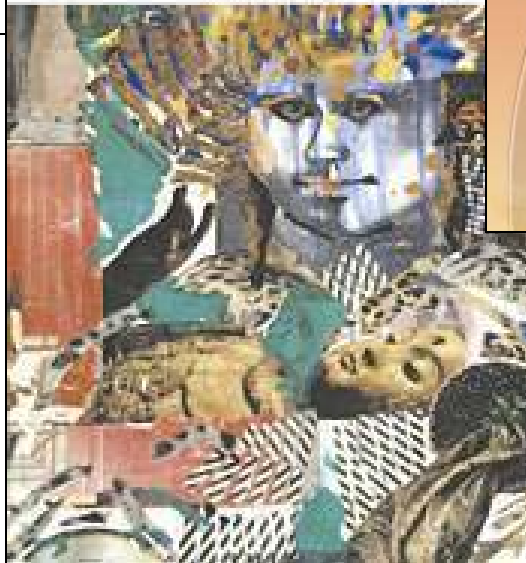
The Public Understanding of Science

The Royal Society 1985



Misunderstanding science?

The public reconstruction of science and technology
by Martin Curran and Brian Wilson



Science Policy Support Group Public Understanding of Science

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The ESRC PUS New Opportunities Programme



The **Public Understanding Science** was an ESRC New Opportunities Programme resources to build on previous investments in the social where ESRC believes there both policy needs for knowledge and a knowledge base that can usefully enhance a short-term concentration of effort.

- [Full Programme report, Decemb](#)
- [The Public Understanding of Sci](#)



The task is to make **visible** the invisible, to expose to public scrutiny the assumptions, values and visions that drive science

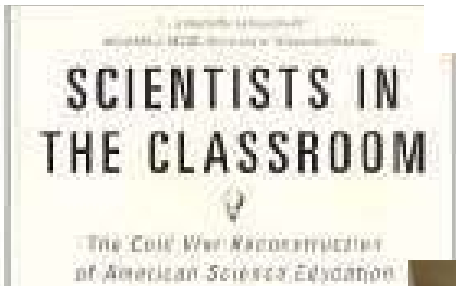


See-through Science
Why public engagement needs to move upstream

James Wilson
Rebecca Willis

◆ But...





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Social Movements, American Scientists, and the Politics of the Military, 1945-1975
Disrupting Science
Kelly Moore



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Periodic Table of the Elements
1869, by Dmitri Mendeleev, Russian Bigamist

1914: They reorganized the table by atomic number instead of atomic weight.

1961: They changed the atomic mass of every atom by 42 ppm.

1940s: They added two rows.

2002: They to away element 118.

26 elements have been added since 1923. When will it end?

Warning. Warning. Warning.
Chemical Periodicity is a theory. The theory keeps changing. The theory is under dispute. Teach alternative theories to children.

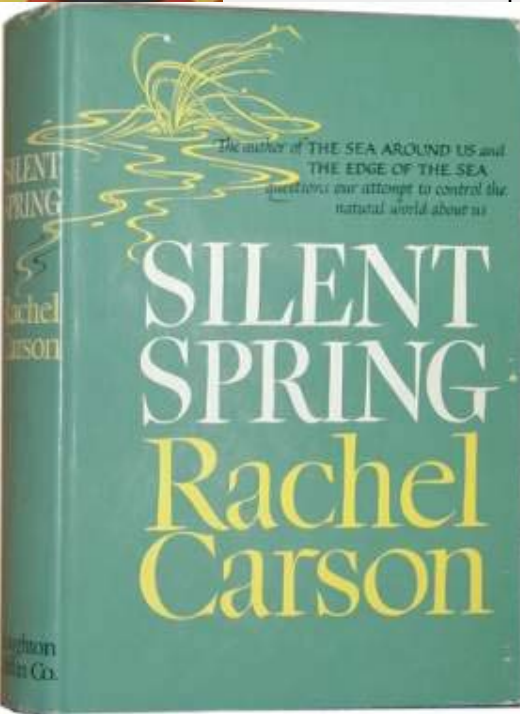
26 elements have been added since 1923. When will it end?

2002: They to away element 118.

Mendelevian Periodicity is used to justify materialistic claims that we are chemicals. Mendeleevists teach that complex molecules grow from a pure and amoral process called bonding. We are told that Mendeleev's theory of Chemical Periodicity is a scientific fact -- even though it is an ever-changing theory.

Teach the Periodic Table Controversy!

DISCOVERY INSTITUTE
www.re-discovery.org



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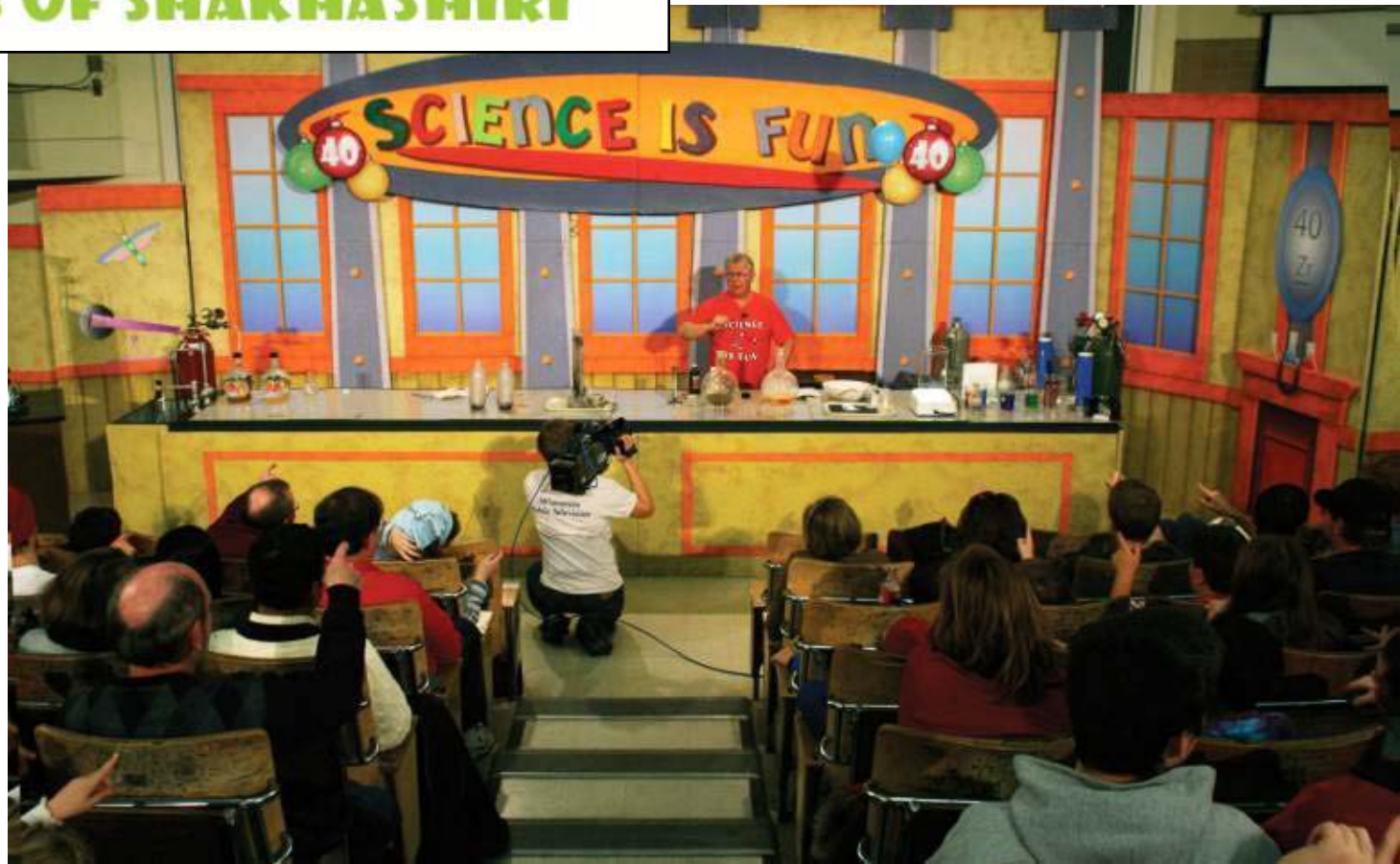


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ONCE UPON A CHRISTMAS CHEERY IN THE LAB OF SHAKHASHIRI







So...

- ◆ Lots of ISE activities for a long time
- ◆ Real growth in many areas in last 50 years
- ◆ Leads to growing scholarship *about* ISE
- ◆ Leads to self-identity within field
- ◆ ISE people find each other and each other's work interesting...so people move around



Some questions to ponder

- ◆ What's the gender balance of ISE people...and does that matter?
- ◆ What's the relation of ISE to “Science”?
- ◆ What's the relation of ISE to “Education”?
- ◆ What's the relation of ISE to “Informal”?

- ◆ And: In what part of ISE will *your* next job be?



Global Research Communi

Research
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Promote Yo
Ac

