

SCIENCE

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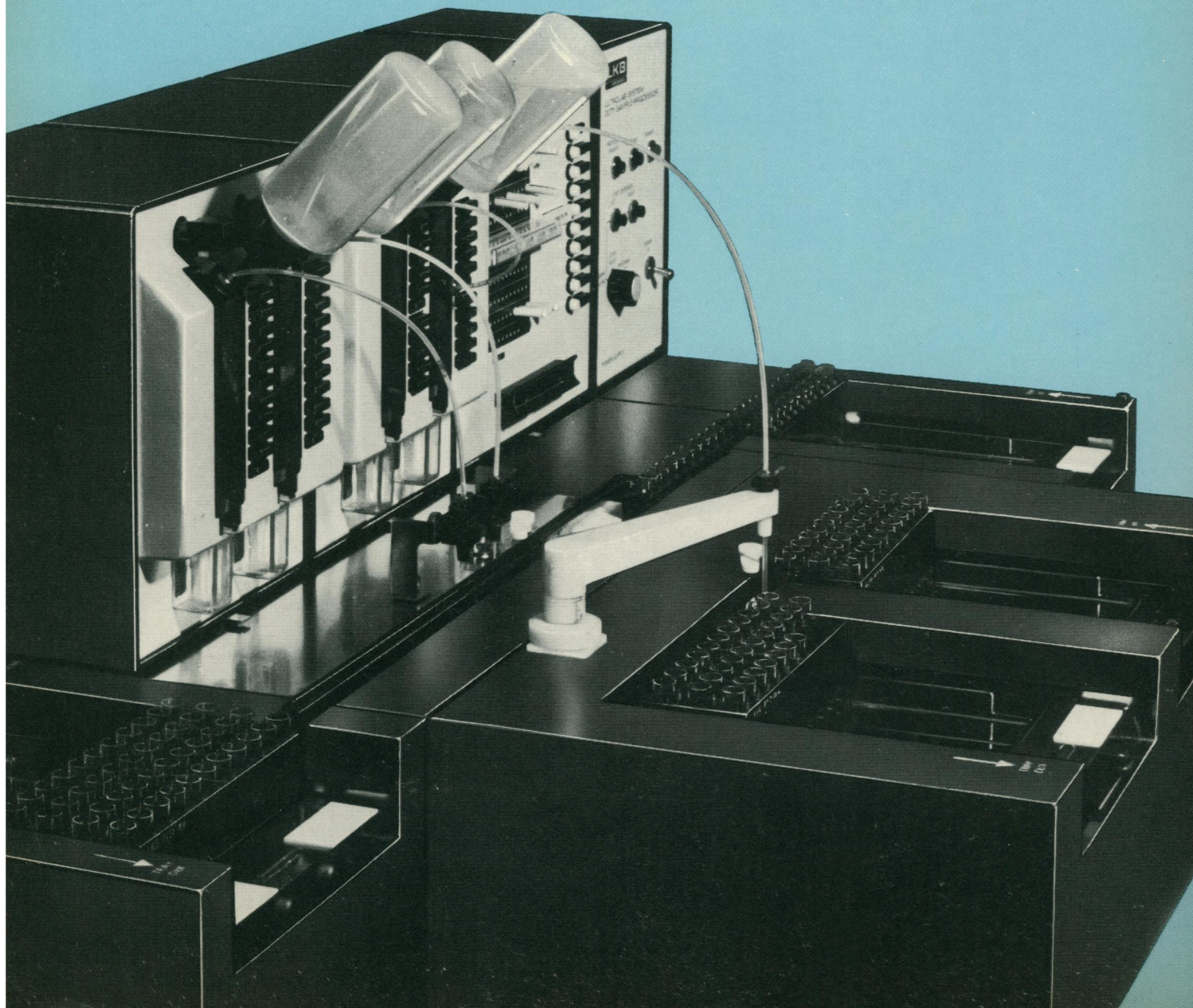
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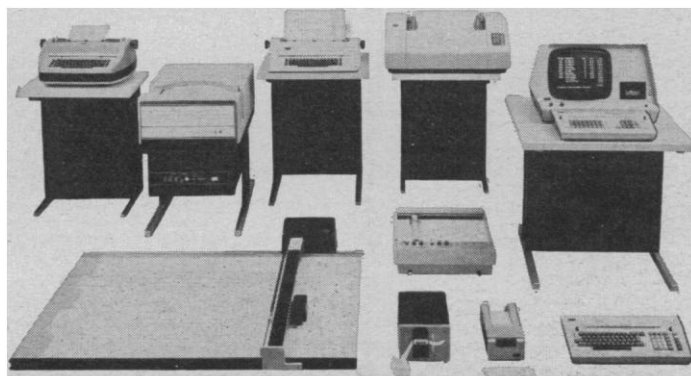
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"... Give me your tired, your poor,
Your huddled masses yearning to
breathe free,
The wretched refuse of your teeming
shore,
Send these, the homeless, tempest-
tossed, to me:
I lift my lamp beside the golden door."
See page 587. [Drawing by Richard
Pellicci, Pelham, New York]

The American Association for the Advancement of Science was founded in 1848 and incorporated in 1874. Its objects are to further the work of scientists, to facilitate cooperation among them, to improve the effectiveness of science in the promotion of human welfare, and to increase public understanding and appreciation of the importance and promise of the methods of science in human progress.

Science and Man in the Americas

Audiotapes

For two weeks last summer (June 20-July 4, 1973) a significant international scientific meeting took place in Mexico City. "Science and Man in the Americas" was attended by more than 5000 scientists, engineers, government officials, representatives of business and industry, science journalists, students, educators and laymen from scores of countries. They deliberated a wide range of topics central to the future development and well-being of the Western hemisphere. The meeting, co-sponsored by AAAS and the Consejo Nacional de Ciencia y Tecnología of Mexico, was created in the belief that science is of overriding importance in the world today and that, being universal, it transcends national boundaries. Here now, captured on audiotape, are many of the most compelling sessions, available for listening, study, and reflection in your home, library, laboratory, automobile. Another service of the AAAS. (Simultaneous translations accompany portions of symposia where necessary.)

148M-73

NON-NUCLEAR ENERGY FOR DEVELOPMENT: Arranged by Edmundo de Alba and J. Frederick Weinhold.

- Session I ☐ **The World's Energy Situation:** David Freeman, Jean C. Leclercq
- Session II ☐ **Energy in the Americas:** J. Frederick Weinhold, Fernando Hiriart, Gordon McNabb, Guillermo O. Zubaran, et al.
- Session III ☐ **Energy for Rural Communities:** Francisco Monteverde, Thomas Venables, J. Neal Thompson.
- Session IV ☐ **Wind and Solar Energy:** Edmundo de Alba, Julio Hirschmann, Peter Glaser, Robert Axtmann, et al.
- Session V ☐ **Geothermal Power:** Federico Mooser, Robert Decker, Richard Stoiber.
- Session VI ☐ **Relationship Between Environmental Protection and Energy:** Juan Eibenschutz, Miguel Angel Garcia Lara, et al.

149M-73

EARTHQUAKE AND EARTHQUAKE ENGINEERING: Arranged by Don Tocher and Enrique del Valle C.

- Session I ☐ **The 1972 Managua Earthquake:** Emilio Rosenblueth, R. B. Matthiesen, John A. Blume, Enrique del Valle C., et al.
- Session II ☐ **Seismicity:** Alan Davenport, Luis Esteve, Donald E. Hudson, William Milne, and Jose Grases.
- Session III ☐ **Earthquake Engineering:** Julio Kuroiwa, Joseph Penzien, Jorge Prince, Patricio Ruiz, Roberto Meli, et al.
- Session IV ☐ **Seismic Intensity and Smooth Spectra, Zoning and Structural Design:** Enrique del Valle C., R. B. Matthiesen, Arturo Arias, et al.

151M-73

CIVILIZATION'S FUTURE: WAS MALTHUS CORRECT?

- Session I ☐ Lecture by Norman E. Borlaug

152M-73

THE SEA AND ITS RESOURCES: Arranged by Agustín Ayala-Castañares, and Arthur E. Maxwell

- Session I ☐ **Introduction, Coastal Zone Resources, Ocean Effects and their Management:** Harris B. Stewart, Jr., Bostwick H. Ketchum, and Julian Adem.
- Session II ☐ **Resources of the Sea:** Robert R. Lankford, Martha Vannucci, and Warren S. Wooster.
- Session III ☐ **Coastal Resources:** Bostwick H. Ketchum, Hermann Ugarte, Richard G. Bader, Robert Warren, et al.
- Session IV ☐ **Ocean Effects on Weather and Climate:** Julian Adem, Donald Gilman, R. Simpson, J. Kuettner, Jay S. Winston, and Kirk Bryan.

- Session V ☐ **Non-Renewable Resources:** Robert R. Lankford, Fred B. Phleger, Alberto G. Lonardi, John P. Albers, Melvin Peterson, et al.
- Session VI ☐ **Living Resources:** Martha Vannucci, Mario Ruivo, Paul E. LaViolette, James Joseph, A. Novak, et al.
- Session VII ☐ **Ocean Affairs:** Warren S. Wooster, John A. Knauss, Jorge A. Vargas, Harris B. Stewart, Geoffrey Kesteven, et al.

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THE IMPORTANCE OF EDUCATION IN DEVELOPMENT: Arranged by Albert V. Baez and Guillermo Massieu.

- Session I ☐ **Educational Technology:** Alfonso Ocampo Londono, Albert V. Baez, Sam Castleberry, Joseph Lagowski, et al.
- Session II ☐ **Laboratory Materials and Teaching Aids:** Nahum Joel, Ernst Hamburger, Rafael Ferreyra, Thomas Taylor, David Lockard, et al.
- Session III ☐ **Motivation and Learning Processes:** David Ehrenfreund, Mary Budd Rowe, Felix Morales, Claudio Dib, et al.
- Session V ☐ **Toward Qualitative Educational Planning:** Don Adams, Manual Bravo Jimenez, Hernan Vera, William Platt, Douglas Wright, Bernard Kaplan, et al.
- Session VI ☐ **The Improvement of Teachers Education:** Ernst Hamburger, Nahum Joel, Carlos Gomez, Olac Fuentes, Luis S. Capurro, et al.

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DESERTS AND ARIDS LANDS: Arranged by Harold E. Dregne and Fernando Medellín Leal.

- Session I ☐ **Planning Problems and Dilemmas in the Development of Arid Zones:** Fernando Medellín Leal, Enrique Beltran, and Thomas Maddock, Jr.
- Session II ☐ **Solar Energy in Arid Lands:** Hector Ruiz Elias, Gustavo del Castillo, Adam B. Meinel, Marjorie P. Meinel, Edward F. Haase, et al.
- Session III ☐ **Water Use Efficiency in Arid Regions:** Terah L. Smiley, Jose Lizarrage Reyes, Ronald F. Probststein, Hasan Qashu, Lloyd E. Myers, et al.
- Session IV ☐ **Educational and Cultural Needs of Desert Zone Inhabitants:** Richard B. Woodbury, Patricio Dreckman, Everett D. Edington, Theodore Downing, Marion F. Baumgardner, Carl N. Hodges, et al.
- Session V ☐ **Storage and Retrieval of Arid Zone Data:** Dean F. Peterson, Antonio J. Prego, Patricia Paylore, Guadalupe Carrion, et al.
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157M-73

SCIENCE, TECHNOLOGY, AND DEVELOPMENT: A NEW WORLD OUTLOOK:

Session I ☐ **A lecture by Glenn T. Seaborg.**

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THE EARTH SCIENCES IN WORLD DEVELOPMENT: Arranged by Guillermo P. Salas and Earl Ingerson.

Session I ☐ **Earth Sciences and Energy and Environmental Problems:** Charles F. Park, P. T. Flawn, P. S. Stepanicic, Eduardo J. Guzman, et al.

Session II ☐ **Geologic Research, Exploration and Development in Mexico, Central and South America:** Diego A. Cordoba M., Carlos Ruiz Fuller, and Enrique Levy.

Session III ☐ **Application of Earth Sciences in the Development of Civilization:** Charles F. Park, P. T. Flawn, Eduardo J. Guzman, et al.

Session IV ☐ **Interrelations of the Sciences in the Solution of Socio-Economic Problems:** Guillermo P. Salas, Earl Ingerson, Charles F. Park, et al.

160M-73

SCIENCE, DEVELOPMENT AND HUMAN VALUES: Arranged by Harrison Brown and Victor L. Urquidi.

Session I ☐ **Where Have the Rich Nations Gone Wrong? Where Have the Poor Nations Gone Wrong?** Guillermo Massieu, Hollis Chenery, Kenneth E. Boulding, et al.

Session II ☐ **Knowledge and Development in Latin America:** Renee C. Fox, Carlos A. Mallman, Richard Griego, and Luis Villoro.

Session III ☐ **Research Priorities for Economic Development in Latin America:** Jose Valenzuela, David Ibarra, and Norman Borlaug.

Session IV ☐ **The Value of Science and Technology to Human Welfare:** Luis Manuel Penalver, Gerhard Jacob, George Bugliarello, Joseph B. Platt, et al.

Session VI ☐ **Science, Technology, and Human Values:** Victor Urquidi, Harrison Brown, et al.

161M-73

VIOLENCE AND BEHAVIOR: Arranged by Santiago Genovés and J. P. Scott.

Session I ☐ **Subcultures of Violence and Social Class as Determinants of Interpersonal Violence:** Berenice A. Carrol, Sandra Bell Rokeach, John Saxe-Fernandez, Osvaldo Sunkel, et al.

Session II ☐ **External Dependency Structure and Scientific Development:** Chadwick F. Alger, Marcos Kaplan, Sylvia Wynter Carew, et al.

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HURRICANES: Arranged by Julián Adem, and Louis J. Battan.

Session I ☐ **New Techniques of Hurricane Observation:** Stanley Rosenthal, Luis Le Moyne, Michael Garstang, Sergio Serra-Castelan, et al.

Session II ☐ **Hurricane Prediction and Modification Techniques:** Pedro Mosino, Robert H. Simpson, Hector Grandoso, Cecil Gentry, et al.

163M-73

TRANSFER OF TECHNOLOGY AND NATIONAL ECONOMIC DEVELOPMENT: Arranged by Jordan J. Baruch and Miguel S. Wionczek.

Session I ☐ **Economic Impact of Technological Change:** Anne Carter, Jorge A. Katz, Jack Baranson, Alejandro Nadal, Alan MacAdams, et al.

Session II ☐ **Social Impact of Current Rate of Technological Change:** Miguel S. Wionczek, Jerome Rotherberg, C. J. Meechan, Edmundo Fuenzalida, et al.

Session III ☐ **Current Vehicles of Technological Trade I:** C. J. Meechan, Robert B. Staubaugh, Ronald Muller, K. D. N. Singh, et al.

Session IV ☐ **Current Vehicles of Technological Trade II:** Mark S. Massel, Luis Soto Krebs, Enrique Aguilar, Luis Figueira Barbosa, et al.

Session V ☐ **Determinants of Technological Policy I:** Francisco R. Sagasti, Manuel Bravo Jimenez, Rodrigo Medellin, Shlomo Argov, Alejandro Nadal, et al.

Session VI ☐ **Determinants of Technological Policy II:** Maximo Halty Carrere, Carlos Bazdresch, Jorge Sabato, Michael Michaelis, et al.

164M-73

APPLICATIONS OF EDUCATIONAL TECHNOLOGY AND NEW METHODS AND EQUIPMENT IN SCIENCE TEACHING: Arranged by Alfonso Bernal Sahagun, Robert Branson, Thomas E. Taylor, et al.

Session III ☐ **Program Development:** Alvaro Galvez y Fuentes, Jay Young, Robert Pecsok, Horacio Gomez Junco, Maria del Carmen Millan, et al.

Session IV ☐ **Television, Wide Territorial Coverage:** Maria del Carmen Millan, Fidel Villarreal, Robert Branson, Isaias Raw, et al.

165M-73

PSYCHODYSLEPTICS AND ADDICTION—MARIHUANA: Arranged by Wallace L. Guess and Oscar Dominguez Vargas.

Session I ☐ **Psychodysleptics, the Botany, Chemistry and Pharmacology of Narcotic Drugs and Marihuana:** Maynard V. Quimby, Carlton E. Turner, Solomon H. Snyder, Harold T. Conrad, Richard B. Resnick, et al.

167M-73

EDUCATIONAL PLANNING: Arranged by Don Adams and Manuel Bravo Jiménez.

Session I ☐ **Quantitative Aspects of Educational Planning:** Juan Chong, Cicily Watson, Jose Antonio Caranza, Hector Correa, et al.

Session II ☐ **Implementing Educational Change:** Guy Benveniste, Jaime Castrejon Diez, Paul Watson, Antonia Ramos, et al.

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"insulation from our baser selves" (1). Apparently pregnant women need no such insulation.

Where does the ethical stop and the amoral begin? Genetic screening may not lead to genocide, but there are some people who would use it for that purpose. Abortion may not necessarily lead to infanticide, but there are some who would suggest that infanticide is all right. We definitely do need checks on our behavior. As it stands right now, though, it is doubtful that the law of the United States as embodied in the Constitution provides the checks we need to guard against taking human life.

PEGGY J. KEILHOLZ

208 Jordon Street,
Jefferson City, Missouri 65101

References

1. T. Marshall, *U.S. Law Week* 60, 4950 (1972).

Human Rights

I recently returned from the annual conference of the American Society for Engineering Education that was held at Rensselaer Polytechnic Institute (RPI). For some reason, I recalled the story about an Iroquois Indian by the name of Donehogawa (anglicized as Ely Samuel Taylor) that had been recounted in Dee Brown's *Bury My Heart at Wounded Knee* (1). He was not permitted to enter law practice in the state of New York because he was not a white male citizen. He made careful inquiries as to which of the white man's professions or trades an Indian could be admitted, entered RPI, and was graduated as a civil engineer. He worked on the Erie Canal, served as an engineer in the Union Army (because of his excellent penmanship, Grant asked him to write out the terms of surrender at Appomattox), and he later was the first Indian to serve as Commissioner of Indian Affairs.

In this day when we are reminded constantly of the need for affirmative action, we can take pride in the engineering profession and RPI for their early recognition of human resources and rights.

HAROLD N. WIREN

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References

1. D. Brown, *Bury My Heart at Wounded Knee* (Holt, Rinehart & Winston, New York, 1971).

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Education and the Job Market

Every time the job market stiffens we face an argument concerning the relationship between education and employment, and whether our young people are being properly trained for the existing job opportunities. In this debate, it usually is general education or "liberal arts" that takes a beating. Part of the problem stems from inflated expectations brought on by a strong job market in recent years. In the 1940's and 1950's, no one expected a student to receive more than one or two job offers, and the mathematics graduate who ended up in retailing seldom felt betrayed by his alma mater. But the frantic recruiting of the 1960's gave rise to expectations of plentiful opportunities within nearly every chosen field. When these opportunities abruptly declined, the clamor began.

The critics of educational institutions ignored the fact that unemployment was more related to widespread economic malaise than to inadequate or inappropriate education. Some critics even suggested that manpower training and vocational-technical education ought to be the paramount responsibilities of colleges and universities. From a statistical point of view, such arguments were less than compelling. Between 1960 and 1970, jobs requiring professional and technical higher education increased 49 percent, while demand for "craftsmen and foremen" increased only 19 percent and nonfarm labor less than 5 percent.

Educational institutions have been providing as many or more career-training curricula than ever, but they cannot impose upon students particular courses of study, nor can they predict what the job opportunities will be 4 or 6 years after the student first enrolls.

The way out of our present troubles lies first in breaking down the false dichotomy according to which general and career education are seen as mutually exclusive. In fact, the two are complementary. Second, we must recognize that the development of lifelong education relaxes the constraints on time. Desired combinations of vocational and general education cannot be limited to a 4-year undergraduate period but can be decided in the context of education over a lifetime.

The case for general education is usually based on its great humanistic benefits—its capacity to give us a sense of place within our cultural heritage, while the benefits of career education are usually regarded as material gains. Yet, in a fundamental sense, general education itself is a crucial sort of job preparation.

In the United States there has long been a high degree of movement between jobs that are significantly different in nature, as in the case of the engineer who enters management. The career skills a man or woman learns prior to accepting a first or second position may be inadequate for a third, fourth, or fifth job.

General education, concentrating on developing a broad cultural perspective, analytic abilities, and communicative skills, enriches our personal lives and enhances our adaptability to new situations. Thus general education is as indispensable to the world of work as any program of vocational training.

I argue for the ascendancy of neither general nor career education. Only a dual approach can serve our purposes—a partnership operating within a context of continuing educational participation by people of all ages, each involved in the kinds of learning experiences appropriate to their various needs. In our future educational strategies, general education and career education must join together, lest either, in standing alone, prove an unfortunate societal liability.—CLIFTON R. WHARTON, *President, Michigan State University, East Lansing 48824*

Skepticism

Skepticism is a stock trade of science. Thus, the promise of the green revolution is weighed against its actual costs . . . the potential of geothermal energy is squared against problems, environmental and political . . . confident 20th-century conceptions of prehistory are critically examined . . . our understanding of natural phenomena — volcanoes, earthquakes, hurricanes — is questioned. This third volume of *Speaking of Science* offers a wide ranging sampling of skepticisms — from population policy to views of man's violent behavior. Knowledgeable people take a sharp-eyed look at twelve different problems involving science and technology. An insight is gained into current attitudes toward some familiar problems . . . and a few new ones.

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