

# guest comment

## Einstein: Amateur Scientist

In the last years of Einstein's life, he became involved in an emotional imbroglio associated with the investigations of the McCarthy era. It started with his response to an appeal for help by William Frauenglass, a teacher of English in a Brooklyn high school. Frauenglass had been called to testify about his political opinions before the Jenner Committee, and he appealed to Einstein for advice and support.

Einstein responded with a letter, which he authorized Frauenglass to quote. It appeared on the front page of *The New York Times* for 12 June 1953. The following quotation from it can now be readily found, since it is one of five of Einstein's remarks in Bartlett's *Familiar Quotations*:

Every intellectual who is called before one of the committees ought to refuse to testify, i.e., he must be prepared . . . for the sacrifice of his personal welfare in the interests of the cultural welfare of his country . . . This kind of inquisition violates the spirit of the Constitution.

If enough people are ready to take this grave step, they will be successful. If not, then the intellectuals of this country deserve nothing better than the slavery which is intended for them.

These words of Einstein brought very stern rebukes from a number of directions, including an editorial in *The New York Times* itself.

Einstein's unhappiness with the course of events and with the response to his statement reached a climax more than a year later, in November 1954, when he made what his biographer, Ronald Clark, calls one of Einstein's "most quoted" statements, although it does not appear in Bartlett: He wrote:

If I would be a young man again and had to decide how to make my living, I would not choose to become a scientist or scholar or teacher. I would rather choose to be a plumber or a peddler in the hope to find that modest degree of independence still available in present circumstances.

The plumbers were very pleased with this statement, and they presented Einstein with a certificate of honorary membership in their craft. But the scientific



and academic communities were understandably very displeased with this renunciation of their mode of life by a man who was certainly one of the greatest scientists of all time, and whom they regarded proudly as one of their own.

Einstein's meaning was clarified, however, as the result of the initiative of a young student, Arthur Taub (now Professor of Clinical Anesthesiology at Yale Medical School), who wrote to Einstein, chiding him for appearing to abandon science for plumberdom. Taub saw to it that the reply was published in the columns of the *Reporter*, where the remark had originally appeared, immediately after Einstein's death. Taub wrote that Einstein's answer "is especially significant now that the world has lost the living mind of one of its greatest friends. I hope this letter will be of value to students contemplating science and life."

The letter from Einstein, in full, is as follows (translated from German):

You have completely misunderstood the intent of my remark. I wanted to suggest that the practices of those ignoramuses who use their public positions of power to tyrannize over professional intellectuals must not be accepted without a struggle. Spinoza followed this rule when he turned down a professorship at Heidelberg and (unlike Hegel) decided to earn his living in a way that would not mort-

gage his freedom. The only defense a minority has is passive resistance.

Those words warrant the most careful consideration by students of Einstein the man. Not only was it his final comment on a controversy that had been simmering for years and had deeply engaged him, but by invoking as a model the career of Spinoza, he was, in his final days, harking back to someone who had been a lifelong hero, and to whose example and ideas he had turned at several points in his life.

What was Spinoza's way of earning a living that enabled him to preserve his intellectual independence?

Casual biographers of Spinoza refer to him as a "lens grinder," an occupation that does not seem very different from Einstein's originally stated preferences for the careers of plumber and peddler. But a more careful examination of the facts about Spinoza's life, with which Einstein can be presumed to have been very familiar, gives quite a different impression.

Spinoza lived in a time when two optical inventions—that of the microscope and of the telescope—were literally opening men's eyes to new dimensions of the universe. These two instruments were the keys to vast treasures of knowledge about biology, astronomy and physics. Their design and construction presented scientific and technical problems of the highest order of difficulty and of contemporary importance. It was to the solution of these problems that Spinoza turned his attention as a means of earning a living.

His skill as an instrument maker and his insight into the underlying scientific and technical problems of optical theory, design, and manufacture brought Spinoza a living that was ample for his modest needs. Equally important, it brought him the friendship and patronage of the leading intellectuals and scientists of his day, including Huygens and Leibniz, whose scientific correspondence with Spinoza is still extant, as is a treatise of Spinoza's on the optical theory of the rainbow.

Thus, it is clear that Spinoza was indeed a "professional intellectual," if one understands by "professional" the employment by which one earns one's living. He was what one would call today a self-

# The heart of the cryopump beats...



## or else!

Think about it...

The cryopump is only as good as its own "heartbeat" ... a dependable source of cold. Without continuous cold, there is no vacuum. If vacuum fails, deposition production stops. Important experiments can be ruined.

Think about this...

More than three-quarters of the world's leading makers of cryopumps and cryopumped deposition systems install reliable, versatile, and economical DISPLEX® closed-cycle refrigerators in their equipment. That should tell you something about dependability.

That should tell you something about the DISPLEX refrigerator. It's the dependable heart of the modern cryopump. Send for details.

 *Air Products*

**APD CRYOGENICS**

1919 Vultee Street, Allentown, PA 18103 (215) 398-8419 Telex: 84-7416

guest comment

employed optical consultant and manufacturer, and he made his living by selling his goods and services in the open marketplace that prevailed in the Western Europe of his day, much as he might today.

Spinoza used the relative freedom from economic reprisal afforded by an open marketplace to support himself as an amateur philosopher in developing his quite singular and far-from-popular ideas on ethics and religious theory on which his fame rests today.

Underscoring this interpretation of Einstein's words is the fact that the model Einstein held up for our attention resembled significantly the model he himself had followed for the early, crucial years of his own career. For when Einstein graduated from the Technical Institute (ETH) of Zurich in 1900, his non-conformist personality deprived him of the academic post that was his first career choice. His first regular job was as a patent examiner in the Swiss Patent Office in Berne, where he remained from 1902 to 1909.

As the world knows, those were sensationally fruitful years. Not only did he complete and publish in 1905 the work that brought him initial and lasting fame,

particularly the Special Theory of Relativity, but he is believed to have worked out during those years much of the General Theory of Relativity that he published later, and which represents substantially the remainder of his prime scientific output. Thus Einstein, like Spinoza, made his mark principally as an amateur, while supporting himself in a noncontroversial intellectual occupation.

In recent years, scientists have witnessed the ordeal of fellow scientists in the Soviet Union and elsewhere who have been deprived of their positions for espousing political opinions unpopular with the prevailing regimes. In the absence of an open marketplace for their services, or such products as they may have created, they have simply been unable to survive economic pressures and have been forced to emigrate. Andrei Sakharov, the dissident Soviet physicist, still has a slender source of income as an Academician and hence is able to hang on in the Soviet Union. But he must be considered the exception that proves the rule. Einstein's perception that an open marketplace for goods and services is an essential condition for an open marketplace for ideas could not be more dramatically vindicated than by the events of the past several decades in the Soviet Union.

Einstein was perhaps naive initially in urging intellectuals to martyr themselves and their families on behalf of intellectual freedom by defying the authority of congressional committees. But in his final words he clearly came to grips with the realities of economic reprisal, and he pointed to a road that is consistent both with one's pride and self-respect and with the demands of prudence and the necessities of survival.

The problems facing graduates in our own day is highlighted by a recent comment of Dean Roskovsky of Harvard that the shortage of academic posts until 1995 is so acute that needs of academe can be met by the output of a single major graduate school!

Does this mean the end of the road for a whole generation of scholars and scientists? Not at all if we keep in mind as models the careers of Einstein and Spinoza. Deprived of the opportunity to pursue a career as a professional scholar, or unwilling to do so, as in the case of Spinoza, they yet succeeded brilliantly in making their contributions as amateur scholars—literally “lovers” of learning and intellectual creativity.

Clearly, the moral for our own day could not be more timely or apposite. Amateurism in science and scholarship have a brilliant tradition down through the ages. The current shortfall of academic jobs for our next generation of academics might presage a revival of that brilliant tradition.

LAWRENCE CRANBERG  
Austin Texas □

EFFICIENT USE OF ENERGY

The APS Studies on the Technical Aspects of the More Efficient Use of Energy

AIP Conference Proceedings #25

EDITORS: K.W. Ford, G.I. Rochlin, R.H. Socolow, D.L. Hartley, D.R. Hardesty, M. Lapp, J. Dooker, F. Dryer, S. Berman and S.D. Silverstein

This volume contains papers that identify areas of physics research and development which promise to improve the technologies governing energy efficiency at points of use. Three parallel sub-studies are included in this volume: I. A Physics Perspective II. The Role of Physics in Combustion and III. Energy Conservation and Window Systems.

305 pages. 1975. \$20.00 clothbound. LC 75-18227. ISBN 0-88318-124-X.

For your copy of EFFICIENT USE OF ENERGY write to: American Institute of Physics, Marketing Services, 335 East 45 Street, New York, NY 10017.

there is a difference

when it comes to CRYOGENIC INSTRUMENTATION, SENSORS & SYSTEMS

Only Lake Shore Cryotronics, Inc. provides state-of-the-art sensors, instrumentation and closed and open cycle refrigeration systems for virtually every cryogenic application.

INSTRUMENTATION

- Digital thermometers 1-400 kelvin
- Digital thermometer/controllers 1-400 kelvin
- Ultra stable precision controllers 1-400 kelvin
- High stability fixed and programmable current sources
- Liquid level readouts and controls
- Vacuum regulator valves



SENSORS

- Germanium resistors <0.05 K to 100 K
- Carbon glass resistors <1 K to 100 K (300 K)
- Silicon diode sensors 1 K to 400 K
- GaAs diode sensors 1 K to 400 K
- Platinum resistors 20 K to 900 K
- Capacitance sensors <1 K to 300 K
- Rhodium iron resistors
- Chromel-gold/iron thermocouples
- Hall generators

SYSTEMS

- LTS-21 closed cycle refrigerator systems
- ±.003 K to ±0.5 K stability
- <10 K to 300 K temperature range
- State-of-the-art instrumentation
- Complete accessories
- CT-310-LHe continuous flow variable temperature cryogenic systems
- <2 K to 300 K temperature range
- State of the art instrumentation
- Complete accessories
- ±.003 K to ±0.5 K stability

In Europe : Cryophysics

Oxford, England (865) 722824  
Versailles, France (1) 9506578  
Darmstadt, W. Germany (6151) 74081  
Geneva, Switzerland (22) 329520

In Japan:

Niki Glass Co. Ltd.  
(03) 503-2787

In North America:

Lake Shore Cryotronics, Inc.

64 East Walnut St., Westerville, Ohio 43081  
(614) 891-2243 Telex: 24-5415 Cryotron WTVL

Circle No. 10 on Reader Service Card