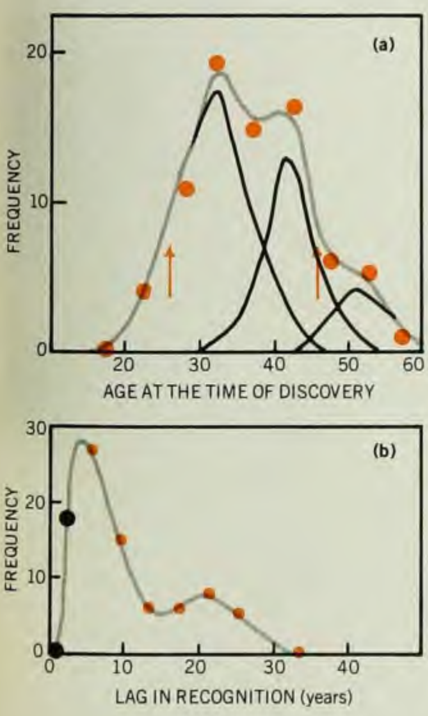
subjects, at the time of award and at the time of the actual basic discovery.

The results of this analysis, published in *Proc. Pak. Acad. Sci.* **10** (1973), pages 27–36, are summarized in figure 1 (page 13), showing the frequency distributions of the ages of Nobel prizewinners in physics and in physiology and medicine over the period 1901 to 1962, while figure 2 shows the frequency distributions of the ages of Nobel prizewinners in physics and in physiology and medicine over the period 1901 to 1962, while figure 2 shows the frequency distribution of ages of physics Nobel prize-winners at the time when they make the basic discovery. Comparison of the data for the two subjects shows that in fact the various frequency distributions are trimodal, with three approximately Gaussian components, of 12-year half-value width, having peaks at 37 ± 1 years, 48 ± 1 years and 61 ± 2 years in figure 1, and at 32, 42 and 52 years in case of figure 2 for the age at the time of the actual discovery. These three peaks are indeed noticeable in the histograms (at 5-year intervals) given in the diagram in the letter by Diemer.

The curves of figures 1 and 2 bring out the existence of three definite groups of persons, whose peak creativities are separated by intervals of about 10 years, with the physicists having the larger share of the first peak at 32 years, while medicine and physiology have the larger share of the third group. This has its parallel in the existence of six to eight-year cycles of high productivity in the work of individual scientists found in an earlier study by the author[1]. It is also interesting to note that a plot showing the mean ages of successive groups of five Nobel winners in physics over the sixty-year period does *not* show any monotonous trend, but rather a cyclic rise and fall.



Frequency distribution of the ages of Nobel prize winners in physics when they made the basic discovery. Figure 2

Reference

1. M. M. Qurashi, Pak. J. Sci. Ind. Res, 12, 449 (1969)

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Reactor safety study

Inasmuch as considerable public use is being made of the Report to The American Physical Society by the Study Group on Light Water Reactor Safety (published as Supplement No. 1 to Vol. 47 of the *Reviews of Modern Physics*), it would be useful to reiterate the nature, and the limitations, of the APS-sponsored effort.

Public concern about present reactors has focused on the following technical issues:

- The environmental and health effects of reactors that operate as designed;
- the risk of accidents;
- the consequences of such accidents, should they occur;
- the research program responsible for assuring that reactors become increasingly safe;
- the possibility of sabotage or diversion of nuclear materials (nationally and internationally), and
- the safety of transportation, storage, reprocessing and disposal of radioactive wastes.

Similar concerns apply of course in many respects to non-nuclear energy sources.

Even if adequate technical assessment of all of these issues were feasible, their evaluation in the larger social, environmental, economic, institutional and political framework would remain a major task for society. There has been a tendency to confuse these technical and nontechnical issues in much of the public debate over nuclear power, leading to a strong polarization of opinion about the proper course for society to follow. It was the conviction of the APS in sponsoring its Study that it would be constructive to separate the issues of fact, known or uncertain, from the broader issues involved in the public policy questions.

In its work, the APS group focused primarily on the third and fourth of the issues listed above. The group did not deal with the larger issues involved, such as the need for nuclear power or its com-

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parative value *vis à vis* coal or other energy sources; it did not attempt to deal, in a definitive way, with some of the other important technical issues relating to reactors, such as the absolute risk of reactor accidents.

Prior to inception of the APS effort, the AEC had begun an extensive study, involving both in-house and outside personnel, of the risks and consequences of possible reactor accidents. This study, known as the Rasmussen study (or Draft WASH-1400), employed an event-tree/fault-tree analysis, with parameters determined by existing data and engineering estimates, to attempt to establish a quantitative measure of accident risk. The Rasmussen study further attempted to model the consequences of such accidents.

It is important to note that the APS group explicitly did not include a review of this draft report as one of its tasks. However, there were regions in which the concerns of the APS group overlapped those of the Rasmussen group. This was primarily in the area of consequence modeling where the APS group discovered some discrepancies between their results and those of the Rasmussen group. After consultation, it became apparent that the consequence model used by the latter group had neglected the effects of dominant sources of long-term radiation exposure. Under the other model assumptions used by the Rasmussen group (including a linear dose-effect relationship), inclusion of this effect led to a sizeable increase in long-term cancer and thyroid disease. The cancer fatalities, however, still remained relatively small, and statistically inseparable, compared with the normally high incidence of these diseases.

In its discussion of the risks of nuclear-power-plant accidents, and on the basis of its experience in estimating low-probability events, the APS group expressed its lack of confidence in the absolute probabilities assigned by the Rasmussen group. However, it saw such analyses as being of value in comparative studies of different sequences of reactor behavior and in highlighting relative strengths and weaknesses of reactor systems.

The APS group completed its work in April 1975 and was thus disbanded. It is expected that individual members of the group would continue to make valuable contributions in this effort. The Rasmussen group has subsequently completed work on its final report (November 1975). We are told that substantial changes have been made in the consequence model.

The strong emphasis of public discussion on risk and consequence estimation has tended to obscure what we regard as one of the most constructive contributions made by the APS group: a careful and thorough review of the rationale, goals and implementation of the safety research program. We wish to reemphasize here that the success of this program is vital to improved reactor safety, particularly if major expansion of the use of nuclear power is contemplated. Members of the APS group (and the Review Committee) have been invited as individuals to make continuing contributions to improvements in the safety research program and have done so when requested. The APS, through its Panel on Public Affairs, is also considering additional studies in the nuclear area (and non-nuclear areas also). Of these, the highest priority has been given to a study of safety and safeguards issues in the recycle of fissionable materials. This study will be under the direction of L. C. Hebel of Xerox, with a Review Committee to be chaired by H. Frauenfelder of the University of Illinois.

C. S. WU, *Past-president*
The American Physical Society
W. K. H. PANOFSKY
H. BETHE
V. F. WEISSKOPF
Council Review Committee

Deflating support

According to GBL, federal support "declined by 26%" since 1967 (November 1975, page 102). The figures are:

1967 Support, 381 ($\times 10^6$) GNP deflator, 100.0%

1975 Support, 436 ($\times 10^6$) GNP deflator, 154.5%

Repeating the editorial calculation procedure (*"Multiplying* the 1975 figure by the GNP price deflator factor, . . ."), I for one find

$436 \times 1.545 = 673.62$ and

$673.62 - 381 = 292.62$

which indicates not a decline of support, but a non-inconsiderable increase of 76.8%. *Dividing*, instead of multiplying, gives $436 \div 1.545 = 282$, and 282 is indeed 381 less 26%.

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IUPAP and China

At the recent 15th General Assembly of the International Union of Pure and Applied Physics (Munich, 24–27 September, 1975) I introduced two resolutions, hoping that a fresh start could be made in negotiations with Academia Sinica on the membership of China. My proposals were:

- Every qualified scientist, whether he or she is from a member country or not, has the right to attend all IUPAP-sponsored conferences.
- Official membership of IUPAP is restricted to countries that belong to the United Nations or UNESCO.