Letters

Laser Isotope Separation

The report on uranium enrichment by Robert Gillette (News and Comment, 22 Mar., p. 1172) is an excellent summary of interest in the possibility of laser isotope separation (LIS). However, some of the statements may inadvertently help to perpetuate common misconceptions regarding the role of enrichment in the economics of nuclear power. Many assume that LIS will result in greatly reduced costs of generating nuclear power. The projected fuel costs of nuclear power for the plants now planned and under construction are 12 to 15 mils per kilowatt-hour. Since the present cost of the enrichment part of the fuel cycle is only about 0.5 mil/kw-hr, the result is likely to be a reduction in the total cost of nuclear power from 15 mil/kw-hr to approximately 14.5 mil/kw-hr, an important but not earth-shaking saving. The recent dramatic price increase in oil and coal have increased the price of some fossil-generated electricity by 15 to 20 mil/kw-hr, to a present total of 25 to 30 mil/kw-hr.

The possibility of removing 100 percent of the ^{235}U from the ^{238}U is an intriguing prospect but one which is probably not practical with LIS. However, if this goal is achieved it would indeed increase the nuclear fuel supply by the amount of ^{235}U now left in the "tails" from the diffusion plant. A successful centrifuge enrichment plant might show a similar although smaller advantage if it is desirable and economic to operate it in this mode. The obsolete electromagnetic separation process achieved almost complete removal of ^{235}U from the tails and had low power costs, but it failed to meet the economic criteria.

The effect of LIS on breeder reactor economics will be negligible because the breeder reactor requires so little uranium fuel that even at $500 a pound the uranium fuel cost is less than 1 mil/kw-hr. By the year 2000 there will be enough uranium in our stockpile of tails from enrichment plants to fuel 1000 breeder reactors for 300 years. The existence or nonexistence of a cheap isotope separation method will have a second-order effect on the complex mix of calculations involving capital, uranium ore, enrichment, and other fuel cycle costs used in determining the comparative economics of breeder and light water reactors. The United States has enough reserves at less than $500 a pound to fuel a greatly expanded breeder nuclear electric company for 100,000 years at a cost for the uranium fuel of less than 1 mil/kw-hr.

There is no doubt about the importance of active research in this field, but one needs to be cautioned against expecting early commercial success. There is a very low probability that this process can be brought to the point where it will affect plans for expanding enrichment production facilities to meet the nuclear fuel needs of the 1980's. Further, the private U.S. corporations that are actively working in the uranium enrichment area will be given the opportunity to review LIS work at the laboratories of the Atomic Energy Commission in order to make an independent judgment of the future commercial potential of the process.

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Disruptions at AAAS Meetings

Now that disruptions at AAAS meetings have largely subsided, a backward glance provides some perspective about the unique phenomenon known generally as "Science for the people." I have attended AAAS meetings at intervals since 1933, served on the AAAS council for a number of years, and had the opportunity to observe rather closely and to attend some of the meetings and planning sessions of the activists since the Boston meeting in 1969. My impressions can be summarized as follows.

1) There is a lack of unity within the activist group. They fight among themselves and accuse each other of having the same faults as those they attack. They yell obscenities at each other as violently as they do at the "establishment." Their own meetings often end in disruption.

2) They lack a positive program or cause. They are "against" the establishment, but not really "for" anything specific. Their criticism is destructive rather than constructive in nature.

3) The dissidents and activists have the same symptoms of "illness" as they claim for society. They seem to be driven by fear and frustration occasioned by the draft (in earlier years), unemployment, lack of political power and recognition by society, and mistrust of their elders.

Some of them are undoubtedly sincere in their beliefs and some are worthy of careful attention, but they are learning that disorderly protest and violence are not the answers. They can bring problems to the surface, but they cannot solve them by their tactics.

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Japanese Conception of Nature

In "The conception of nature in Japanese culture" (25 Jan., p. 279) Masao Watanabe lists two examples of possibly "positive and unique contributions to science that were related to the intellectual and spiritual traditions of Japan and that would not likely have been made by Western scientists. No doubt the examples Watanabe cites will provoke disclaimers, but I should like to offer what may be an equally good example of what he proposes. The case I have in mind relates to China rather than Japan, but from the context of Watanabe's account and from some of the specific stories he relates, this example would undoubtedly reinforce his arguments.

In 1957, Lee and Yang published an unexpected theory on the nonconservation of parity. The first confirmation came from experimental work done by Wu at the National Bureau of Standards. My wife, who is an artist, ob-