Letters

Disputed Discovery of Element 105

The recent letter of G. N. Flerov (2 Oct.) raises questions concerning the claims of my group to the discovery of element 105. Flerov's major concern seems to be that neither the formal presentation (*1*) of our results in *Physical Review Letters* (29 June) nor the account of this work by Holcomb in *Science* (15 May, p. 810) give adequate recognition to results obtained by Flerov and his associates that claim the discovery of an isotope of element 105 which decays by spontaneous fission (*2*).

With regard to the publication of the paper in *Physical Review Letters* on element 105, I must respond simply that the paper had been completed before the Dubna preprint was received. Holcomb's report on the other hand was based on an invited paper which I delivered at the Washington meeting of the American Physical Society on 28 April 1970, not long after receipt of this preprint. Our translation of this document was completed on 10 April 1970. In retrospect, it is clear to me that it would have been prudent to insert in press a reference to the new Dubna results, and I apologize to Flerov and his group for not doing so.

It is certainly debatable whether laboratory preprints should be considered as publication in the open literature (there is at least one major research facility in this field which does not receive the Dubna preprints), but that is not my major concern here. It is clear that the work in the two laboratories is completely independent and essentially concurrent (our first detection of the 1.6-second $^{260}105$ alpha activity was in November 1968, but the data were inadequate for publication).

I would like to raise the basic question of what constitutes the *discovery* of a new element. It seems to me that the *discoverer* is the one who first *proves* that he has indeed found a new element. Our published work demonstrates beyond question that we have identified the isotope $^{260}105$ by linking it genetically to its well-known lawrentium daughter, ^{256}Lr. This was done both by the alpha-recoil milking of the daughter and by a time-correlation analysis of mother-daughter events. On the other hand the Dubna discovery of a 2-second spontaneous-fission emitter is *still open to question* as to the identity of the atomic number involved. They have attempted to link this discovery with data published in an earlier preprint (*3*) in which the discovery of element 105 was attributed to the detection of isotopes which decayed by alpha particle emission. In our *Physical Review Letters* communication we discussed this earlier work and showed that it was completely contradicted by our experiments. I would certainly agree that it is *possible* that the 2-second spontaneous-fission activity arises by a branch decay of $^{260}105$ (our present experiments set a limit of about 20 percent) or, more likely, from $^{261}105$, but I believe that it is by no means firmly established that the spontaneous fission is due to element 105.

My lack of confidence in experiments based exclusively on the detection of spontaneous-fission activity stems from our own work as well as that of others. Nothing presented in the Dubna preprint of February 1970 alters my conviction that this mode of decay is not sufficient by itself to conclusively demonstrate that a new element has been formed. Witness the fact that this same controversy between the Dubna and the Berkeley groups has prevailed for several years over our competing claims to the discovery of element 104. In this case a 0.1-second (formerly 0.3-second) spontaneous-fission activity was assigned to $^{260}104$ by the Dubna group and was not confirmed by our work. On the other hand we have positively identified the alpha emitters $^{257}104$, $^{259}104$, and $^{261}104$ by mother-daughter experiments similar to that performed with $^{260}105$. In addition we have found a 10-millisecond spontaneous-fission activity that we believe is due to $^{258}104$, but its positive identification suffers from aforementioned difficulties.

Our position in regard to the naming of these two elements is very straightforward. We believe that we have found and characterized isotopes with these atomic numbers in a clear and unambiguous manner, and to illustrate our confidence we have proposed the names rutherfordium (Rf) for element 104 and hahnium (Ha) for element 105. If our findings stand over a period of time they will be recognized in the traditional way—acceptance by the scientific community and its established nomenclature committee. If, on the other hand, it becomes obvious that prior or concurrent work should take precedence, then presumably other names should and will be recognized.

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Science Teachers: Ignored in a Crisis

Spurned may not be quite accurate; perhaps *ignored* describes better what is happening to science teaching today. Recently a 14-member commission presented a report (*1*) on pesticides and their relationship to environmental health to the Secretary of Health, Education, and Welfare. More than 150 additional university, government, and industrial scientists contributed advice, information, or services to the commission. The problems of environmental pollution by pesticides were reviewed thoroughly in the report and 14 recommendations were made to repair the damage already done and to prevent future instances of this type of pollution.

There is a glaring omission among the recommendations. No role is assigned to science teachers. Are not the ecological principles underlying these problems those which receive major emphasis in school biology courses? A full appreciation of food chains, population balances, and biological evolution would certainly help the citizenry to act intelligently toward solving environmental pollution problems. Another recent report on the environment by a 30-member task force of the American Chemical Society made 69 recommendations (*2*). The closest any of these came to involving science teachers asked for an extensive educational program by government agencies to teach pesticide users the optimum methods of pest control.

Recently, Congress has been studying legislation to protect consumers from possible injury by household chemicals. Here again, science teachers, if properly encouraged to teach safety precautions, could make such legislation superfluous.

Dozens of local, state, and federal programs are being launched to help young people bypass the risks to health and character caused by using alcohol and drugs. The general practice of not involving science education with such programs is doubly soul-searching. The vital messages of these programs are diluted with many warnings on much less lethal matters, and the total effect is so diminished that science teachers must continue to face young minds and bodies who are flirting with total destruction. Preventive education is essential. Our environment has already undergone extensive damage. So have large segments of our disadvantaged population. And, most amazing, the logical thought processes of science are losing ground during this "Age of Aquarius" and there is a resurgence of faith in astrology, superstition, and all such hanky-panky.

Does science teaching deserve to be ignored? Maybe the thousands of men and women who teach elementary and secondary school science are suffering from a bad image. Certainly there have been few programs recently intended to improve that image. During the years after Sputnik, many voices proclaimed the shortcomings of the science teaching profession. Now is the opportunity to measure the capabilities of this profession when urgent problems need to be solved. The nation's science teachers are ready, willing, and able to work on these programs. Congressmen, Cabinet officers, industrial leaders, and members of the communications media should be urged to utilize this great national resource—while there is still time.

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J.C.T.: Environmental Scapegoat

Lewis Moncrief's article, "The cultural basis for our environmental crisis" (30 Oct., p. 508), is perhaps one of the most important contributions to the amelioration of that crisis that *Science* could have made. The damage done by Lynn White's article (*1*), most of it by amplification of White's errors, so carefully pointed out by Moncrief, has spread far and wide outside of the technical community. So many, including especially that part of the religious community which has experienced a failure of nerve, have now found a scapegoat for our crisis in "the Judeo-Christian tradition" (J.C.T.) which distracts them from more real culprits. . . .

Moncrief has pointed out that there is no evidence that in other cultures where the same level of wealth exists, the environment has deteriorated less. While comparisons are odious, I find it difficult to hypothesize that, given Calvinistic emphasis on cleanliness as a virtue, a village in Europe would have managed its waste less well than a typical one in India, or Africa, or Brazil. It is sheer ignorance of history compounded by unbecoming brazenness to equate *contemporary* American habits with the J.C.T., the Protestant ethic, Puritan narrow-mindedness, or any other favorite whipping boy. Surely a much better statistical case could be made to correlate environmental degradation with *lessening* of the hold of the J.C.T. at the *personal* level in America. . . .

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Moncrief proposes a model for environmental degradation which follows the steps: Judeo-Christian tradition→capitalism and democratization→urbanization, increased wealth and population, individual resource ownership→environmental degradation. Goldman ("The convergence of environmental disruption," 2 Oct., p. 37), however, clearly shows that environmental degradation in the Soviet Union demonstrates that "not private enterprise but industrialization is the primary cause of environmental disruption." Indeed, as he points out, the state planning officials in the Soviet Union "are judged almost entirely by how much they are able to increase their region's economic growth." It has long been obvious that attempts to interfere with such plans are punished harshly by the Soviet regime.

Goldman substantiates his thesis with an impressive account of pollution in the Soviet Union. Further substantiation may be found in Kasymov's account (*1*) of the destruction of aquatic life in the Caspian Sea by Soviet industry. Countries that are as yet undeveloped are hastening to make their contribution to consumption of the environment by satisfying the demands of their populations.

Surely it is time to stop constructing spurious "models" such as that of Moncrief. "Environmental degradation" stems from the desire of human beings for food, shelter, health, leisure, amenities, and luxuries. The process is evidently accelerated by any centralized sociological system.

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Galápagos Verging on Desecration

I recently returned from a trip to the Galápagos Islands. It was a magnificent experience, but I learned of some extremely distressing conditions.

In the game reserves of Africa, all tourists must be accompanied by a ranger, but in the Galápagos, where the government of Ecuador has begun promoting tourism, no such precautions are being taken. If a ranger could be stationed on each of the islands, this would insure the preservation of the environment. In addition to the damage