

Ethical Issues in the US 1956 National Academy of Sciences BEAR I Genetics Panel Report to the Public

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Abstract—This paper presents newly discovered evidence from the personal correspondence of four US National Academy of Sciences (NAS) Biological Effects of Atomic Radiation (BEAR) Genetics Panelists that their 1956 report to the public was written by a third party and was neither reviewed nor approved by the Panel prior to its publication and release to the public. The letters revealed that the 1956 Report contained serious errors and did not represent the views of the Panel. The failure of the US NAS to notify the public that the Report had not been reviewed and approved by the Panel represents a serious breach of ethics. Further ethical issues relate to the failure of the NAS to (1) correct the errors in the Report within an appropriately timely manner and (2) reveal the lack of approval by the Panel even after the Report's release. In light of these discoveries and the profound historical—and continuing—significance of the 1956 Report to all conventional cancer-related risk assessment processes, we opine that this ethical improbity must be acknowledged and that this document must be retracted by the NAS.

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INTRODUCTION

ON 12 JUNE 1956, the US National Academy of Sciences (NAS) Biological Effects of Atomic Radiation (BEAR) Committee released a report that presented the work of six panels in a “for the general public” publication that was sent to all US public libraries. Of the six panels, the sub-report of the Genetics Panel evoked particular media attention, as it

made the provocative claim that any exposure to ionizing radiation, regardless of how low, could cause mutation in reproductive cells. This claim was presented as front-page news in major media outlets such as the *New York Times* and the *Washington Post*. Within the next month, each of the six panels published separate so-called “technical” papers in the journal *Science* (Committee on Genetic Effects of Atomic Radiation 1956).

The technical report of the Genetics Panel and the process by which it was developed has been assessed in considerable depth (Calabrese 2019; Calabrese et al. 2020). However, much less focus has been directed to the “Report to the Public,” although this report received the majority of media—and general public—attention, and indeed could be viewed as controversial in ways that warrant evaluation. To wit, the Genetics Panel recommended that appropriate governmental agencies should abandon the long-standing use of the threshold model and instead should adopt a linear model for assessing risks and harms of ionizing radiation exposures. The report would become the most significant document in the history of cancer risk assessment, both radiological and chemical, and would challenge the authority of the Atomic Energy Commission (AEC) on matters of radiation risk assessment.

By this process, the leadership of the BEAR Genetics Panel essentially invalidated the positional views and recommendations of the AEC and, in these ways, prompted then President Dwight D. Eisenhower to move the health risk assessment function from the AEC, via the creation of a new federal organization, the Federal Radiation Council (FRC), specifically detailed to conduct and oversee these activities. The FRC almost immediately accepted the linear model proposed and advocated by the BEAR Genetics Panel and, in so doing, explicitly rejected the AEC threshold approach. The FRC established a radiation risk assessment advisory committee that was derived largely from BEAR Genetics Panel members, and which thereby assured adoption of the linear no-threshold (LNT) model (Calabrese et al. 2022).

While much of this history is well known, the intent of the present paper is to report a recent discovery of preserved letters of four members of the BEAR Genetics Panel (i.e.,

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Alexander Hollaender, William L. Russell, Alfred H. Sturtevant, and Hermann J. Muller), which explicated that the NAS BEAR I Genetics Panel “public report” section was not shared with—or approved by—the Genetics Panel prior to its publication.³ The decision to proceed with drafting, publication, and public distribution was influenced (if not directly determined) by administrative pressures to coordinate the same day publication (12 June 1956) of the United States and United Kingdom reports on the effects of ionizing radiation, a decision that likely resided with the NAS President, Detlev Bronk. This decision had important implications, as it placed considerable time pressure on panel chairs to finalize their respective sections of the Report to the Public.

The Genetics Panel was informed in a 1 June 1956 memorandum that their technical report would be transformed into a separate Report for the Public via the hiring of a third-party author who had not been part of their discussions and debates but who ostensibly would work with panel chairs to write the “Report to the Public.” Not stated in the memorandum was whether panel members would have opportunity to review and vet what the external third-party writer(s) would develop and that panel chairs would approve. For the Genetics Panel, this appears to have been a source of some concern, since Warren Weaver, the panel Chair, was neither a biologist nor a geneticist and lacked formal education, training, and experience in assessing effects of ionizing radiation.

While it could be assumed that Bronk, Weaver, and the Panel hoped that the report would be acceptable as planned, this proved not to be the case. The Genetics Panel Report to the Public subsequently was strongly criticized by panel members in private as containing critical mistakes and in not accurately representing the views and judgements of the Panel. In this light, the present paper examines these failures of the Report to the Public, including the impact of these failures upon the provision of evidently inaccurate public information and views that did not reflect those of the Panel itself. Clearly, the NAS “Report to the Public”

³On 1 June 1956, a memo was sent to the BEAR I Genetics Panel by Charles I. Campbell informing them of the “first public announcement of the preliminary results of your study.” This memo noted that a “report to the public” was being prepared by the *Scientific American* staff working with the committee Chairman to summarize the entire study in “popular language.” Four days later, the NAS issued a press release stating that it “will release the first findings in a study of the biological effects of atomic radiation on man and his environment...” The press release stated that the findings “represent the carefully-considered judgement of more than 100 leading scientists who have studied this serious problem for many months.” Note that the NAS press release did not indicate that the report to the public would not involve the scientific committee members, but a third party of science writers from *Scientific American*, without the consultation, review, and or approval of content by the panels. Furthermore, the Genetics Panel was the only panel that lacked a technical subject matter expert as the chair. Weaver was a mathematician with no education or training in genetics and radiation. The Report to the Public failed to disclose that the genetics panel (and perhaps the others) were not permitted the opportunity to review—or approve or reject—the material written by those contracted to represent their view and efforts. Thus, the report was represented as being that of the panel when it was not.

raises the issue of crucial ethics violations with respect to (1) releasing a highly publicized report to the public without assuring its accuracy, (2) failure to share with the public that this report had not been approved by the constituent panel members it claimed to represent, and (3) failure of the BEAR I Genetics panelists to correct the scientific record in an appropriate and timely manner.

The discovery of possible concerns with the Report for the Public resulted from due diligence in providing documentation (March 2022) for a series of recently completed interviews (with EJC) for a documentary by the Health Physics Society addressing the historical foundations of the LNT model. Important to these interviews was documentation of a number of comments made about the scientific aspects of the 1960 BEAR Genetics Panel report. In attempting to provide the needed documentation, detailed review of a series of letters and documents in files of the 1960 BEAR report shed new light on the 1956 BEAR Report to the Public. These findings are provided in the present communication.

CONCERNS ABOUT THE 1956 REPORT TO THE PUBLIC

Controversy arose in what was likely the final draft of the 1960 BEAR Genetics section draft before publication when panelist William L. Russell saw the comment on page 1 of the 1 February 1960 version, which stated that no new significant developments in committee activities had occurred since the 1956 publication of the BEAR I Genetics Panel. Russell expressed his concerns about the veracity of this assertion because he had published what was considered to be a ground-breaking discovery on 18 December 1958 in *Science*.

Russell had firmly believed that radiation-induced gene mutations could not be repaired. However, he subsequently demonstrated that this belief of his was incorrect. Russell’s work revealed that murine spermatogonia and oocytes were capable of repairing radiation-induced mutations, particularly when ionizing radiation was administered in a relatively low dose rate (Russell et al. 1958). Prior to this discovery, it was widely accepted that all radiation-induced gene mutation was cumulative, irreversible, irreparable, and would incur effect(s) via a linear dose response relationship. To that point, this principle had been the dominant belief of the radiation genetics community, and it provided the foundation for the genetic risk assessment guidance that emerged from the BEAR I Genetics Panel 1956 (Calabrese 2019), which subsequently was adopted into chemical risk practices.

Given the potential significance of Russell’s findings, it is clear that the “no significant developments” assertion (as written by Howard Andrews) was patently incorrect. This surely captured Russell’s attention, and likely consternation, that Andrews, in his NAS staff position, had completely missed (or overlooked) one of the most significant new developments in radiation genetics since Muller first

discovered radiation-induced gene mutation some 30 y previously. Russell informed his superior at Oak Ridge National Laboratory, Alexander Holleander, Director of the Biology Division, of his concerns.

Holleander, also an original member of the BEAR Genetics Panel, fully understood the issue(s) Russell had raised. Toward some attempt at resolution, Holleander and Russell communicated their concerns (via telephone) to George Beadle and proposed the need to revise and correct the penultimate version of the report. Beadle agreed and allowed them to draft the necessary correction or clarification for inclusion in the final manuscript. Of further note is that Hermann J. Muller had also confirmed Russell's dose-rate findings in his own work with fruit flies. While this correction involved issues related to the 1960 draft, it additionally evoked a series of comments that related back to the 1956 BEAR Genetics section in the Report to the Public.

COMMENTS ON THE NAS/NRC BEAR 1956 REPORT TO THE PUBLIC BY 1960 NAS/NRC BEAR GENETICS PANEL MEMBERS

The letters referred to above show that the NAS arranged for *Scientific American* staff to write the Genetics Panel Public Report under Weaver's guidance. Hollaender (7 February 1960 letter to Andrews) stated that:

“page 3 (of the 1 Feb. 1960 BEAR II Genetics Panel draft report) was apparently quoted from the popular report prepared from the 1956 genetics report. This popular report was written by an editor from Scientific American and was never approved by our committee. Under pressure to time, Dr. Warren Weaver approved it for publication, but it was not circulated for approval to members of the committee.”

It is important to consider the comments of Russell on the same general issue. On page 2 (number 2) of his letter to Andrews, Russell (5 February 1960 to Andrews) wrote:

“The word ‘universally’ in the third paragraph is too extreme. The last paragraph of the page is a bad misinterpretation of the 1956 Genetics Committee Report. It is true that both of these statements are quotations from the 1956 ‘Report to the Public.’ However, they were never made by the Genetics Committee. They were also never approved by the Committee, although the Chairman of the Committee reluctantly accepted the ‘Report to the Public’ under pressure of the haste for publication. He had no time to consult with the Committee, and he, himself, was not a geneticist. The statements were bad then and they are still bad, so why quote them?”

A Sturtevant comment (8 February 1960 to Andrews) stated:

“I have felt that the one issued in 1956 was a mistake, since it was not checked by the committee members, and even the chairman did a rather hurried job. It contained some inaccuracies and many rather unfortunate wordings... .”

Muller (8 February 1960 to Andrews) confirmed the statements of the other panelists that the published version of the 1956 Report to the Public was a

“version that had in fact not been prepared by the committee nor seen by or approved by them before its publication”.

Muller focused upon the statement on page 3 in the 1956 Public Report that:

“Human gene mutations which produce observable effects are believed to be universally harmful.”

This statement had been taken (verbatim) from the 1956 report and inserted in the 1 February 1960 draft. Muller (8 February 1960 to Andrews) stated that:

“I am sure that all members of the genetics committee who in 1958 (sic 1956) saw this statement in the ‘Report to the Public’—a statement which the public would naturally assume to have been approved by the committee or at least to represent their viewpoint—were shocked by it and certainly would not approve of its being reiterated now, again presumably under their sponsorship.”

Consistent with Muller's comment is a 22 June 1956 “News of Science” report in the journal *Science* that referred to the conclusion that “all radiation is harmful,” thus confirming Muller's (8 February 1960 to Andrews) concerns that the “universally harmful” characterization was an “unpardonable overstatement.” It also provided a clear example of how the risk communication message was problematically affected and misrepresented. Muller (8 February 1960 to Andrews) felt so strongly about the 1956 BEAR Panel misrepresentations that he wrote to Andrews in that same letter stating that:

“I should not wish to continue on a committee in which there was a continuing risk of reports being published over our names or even our implied sponsorship, without our having been given sufficient time to consider and approve them.”

Therefore, it must be acknowledged that four members of the BEAR Genetics Panel in 1960 clearly stated that the 1956 Public Report was released without their review and/or approval and contained information that was both incorrect and not representative of Panel viewpoints. These

correspondences reveal that the Public Report was written by a third party separately arranged by Weaver. It is also clear that some of the errors in the 1956 Report to the Public had been transferred into the 1 February 1960 draft by Andrews and that he subsequently was directed to remove errors and add the new material focal to Russell's dose rate findings. Fortunately, these changes were indeed incorporated and finalized in the 1960 report (NAS/NRC 1960), thereby avoiding the harmful effects and outcomes of continuing to disseminate recognizably inaccurate and knowingly false information.

DISCUSSION

The noted errors and concerns were not found by the 1960 BEAR Genetics Panel because the task of writing their final draft was given to Howard Andrews, who had been added as the Executive Secretary to all the Panels—a position that had not existed for the BEAR I Panels (1956). Andrews was tasked with writing interim draft final reports for the BEAR II Genetics Panel during the spring and fall of 1959 and well into 1960.

Letters were sent to Andrews from Holleander, Russell, Sturtevant, and Muller during the first week of February 1960 in attempt to establish a proper resolution to the concerns raised. In these letters to Andrews, new information related to the BEAR I 1956 Public Report was provided that revealed that the 1956 public report had never been approved by the panel, and thus they were unable to identify and prevent either errors of science or misrepresentations of Panel opinions. Andrews had copied the questionable and/or incorrect statements from the 1956 report and inserted them into the pre-final draft of the 1960 report. The panel members were insistent that they did not want a repeat occurrence of the disastrous experience associated with the release of the 1956 report. Thus, the tone of the letters to Andrews was particularly demanding.

We may question why the radiation geneticists on the panel did not challenge their Report to the Public at the time of its publication so as to correct its most glaring inaccuracies. In the absence of any explicit documentation, discussion of this matter must remain speculative. Yet, issues of researchers' self-interest may be relevant. The Rockefeller Foundation had long been supporting academic researchers on the Panel, and Weaver promised on 3 February 1956 (NAS transcripts, 3 February, page 35, cited in Calabrese 2015) to advocate for considerable new funding for geneticists that would likely

⁴The Weaver quote from the panel proceedings: "There may be some very practical results—and here is the dangerous remark—don't misunderstand me. We are just all conspirators here together. I am not talking as an officer of the Rockefeller Foundation but I will bat my head in the Rockefeller Foundation to try to get a very substantial amount of free support for genetics if at the end of this thing we have a real case for it. I am not talking about a few thousand dollars, gentlemen, I am talking about a substantial amount of flexible and free support of genetics. I will bat my head off to get it at the end of this if we have a really good case for it."

be forthcoming following the completion of the report.⁴ Given this contingency, there may have been general reluctance by Panel members to correct the record—as any such effort would surely have been an embarrassment to both the Rockefeller Foundation and to Weaver.

Absent in the 1960 BEAR Genetics Panel story is another study that Russell completed in 1959 about which he wanted no one to know. Russell's work evaluated murine transgenerational patterns of cancer, focusing upon the longevity of offspring whose paternal parent(s) were subjected to a single, very high dose of x radiation (600 r). The study revealed that there were no treatment-related effects. Despite these findings, the 1960 BEAR Genetics report emphasized the shortening of life in the progeny of irradiated male mice. Russell's silence on this matter recently has been revealed (Calabrese and Selby 2022). Even though Russell chose not to publish his findings during the BEAR Panel meeting period (i.e., ending in 1964), he subsequently disseminated these results some 34 y later in the journal *Mutation Research* in an effort to win a court case in England with members of his team serving as experts for the defense (Wakeford and Tawn 1994).

ETHICAL ISSUES AND IMPLICATIONS

Science is a public good, and as such must strive to uphold the inherent responsibilities contingent upon sustaining public trust. Thus, scientific enterprise must be truthful, authentic in its execution of obligated tasks and outcomes, and non-wasteful (May 1975; Giordano 2013). Therefore, we posit that the events described in this paper bring five major ethical issues into stark relief:

1. The NAS published and publicly distributed a major report that had not been reviewed, vetted, and or approved by the scientific panel whose views and recommendations it purported to explicate and faithfully represent;
2. In knowingly failing to gain panel constituent approval, the NAS deliberately disseminated inaccurate and false information, and in so doing intentionally deceived the public;
3. The administration of the NAS, inclusive of Bronk and Weaver, and perhaps others, thereby committed scientific misconduct in both the writing and publication of that report;
4. In the intervening six decades, the NAS has made no attempt to correct the scientific record following publication of the public report, and in this way (a) failed to acknowledge said irresponsible conduct of research, (b) disavowed one of the core philosophical and professional precepts of science—to be self-critical and self-revising; and (c) failed in its professional responsibility as an institution representing (both to the American public and to the world at large) the national ethical conduct and posture of science in the United States; and

5. Despite acknowledging these crucial flaws, no members of the Genetics Panel corrected those sections of the public report that directly misrepresent the findings, views, and recommendations of the Panel. These inaccuracies and misrepresentations have been permitted to remain in the document and have become part of—and influential to—the public scientific policy discourse and formulation.

In sum, given the public significance of this report, its widespread publicity and distribution, regulatory significance, and its prompting of several Congressional hearings (1957, 1959, 1960) concerning radiation risks and risk assessment, the activities constituent to the development, publication, and distribution of the 1956 BEAR I Genetics Panel Report to the Public should be deemed unethical, in violation of formal definition of responsible conduct of research (Office of Research Integrity 2022), and injurious to both public health and trust. Therefore, we opine that the evident misconduct should be acknowledged and the NAS report should be formally retracted.

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