

# F. A. S. NEWSLETTER

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Paul M. Doty, Chairman.

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June 17, 1957

## U.S. Agrees to Inspection to Enforce Interim Test Ban

On June 14, Soviet delegate Valerian Zorin proposed in a closed meeting of the UN Disarmament Subcommittee a "two or three year" suspension of all nuclear tests. The suspension would be implemented by scientific control posts to be set up in the US, USSR, UK and "Pacific Ocean areas." Supervision of the test ban would be entrusted to an international commission reporting to the UN. No mention was made of any cut-off of fissionable material production for military purposes -- a provision sought by the West.

The significance and importance of the new Soviet proposal lay in its acceptance of inspection as a guarantor of compliance. This major concession to Western insistence is interpreted as a new token of serious Soviet intent in current disarmament negotiations. Washington Post reporter Chalmers Roberts called the USSR proposal "the most serious move in more than a decade of disarmament talks between East and West, assuming the control mechanism offered is valid. ... The Soviet offer has a major point of attraction for the US. That is the stationing of international inspectors, in this case monitors, within the Soviet Union. That is something the US and its allies have long sought and which the Soviets have generally resisted. Now they are offering it in a specific case and on what appears to be possible terms."

Roberts saw the US as presented "with a monumental choice -- whether or not to agree to end tests before either nation has perfected and tested the so-called ultimate weapon, the 5000-mile intercontinental ballistic missile. ... Those who are for and those who oppose further tests appear to be in general agreement that tests are vital for new weapons, including the ICBM and the IRBM. Even the long-range missile could be tested with its nuclear warhead by deliberately shortening its range." Defense

Secretary Wilson, however, said on June 15 that he thought an international ban on further atomic tests would not hinder US development of the ICBM.

**REACTION** The Washington Post commented editorially: "The Soviet Union's proposal of a 2-year ban on nuclear testing, accompanied by an appropriate enforcement by inspection, deserves the most careful scrutiny. This is, on its face, an extremely hopeful development. The first consideration is that it would relieve the world of the danger of further poisoning of its atmosphere by radioactive fallout from experimental nuclear explosions. That objective is certainly of as much concern to the Western powers as to the Soviet Union."

"The second substantial advantage in the plan is that it would put into effect an international inspection system. This is what the US and other free countries have been contending for over a period of many years. To be sure, the proposed international commission, which would report to the UN Security Council and General Assembly, would have a very limited function -- to check on nuclear blasts in violation of the moratorium. But the important point is to get the principle of international inspection established. If successful in operation in this limited field, it could more easily be extended to other phases of arms limitation."

"A third gain from such a step would be the breaking of the disarmament stalemate. All the powers seem committed to the idea of taking a small first step. This Soviet proposal is a smaller step than the Western statesmen want, and it will have to be matched against the proposal soon to be made by Harold E. Stassen, chief of the US delegation to the London disarmament talks, in collaboration with our allies. ...."

Some officials in London, however, according to the N. Y. Times, found the Soviet proposal only "mildly encouraging," noting that many points of disagreement on the issue remain between Moscow and Washington. They complained that in making the move the Russians had been allowed to recover the initiative, due to Western squabbling over a projected US offer of a 1-year test ban linked with a cessation of nuclear weapons production. The US proposal has yet to be made publicly, reportedly in part because of allied complaints and opposition over the manner and timing of its preliminary disclosure to the Russians.

"Let Me Know When You Decide Something"



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### AN EXPLANATION AND AN APPRECIATION

A word may be advisable to explain the tardy appearance, and slightly less than complete coverage, of this issue of the FAS Newsletter. A combination of circumstances has made the Washington Office life unusually hectic during the past month. A major factor is the impending marriage, on June 29, of long-time secretary, office manager, and indispensable cog, Dorothy Higinbotham. This is a good example of, and hence a good occasion to note, the dependence of the Newsletter, as of the Washington Office generally, on Dorothy's devoted services. From the Washington volunteers, and from FAS, many thanks and best wishes to soon-to-be Mr. and Mrs. Theodore Osgood.

Incidentally, while "Doty" is willing to continue on a part-time basis for several months, it is essential to continuity in the FAS office to locate additional help in the very near future. It will be difficult to find a new secretary-manager with the know-how and dedication required. We are already looking, and invite suggestions.

## FAS and other Scientists' Views on Test Ban

On June 12, the FAS Executive Committee again urged the US Government to seek "an international agreement prohibiting further test explosions of large nuclear weapons," under supervision of a UN monitoring agency. The Committee said that such a ban would not involve complicated inspection systems, since explosions above the level of 100 kilotons (and perhaps much smaller) could be detected "by monitoring systems outside national boundaries." The statement appeared before the Russians indicated their willingness to submit to inspection (see p. 1).

**HAZARD** Noting that the Joint Atomic Energy Committee's recent hearings contributed to public evaluation of the potential danger from fallout, the Committee said: "While there is uncertainty as to the extent of the hazard, it is clear that the three nations currently involved must carefully weigh their reasons for further testing of large nuclear weapons against the damage that may be done by such testing. On the other hand, decisions regarding limitation of future bomb testing programs must ultimately rest on other factors of a political and strategic nature, and the current concentration on the radiation hazard problem should not be allowed to obscure these other considerations." Five points were listed, which argue for a ban on the testing of large nuclear weapons at the present time:

**ARGUMENTS** (1) Distinguishing between small and large bombs, "only the large bombs can be detected with assurance by monitoring systems outside national boundaries, and for this reason, they are the only bombs subject to a self-enforcing ban. The testing of large bombs is by far the major source of fallout radiation; testing of small, 'tactical' weapons adds little to already existing radiation levels." (2) "...there is good reason to believe that we already have, or can soon have without further testing, more than enough large nuclear weapons capacity to deter any potential aggressor. We could, until further disarmament agreements are reached, continue to stockpile large nuclear weapons, thus preserving the deterrent value of our atomic arsenal."

(3) "A ban at this time might have an important effect in slowing down the development of 'refined' nuclear weapons, particularly H-bomb warheads of a size deliverable with the intercontinental ballistic missile (ICBM). The slowdown of development along these lines would be at least as great for the Russian program as for our own. Perfection of this terrifying weapon would put all countries, including our own, at the mercy of an aggressor nation that could launch a surprise attack against which there would be no adequate defense. Once this weapon has been developed and produced, it will be extremely difficult to devise practical inspection systems to disclose the stockpiles, and it will be far more difficult to reach international agreement on the detailed inspection systems that would be necessary."

(4) "The potential hazard from radioactive fallout has become a moral problem which has attracted critical comment and discussion from responsible people around the world. A moratorium on large bomb tests would minimize this threat, and would allay the present worldwide anxiety over radiation hazards from fallout." (5) "So far, only 3 countries have produced and tested A- and H-bombs; the US, Britain, and the USSR. Many other countries are building or soon will be building atomic piles, and some anticipate producing nuclear weapons material. In a very few years, several such countries will be in a position to make bombs and to conduct tests. The danger of a worldwide conflagration from a mistaken judgment or hasty act on the part of a nation armed with nuclear weapons will be minimized if the number of nations possessing such weapons does not increase."

### AMERICAN SCIENTISTS APPEAL

Approximately 2000 scientists signed "An appeal by American scientists to the governments and people of the world" for international agreement to stop nuclear bomb testing. The appeal was released to the press on June 3 by Nobel Laureate Linus Pauling of Calif. Institute of Technology. Pauling, who initiated the document and arranged its nation-wide circulation for signature during a 4-day period, noted that among the signers were 3 Nobel laureates (Pauling, Muller, Erlanger), about 40 members

of the National Academy of Sciences, and such leading geneticists as M. R. Irwin, Sewall Wright, M. Demerec, R. B. Goldschmidt, and L. C. Dunn. About half of the scientists who signed were identified as biologists. Others were mainly biochemists, chemists or medical scientists. The number of physicists was said to be small.

The full text of the appeal, which was forwarded to Rep. Holifield, who conducted the fallout hearings (see p. 3), follows:

"We, the American scientists whose names are signed below, urge that an international agreement to stop the testing of nuclear bombs be made now. Each nuclear test spreads an added burden of radioactive elements over every part of the world. Each added amount of radiation causes damage to the health of human beings all over the world and causes damage to the pool of human germ plasma such as to lead to an increase in the number of seriously defective children that will be born in future generations.

"So long as these weapons are in the hands of only 3 powers an agreement for their control is feasible. If testing continues, and the possession of these weapons spreads to additional governments, the danger of outbreak of a cataclysmic nuclear war through the reckless action of some irresponsible national leader will be greatly reduced. An international agreement to stop the testing of nuclear bombs now could serve as a first step toward a more general disarmament and the ultimate effective abolition of nuclear weapons, averting the possibility of a nuclear war that would be a catastrophe to all humanity.

"We have in common with our fellow men a deep concern for the welfare of all human beings. As scientists we have knowledge of the dangers involved and therefore a special responsibility to make those dangers known. We deem it imperative that immediate action be taken to effect an international agreement to stop the testing of all nuclear weapons."

**COMMENT** *Science* (June 14) reports refusal of many well known scientists to sign the appeal. J. H. Hildebrand, Univ. of Calif. chemist, commented in a letter to Pauling: "Your statement that 'each nuclear bomb test spreads an added burden of radioactive elements over every part of the world' is not a true indication of the dangers in the absence of quantitative comparisons with natural radiation and current X-ray usage. ... Your statement goes far beyond 'making the dangers known;' it enters the realm of international diplomacy where a scientist possesses no peculiar knowledge or wisdom. ... I think, with Dr. Willard F. Libby, that the risk to persons from radioactive fallout should be estimated against the risk to human freedom of abandoning what appears at present to be its main defense in a world where international agreements are continually violated. Freedom was won for us by men who valued it above life; we should preserve it even at the cost of lives."

Bentley Glass, Johns Hopkins geneticist and participant in the National Academy's radiation report of last year, is quoted in *Science*: "It is important to note that this appeal does not ask for a unilateral cessation of weapons testing, but for an international agreement. That, of course, is exactly what all Americans want if it is obtainable with the proper precautions. Whether the appeal backed by the signatures of many scientists will at the present moment strengthen the hands of our representatives trying to negotiate such an agreement in London, or possibly may embarrass them, it is hard to say."

### SCHWEITZER vs. LIBBY vs. BROWN

Dr. Albert Schweitzer's appeal for an end to nuclear testing, released through the Norwegian Nobel committee on April 23, had impact on the current debate commensurate with the worldwide respect accorded him. The full text of the appeal, together with an interesting account of its origins by Editor Norman Cousins, appears in the May 18 issue of the *Saturday Review*. The succeeding issue (May 25) contains the text of the reply to Schweitzer by AEC Commissioner W. F. Libby, a rebuttal to Libby by Cal. Tech. geochemist Harrison Brown, and further comment by *SR Science* Editor John Lear. The series is a lively and informative review of a number of the facts and complexities of the test ban issue.

## FALLOUT HEARINGS

Fallout -- the whys and wherefores of its creation, dissemination, and assimilation -- was the subject of recent hearings by the Joint Committee on Atomic Energy. In the most complete gathering and presentation of views since fallout first fell, Rep. Chet Holifield masterfully steered the Subcommittee through two weeks of hearings which ended on June 7th.

Three conclusions seemed to emerge: (1) there is a great deal of disagreement among scientists as to the quantitative aspects of the radiation hazard due to fallout; (2) there are many highly qualified scientists who feel the potential risks in nuclear weapons testing are greater than suggested by formal AEC statements; (3) any decision regarding future weapons testing programs must take account of radiation hazard as one factor to be weighed against the reasons for such testing. In a statement prior to the hearings (Washington Star, May 5), Commissioner Libby summarized the AEC position in this way:

"No scientist maintains that there is no risk at all from fallout. What the data show is that the risk is extremely small compared with other risks which are a part of everyday life. We must weigh this risk against the risk to ourselves, our freedoms, and the safety of the whole free world should we abandon tests before achieving an effective system of safeguarded disarmament."

There was little disagreement about the actual levels of fallout radiation to which people are being exposed. The carefully collected data of Kulp and coworkers (Science, Feb. 8, '57) were generally accepted as a basis for calculations. US Weather Bureau meteorologist Machta, however, reported data indicating fallout deposition is not uniform, as assumed by the AEC and many scientists, but that there is a strong tendency for localization, particularly in the north temperate zone.

**GENETIC HARM** A panel of the country's foremost experts on heredity (Muller, Glass, Crow, Sturtevant) were unanimous in their opinion that the genetic effects of radiation are proportional to dose. Muller said "the number of lives that will be seriously curtailed or injured throughout the world in future generations as a result of the tests already held is in all probability in the hundreds of thousands, or millions, and is therefore enormous." Crow gave his opinion that "even one unnecessary individual tragedy is too many and no increase in radiation for any reason should occur unless it offers some compensating benefit for mankind." In addition to effects on heredity, W. L. Russell (Oak Ridge) and H. Jones (U. Cal.) both reported significant life-span shortening in first generation offspring of irradiated animals.

**CANCER** Walter Selove, physics professor at the U. of Penna., and Chairman of the new FAS Radiation Hazards Committee in Philadelphia, presented testimony for FAS. Drawing on extensive studies by the FAS committee, Selove attempted to assess the potential threat of fallout radiation to human life, and to explore the reasons for the apparently discordant views on this point. His testimony said, in part:

"That radiation can induce cancer is known. Animal experiments show that the number of induced tumors is directly related to the total amount of radiation given. It is true that these data are obtained with high doses of radiation and it is not certain that the results can be extrapolated to low doses of radiation. Such an extrapolation is, on the other hand, a reasonable one and results reported in a recent paper by E. B. Lewis (Science, May 17) strongly support the validity of such an extrapolation in the case of radiation-induced leukemia in man. Dr. Lewis' work suggests, in fact, that 5-10% of all present cases of leukemia are due to normal 'background' radiation reaching the bones -- cosmic rays, and natural radioactivity from our surroundings and from internal sources. If this is true for the cancer-like disease, leukemia, it is reasonable to assume that, for bone cancer as for leukemia, a fraction of present cases is due to normal background radiation. The total number of deaths due to bone cancer, in the U.S., is only 1/5th of the number due to leukemia, so if we lump bone cancer and leukemia effects together, estimates of the production of these 2 diseases by radiation will not be far in error, even if we do not know with any accuracy what fraction of bone cancer deaths is normally due to background radiation. We therefore assume that about 10% of the normally occurring cases of bone cancer as well as of leukemia are due

to background radiation.

"If natural background dose to the bone is responsible for 5-10% of normal leukemia and bone cancer, then even a small percentage increase over background would harm many individuals. The average bone dose of radiation from Sr<sup>90</sup> derived from tests already conducted will rise to 5-10% of natural background. The incidence of leukemia and bone cancer would consequently rise 1/4-1%. Since some 10 million individuals in the next generation would normally die of leukemia or bone cancer (estimate based on statistics for the US), this 1/4-1% increase represents 25,000 to 100,000 individuals. Thus, although normally only about 1 in 150 or so of all deaths (statistics for US) would be due to leukemia or bone cancer, an increase as small as 1/4-1% in this rate still represents many individuals.

"It may be noted that these figures are consistent with a recent estimate made by the Radiation Hazards Committee of the British Atomic Scientists Association. That Committee estimated that, subject to the assumption that even small radiation doses produce proportionate amounts of bone cancer, some 50,000 cases of bone cancer might be expected to develop as a result of nuclear tests already carried out.

"A great deal of apparent disagreement on the dangers of fallout has probably been due simply to a difference in emphasis. The AEC has emphasized that the radiation from Sr<sup>90</sup> from tests so far will represent only a few percent increase over natural background radiation, on the average, and the AEC has further emphasized that this average increase in radiation due to Sr<sup>90</sup> is small compared to the additional radiation exposure many people receive as a result of living with a higher background radiation level than average, or as a result of medical X-rays. Relative to other sources of radiation, then, it is perfectly true that fallout radiation contributes, at the present level of testing, only a small additional increment. On the other hand, it can be stated that even a small percentage increase over natural background radiation is likely to harm a considerable number of individuals."

Lewis' conclusions referred to above, which he presented to the June 3 hearing, were challenged by Boston pathologist Shields Warren who contended that, while radiation can shorten the life span, cause leukemia, or induce genetic changes, he still believed definite amounts above a threshold were needed before damage occurred. Five scientists testifying on May 29 (4 of them doing AEC-supported research) disagreed on the extent to which fallout, principally Sr<sup>90</sup>, represented a hazard to mankind, though all agreed there should be a limit on the size of future bombs tested. W. Neuman, U. Rochester bone biochemist, warned: "No matter how you slice this particular batch of data, you come out with a (permissible) testing rating of a few megatons of fission products a year." M. Eisenbud, head of the AEC's New York Operations Office, however, said "one can feel comfort that the emergency is

(Continued on Page 4, end of Column 2)

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The FAS is a national organization of scientists and engineers concerned with the impact of science on national and world affairs. This issue of the Newsletter was prepared by the following FAS members in the Washington area:

C. B. Anfinson, M. M. Elkind, C. Grobstein, D. Steinberg

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**NEW FAS OFFICERS:** Paul M. Doty, chemistry professor at Harvard, was elected FAS Chairman for '57-58, and took office at the spring Council meeting in Washington (Apr. 24 & 27). New Vice-Chairman is Hans A. Bethe, Cornell physics professor. Both were elected by the membership in the spring balloting, together with 12 new delegates-at-large to the FAS Council.

Serving on the 7-man Executive Committee with Doty and Bethe are former Chairman Charles C. Price (head, Chem. Dept., U. Pa.), and 4 members elected by the Council in April: Christian B. Anfinsen (biochem., Nat. Heart Inst.), M. Stanley Livingston (phys., MIT), Daniel Steinberg (biochem, Nat. Heart Inst.), and Paul F. Zweifel (phys., Knolls Atomic Power Lab.). The Executive Committee, at its first meeting April 27, selected Zweifel and Anfinsen, respectively, as Secretary and Treasurer of FAS.

**NEW DELEGATES-AT-LARGE:** Wayne A. Bowers (physics prof., U. No. Carolina), Milton Burton (chem. prof., Notre Dame), Barry Commoner (physiol. prof., Washington U.), Robert Karplus (phys. prof., U. Calif.), Livingston (above), William M. Preston (phys. prof., Harvard), Eugene Rabinowitch (botany prof., U. Ill.), Frederick Reines (phys., Los Alamos Sci. Lab.), Arthur Roberts (phys. prof., U. of Rochester), Joseph H. Rush (writer and physics consultant, Boulder, Col.), Walter Selove (phys. prof., U. Penna.), and Brunc H. Zimm (chem., General Elec. Research Lab.).

#### SENATE COMMITTEE FAVORS IAEA

On June 13, the Senate Foreign Relations Committee voted unanimously to approve US participation in the new International Atomic Energy Agency (IAEA). The Statute now goes to the full Senate for ratification, where Sen. Knowland is reported to favor insertion of a qualifying paragraph allowing US withdrawal if the treaty is amended by the member nations at some future time. Some 80 nations have indicated their support, and several, including Russia, have already ratified the Statute. When 18 countries have ratified, including three of the atomic powers, the IAEA will become a reality.

At hearings conducted by the Foreign Relations Committee, John S. Toll, Chairman of the Physics Dept. at the U. of Maryland, testified for FAS on May 20. Among 8 arguments in support of prompt ratification, "without limitations," Toll said the US can only benefit from the continuing release of peacetime research results which would be encouraged as the Agency matures. Failure to act could damage our reputation as a leading supporter of international atomic cooperation, and allow Russia to pose as the major "exponent of peaceful development of the atom." He assured the Senators that the IAEA's inspection provisions "would not involve inspection of any US facilities without our permission." As new nations enter the atomic field, Toll said, "there will be increasing need for an international body to establish the necessary safeguards to protect the world's population."

#### FAS FILES BRIEF IN PASSPORT CASE

FAS is filing a brief amicus curiae in the case of Weldon Bruce Dayton, cosmic-ray physicist, who was denied a passport for travel to India in April, '54. The case will be argued June 28 before the US Court of Appeals for the District of Columbia. FAS participation was authorized by the Council, on recommendation of the FAS Passport Committee. Washington attorney Nathan H. David, who handled the Kamen passport case, is again assisting FAS, and Harry I. Rand, also of Washington, is Dayton's lawyer.

The passport denial was based on State Dept. findings of Communist connections -- including those with Bernard Peters, alleged to be a former communist and with whom Dayton wished to work at the Tata Institute. The Department regards the trip as intended to further communism and not in the national interest. Dayton denied the charges against him in appeal procedures. The passport refusal was upheld in the District Court, in an opinion which denied that any abridgement of due process was involved in the failure of the Secretary of State to disclose publicly substantial confidential information on which he based his ruling.

The FAS brief is addressed to this procedural point, rather than to the facts of the case. It argues that "a passport is an indispensable prerequisite to travel in almost every foreign country," that "travel restrictions have their stifling effects on scientific advances and on the growth of knowledge in other fields," and that an individual's "exit from the country should not be denied unless all the evidence against him is revealed."

#### FALLOUT HEARINGS (Cont. from Page 3)

not here. We're talking about something...many years from now."

AEC Commissioner Libby said the risk from present testing is "small," and must be balanced against "the risk of annihilation which might result if we surrendered the weapons which are so essential to our freedom and our actual survival." In a separate statement requested by Holifield and submitted June 7, Libby said "cessation of tests would ... end shortly our development work... It would mean that systems being developed and urgently needed for our defense would be without the most effective warheads." Physicist R. Lapp said the AEC has repeatedly played down the fallout hazard and withheld information from the public; he documented his assertions with quotes and examples.

Selove noted that the Nat. Academy radiation report (issued June 13, '56) was prepared more than a year ago, new data is now available, and an up-to-date scientific evaluation of the fallout hazard is needed. He said the AEC's "dual responsibility" of conducting a weapons program and of evaluating the fallout hazard allowed decisions in one area to "unduly influence" those in the other, and he questioned whether "both functions belong in the same agency." (For copies of the hearings when printed, write: Joint AE Committee, Capitol Building, Washington 25, D.C.)

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