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ANNUAL PROGRESS REPORT OF THE SCIENTIFIC COMMITTEE ON
THE EFFECTS OF ATOMIC RADIATION FOR 1959

1. The Scientific Committee on the Effects of Atomic Radiation was established by resolution 913 (X) of 3 December 1955 at the tenth session of the General Assembly. It has the following members: Argentina, Australia, Belgium, Brazil, Canada, Czechoslovakia, France, India, Japan, Mexico, Sweden, Union of Soviet Socialist Republics, United Arab Republic, United Kingdom of Great Britain and Northern Ireland, United States of America.
2. The Committee held its sixth session at Headquarters between 23 March and 1 April 1959. Professor Rolf Sievert of Sweden and Dr. V.R. Khanolkar of India served as Chairman and Vice-Chairman, respectively.
3. The Committee considered its future work in the light of the requests made by the General Assembly in resolution 1347 (XIII) of 13 December 1958, of its previous comprehensive report to the General Assembly^{1/} and of the discussions in the First Committee between 5 December and 8 December 1958.^{2/} The Scientific Committee discussed its work under the following headings:
 - (a) Maintenance and stimulation of the flow of information to the Committee;
 - (b) The pattern of scientific study by the Committee;
 - (c) The reporting practice of the Committee;
 - (d) The manner and areas in which research may usefully be stimulated;
 - (e) The pattern of meetings of the Committee;
 - (f) The organization of work and staff needs of the Committee;
 - (g) Relations of the Committee with other bodies;
 - (h) Immediate programme of work for 1959 and 1960.

1/ Official Records of the General Assembly, Thirteenth Session, Supplement No. 17 (A/3838).

2/ Ibid., Thirteenth Session, First Committee, 1011th to 1014th meetings.

4. In the course of its discussions, the Committee noted that it had received, and hoped it would continue to receive, much useful information on fall-out, radiation levels and radio-biological questions from States Members of the United Nations and members of the specialized agencies and of the International Atomic Energy Agency. In order to carry out the task assigned to it by the General Assembly, the Committee found it necessary to suggest that this collection of information be supplemented by a variety of activities and discussions undertaken by the United Nations, its specialized agencies, the International Atomic Energy Agency and certain non-governmental organizations. The Committee further decided to request the Secretary-General to continue to provide it with assistance as in the past; to recommend to the General Assembly that its normal pattern of meetings be similar to that of past years, with appropriate adjustments found desirable in the light of the Committee's past experience and present situation; and to centre its discussion in the immediately forthcoming sessions on radioactive fall-out and radio-biological questions. The Committee intends to continue to report progress annually to the General Assembly and to submit a further comprehensive report in 1962. The conclusions and recommendations approved by the Committee are set out in detail in annex I.

ANNEX I

SUMMARY OF CONCLUSIONS REACHED BY THE SCIENTIFIC COMMITTEE ON
THE EFFECTS OF ATOMIC RADIATION AT ITS SIXTH SESSION

I. MAINTENANCE AND STIMULATION OF THE FLOW OF INFORMATION TO THE COMMITTEE

1. The Committee decided to recall to States Members of the United Nations and members of the specialized agencies and of the International Atomic Energy Agency (IAEA) the comprehensive report of the Committee^{3/} and the decision of the General Assembly to request the Committee to continue its useful work; and to invite them to send any further data of the type already contained in the comprehensive report so as to enable this report to be kept up to date or extended, having in mind as a guide its earlier detailed requests for such information.

II. THE PATTERN OF SCIENTIFIC STUDY BY THE COMMITTEE

A. Stratospheric fall-out mechanism

2. The Committee decided to discuss problems relating to the stratospheric fall-out mechanism at its next session, and to emphasize the need for further information of specific kinds bearing on this problem. It also welcomed the co-operation of the World Meteorological Organization (WMO), asked that organization to assist it in its discussions by making available relevant information from conferences, and invited the participation of a group of experts of WMO in its discussions of the problem.

B. Food-chain problem

3. The Committee emphasized the continued importance for its work of further studies of the movement of radioactive nuclides in food-chains and the value of the work carried out and of the information submitted to the Committee by States Members of the United Nations and members of the specialized agencies and of IAEA.

^{3/} Official Records of the General Assembly, Thirteenth Session, Supplement No. 17
(A/3838)

It welcomed the proposal of the Food and Agriculture Organization of the United Nations (FAO) that that organization, in association with other interested international agencies, should give detailed and continuing consideration to this subject on an international basis, expressed its immediate concern with the soil-plant-animal human diet relationships for isotopes such as Sr^{90} , Sr^{89} , Cs^{137} and I^{131} , and also with the levels of these isotopes in diets and the factors which govern the contribution made by diets of various types to human body burdens; and it recommended that FAO give specialized consideration to the difficult problems of sampling food and agricultural materials. The Committee also agreed to make available for agricultural studies by FAO relevant data submitted to it.

C. Studies of exposed groups of populations

4. Recognizing that an appreciable contribution to the present irradiation of human populations caused by man-made sources originates in a number of countries from the medical uses of radiation, the Committee expressed its belief that a careful study of the radiation doses received by patients is desirable and should include not only doses to the gonads but exposure of significance for the possible induction of malignant diseases; it also expressed its belief that the results of such a study should be correlated with the results of epidemiological investigations of possible radiation-induced diseases. It noted that the International Commission on Radiological Protection and the International Commission on Radiological Units and Measurements are appropriate and competent bodies to study the problems of dose estimation involved, and observed that WHO, having interests and activities in epidemiological studies, is an appropriate and competent body to consider questions of radiation-induced diseases. The Committee therefore invited the International Commission on Radiological Protection and the International Commission on Radiological Units and Measurements:

- (a) To define the relevant parameters needed to describe any one exposure as fully as possible;
- (b) To consider the methods of obtaining reliable information with regard to these parameters and the procedures of measurement and computation, with special attention to the concept of "significant dose" as used in the comprehensive report of the Committee;

(c) To survey the available information with regard to the number of patients undergoing different types of treatment and examination involving ionizing radiation, and to indicate wherever possible what are the exposures as described in the relevant parameters;

(d) To submit to the Committee as soon as possible, and in any event before the end of 1960, a report upon their deliberations and conclusions on the subjects mentioned in (a) to (c) above, and to make any appropriate recommendations.

It also invited WHO:

(a) To further consider the development of suitable methodology for the investigation of radiation-induced diseases;

(b) To examine the question of epidemiological studies of human malignant diseases in relation to medical radiation exposures;

(c) To take steps as may be appropriate for the stimulation and furtherance of such studies. The Committee requested the Secretary-General to make the necessary arrangements to implement the above invitations, including provision for the reimbursement of expenses incurred by the International Commission on Radiological Protection and the International Commission on Radiological Units and Measurements.

D. Adaptation and use of national vital and health statistics for genetic purposes

5. The Committee considered it desirable that a seminar be held in the near future to review how best to use and adapt national civil registration practices and vital and health statistics for genetic purposes and other considerations relevant to the radiation problem and that such a seminar be held under the joint sponsorship of the United Nations and the World Health Organization, if possible in 1960. It therefore decided to recommend to the General Assembly that such a seminar be held and to suggest to WHO that it co-sponsor such a seminar.

E. Population studies

6. The Committee expressed its continued interest in studies of populations exposed to relatively high levels of natural radiation, and stated that

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it considered such studies to be important, and would welcome reports on their progress.

F. Human genetics

7. The Committee suggested to WHO that it continue its work in the field of human genetics and that it consider convening in the near future an expert group for the discussion of the distribution and maintenance of genetic defects in populations; it stated that it would welcome the results of such a meeting in the light of its intention to consider this question at a subsequent session of the Committee. The Committee also stated that it considered important the study of the significance of alterations in the sex ratio as a possible indicator of radiation-induced genetic disturbance in human populations, and it sought the close co-operation of WHO in a study of this problem.

G. Accidental exposure

8. The Committee considered it important that it should be aware of available information as to accidental exposure of human beings to large doses of ionizing radiation and the biological effects produced, and requested its secretary to prepare and circulate short bibliographies on these subjects prior to meetings of the Committee.

H. Hazards of incorporated radioactive atoms

9. The Committee recognized that the recent progress in molecular biology of DNA is an important and most critical approach to the understanding of fundamental radiobiology and of genetic effects of ionizing radiation in particular. It noted that the genetic effects of radio-isotopes incorporated into the body have so far been considered mostly as consequences of molecular changes caused by ionizations only; that the recoil of the decayed radioactive atom and the change of its chemical characteristics could, however, also lead to mutations if the radio-isotopes (H^3 , C^{14} , P^{32} , F^{33}) have been incorporated into DNA molecules of the genetic material; and, further, that experiments made to obtain basic data on relative efficiencies of ionization and of transmutation or recoil in specific locus mutation would enhance the accuracy of the quantitative assessment

of the biological hazards of radioactive contamination. In formulating its conclusion, the Committee also pointed out that certain viruses and micro-organisms give the greatest promise of the profitable attack on this problem because of the precise genetic technique available. The Committee considered that, since some of the somatic effects may reflect mutations in somatic cells or damage of their genetic apparatus, studies of the molecular effects of radioactive decay of incorporated radio-isotopes may be important not only for the understanding of genetic hazards but also for the explanations of such somatic effects as carcinogenesis, ageing or even acute lethality.

I. Urgent need of further research in general biology

10. The Committee decided to point out that further advance in radiobiology depends mainly upon progress in general biology, and that better understanding of complex cellular mechanisms is required before any satisfactory explanation of primary radiation effects can be expected; that, as in other similarly complex fields of applied biological science, continuing progress can only be achieved by giving enough support and research effort to the fundamental biology; and that, since an assessment of radiation damage produced at very low dose levels can hardly be based only on statistical experimentation, understanding of the basic radiobiological mechanism may be the only rational approach to the evaluation of radiation risk and to the eventual prevention of it. The Committee drew the attention of scientific organizations and research institutions to the great benefit that would come from better knowledge in fundamental biology, not only through understanding the effects of ionizing radiation, but also through the deep influence of such knowledge on the whole field of genetics and on other important problems like carcinogenesis or ageing.

11. In the two following general fields, the Committee noted that more data are urgently needed:

- (a) Molecular biology, especially studies in polynucleotides;
- (b) Cell physiology and cell chemistry.

It also stressed that additional information on the following particular problems will be of immediate profit:

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- (a) Structure of polynucleotides, their role in the transfer of genetic information and in protein synthesis;
- (b) Mechanisms of mutation and possible recovery processes of genetic damage; comparative nature of induced and spontaneous mutation; the fate of mutational changes in a population;
- (c) Role of genetic mechanisms in somatic cell variation;
- (d) Chemical composition of cell structures carrying genetic information; role of specific minerals, such as strontium and calcium as microelements necessary for normal cell function;
- (e) Regulation of cell growth and cell differentiation; role of different cell structures in normal functioning of the cell; problem of ageing on the cellular level;
- (f) Nature of cellular processes leading to tumour development; and recognized the value of recent advances in relevant methodology such as the method of in vitro cultivation of mammalian cells.

12. The Committee stated that it was conscious of the over-all importance of progress in general biology, and it therefore recommended that the specialized agencies of the United Nations and other bodies give adequate support to fundamental biological research, stimulate this research by organizing frequent exchanges of new information, possibly by holding inter-disciplinary symposia, and help in the training of specialists by granting an appropriate number of fellowships in general biological disciplines.

III. THE REPORTING PRACTICE OF THE COMMITTEE

13. The Committee expressed its intention to submit annual progress reports to the General Assembly, to report to the Assembly on each phase of its scientific work separately, as it is completed, and to submit a further comprehensive report during or before 1962, including a summary of interim scientific reports and modifications necessary to update the Committee's 1958 comprehensive report, which would constitute a self-contained document rather than material in the form of annexes updating the Committee's 1958 comprehensive report.

IV. THE PATTERN OF MEETINGS OF THE COMMITTEE

14. After giving careful consideration to the place and frequency of its future meetings, and reviewing its experience at previous meetings, the Committee decided that it would normally be desirable to hold two meetings every year, one in the first half of the year, which would include the preparation of a progress report to be submitted to the General Assembly through the Secretary-General, and the other in the second half of the year, which would be devoted mainly to the evaluation of technical data which had become available to the Committee during the course of the year. The Committee stated that it considered it absolutely essential to its work that the sum of its sessions be attended by the widest group of experts whose advice its members can collectively bring to bear, and, moreover, that it desired the corresponding burdens in time, and expense incurred by Governments, to be more equitably distributed among its members. It therefore considered it very desirable that the Committee meet from time to time at Geneva, and also that it meet in other places following an invitation from a Government or a United Nations agency made in accordance with the principles of General Assembly resolution 1202 (XII) of 13 December 1957, and that it hold one session in 1960 at Geneva or such other place as may be approved, in accordance with the principles of the above resolution.

V. THE ORGANIZATION OF WORK AND STAFF NEEDS OF THE COMMITTEE

15. The Committee requested the Secretary-General to continue to provide it, on the same basis as in the past, with scientific staff assisted, as appropriate, by the services of scientific consultants, with a small working library, and with other ad hoc services; and it emphasized the value of travel by members of the scientific staff for purposes of consultation during their work.

VI. RELATIONS OF THE COMMITTEE WITH OTHER BODIES

16. The Committee welcomed the offers of co-operation it had received from the specialized agencies of the United Nations, from the International Atomic Energy Agency and from the International Commission on Radiological Protection and the

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International Commission on Radiological Units and Measurements. It anticipated that its work would be assisted by the IAEA because of that Agency's expanding work in subjects related to the question of radiation.

17. The Committee decided to draw the attention of the General Assembly to the requests for studies and information that it has made to specialized agencies of the United Nations, to the International Atomic Energy Agency and to other bodies, and to emphasize that these requests were made in order to assist the Committee to carry out the obligation assigned to it by the General Assembly for evaluating the effects of ionizing radiation on man and on his environment.

VII. IMMEDIATE PROGRAMME OF WORK FOR 1959 AND 1960

18. The Committee decided that at its forthcoming sessions it would include the following as main subjects for discussion:

(a) At the seventh session:

- (i) The physical aspects of fall-out;
- (ii) Physical and biological problems concerning the transmission of fission products through food-chains;
- (iii) The relationship between radiation dose and effects, particularly at small-dose levels.

(b) At the eighth session:

- (i) Physical and biological problems concerned with Carbon-14;
- (ii) Genetic problems.

At this session a report from FAO on food-chain problems might be expected.

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ANNEX II

FINANCIAL IMPLICATIONS

At the time of adoption of the conclusions set forth in annex I, the Committee was informed that the request to the Secretary-General contained in paragraph 4 would, on the basis of information supplied by the two non-governmental organizations concerned, require an expenditure of not more than \$10,000, and that the recommendation contained in paragraph 5 would, on certain simple assumptions, involve the expenditure of approximately \$35,000 to \$40,000, to be apportioned between the sponsors.

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Statement of financial implications
submitted by the Secretary-General

1. An indication of the types of new costs associated with the proposals contained in the Scientific Committee's report was given in annex II of document A/4119. The present statement supplements the information given therein.

Studies of exposed groups of populations^{1/}

2. Work on these studies has been begun by the International Commission on Radiological Protection and the International Commission on Radiological Units and Measurements. Inasmuch as the studies will not be completed until the middle of 1960 and reimbursement to the two organizations is not required until that time, the amount (\$10,000) earmarked for this purpose within the 1959 global appropriation under section 1 has been surrendered. The same amount would now be requested in supplementation of the consultancy funds under section 6 of the initial budget estimates for 1960.

Adaptation and use of national vital and health statistics for genetic purposes^{2/}

3. In pursuance of the recommendation of the Scientific Committee, the Secretary-General has invited the World Health Organization (WHO) to co-sponsor the proposed seminar. In accepting the Secretary-General's invitation, WHO has offered to share in the costs of the seminar by paying at least \$9,200 of the expenses.

^{1/} A/4119, annex II, para. 4.

^{2/} Ibid., para. 5.

4. The proposed plan for the seminar as developed jointly by the Secretariat of the United Nations and the secretariat of WHO would call for the convening, immediately before the summer session of the Economic and Social Council at Geneva, of an international expert workshop of approximately five days' duration. The purpose of the workshop would be to explore fully the possibilities of a systematic linkage and application to certain genetic and other radiation problems of information already widely recorded for large populations (e.g., civil registration and health records), together with other relevant records, such as those of radiation exposures or particular conditions and traits. It is believed that funds should be provided to assure the participation of approximately twenty-five experts from ten to twelve countries to present or discuss papers. Other participants, perhaps resulting in a total attendance of some 100 persons, would consist of experts nominated by Governments or other individuals whose travel and subsistence expenses would not be a charge to the United Nations budget. It is not proposed to pay fees or honoraria for the submission of papers, but proceedings of the seminar, consisting primarily of the scientific papers submitted and records of discussion, would be published.

5. On the basis just outlined, the additional requirements of the United Nations budget would come to a total of \$29,800, in respect of which miscellaneous income would be received from WHO in the amount of at least \$9,200. Details of the cost items for which provision would have to be made in the 1960 appropriations are shown below.

<u>Item</u>	<u>Cost</u> \$
Travel and subsistence of twenty-five participating experts at \$800 each: (average travel cost of \$725 and subsistence for six days)	20,000
Travel of United Nations staff (secretary of the seminar, secretary of the Scientific Committee, three substantive officers from the Statistical Office and the Population Branch of whom two would serve as expert participants)	5,000
Contractual printing	4,500
Miscellaneous supplies and services	<u>300</u>
Total	<u><u>29,800</u></u>

6. Excluded from the above enumeration is an anticipated cost of \$2,700 for additional temporary assistance language staff at Geneva which it is believed can be met without increase in the appropriations as now foreseen. The language services in this particular case would be limited to minimal ad hoc interpretation into English and French, and possible summary records for the opening and closing plenary meetings.

Pattern of meetings of the Committee^{3/}

7. For the reasons shown in its report, the Scientific Committee has recommended that its normal pattern of meetings be similar to that in past years, with certain adjustments. Specifically, it proposes that it meet from time to time at Geneva and also that it meet in other places following an invitation from a Government or a United Nations agency, made in accordance with the principles of General Assembly resolution 1202 (XII) of 13 December 1957. As to the pattern of meetings for 1960, it is the proposal of the Committee that one of its sessions be held at Geneva or such other place as may be approved in accordance with the principles of resolution 1202 (XII).

8. If the Scientific Committee's conclusion concerning the pattern of meetings normally desirable for it is approved, the Secretary-General will continue to make budgetary provision for two meetings of the Committee each year. Bearing in mind the Committee's conclusion that it would be very desirable, from time to time, for its meetings to be held elsewhere than in New York, the Secretary-General anticipates that specific proposals to that end would, from time to time, be formulated by the Committee in consultation with him. Any such proposal would then be taken into account by the Secretary-General in preparing his initial budget estimates for the year in question, or, if time did not so permit, by seeking the concurrence of the Advisory Committee on Administrative and Budgetary Questions. The budgetary effect of this adjustment of pattern, in any year in which it might be reflected by the Committee holding one of its sessions in Geneva instead of New York, would be to reduce the requirement for travel of representatives by approximately \$3,800 and to increase the requirement for

^{3/} Ibid., para. 14.

travel of staff, inasmuch as it would be necessary to provide for the overseas round-trip travel of the Committee secretary and other staff scientists at a variable amount not exceeding approximately \$8,000.

9. So far as 1960 is concerned, the Secretary-General has scheduled the first session of the Scientific Committee for January at Headquarters. He would expect the place of the second session to be determined during that meeting and would propose in the meantime that the 1960 budget provision be revised to allow for the holding of the second session at Geneva (September 1960). It would be his understanding, however, that an alternative decision during the Committee's first session to accept an invitation from a Government or a United Nations agency would be dealt with in accordance with the requirements of General Assembly resolution 1202 (XII). In such event, therefore, the Secretary-General would submit a statement of the financial arrangements and expenditures involved to the Advisory Committee on Administrative and Budgetary Questions for concurrence at an early date in 1960.

10. The budgetary revisions involved for 1960 are as shown below:

<u>Item</u>	<u>Initial estimate</u> <u>(New York)</u> \$	<u>Revised estimate</u> <u>(Geneva)</u> \$
Travel and subsistence of representatives (two-week session, fifteen members) (section 1)	20,200	16,400
Travel and subsistence of Headquarters staff (Committee secretary, five staff scientists, two general service staff) (section 8)	--	8,600
Temporary language staff at Geneva (local recruits or continued subsistence for Headquarters staff retained at Geneva) (section 6)	--	1,000
	<u>20,200</u>	<u>26,000</u>

In view of the special staffing arrangements for other meetings which may take place in 1960, it is possible that the expenditure of \$1,000 for temporary language staff can in fact be absorbed, so that the actual increase in budgetary provisions required would be \$4,800.

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Recapitulation

11. The 1960 budget estimates contain provision for the continuation of the Scientific Committee secretariat and the holding of two sessions of the Committee at Headquarters. The 1959 global provision of \$23,000 for special activities has not been carried into 1960, except for the inclusion under section 12 of \$1,000 for purchase of library materials. Hence, implementation of the proposals just described would necessitate revisions in the 1960 budget estimates as follows:

	<u>New provision</u>
	\$
<u>Section 1</u>	
Travel and subsistence of members (reduction in cost of Committee's second session at Geneva)	(3,800)
United Nations-WHO seminar	29,800
<u>Section 6</u>	
Temporary assistance (consultant payment for studies of exposed groups of populations: deferred from 1959). .	10,000
<u>Section 8</u>	
Travel of staff to meetings (for Committee's second session at Geneva)	<u>8,600</u>
Total	<u><u>44,600</u></u>

The estimate of miscellaneous income would also be revised to take account of a sum of at least \$9,200 to be received from WHO toward expenses of the United Nations-WHO seminar.
