

EXPERT COMMITTEE ON BIOLOGICAL STANDARDIZATION

Report on the Fourth Session

Geneva, 6-11 November 1950

	Page
1. Cholera	3
2. Pertussis	4
3. Smallpox.	4
4. Diphtheria toxoid	5
5. Tetanus toxoid	5
6. Streptococcus antitoxin	5
7. Histolyticus antitoxin	5
8. Enteric and rickettsial diagnostic antisera	6
9. BCG	6
10. Digitalis	7
11. Sulfarsphenamine	7
12. Vitamin B ₁₂	7
13. Fat-soluble vitamins.	7
14. Hormones (including insulin)	7
15. Antibiotics	8
16. Blood-grouping sera.	10
17. Enzymes and related substances	11
18. Requests of the Expert Committee on Tuberculosis	11
19. Tuberculin	13
20. Requests of the Expert Committee on the Unification of Pharmacopoeias	13
21. Cardiolipin and lecithin	14
22. The International Salmonella and Shigella Centres	14
23. Standard rickettsial suspensions	14
24. Rabies	15
25. Information concerning biological standards	15

WORLD HEALTH ORGANIZATION

PALAIS DES NATIONS

GENEVA

APRIL 1951

EXPERT COMMITTEE ON BIOLOGICAL STANDARDIZATION

Fourth Session

Dr. J. Bretey, Chef de la Division de la Tuberculose, Institut Pasteur, Paris, France

Professeur E. Grasset, Directeur de l'Institut d'Hygiène, Geneva, Switzerland
(*Rapporteur*)

Dr. O. Maaløe, Chief, Department of Biological Standardization, Statens Seruminstitut, Copenhagen, Denmark

Dr. A. A. Miles, Director, Department of Biological Standards, National Institute for Medical Research (Medical Research Council), London, United Kingdom (*Chairman*)

Dr. J. Ørskov, Director, Statens Seruminstitut, Copenhagen, Denmark
(*Vice-Chairman*)

Dr. W. L. M. Perry, National Institute for Medical Research (Medical Research Council), London, United Kingdom

Dr. I. N. Orpwood Price, Director, Venereal Diseases Reference Laboratory (Public Health Laboratory Service), St. Peter's Hospital, London, United Kingdom

Professeur J. Tréfouël, Directeur de l'Institut Pasteur, Paris, France

Dr. M. V. Veldee, Medical Director, Hyland Laboratories, Los Angeles, Calif., USA

Secretary :

Dr. W. Aeg. Timmerman, Director, Division of Therapeutic Substances, WHO

The report on the fourth session of this committee was originally issued in mimeographed form as document WHO/BS/112, 15 November 1950.

EXPERT COMMITTEE ON BIOLOGICAL STANDARDIZATION

Report on the Fourth Session ¹

The fourth session of the Expert Committee on Biological Standardization was held in Geneva from 6 to 11 November 1950.

The Director-General welcomed the members and pointed out that all those concerned with biological standardization were becoming increasingly dependent on the activities of the expert committee. He reminded the committee that their recommendations, if adopted by the World Health Organization, were transmitted directly to the governments of Member States.

Dr. Miles was elected Chairman, Dr. Ørskov, Vice-Chairman, and Professeur Grasset, Rapporteur.

1. Cholera ²

The committee authorized the Statens Seruminstitut, Copenhagen, to establish dried standard preparations of the Ogawa and Inaba types of the cholera vibrio to be used in the preparation of diagnostic antisera in the rabbit.

The committee authorized the Statens Seruminstitut, Copenhagen, to institute a collaborative assay of three freeze-dried cholera vaccines of

¹ The Executive Board, at its seventh session, adopted the following resolution:
The Executive Board

1. NOTES the report of the Expert Committee on Biological Standardization on its fourth session;
2. THANKS the members of the committee for their work;
3. AUTHORIZES the publication of the report;
4. REQUESTS the Director-General to study:
 - (1) the recognition of an international blood-grouping reference laboratory;
 - (2) the conversion of the International Salmonella Centre at the Statens Seruminstitut, Copenhagen, to an International Salmonella and Escherichia Centre;
 - (3) the establishment of international shigella centres at Atlanta (Georgia, USA) and Oxford (United Kingdom),and to report to the Board at a later date.

(Resolution EB7.R63, *Off. Rec. World Hlth Org.* 32)

² Sokhey, S. S. & Habbu, M. K. (1950) *Bull. World Hlth Org.* 3, 43. Murray, R., WHO/BS/82; Sokhey, S. S. & Habbu, M. K., WHO/BS/87; Kauffmann, F., WHO/BS/98; Gallut, J., WHO/BS/107: unpublished working documents

unknown potency in terms of the provisional reference vaccine, with a view to establishing the latter as an international reference preparation of cholera vaccine. It recommended that the participants be asked to carry out assays both by a specified method and by any other method they prefer. Specimens of a single batch of mucin and of a batch of freeze-dried culture of the cholera vibrio to be used in the challenge tests of immunity will be provided for use in the specified method.

The committee noted that the Haffkine Institute, Bombay, was prepared to send to interested workers freeze-dried cultures of its challenge strains of *Vibrio cholerae*, and that the Central Research Institute, Kasauli, was prepared to send specimens of diagnostic cholera antisera.

2. Pertussis³

2.1 *Pertussis vaccine*

The committee also authorized the Statens Seruminstitut, Copenhagen, to obtain a pertussis vaccine of proved protective value in man and to distribute it in dried form for collaborative assay with a view to establishing it as an international reference preparation of pertussis vaccine.

2.2 *Standard for the opacity of bacterial suspensions*

The committee authorized that the Statens Seruminstitut, Copenhagen, be requested to proceed with the establishment of an opacity standard for the direct visual characterization of bacterial suspensions, using the opacity standard suspension of the National Institutes of Health, Bethesda, Md., USA, as the starting material, and to assign to it an opacity of 10 provisional units per ml.

3. Smallpox⁴

In accordance with the resolution of the World Health Assembly,⁵ the committee recommended that an investigation be made of the value of dried smallpox vaccine.

It suggested that the dried vaccines to be investigated should be made from lymph of a potency which, on vaccination of children over six months of age who have not previously been vaccinated nor recently exposed to infection with variola or vaccinia, will produce a typical primary vaccinal

³ Pittman, M., WHO/BS/81; Francis, A. E. & Blanchard, D. M., WHO/BS/88; Irwin, J. O. & Standfast, A. F. B., WHO/BS/96: unpublished working documents

⁴ McClean, D., unpublished working document WHO/BS/73

⁵ Resolution WHA3.18, *Off. Rec. World Hlth Org.* **28**, 21

reaction. The material should be free from anaerobic and aerobic pathogenic bacteria and should contain not more than 1,000 non-pathogenic bacteria per ml. If the dried material is intended for injection it must, before drying, be bacteriologically sterile.

4. Diphtheria Toxoid ⁶

The committee established a provisional reference preparation of diphtheria toxoid, plain, and a provisional reference preparation of diphtheria toxoid, aluminium-phosphate adsorbed.

It asked the Statens Seruminstitut, Copenhagen, to investigate the dose-response relationships of the various toxoids in current use and to obtain opinions of interested workers on the unitage of immunizing power to be assigned to the reference preparations.

5. Tetanus Toxoid ⁷

The committee noted the progress made in the establishment of an international reference preparation for tetanus toxoid.

6. Streptococcus Antitoxin ⁸

The committee noted the progress made in the establishment of the international streptococcus antitoxin standard and discussed certain difficulties arising out of methods of assay and the magnitude of existing units. It authorized the National Institute for Medical Research, London, to proceed with the establishment of the standard in the light of this discussion.

7. Histolyticus Antitoxin ⁹

The committee authorized the Statens Seruminstitut, Copenhagen, to establish the new histolyticus antitoxin standard and to assign to it a unitage on the basis of the collaborative assays already carried out.

⁶ Department of Biological Standardization, Statens Seruminstitut, Copenhagen, WHO/BS/77, WHO/BS/79; Murray, R., WHO/BS/83; Greenberg, L., WHO/BS/86; Department of Biological Standards, National Institute for Medical Research, London, WHO/BS/102; Tréfouël, J., WHO/BS/108: unpublished working documents

⁷ Murray, R., WHO/BS/83; Department of Biological Standardization, Statens Seruminstitut, Copenhagen, WHO/BS/92: unpublished working documents

⁸ Miles, A. A., unpublished working document WHO/BS/84

⁹ Department of Biological Standardization, Statens Seruminstitut, Copenhagen, unpublished working document WHO/BS/91

8. Enteric and Rickettsial Diagnostic Antisera

The committee noted the progress in making the standard preparations of these antisera which, when complete, would be distributed for test and comment.

9. BCG¹⁰

9.1 *Centres for testing BCG vaccine*

The committee expressed its appreciation of the work of the Paris Pilot Station and of the BCG-testing arrangements of the WHO Tuberculosis Research Office, Copenhagen, and, in response to a request from the United Nations International Children's Emergency Fund (UNICEF), recommended that these centres should be recognized as suitable for the periodic testing of BCG vaccine.

9.2 *BCG vaccine*

With regard to the use of liquid or dried BCG vaccines, the committee decided that no general recommendation could be made in the present state of knowledge: the choice in a particular case must depend, in the first place, upon the evidence of efficacy put forward by the manufacturer of the vaccine and, in the second place, upon the facilities in the field for the rapid distribution and use of the vaccine. The chief advantage of freeze-dried vaccine is its presumed keeping quality. The proper production of freeze-dried vaccine may be beyond the resources and facilities of many laboratories preparing a good liquid vaccine. The committee, therefore, decided to investigate recent reports that liquid vaccines have a currency period substantially in excess of the fourteen days usually assigned to them.

9.3 *Centres for the preparation of BCG vaccine*

The committee approved the reports, submitted at the request of UNICEF by Dr. W. Aeg. Timmerman, on the preparation of BCG at Mexico City, Athens, Tunis, and Casablanca,¹¹ and by Dr. J. Bøe at Parkville, Saigon, and Taipeh.¹²

¹⁰ WHO/BS/97; Tuberculosis Research Office, World Health Organization, WHO/BS/109: unpublished working documents; *Bull. World Hlth Org.* 1950, 3, 1

¹¹ Timmerman, W. Aeg., unpublished working documents JC4/UNICEF-WHO/3 and 4, JC5/UNICEF-WHO/1 and 2

¹² Bøe, J., unpublished working documents JC5/UNICEF-WHO/3, 4, and 5

10. Digitalis¹³

The committee confirmed the establishment of the third international standard for digitalis.¹⁴

11. Sulfarsphenamine¹⁵

The committee authorized the National Institute for Medical Research, London, to establish the third international standard for sulfarsphenamine.

12. Vitamin B₁₂

The committee noted that material for the standard preparation of Vitamin B₁₂ had been acquired, and authorized the National Institute for Medical Research, London, to proceed with the characterization of a standard preparation.

13. Fat-soluble Vitamins¹⁶

The committee noted that its recommendations on the establishment of the second international vitamin A standard, the second international vitamin D standard, and the new international standard for provitamin A¹⁷ had been implemented and that the three standards were now in use.

14. Hormones (including Insulin)

14.1 Adrenocorticotrophic hormone¹⁸

The committee established the international standard for adrenocorticotrophic hormone. The international unit of potency is the activity contained in 1 mg of the international standard preparation. The committee authorized the National Institute for Medical Research, London, to proceed

¹³ Bull. World Hlth Org. 1950, 2, 655

¹⁴ World Hlth Org. techn. Rep. Ser. 1950, 2, 8

¹⁵ Davies, M. G., Miles, A. A. & Perry, W. L. M., unpublished working document WHO/BS/110

¹⁶ World Hlth Org. techn. Rep. Ser. 1950, 3

¹⁷ World Hlth Org. techn. Rep. Ser. 1950, 2, 10

¹⁸ Miles, A. A., unpublished working document WHO/BS/85 and Corr. 1

with the collaborative assay of four other preparations of adrenocorticotrophic hormone, to serve as working and replacement standards.

14.2 *Thyrotrophin and growth hormone*

The committee authorized the National Institute for Medical Research, London, to establish a reference preparation of thyrotrophin and of growth hormone of the anterior pituitary, with a view to their establishment as international standards.

14.3 *Chorionic gonadotrophin*¹⁹

The committee reviewed the current methods of assay of chorionic gonadotrophin and authorized the National Institute for Medical Research, London, to undertake a collaborative investigation of the accuracy and precision of the methods in current use.

14.4 *Androsterone*

The committee noted that the international standard preparation for androsterone had been renewed. It recognized that the standard is used mainly for chemical assays and recommended that it should cease to be an international biological standard when the present stock was exhausted.

14.5 *Insulin*²⁰

The committee authorized the National Institute for Medical Research, London, to obtain a preparation of insulin and, after its collaborative assay in terms of the second international standard for insulin, to establish a third international standard for insulin.

14.6 *Secretin*

The committee decided to defer consideration of the establishment of an international standard for secretin.

15. Antibiotics

15.1 *International standard for penicillin*²¹

The committee authorized the National Institute for Medical Research, London, to obtain a new standard penicillin preparation and after

¹⁹ Perry, W. L. M., unpublished working document WHO/BS/93

²⁰ Perry, W. L. M., unpublished working document WHO/BS/89

²¹ Humphrey, J. H. & Perry, W. L. M., unpublished working document WHO/BS/94

collaborative assay to determine its unitage and establish it as the second international penicillin standard.

15.2 *Streptomycin and dihydrostreptomycin*²²

The committee recommended that the specimen of streptomycin sulfate obtained as a standard preparation should be established as the international standard for streptomycin with a potency of 780 international units or microgram-equivalents per milligram.

The committee authorized the National Institute for Medical Research, London, to obtain a standard preparation of dihydrostreptomycin and to assign to it a unitage or microgram-equivalence (depending on the activity of the dihydrostreptomycin base contained therein).

15.3 *Aureomycin and terramycin*

The committee authorized the National Institute for Medical Research, London, to proceed with the establishment of international standards for aureomycin and terramycin.

15.4 *Chloramphenicol*

The committee recognized that, though it is possible to characterize chloramphenicol by chemical and physical means, it would be convenient for workers depending partly on biological assay for its characterization to have a preparation for reference. It authorized the National Institute for Medical Research, London, to proceed with the establishment of an international reference preparation of this substance.

15.5 *Bacitracin*

The committee considered that bacitracin had not yet reached the stage of development which would justify the establishment of an international standard. It authorized the National Institute for Medical Research, London, to proceed with the establishment of an international reference preparation.

15.6 *Other antibiotics*

The committee considered it desirable to have for distribution to interested workers specimens of certain antibiotics whose clinical and scientific status would justify their inclusion in a collection of "author's preparations". To this end, the committee decided (a) to invite authors who have described such antibiotics in the scientific journals to contribute

²² Miles, A. A., unpublished working document WHO/BS/76

specimens of their antibiotics to this collection, and (b) to advertise the collection as widely as possible among workers in the field of antibiotics.

At the request of the Expert Committee on Antibiotics,²³ the committee considered the existing anomalies in the nomenclature of units in scientific literature. It recommended that it should be made widely known among authors and editors of scientific journals (a) that when there was an official description of an authentic unit (e.g., an international or a national unit), the unit should be so described, and (b) that when any other unit of potency was cited, it should be fully described in the context or proper reference made to a published description.

16. Blood-Grouping Sera

16.1 *Anti-A and anti-B international standards*²⁴

The committee established the international anti-A and anti-B agglutinating serum standards and assigned to each a unitage of agglutinating potency. The unit of anti-A agglutinating potency is the activity contained in 0.3465 mg of the standard preparation, and the unit of anti-B agglutinating potency is the activity contained in 0.3520 mg of the standard preparation.

16.2 *Rh blood-grouping sera*

The committee authorized the Statens Seruminstitut, Copenhagen, and the National Institute for Medical Research, London, to undertake the establishment of standards for anti-rh' (anti-C), anti-Rh^o (anti-D), and anti-rh'' (anti-E) blood-grouping sera of the blocking variety.

16.3 *Blood-grouping reference laboratories*²⁵

The committee considered the proposal of the Council for the International Society of Hematology that WHO should recognize an international blood-grouping reference laboratory. The committee was of the opinion that at present international work in haematology would be facilitated by the provision of international standards of the commoner Rh blood-grouping sera.

With regard to facilities for checking, providing, and distributing the rarer blood-grouping sera, the committee suggested that WHO, after consultation with the International Society of Hematology, should serve

²³ *World Hlth Org. techn. Rep. Ser.* 1950, **26**, 12

²⁴ *Bull. World Hlth Org.* 1950, **3**, 301

²⁵ Unpublished working document WHO/BS/97

as a centre for co-ordination of matters of international interest and advertise research laboratories which were willing to place their facilities at the disposal of interested workers.

17. Enzymes and Related Substances

17.1 *Hyaluronidase*²⁶

The committee authorized the National Institute for Medical Research, London, to obtain the opinions of interested workers on the British standard preparation of hyaluronidase in order to determine its suitability for an international standard and the unitage to be assigned to it.

17.2 *Streptokinase*²⁷

The committee deferred consideration of a standard for streptokinase.

17.3 *Thrombin*

The committee authorized the National Institute for Medical Research, London, to procure a preparation of thrombin and to obtain the opinion of interested workers about its suitability for an international standard and the unitage to be assigned to it.

17.4 *Prothrombin*

The committee deferred consideration of a standard for prothrombin.

18. Requests of the Expert Committee on Tuberculosis²⁸

18.1 *Tuberculosis diagnostic laboratories*

At the request of the Expert Committee on Tuberculosis, the committee discussed minimum standards for laboratories engaged in the demonstration of tubercle bacilli. It is impracticable to make detailed recommendations because the minimum requirements would, to some extent, vary from country to country. The committee agreed, however, that the following requirements should, wherever possible, be met:

(1) The centre should be situated in a laboratory dealing with a wide range of pathological investigations in order to economize in the provision

²⁶ Humphrey, J. H., unpublished working document WHO/BS/78

²⁷ Humphrey, J. H., unpublished working document WHO/BS/95

²⁸ WHO/BS/97; Grasset, E., WHO/BS/99; Wilson, G. S., WHO/BS/100: unpublished working documents

of services common to general and tuberculosis work, and in order to give the staff the benefit of constant contact with other aspects of clinical pathology.

(2) The bacteriologist-in-charge should be fully trained and medically qualified and should have at least five years' laboratory experience, including a period of six months at a recognized laboratory devoted to the diagnosis of tuberculosis.

(3) The area served by the laboratory should be large enough to justify maintaining a well-equipped and well-staffed centre, dealing with a minimum of 50 specimens a day. The size of the area should be limited so that specimens from the remotest district will not become difficult to examine as a result of deterioration during transmission to the laboratory.

(4) The staff required for the examination of specimens should consist of the bacteriologist-in-charge, a trained assistant bacteriologist, and one trained bacteriological technician for every 10 to 20 specimens examined daily. Additional staff will be required for media preparation, cleaning of glassware, and care of animals.

(5) The laboratory must be able to undertake full microscopic and cultural examination of each specimen and must have facilities for animal inoculation for the purpose of testing the pathogenicity of strains of acid-fast bacilli. Wherever possible, facilities for animal work should be extended first to include routine animal tests of all doubtful specimens, then routine animal inoculation of all specimens, and, finally, the typing of tubercle bacilli.

(6) In areas where it is intended to set up more than one centre, it is desirable that the first centre to be established should have facilities for training bacteriologists and technicians, for staffing the subsidiary centres.

The committee recommends that a list of laboratories, suitable for recognition as places where proper training in the diagnosis of tuberculosis can be obtained, should be supplied by the Secretariat to the Expert Committee on Tuberculosis.

18.2 *Assay of tuberculin*

In compliance with the request from the Expert Committee on Tuberculosis for a definite recommendation on the assay of tuberculin, the committee reaffirmed its general principle that no method of assay should be considered obligatory. It recommended that the assay of tuberculin should be carried out in guinea-pigs sensitized with either living tubercle bacilli or BCG or dead tubercle bacilli in conjunction with a suitable adjuvant. The degree of sensitization of the test animal should be such that the intradermal injection of five international units of tuberculin should produce an erythematous, indurated reaction at least 10 mm in diameter. Each animal in the test should receive injections of both the

standard and unknown preparations ; the injection sites of each dilution of tuberculin should be randomized separately for each animal.

19. Tuberculin²⁹

The committee noted the progress made in the preparation of purified tuberculins at the Institut Pasteur, Paris, and asked the Institut Pasteur to initiate a collaborative comparison, preferably in both guinea-pigs and man, of this material with other preparations from the tubercle bacillus.

20. Requests of the Expert Committee on the Unification of Pharmacopoeias³⁰

(1) The committee agreed to advise the Expert Committee on the Unification of Pharmacopoeias on the specification of bacteriological sterility tests and tests for pyrogenic substances and on the assay of taenia-cidal potency.

(2) The committee considered the monographs prepared for the *Pharmacopoea Internationalis* on substances requiring biological tests for their specification. In this connexion, the committee authorized the National Institute for Medical Research, London, to proceed with the establishment of international standards for oxophenarsine and dimercaprol, and to establish an international standard for dextro-tubocurarine and to assign to it a potency of 1 unit or 1 milligram-equivalent per mg.

The committee decided that, though a preparation of a pyrogenic substance was desirable as a standard for pyrogen tests, there was not at present a clear indication of the type of substance which should be used for the standard. The committee authorized the National Institute for Medical Research, London, to obtain specimens of pyrogen standards in current use in various countries, to facilitate further research, and to form the basis of a collection of "author's preparations" of standard pyrogens.

(3) The committee discussed the desirability of establishing and distributing chemical reference standards³¹ for the assay of certain drugs in preparations for injection. The committee was of the opinion that such chemical standards should have the same status as reagents in the *Pharmacopoea Internationalis* ; it should be sufficient to include in this pharmacopoeia a full chemical and physical specification of the substances necessary for the chemical assay of these preparations for injection.

²⁹ Unpublished working document WHO/BS/106

³⁰ Unpublished working document WHO/BS/97

³¹ *World Hlth Org. techn. Rep. Ser.* 1950, **29**, 9

21. Cardioliipin and Lecithin ³²

The committee authorized the Statens Seruminstitut, Copenhagen, to establish international standards for cardioliipin and lecithin for use in serological tests for syphilis. These two substances are to be prepared in accordance with the methods agreed to by the committee.³³

22. The International Salmonella and Shigella Centres ³⁴

The committee discussed the recommendations made by the Permanent International Committee on Bacteriological Nomenclature concerning the establishment of salmonella, escherichia, and shigella centres. The committee recommended that the International Salmonella Centre at the Statens Seruminstitut, Copenhagen, should become the International Salmonella and Escherichia Centre.

The committee also recommended that international shigella centres should be established at Atlanta, Georgia, USA, and at Oxford, United Kingdom.

23. Standard Rickettsial Suspensions ³⁵

The committee discussed the recommendations of the Joint OIHP (Office International d'Hygiène Publique) /WHO Study-Group on African Rickettsioses. Although it felt that the provision of standards for rickettsial suspensions lay within its province, the immediate establishment of such standards would be premature.

It recommended that further research on standard rickettsial suspensions should be facilitated by giving technical and financial aid to the Institut Pasteur, Paris, and to the South African Institute for Medical Research, Johannesburg. It also recommended the advertisement of the fact that these two institutes were prepared to distribute rickettsial suspensions to interested workers.

³² Unpublished working documents WHO/BS/97, WHO/VD/Sero/1

³³ These methods are described in *Bull. World Hlth Org.* 1951, 4, in press.

³⁴ *Bull. World Hlth Org.* 1950, 3, 171; unpublished working document WHO/BS/97

³⁵ Unpublished working document WHO/BS/97; *World Hlth Org. techn. Rep. Ser.* 1950, 23

24. Rabies³⁶

The committee discussed the recommendation made by the Expert Committee on Rabies.³⁷ It was of the opinion that the establishment of a provisional preparation of rabies vaccine fell within its province, but that this was at present impracticable.

25. Information concerning Biological Standards

The committee felt there was a need to make the biological standards held on behalf of WHO more widely known and recommended that, in addition to publicizing them in the various periodicals of WHO, information about them should be brought to the notice of editors of general medical journals and of journals devoted to special fields of work in which the use of a particular standard was relevant.

³⁶ Unpublished working document WHO/BS/97

³⁷ *World Hlth Org. techn. Rep. Ser.* 1950, **28**

**WORLD HEALTH ORGANIZATION
TECHNICAL REPORT SERIES**

	Number	Date of publication	Price
Antibiotics , Expert Committee on Report on the first session	26	October 1950	9d \$0.10
Bilharziasis in Africa , Joint OIHP/WHO Study-Group on Report on the first session	17	August 1950	9d \$0.10
Biological Standardization , Expert Committee on Report on the third session	2	February 1950	1/6 \$0.20
Report on the fourth session	36	April 1951	9d \$0.10
Report of the Subcommittee on Fat-Soluble Vitamins	3	February 1950	9d \$0.10
Brucellosis , Joint FAO/WHO Expert Panel on Report on the first session	37	April 1951	2/- \$0.25
Cholera , Joint OIHP/WHO Study-Group on Report on the third session	18	December 1950	1/3 \$0.15
Communicable Diseases of Childhood , active immuniza- tion against common Report of a group of consultants	6	March 1950	1/3 \$0.15
Drugs Liable to Produce Addiction , Expert Committee on Report on the second session	21	March 1950	9d \$0.10
Environmental Sanitation , Expert Committee on Report on the first session	10	May 1950	2/- \$0.25
Health Statistics , Expert Committee on Report on the first session	5	March 1950	9d \$0.10
Report on the second session (including reports on the first sessions of the Subcommittees on the Definition of Stillbirth and Abortion, on Registration of Cases of Cancer, and on Hospital Statistics).	25	October 1950	2/- \$0.25
Hygiene of Seafarers , Joint ILO/WHO Committee on Report on the first session	20	September 1950	9d \$0.10
Insecticides , Expert Committee on Report on the first session	4	October 1950	2/3 \$0.30
Report on the second session	34	1951	<i>To be published</i>
Malaria , Expert Committee on Report on the third session	8	May 1950	2/3 \$0.30
Report on the fourth session	39	1951	<i>To be published</i>
Malaria Conference in Equatorial Africa	38	1951	<i>To be published</i>
Mental Health , Expert Committee on Report on the first session	9	May 1950	2/3 \$0.30
Report on the second session	31	April 1951	2/9 \$0.35
Nursing , Expert Committee on Report on the first session	24	November 1950	1/6 \$0.20
Nutrition , Joint FAO/WHO Expert Committee on Report on the first session	16	June 1950	1/3 \$0.15