abolished under the new arrangement, much to the benefit of public health.

The United States Government is very much interested in the opium question, especially so in view of the conference this fall for cutting down the production and manufacture of opium to the amounts needed for medical and scientific purposes. In this connection the figures of 450 milligrams of raw opium per head per year suggested by the League Health Committee is extremely valuable, for it gives us something to go on. However rough and tentative an estimate the figure represents, it is a first step to a solution of the problem. We are at present collecting data in the United States on our annual requirements for medical and scientific purposes, as a contribution to this enquiry.

The proposal of the health committee that a central bureau of epidemiological intelligence should be established in the Far East is an excellent thing, and the selection of Singapore as a site is an excellent choice that was made on the merits of the matter and not on political grounds. The Straits are a funnel through which practically all shipping bound east or west passes; the geographical position is central; wireless communications are good and the port is right on the harbor.

The proposal for a Far Eastern sanitary convention shows above all the crying need for bringing the Paris Sanitary Convention of 1912 up to date, when the proposed Far Eastern Convention could easily be incorporated as a special chapter in the new general convention.

The progress of malaria in Eastern Europe has become a grave international problem, particularly in the Balkans, Southern Russia and Turkey, and the enquiry in these areas that is about to be undertaken by a League Committee will be most valuable. The committee is composed of extremely able men, and the United States will be much interested in the work it accomplishes.

Lastly, I would say that the system of "interchanges" by which medical officers of health from many countries are enabled to study health problems in and establish personal contact with colleagues from other countries is extremely valuable. The development and consolidation of this branch of work is one of the most valuable things the league has done from the point of view of public health.

THE NATIONAL PHYSICAL LABORATORY

THE annual report of the National Physical Laboratory, London, signed by Sir Arthur Schuster, chairman of the executive committee, gives as summarized in the London *Times* full particulars of the work of the laboratory during 1923, under the following heads:

(1) General research; (2) maintenance of standards; (3) research carried out by the laboratory for the coordinating research boards and committees of the Department of Scientific and Industrial Research; (4) investigations and tests for which payment is made by other government departments; (5) investigations and tests carried out for payment by firms and other bodies.

The report states that the past year has been characterized by a steady growth of work in all departments of the laboratory. This has been mainly due to the demands made upon the laboratory from outside, and in particular to the requirements of other government departments. Owing to the general business depression there was a slight falling off in work for firms, as compared with the preceding year, but towards the end of the year this work also showed a tendency to recover. The growth of the work involved considerable pressure on the staff, and necessitated increase in the staff in nearly all departments.

The work comprised under the heading of maintenance of standards constitutes one of the most important functions of the laboratory. The Board of Trade is responsible for the custody of the primary British standards of length and mass and for arranging certain periodical intercomparisons of these standards. At the request of the Board of Trade, the laboratory has recently undertaken the duty of making these intercomparisons on their behalf so long as the Superintendent of the Metrology Department continues to act as Deputy-Warden of the Standards. The close relationship thus established between the standards department of the board and the laboratory is expected to be of great value in maintaining uniformity in the fundamental measurements of length and mass. With reference to the resolutions adopted by the International Committee of Weights and Measures, the Department of Scientific and Industrial Research has also been requested by the Board of Trade to undertake an investigation into the use of a wavelength of light as a standard of length. This investigation was already included in the laboratory program for the current year, and, in response to the request of the board, steps have been taken to secure that the work shall be advanced as rapidly as possible.

Satisfactory progress has been made during the year with work on the fundamental electrical standards. The construction of the new cylinders for the ampere balance has been proceeding steadily, and it is hoped that these will be completed during the coming year. A series of comparisons has been made between one of the standard wire coils of the laboratory and the mercury ohm; for the realization of the latter the tubes used in 1912 by Mr. F. E. Smith have been again employed. The comparisons indicate that a slight increase in the dimensions of the tubes may have taken place, and the tubes are being recalibrated to check this supposition. Work on the new Schuster-Smith magnetometer is also well advanced.

The work undertaken for boards and committees of the Department of Scientific and Industrial Research has greatly increased, and a further considerable increase is anticipated during the year 1924–25. This,

the report says, is largely due to the activities of the research boards of the department in the coordination of work required by various government departments. It is manifest that this work must be expected to develop, and that the needs are most economically met by extending the facilities for research in existing institutions. The more important items of work recently undertaken by the laboratory for the coordinating research boards include a research on motor springs, and spring materials generally, which is of great importance to the War Office and other departments in respect of transport problems; an investigation into the properties of constructional materials at high temperatures; a research on big-end bearings desired by the Air Ministry, which is of general importance for high-speed engine design; experiments to determine a suitable yellow glass for railway signal lights, as well as colored glasses for ships and aircraft lights; and an investigation relating to pivots and jewels as employed in a variety of instruments of importance for naval, military and other purposes.

In the Radiology Division, a large number of tests have been made on X-ray protective materials, and a considerable amount of time has been devoted, as already mentioned, to the very important work of inspecting X-ray installations in hospitals. Good progress has nevertheless been made with a number of interesting researches, including an investigation into the scattering of gamma rays by matter, the excitation of X-ray bulbs by different high-tension generators, the relation between total and "local" ionization, the scattering of cathode particles when allowed to fall on different substances, and the structure of metallic crystals.

In the Optics Division, the main item of research for the year has been that connected with color standardization and spectrophotometry. Much attention has been directed to the problem of producing a satisfactory laboratory source of white light, for which a solution has not yet been found.

In the Photometry Division, the investigation into problems of illumination of buildings, originally undertaken for the Office of Works, has been extended to the study of daylight illumination, and much interesting work has been done. Experiments are in progress to determine the best arrangement of windows for one of the proposed galleries to be constructed in the new wing of the Tate Gallery.

EXPEDITION OF THE BISHOP MUSEUM

THE Bishop Museum will have at its disposal for the next two or three years the four-masted schooner *Kaimiloa* for research work in the South Seas. The boat will leave Honolulu on its first cruise about the middle of October. The first year's tentative schedule includes Malden, Starbuck, Tangareva, Rakahanga, Manihiki, Pukapuka and Manua Islands, and if conditions permit considerable time will be spent in the Tuamotus.

On the initial cruise, six members of the museum staff will constitute the scientific personnel: Stanley C. Ball, curator of collections; Kenneth P. Emory, ethnologist; Charles H. Edmondson, zoologist; Armstrong Sperry, assistant ethnologist and artist; Gerrit P. Wilder, associate in botany; and Mrs. Wilder, interpreter. The scientists will be guests of the owners of the *Kaimiloa*, Mr. and Mrs. Med R. Kellum, who will accompany the cruise on some of its expeditions. The personnel of the later trips has not yet been selected.

The museum plans to study the out-of-the-way islands of the Pacific, making botanical, zoological and geographical studies, but giving particular attention to an ethnological study of the natives. It is hoped that relations may be established between the museum and the residents of the islands which will pave the way for a broad scientific survey in the near future, and lead to betterment of conditions under which the natives live.

The schooner has a length of 200 feet and a 38-foot beam. It has been remodelled to meet the needs of the scientists, and will carry a fully equipped laboratory, wireless apparatus, refrigerating plant, a library and spacious comfortable living quarters.

SCIENTIFIC NOTES AND NEWS

THE centenary celebration of the founding of the Franklin Institute and the inauguration exercises of the Bartol Research Foundation open on September 17 with an address of welcome by the mayor of Philadelphia, and addresses by Dr. Wm. E. L. Eglin, president of the institute, and Professor Elihu Thomson, honorary chairman of the celebration committee. The program, printed in SCIENCE for August 8, contains the names of a large number of scientific men who are to give addresses, including the following from abroad: Sir Ernest Rutherford, Sir William Bragg, Professor W. L. Bragg, Professor E. G. Coker, Professor F. G. Donnan, Sir Charles Parsons, Professor J. S. E. Townsend, Professor Charles Fabry, Professor F. Haber and Professor P. Zeeman.

DEAN HUGH MILLER, dean of engineering in George Washington University, has been elected to be secretary of the engineering section of the American Association for the Advancement of Science, to complete the present term. Mr. L. W. Wallace, who has been secretary of the section for several years, found it necessary to resign on account of other duties. Correspondence regarding the engineering section should be addressed to Dean Miller.