THE CENTRAL REVENUES CONTROL LABORATORY NEW DELHI

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THE first chemical work done in connection with the assessment of sea-borne imports to duty was in the determination of the spirit strengths of potable liquors in the Gauging Departments of Custom Houses. In the first instance, all customs duties were assessed on a flat *ad valorem* basis and the administration of this tax did not involve the chemical examination of goods other than spirituous liquors.

Gradually, however, variations arose in the rates of duty on different classes of articles and, in many cases, within those classes on the types and grades of manufactures as indicated by percentage composition, instances of which in the current schedule are mixed textiles, paper, paints, dyes, petroleum products, condensed milks, chemicals, cements, certain articles containing precious metals and many others.

World progress in industrial chemistry resulted in the manufacture of many important commodities frequently marketed under fanciful and often misleading trade names. The range of goods of this kind covers an immense field of utility and is consequently on the increase.

The examination of such synthetic compounds or mixtures in order to determine their allocation to the correct item in the Indian Customs Tariff for assessment to duty calls for much analytical skill and resource. A study of the tariff will show that more than half the classes of import mentioned are susceptible to chemical examination in connection with their assessment, and the amount of revenue involved is very large. The increase in the number of headings and sub-headings in the Tariff was gradual in its progress but cumulatively very considerable and ultimately introduced the necessity for the creation of some regular and reliable agency for chemical testing of many articles at the principal sea-ports.

In 1912, a combined Customs and Excise Laboratory was set up in the Calcutta Custom House but analytical work at the other major ports of Bombay, Karachi, Madras and Rangoon was carried out by the Chemical Examiner to the Local Government on payment. After some years, however, it was found that this arrangement was not working very satisfactorily, mainly because of the increasing number of samples sent for test and the unavoidable delays involved thereby and on account of the distance of the Local Governments' Laboratories from the Custom Houses.

As a result of a careful review of the whole position, it was decided in 1926 that the work of examining samples could be more expeditiously carried out and at less expense to the Central Government, if suitable laboratories were equipped and staffed in the Custom Houses themselves. In this way delays annoying to importers would be avoided and there would be the additional advantage that the laboratory, like other departments of the Custom House, would be under the direct administrative control of the Collector of Customs.

Laboratories provided with certain essential apparatus and chemicals from Calcutta were first opened at Rangoon and Karachi but the equipment and staff were inadequate and it was decided that a specialist officer must be appointed to put the organisation of the existing laboratories on a suitable footing and open up similar analytical departments in the Custom Houses at Bombay and Madras.

In 1928, the Government of India selected the Chemical Examiner for Customs and Excise at Calcutta, Mr. R. L. Jenks, to

undertake this development and to stardardise the methods of analysis to be adopted at all ports. Unfortunately, in the July of that year, Mr. Jenks fell seriously ill and had to proceed at once to England.

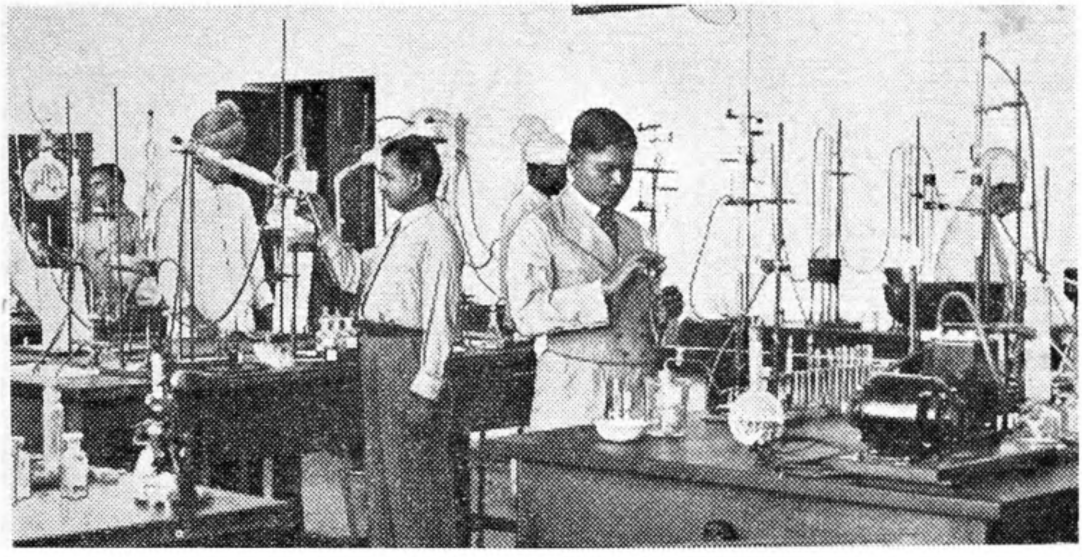
The following October, the author was appointed Special Chemical Adviser (Customs) to the Central Board of Revenue and the four new laboratories were in operation by April 1st, 1929, although the equipment and staff was not complete in all cases.

Proposal for a Control Laboratory

An integral factor of the scheme for the administration of these laboratories was the inauguration of a Central Control Laboratory, the functions of which would be to deal with technical matters such as the standardisation of analytical methods, the issue of instructions for the testing of goods presenting special difficulties, the investigation of chemical problems arising at the port laboratories and the re-examination of samples relevant to cases in which the importer had appealed against the assessment of the Collector at the port. It was also necessary to have an independent laboratory at which a selection of routine samples from each laboratory could be examined periodically by competent chemists to make sure that the standards and methods used at port laboratories were efficient and identical. There was also a demand for a technical advisory officer to whom questions of a scientific nature from the Central Board of Revenue and, incidentally, miscellaneous chemical problems from other Government Departments could be addressed.

This scheme, though accepted in principle, was to be tried out experimentally before embarking on the building and equipment of a Control Laboratory.

Arrangements were, therefore, made with the Punjab Government for the Control Laboratory to be accommodated temporarily in the Chemistry Department of the Government College, Lahore. A small staff was appointed under the administrative and technical control of the author who undertook the part-time appointment of Special Chemical Adviser to the Central Board of Revenue in addition to his post as Professor of Chemistry in the College.



The Main Laboratory

The scope of the scientific responsibilities of the Special Chemical Adviser increased progressively, first opium, then salt advisory and investigation work being added to his duties for Custom Houses. Further demands were made on the services of the Control Laboratory from time to time and it eventually became obvious that there was too much work for a part-time Chemical Adviser and the small staff and restricted facilities at Lahore. As a result, it was decided that certain of the functions which the scheme proposed should be served at the central laboratory should be undertaken elsewhere until the Control Laboratory was placed on an individual footing.

Accordingly, to the Calcutta Custom House were assigned the purification of contraband cocaine by a chemist trained at Lahore and

the newly devised co-ordination scheme for testing potable spirits and spirituous and medicinal preparations, while the standardisation of hydrometers and certain excise work already being done there for certain Indian States, Local Governments and Centrally Administered Areas and intended ultimately to be moved to the Centre, remained undisturbed. To Bombay was given the co-ordination schemes for restricting the testing of dyes, mineral greases, lubricating oils and certain other petroleum products.

After this modified scheme had operated for about six years, during which the Customs and Opium Chemical Service had come into being, the Government of India decided on the appointment of a full-time Chemical Adviser and the construction of a separate building for the Central Revenues Control Laboratory. The question arose as to where this central laboratory could be most suitably located.

From the first, the general view was that it was undesirable that the Control Laboratory should be accommodated in any of the Custom Houses as it was considered inexpedient that control work should be carried on in immediate association with the routine analytical work at any one of the Board's laboratories. From an administrative standpoint also it was agreed that a place nearer the Government of India headquarters would be most suitable.

A suggestion that, by arrangement with the University of the Punjab, the Control Laboratory should be accommodated in the University Laboratories was rejected after considering all the implications of the proposal.

Similarly, in connection with the construction of a new Custom House at Calcutta, it was originally proposed to house the Control Laboratory in that building but this scheme was eventually dropped in favour of a more central site at Delhi.

Delhi Chosen for the Control Laboratory

The final decision followed upon a national calamity, the Bihar earthquake of 1934.

When, as a result of the damage caused to the Pusa Laboratories by that disaster, it was decided to transfer the Imperial Agricultural Research Institute to the present site at New Delhi, it was felt that, without inconvenience to the Institute, the Control Laboratory of the Central Board of Revenue could be built within its precincts. It was considered that it would be mutually beneficial to have such scientific departments near each other and that, apart from technical advantages, it would avoid duplication in the cost of some essential expensive services such as gas manufacture, high pressure water supply, electricity mains and sewerage. Furthermore, certain departments of the two institutions could be mutually helpful, as, for example, the library, the constant temperature rooms, the store room for dangerous petroleum and other inflammable solvents, safe deposit facilities and the use of certain expensive apparatus.

The proposal was accepted in principle in 1935 and, at a cost of about Rs. 5,000, the capacity of the gas-plant of the Institute was increased to meet the future requirements of the Control Laboratory but, though the site for the Central Revenues Laboratory was reserved, financial considerations prevented further immediate action.

The Laboratory, its Staff and Equipment

In 1938, however, the Government of India decided to put into execution the plan for the construction and equipment of the laboratory.

The sanctioned cost of the building and equipment was as follows:—

Construction of the Laboratory including electrical equipment, sanitation, etc. . . .	Rs. 47,400
Construction of Chemical Examiner's bungalow staff, garage and cycle shed, godown and inferior servants' quarters . .	„ 24,600
Portable furniture and laboratory benches, etc., involving the incorporation of gas and water supply; gas supply, water supply, workshop tools, picture rails, etc.	„ 25,240
Apparatus and Chemicals	„ 23,000
Books . .	„ 3,000
Gold-plating plant	„ 970
	Rs. 1,24,210
Addition to gas plant . .	„ 5,000
	Rs. 1,29,210

The accommodation comprises a large general laboratory (41′ 0″ × 30′), a smaller laboratory (33′ × 19′) mainly devoted to excise work and standardisation of instruments, a combined office and laboratory (17′ 9″ × 19′) for the Chief Chemist, a dark room (16′ 6″ × 8′), a combined balance and precision instrument room (20′ 6″ × 12′ 3″), a furnace room (19′ × 11′), a rest room (20′ 6″ × 16′) which being suitably fitted can, when necessary, be also used for testing explosives as it is correctly lighted

and free from any risk of fumes, a combined library and museum (29′ 7½″ × 20′ 6″), an office (25′ 9″ × 20′ 6″) and a workshop (15′ 6″ × 20′ 6″) together with the necessary lavatories and store-rooms for apparatus, chemicals, records and remnant samples.

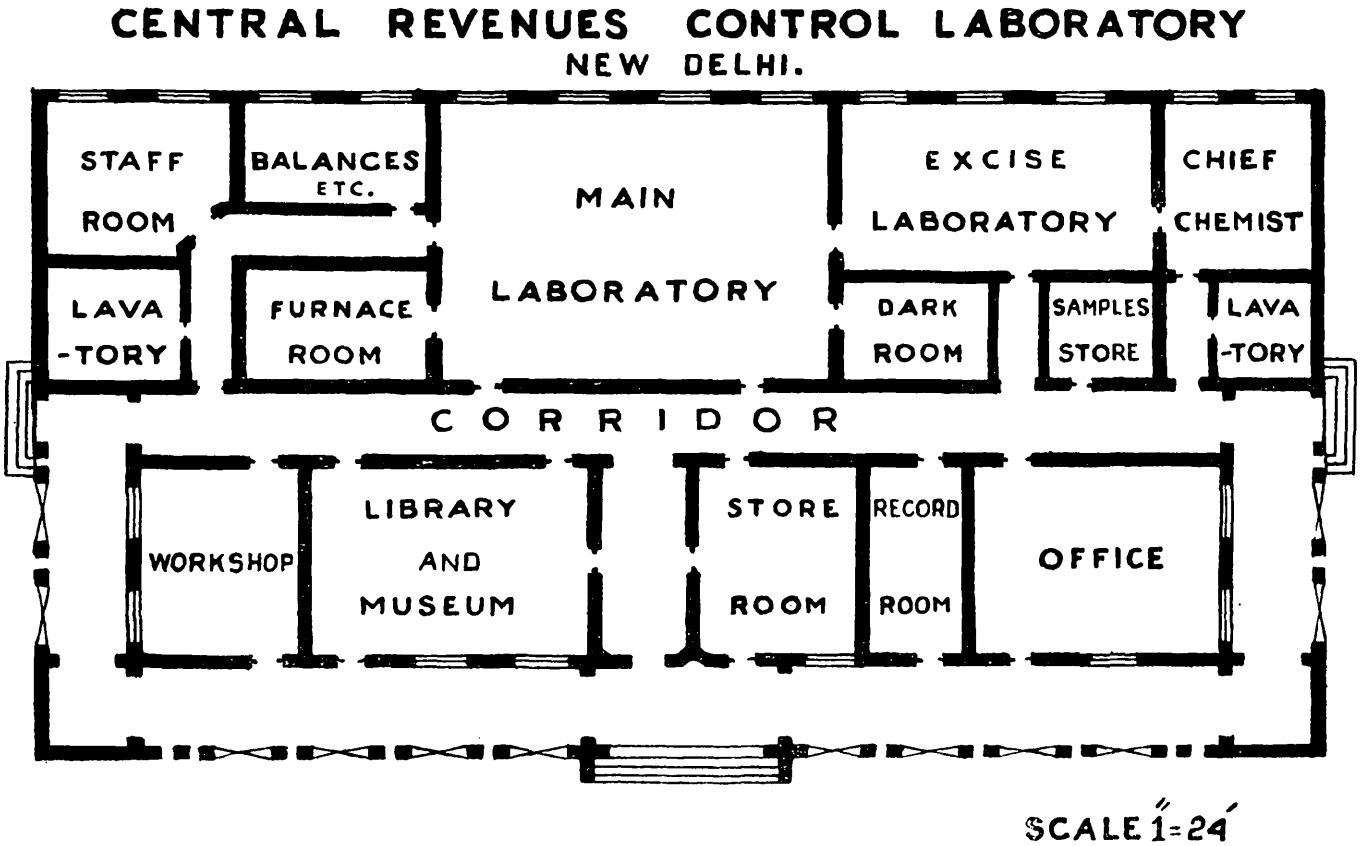
The workshop is equipped with an electric lathe, a drilling machine, a forge, a carpenter's bench, a gold-plating plant and buffing and polishing machines.

The walls have been provided with chases for air-conditioning and it is hoped that, as the laboratory will operate throughout the year, this desirable amenity will be supplied before next hot weather.

The general arrangement of the rooms is shown in the line plan.

The building, furnishing and installation of essential services were completed by the Central Public Works Department in October, 1939 and the laboratory was taken into service from November 9th of the same year, a start in the experimental work being made with such apparatus as was brought from Lahore augmented by purchases from Calcutta and elsewhere as, owing to the war, the greater part of the apparatus and chemicals from Europe and America had not been received.

The apparatus for the purification of contraband cocaine and the excise work done by the Calcutta laboratory was taken to Delhi early in December together with the relevant records.



The air-conditioning plant will be placed at the west end of the building while an impression of the exterior of the building, the back of which faces due north, and the main laboratory can be obtained from the photographs published by the courtesy of *The Statesman*.

Owing to the limited space available, a residence was not provided for the Chief Chemist nor the majority of his scientific and ministerial staff. A suitable bungalow has, however, been built near the laboratory for the Chemical Examiner and a number of quarters for inferior staff.

The Control Laboratory Staff

The entire staff was transferred from Lahore and the Assistant Chemical Examiner and a Chemical Assistant from Calcutta, the rest of the sanctioned establishment being appointed by direct recruitment.

The personnel is as follows:—

The Chief Chemist, Central Revenues, who is also Director of the Control Laboratory.

The Chemical Examiner (Grade I), Central Revenues Control Laboratory.

The Assistant Chemical Examiner, Central Revenues Control Laboratory.

One Chemical Assistant (Grade I) (Rs. 300–20–400) and, including one chemist for the Central Excises and Salt Department.

Three Chemical Assistants (Rs. 150-10-250-E.B.-10-300).

In addition, the laboratory is available for use by the technical staff of the Central Excises and Salt Department as occasion requires.

The three officers first named are members of the recently constituted Central Revenues Chemical Service (see Note*), a Central Service, Class I.

The Chief Chemist is an *ex-officio* member of the Technical Advisory Board constituted under the Drugs Act of 1940 and the present incumbent of the post is a member of the Drugs Supply Advisory Committee and also Chairman of the Salts Committee of the Department of Scientific and Industrial Research.

Altogether, thirty chemists are employed in the laboratories maintained by the Central Board of Revenue at Bombay, Calcutta, New Delhi, Ghazipur, Karachi and Madras.

At the Control Laboratory, there is an instrument maker and a head laboratory attender and store-keeper while each chemist is allowed one laboratory attender to assist him in chemical operations.

The ministerial staff consists of an office superintendent, a stenographer, one upper division clerk and four lower division clerks including one for Central Excises and Salt. Adequate inferior staff has also been provided.

The Duties of the Control Laboratory

As has been shown above, the chemical work from which this expanded scheme and the construction of the Control Laboratory arose dealt primarily with the examination of imported goods in order to ensure the correct assessment of the merchandise to customs duty. This is still the main function of the laboratories at the Custom Houses though they do other chemical work, such as the testing of explosives and petroleum products for Labour Department and foodstuffs for the Port Health Department, classification of oils for duty and railway freights and the examination of a variety of export samples under recent war legislation. Although many changes have occurred in the Indian Customs Tariff since the article was written, a very fair idea of the duties of the Custom House Laboratories can be gathered from the article "Chemistry in the Customs Department", published in *Current Science* of July 1935, pp. 42–46.

The duties contemplated for the Central Revenues Control Laboratory are also outlined in the earlier paragraphs of that article but, with the passage of time, the range of the analytical and advisory work expected of the department has expanded very materially. Thus, in addition to (*i*) the centralisation of the issue of standard lists of potable spirits and spirituous and medicinal preparations and of imported dyes, the object of which is to restrict the number of samples of these commodities sent for test, (*ii*) some general excise work, including chemical

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* The Central Revenues Chemical Service, a Central Service, Class I, is the youngest of the All-India Services. It was created by the Governor General-in-Council in 1937 under the designation "The Customs and Opium Chemical Service, Class I". When, subsequently, analytical and scientific advisory work for the Collectors of Central Excises and Salt were included in the duties assigned to the Service, it was re-named "The Central Revenues Chemical Service" in 1938 and the designation "Special Chemical Adviser", Central Board of Revenue" was changed to "Chief Chemist, Central Revenues".

The following ten posts are at present borne on the cadre of the Service. The grades of pay and headquarters of each officer are also shown,

Chief Chemist Central, Revenues (New Delhi).

Rs. 1,500–50–1,800 *plus* £ 30 sterling overseas pay if admissible.

Chemical Examiners, Grade I (4):

Rs. 600–40–1,000 for officers in the service before 1931;

Rs. 450–475 (on probation) 500–30–740–E.B.–35–950 for officers entering the service after 1931.

Chemical Examiner, Central Revenues Control Laboratory, New Delhi.

Chemical Examiner, Central Excises and Salt, Delhi.

Chemical Examiner, Custom House, Bombay.

Chemical Examiner, Custom House, Calcutta.

Chemical Examiners, Grade II (4):

Rs. 250–275 (on probation)–300–20–520–E.B.–550–30–700.

Chemical Examiner, Central Excises and Salt, North Eastern India, Calcutta.

Chemical Examiner, Custom House, Karachi.

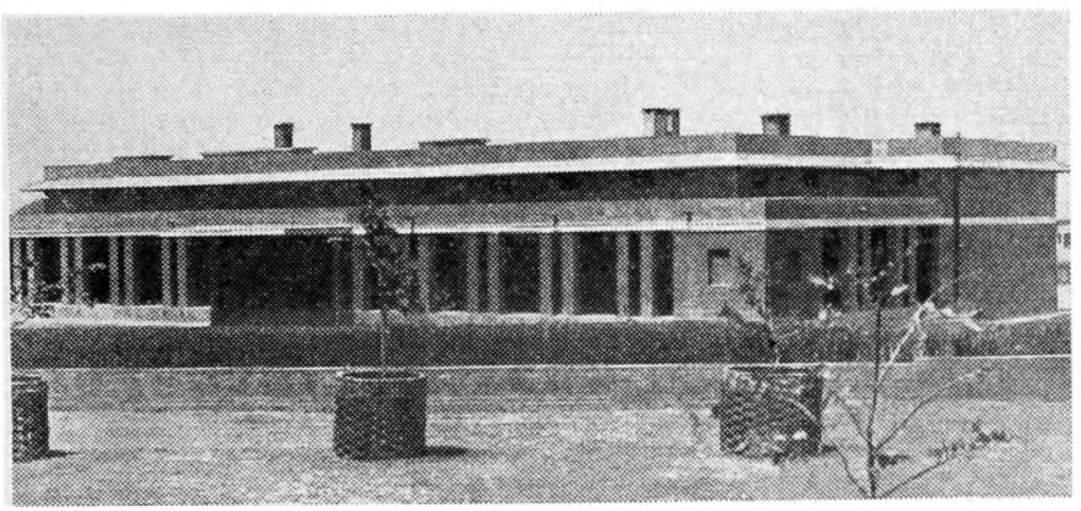
Chemical Examiner, Custom House, Madras.

Chemical Examiner, Opium Factory, Ghazipur.

Assistant Chemical Examiner, Central Revenues Control Laboratory, New Delhi:

Rs. 300–20–500.

examinations in certain classes of court cases and advice on problems connected with indigenous alcoholic preparations, etc., for a number of Indian States, Provincial Governments and Centrally Administered Areas, (*iii*) the purification of contraband cocaine for sale to Indian Medical Store Depots, (*iv*) appeal cases from Custom Houses and the Central Board of Revenue and (*v*) control analyses for the ports, the Central Revenues Control Laboratory serves a number of other functions of which the following will give some idea.



Central Revenues Control Laboratory, New Delhi

Hydrometers are standardised for the port laboratories and a gold-plating plant has been installed in the workshop for re-conditioning brass instruments and balance-weights not otherwise damaged.

A number of laboratory investigations have been carried out in connection with the factory processes and the storage of opium at Ghazipur, such as the determination of oil in Malwa opium, the deterioration of opium on storage, the investigation of opium alkaloids and their derivatives used in medicine, *e.g.*, the manufacture of codeine, dionin, heroin and apomorphine, the possibility of the extraction of papaverine from marc of opium on a commercial basis and an attempt to separate opium into analysable fractions by the chromatographic method.

From time to time, technical notes are issued to port laboratories on the uniformity and standardisation of analytical methods on such diverse subjects as the determination of denaturants in imported spirits, the testing of kerosenes as regards their suitability as illuminants, the quantitative examination of paints, dyes, mixed fabrics, gold and silver plated articles, paper, extreme pressure lubricants, explosives, asphalts and refractories. A field of endless variety is the examination of imported preparations with fancy names in order to determine their description in terms of the Tariff, and sometimes to detect infringements of the Merchandise Marks Act.

Problems concerning various products in the sugar and nitre industries, the utilisation of bitterns salt from Sambhar in various manufactures, the examination of the East Lake salt deposits at Sambhar particularly with respect to the formation and amount of crystal salt available, the specification for marketable Khewra gypsum, the analyses of country-made soaps in connection with duty-free salt concessions, the denaturation of salt for various industrial purposes and the determination of these denaturants after admixture are among the types of scientific work conducted for the Collector of Central Excises and Salt, North Western India, in the Central Revenues Control Laboratory in New Delhi.

While research work, as such, is not a major function of the Control Laboratory, original papers have been published from time to time on chemical problems successfully investigated. Chemists at the Board's other laboratories also make occasional contributions to scientific journals though there is little opportunity for such work at the ports.

Occasionally, an analyst is trained for a

Provincial Government or for one of the Board's Laboratories.

A number of enquiries are received from various official sources, asking for technical advice, often requiring experimentation in the laboratory or in the design or equipment of laboratories and it has been possible, with the approval of the Board, to accept a limited amount of such consultative work.

Recently, in conformity with the decision taken at the Excise Commissioners' Conference, 1937, the Provinces requested the Central Board of Revenue to prepare a schedule of potable alcoholic medicinal preparations which might be used for other than medicinal purposes with a view to imposing a Provincial Excise Duty on such preparations higher than that levied on other spirituous medicines. The lists were prepared by the Chief Chemist after consulting a number of authorities and have been generally accepted by Provincial Governments and the Indian States.

There is also a considerable volume of work in connection with controversial cases, the revision of regulations and schedules of drugs, etc., and advice to the Central Board of Revenue on technical problems connected with Customs assessment, Central Excises problems and the Opium Factory at Ghazipur.

From the foregoing short account of its work, it will be seen that the functions of the Control Laboratory are very comprehensive. In addition to being Director of the Laboratory, the Chief Chemist visits the Custom Houses and the Opium Factory to inspect the laboratories and advise on their equipment and scientific work. He also visits the salt sources and sugar, leather and other factories, etc., in connection with the departments of Central Excises and Salt.

The Central Revenues Control Laboratory was opened by the Hon'ble Sir Jeremy Raisman, C.S.I., C.I.E., I.C.S., Finance Member to the Government of India, on April 5th, 1940, in the presence of a number of distinguished visitors.

SCIENCE AND INDIAN INDUSTRY

INDUSTRIAL researches, covering a wide range of technical and scientific subjects, are described in the Annual Report of the Industrial Research Bureau for the year 1939–40.

The research work of the Bureau, carried out by the Research Branch at the Government Test House, Calcutta, comprised work on the improvement of paints, the manufacture of efficient dry-cells, the utilisation of vegetable oils as lubricants or fuels in internal combustion engines, investigations to aid the glass industry, and many other items of practical industrial value.

A wide range of industrial information was collected and supplied to private concerns, individuals, and Government departments. The Bureau also published a series of Bulletins on various subjects such as Indian refractory clays, titanium oxide recovery, the manufacture of liquid gold and of china glass for use in the ceramic and glass industries, and the utilisation of Indian vegetable oils as lubricants or fuels in engines. Arrangements were made for the publication of bulletins on the leather, handloom, and silk industries and on other industrial subjects.

Other activities of the Bureau were connected with the development of improved glass-melting furnaces and pots, the production in India of the materials necessary for the preparation of bakelite type and shellac moulding powders, artificial silk manufacturing possibilities, and numerous industrial enquiries.

The staff and consequently the activities of the Bureau suffered considerable curtailment at the outbreak of war, but the Bureau, including the Research Branch, were subsequently merged into the recently formed organisation of the Director of Scientific and Industrial Research, by which this kind of work is being continued on a larger scale.