



Government of Bengal

Department of Public Health and Local Self-Government

Report of the College of Pharmacy Committee 1938-39

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Report of the College of Pharmacy Committee, 1938-39.

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Report of the College of Pharmacy Committee, 1938-39.

PART I—REPORT.

Section I—Introductory.

CHAPTER I.

Genesis of the Committee.

On the 14th of January 1938, Dr. D. E. Anklesaria, a retired Assistant Surgeon and an influential medical practitioner of Ahmedabad, addressed a letter (see Appendix A) to the Secretary to the Hon'ble Minister of Local Self-Government, Medical and Public Health Department, Government of Bengal, offering a donation of two lakhs of rupees under certain conditions with the object of founding a College of Pharmacy in Calcutta.

The Government of Bengal after considering the implications of the proposal and after unofficial consultations with Government experts, decided to appoint an expert Committee for consideration and advice regarding certain matters connected with the proposal for the establishment of a College of Pharmacy. Thereupon, the Government of Bengal, Department of Public Health and Local Self-Government (Medical) issued the following resolution (No. 1-T.Medl.), dated the 12th October 1938, appointing the present Committee:—

“A proposal has been made by Dr. D. E. Anklesaria, Retired Assistant Surgeon of Ahmedabad, for the establishment of a College of Pharmacy in Calcutta for the training of pharmaceutical chemists according to the standard of the British Pharmaceutical Society, London, and of such British Universities as grant a degree in Pharmacy. Dr. Anklesaria has offered to make a donation of Rs. 2 lakhs towards the above scheme on the following conditions, viz. :—

- (i) The Government of Bengal should contribute an equal sum of Rs. 2 lakhs for construction of building and laboratory on a suitable land, to be given free by Government, and equip them with modern pharmaceutical apparatus and plant.
- (ii) Government should undertake to bear all recurring expenses of the institution.
- (iii) The entire teaching staff shall be Indian except that (a) the Principal and (b) the Professor for teaching Pharmaceutics, Pharmacology and Pharmaceutical Chemistry may be non-Indians so long as properly qualified Indians possessing the requisite qualifications for these two posts are not available.

- (iv) The course should be one of three or four years after the passing of the Matriculation Examination and the College should grant a diploma in Pharmacy, a degree in Bachelor of Pharmacy being granted by the Calcutta University.
- (v) In order to provide employment for the qualified Pharmaceutical Chemists, the Government of Bengal should enact that no Chemist's and Druggist's shop can be conducted except by a qualified chemist.

2. The terms of reference to the Committee will be as follows:—

- (i) to investigate the necessity of establishing a College of Pharmacy in Bengal;
- (ii) to report on the syllabus and course of study and the staff that would be necessary;
- (iii) to report on the total expenditure, capital and recurring, involved in the proposal;
- (iv) to enquire into the necessity and feasibility of legislation with a view to ensuring that only qualified Pharmaceutical Chemists should conduct Chemists' and Druggists' business, and make recommendations.

3. The Committee will be composed as follows:—

President.

- (1) Bt.-Col. R. N. Chopra, C.I.E., K.H.P., M.A., M.D., Sc.D. (Cantab.), F.R.C.P. (Lond.), I.M.S., Director and Professor of Pharmacology, School of Tropical Medicine, Calcutta.

Members.

- (2) One member to be nominated by the Calcutta University. Dr. B. C. Roy, M.D. (Cal.), M.R.C.P. (Lond.), F.R.C.S. (Eng.), F.S.M.F. (Bengal), member of the Syndicate and Senate of the Calcutta University was later nominated. (Letter No. 143 Medl., dated the 27th January 1939.)
- (3) The Professor of Pharmacology, Carmichael Medical College, Calcutta, Prof. B. N. Ghosh, M.B.E., F.R.F.P. & S. (Glas.), L.M. (Dub.), F.R.S. (Edin.), F.S.M.F. (Bengal).
- (4) Mr. J. L. Bell, M.P.S. (Lond.) Manager, Messrs. Smith, Stanistreet & Co., Convent Road, Entally, Calcutta.
- (5) Dr. B. Mukerji, M.B. (Cal.), M.D., D.Sc. (Mich.), Pharmacologist, Biochemical Standardisation Laboratory, All-India Institute of Hygiene and Public Health, Calcutta.
- (6) Dr. J. C. Aich, M.B. (Cal.), M.R.C.P. (Edin.), D.T.M. & H. (Lond.), Teacher of Materia Medica, Campbell Medical School and Physician, Campbell Hospitals, Calcutta.
- (7) A medical practitioner of experience and repute to be nominated by the Government—Sir U. N. Brahmachari, Kt., M.A., M.D., Ph.D. (Cal.), was later nominated. (Letter No. 182 Medl., dated the 3rd February 1939.)

4. No remuneration shall be paid to any of the members for the above work and no financial commitment, direct or indirect on behalf of Government shall be incurred in respect of the constitution and work of the above Committee. The Committee, will, it is hoped, submit its report to the Government within a period of six weeks."

Under resolution No. 142Medl., dated the 27th January 1939, the Government were pleased to appoint the following gentlemen as additional members on the Committee, viz. :—

- (1) Mr. Premananda Das, Ph.C., M.S. in Phar. (Mich.), Bacteriologist (Harvard), M.A.Ph.A., F.C.S. (Lond.), Organising Secretary, Bengal Pharmaceutical Association, Calcutta.
- (2) Lt.-Col. T. C. Boyd, M.R.C.P.I., F.R.C.S.I., D.P.H., F.I.C., I.M.S., etc., Superintendent, Medical College Hospitals, and Principal, Medical College, Calcutta, and in his absence, Dr. P. De, B.Sc., M.B. (Cal.), F.R.C.P. (Edin.), Professor of Physiology, Medical College, Calcutta.

Under resolution No 648Medl., dated the 29th March 1939, Dr. B. Mukerji, was subsequently appointed to act as the Secretary to the Committee.

CHAPTER II.

Procedure.

Though the resolution appointing the Committee was notified on the 12th October 1938, the Committee could not assemble before the 15th January 1939. There was some delay in receiving intimation from the University of Calcutta and the Government respectively of the nomination of Dr. B. C. Roy and of Sir U. N. Brahmachari. The formal appointment of the Secretary was not received until the 29th March 1939. But, all this was not allowed to hinder or postpone the preliminary work of the Committee. With the help of Dr. B. Mukerji (later appointed Secretary), the President carried on a large amount of correspondence, both locally and abroad, with the object of gaining information calculated to throw light on the work of the Committee. To elicit the opinion of the pharmaceutical profession, trade and industry who are likely to be vitally interested in the proposal, the President asked the Bengal Pharmaceutical Association, the most influential pharmaceutical organisation in Bengal, to appoint a special sub-committee to go into the question of the advisability of establishing a College of Pharmacy in Calcutta and to submit a memorandum, if possible, embodying the Association's viewpoint on the matter. All these steps taken before the formal initiation of the whole Committee facilitated the subsequent course of the enquiry greatly.

The entire Committee formally set to work on the 15th February 1939. In the meantime the memorandum prepared by the Bengal Pharmaceutical Association was received and this was circulated to all the members concerned to form a basis for discussion on the various terms of reference to the Committee. Altogether 10 meetings were held at the School of Tropical Medicine, in all of which the President was present to guide the deliberations. After the sixth meeting it was felt that in order to give final shape to the details of the proposals regarding the syllabus course of study, staff, etc., involved in the second term of reference, a special sub-committee should be constituted consisting of some members of the Committee and a few outside experts, who by virtue of their experience and association with teaching and research institutions, are particularly qualified to speak with authority on the course of study and the working hours for students, going to be recommended for the proposed College. The following gentlemen were accordingly nominated to serve in this sub-committee:—

- (1) Prof. B. N. Ghosh, M.B.E., F.R.F.P. & S., L.M., F.R.S.E., etc.—
Chairman.
- (2) Dr. J. C. Aich, M.B., D.T.M. & H., M.R.C.P.E.
- (3) Dr. B. Mukerji, M.D., D.SC.—*Secretary.*
- (4) Rai Bahadur K. N. Bagchi, B.Sc., M.B., D.T.M., F.I.C., etc.,
Chemical Examiner to the Government of Bengal, and Professor of Chemistry, Medical College, Calcutta.

- (5) Dr. I. B. Bose, ph.D. (Berlin), Pharmaceutical Chemist, Biochemical Standardisation Laboratory, All-India Institute of Hygiene and Public Health, Calcutta.
- (6) Prof. S. R. Bose, M.A., Ph.D., F.N.I., Professor of Botany, Carmichael Medical College, Calcutta.
- (7) Dr. H. K. Mookerjee, D.Sc. (Lond.), D.I.C., etc., Professor and Head of the Department of Zoology, University College of Science, Calcutta.

The sub-committee held six sittings in the office of the Secretary at the Biochemical Standardisation Laboratory, All-India Institute of Hygiene and Public Health, Calcutta, and finally drafted the syllabus and course of study including all the necessary details for the proposed College. The Committee desires to record its appreciation of the valuable help it received from the members of the sub-committee which has materially facilitated its work.

A questionnaire was prepared and circulated to certain individuals and associations, specially qualified to help in the solution of the questions which engaged the attention of the Committee. Replies to the questionnaire were received from most of the individuals and bodies addressed. To supplement the views expressed in their replies to the questionnaire, the following gentlemen were invited for oral evidence and they co-operated in every way by presenting themselves before the Committee and clarifying some of the points on which their opinions were sought. Many of them further furnished the Committee with additional memoranda. The Committee acknowledge their indebtedness to all the following gentlemen for the extremely valuable and material assistance which they rendered at considerable personal inconvenience and sacrifice of their time:—

- (1) Mr. S. N. Bal, Ph.C., B.S., M.S. in Phar. (Mich.), Officer-in-charge, Industrial Section, Indian Museum, and Chairman, Educational Council, Bengal Pharmaceutical Association.
 - (2) Prof. S. Ghosh, M.Sc. (Cal.), D.Sc. (Edin.), F.I.C. (Lond.), Professor of Chemistry, School of Tropical Medicine, Calcutta.
 - (3) Dr. J. C. Gupta, M.B., Assistant Professor of Pharmacology, School of Tropical Medicine, Calcutta.
- [Nos. 1, 2 and 3—Representing Pharmaceutical Education.]
- (4) Mr. J. C. Ghosh, B.Sc. (Manch.), F.C.S. (Lond.), Principal, School of Chemical Technology, Calcutta.
 - (5) Mr. K. K. Acharjee, Chairman, Pharmacist's Section, Bengal Pharmaceutical Association, Calcutta.
 - (6) Mr. B. N. Dey, Secretary, Pharmacist's Section, Bengal Pharmaceutical Association, Calcutta.
 - (7) Mr. N. N. Ghosh, Assistant Secretary, Bengal Pharmaceutical Association, Calcutta.

[Nos. 4, 5, 6 and 7—Representing Pharmaceutical Profession.]

- (8) Mr. R. D. Lemmon, Managing Director, Martin & Harris, Ltd., Lal Bazar, Calcutta.
- (9) Mr. J. N. Lahiri, M.Sc., Manager, Bengal Chemical and Pharmaceutical Works, Ltd., Calcutta, and Vice-President, Indian Chemical Manufacturers' Association.
- (10) Mr. Md. Hanif, Managing Director, Bharat Chemical & Laboratory Works, Ltd., and member, Chemical Manufacturers' Association, Calcutta.

[Nos. 8, 9 and 10—Representing Pharmaceutical Trade and Industry.]

Through the courtesy of Prof. J. H. Burn, late Dean of the College of the Pharmaceutical Society of Great Britain and now Professor of Pharmacology at the University of Oxford, it was possible to submit a preliminary draft syllabus drawn up by the Committee before the present Dean, Mr. H. Berry and the present Secretary and Registrar of the Pharmaceutical Society, Mr. Hugh N. Linstead, O.B.E., for their opinion and for any criticisms and suggestions that they might like to offer. If the question of reciprocity between the Indian and London qualifications arises at some future date, as is likely, the opinions of these gentlemen would naturally have great weight. The Committee wishes to express its sincere gratefulness to Prof. Burn for his help in putting the Committee in touch with Mr. Berry and Mr. Linstead, and to both these gentlemen for their ungrudging help in going through the syllabus and in suggesting modifications and improvements. The Committee has profited greatly from their remarks. Mr. Linstead has further submitted a very valuable memorandum which has been of great assistance to the Committee in drafting their report (Appendix C).

The Committee was fortunate in securing the services of Dr. B. Mukerji as Secretary. His experience of committee work gained while he was associated with the Drugs Enquiry Committee of the Government of India as its Assistant Secretary (1930-31), stood him in good stead both in the organisation of the work involved and in the drafting of the report. We wish to record our sense of high appreciation of the services rendered by him.

CHAPTER III.

Importance of the Enquiry.

Origin of Pharmacy.—To appreciate fully the aim and scope of the enquiry set before us, it is necessary to indicate the origin, evolution and significance of the term "Pharmacy". The origin of pharmacy is lost in antiquity, but it is probably as old as the practice of medicine itself. References to the art of preparing and mixing ointments, lotions and fragrant unguents in some form or other are found in ancient Indian and Chinese literature and also in Egyptian inscriptions (Ebers papyrus, 1500 B.C.). The word "pharmacy" however is of comparatively recent origin and is derived from the Greek word "pharmakon" meaning "the use of a drug, potion, spell or witchcraft," and the familiar Rx (meaning "recipe"), which physicians still use to head their prescriptions, was originally an invocation to Jupiter. The Egyptians attributed the medicinal virtues of plants to spirits that dwelt within them, and prescriptions dispensed by the priests of Isis to the sick were often accompanied by incantations and spells. Astrologers of Middle Ages believed that plants, animals, and minerals were under the influence of planets and named them accordingly—lead was named "Saturn", iron, "Mars", etc. Silver was used in the treatment of lunacy because it was dedicated to "Luna", the Moon. By slow degrees through several centuries, sorcery lost the confidence of the people, and loathsome mixtures and concoctions of toads and vipers, which used to be administered to patients in sick bed, disappeared as a result of reason and research. When the modern science of chemistry finally replaced alchemy, the art of compounding was separated from the art of prescribing. In course of time, the preparation of drugs and medicines reached a scientific basis, standard books of reference for drugs called the "pharmacopoeias" were introduced, and the practice of pharmacy became a specialised field of science. Pharmacy, as it is understood to-day, comprises the science and art of preparing from crude vegetable, animal, and mineral substances and chemicals, materials in suitable and convenient form for use as drugs, the compounding of drugs, the dispensing of drugs and medicines according to the prescriptions of physicians, and their distribution in other ways. The province of pharmacy, in fact, extends through all the stages in sequence which carry drugs or medicines from their original source to the actual consumers or patients. As practised in all of its branches, pharmacy embraces the collection, identification, preservation, analysis, and standardisation of drugs and medicine, the synthesis of medicinal chemicals, and the preparation of biological products.

Evolution of Modern Pharmacy.—With the development of modern medicine and science, the realm of pharmacy has increased considerably. The science of pharmacology, chemistry and physiology has advanced with rapid strides and has practically changed the very foundations of the present-day materia medica; pharmacopoeias have been revised and newer editions brought out; various tests for the identity and purity of chemicals as well as newer methods of standardisation and assay have

been introduced. In place of crude preparations and galenicals of unknown strength, purified active principles have come into the field. Various synthetic products of the laboratory for defence against disease and infective conditions (chemotherapeutic agents) have been discovered. The introduction of biological, organometallic, endocrine and vitamin products has made a number of substances available for use in therapeutics. The preparation and manufacture of these substances required in modern medical practice could not possibly be accomplished in the insignificant and ill-equipped drug stores that existed in the days of the ancient pharmacists who dealt with only a few crude drugs of vegetable and animal origin and in a few decoctions brewed in their own premises. Many functions in the pharmaceutical field have therefore gradually been absorbed by drug manufacturers. The individual pharmacist no longer makes up in his laboratory all the pills, elixirs, tinctures, extracts and the multitude of other preparations which physicians prescribe, but purchases from the manufacturers many of the ingredients which he dispenses on prescription. This does not however indicate that the function of the pharmacist has essentially changed, but the base of many of his operations has been moved from the laboratory of the drug store to the laboratory of the manufacturer.

The retail pharmacist, that we come across in the drug stores every-day, is therefore to be looked upon as a specialist in one particular phase of modern pharmacy to the virtual exclusion of all others. His speciality—the compounding of prescriptions and the preparation and dispensing of drugs and medicines—is the distinctive service now associated in the public mind with the pharmaceutical profession in this country. It should not be forgotten however that the other pharmaceutical services which are intimately associated with the province of pharmacy and which fall legitimately within the scope of the modern pharmacist include manufacturing (chemical, pharmaceutical and biological), wholesale distributing of drugs, drug collecting and identifying, laboratory analysis of drugs, teaching of pharmacy and allied subjects, administration and enforcement of laws for ensuring a supply of drugs of proper quality and for preventing drug adulteration.

Pharmacy: Its relation to Medicine and Public Health.—The important part which the pharmacists play in matters regarding public health will be appreciated if we consider their intimate relationship with the practice of medicine in every-day life and in health matters. The pharmacists are the custodians of drugs and are intimately associated with all the phases concerned in the production and distribution of drugs. Much therefore depends on their efficiency and technical ability. The busy practising physician or surgeon has no time at his disposal to dispense his own medicine, as he used to do ages ago; the wider scope of medicine as a science also makes it almost impossible for him to devote time systematically to the study of pharmacy. Hence, in matters of drugs and their dispensing and preparation, the physician will have to depend more and more on the co-operation, advice and guidance of the pharmacist. The growth of civilisation has further introduced various types of trickery and fraud in the sale and distribution of drugs. The modern pharmacist, with his intimate knowledge of the chemical and physical properties of the drugs, is expected to analyse and standardise them and thus help in maintaining their quality and potency for safe public consumption. and reliable therapeutic results.

The demands made upon the scientific knowledge and technical skill of the modern pharmacist, therefore, can be easily appreciated. Pharmacists should no longer remain content with learning the art of compounding and dispensing and with being simply purveyors of "patent medicines", food products, or tinned provisions. They should keep themselves conversant with all the phases of development in physical, chemical and biological sciences that fall legitimately within their scope so as to be able to do justice to their profession and to practise it intelligently. Pharmacy has now grown to be an applied science, the extent and utility of which is not fully recognised in this country. The labour of these workers is not less complicated and arduous than that of other workers in the scientific field. The modern pharmacist therefore, can no longer remain satisfied or even be safe with the limited training of the past. The need for pharmacists to advance their knowledge and educational qualification has never been so great as it is to-day, as they are responsible for the dispensing of products of great potency. It is essential that this should be recognised and that by their training, pharmacists should be fully prepared to meet the modern requirements of their profession.

Section II—The Enquiry.

CHAPTER I.

Need for a College of Pharmacy in Bengal.

We propose in this chapter to examine the first term of reference to the committee, viz., the necessity of establishing a College of Pharmacy in Bengal. To give an opinion on this question, it is necessary and desirable to enquire first into (a) the existing system of pharmacy training, (b) the institutions and other agencies where pharmacy training is imparted, and (c) the educational qualifications and status of the pharmacists practising the profession in Bengal. A comparison with the organisation of pharmaceutical training and the status of the profession in other countries will then provide us with the necessary data for judging whether an improvement in the present system is called for and if so, how this improvement can be achieved by creating an independent institution for pharmacy in the province.

(a) **System of Pharmacy training in Bengal.**—In Bengal, and for that matter in practically all the provinces of British India, there is no satisfactory arrangement for imparting a proper training in pharmacy, in the sense in which the word is used in Western Countries. There is no independent or Governmental body primarily set up for the organisation and management of pharmacy, as is the case with medicine or nursing, for example. The State Medical Faculty of Bengal is authorised to look after both the training and registration of compounders (pharmacists). Before the year 1928, a prospective student wishing to take up pharmacy as a career was required to undergo a course of study and instruction extending over a period of one year only. No preliminary qualification was enjoined and anybody with even the poorest educational background could hope to be a "Compounder". This was obviously a very unsatisfactory state of affairs and a source of grave danger to the public particularly when it was considered that these "Compounders" were given full liberty to "compound, dispense and sell" potent poisons and narcotics. In July 1928, the State Medical Faculty completely overhauled the system of training of compounders and introduced a better and more advanced type of training which is now in operation. A preliminary educational qualification of the standard of a Matriculation Examination of a recognised Indian University or an examination accepted by the Faculty as equivalent thereto was made obligatory on all entrants to the course of training. The course of training as prescribed by the Faculty is given below:—

"The training shall be of two years' duration, distributed in the following manner:—

(a) The first year of training shall be spent at some specified institution during which period instruction will be given in materia medica, in reading prescriptions and writing labels from prescriptions, in the laws regulating the sale of poisons, in doses, incompatibilities and the recognition of drugs and in practical pharmacy. In

every institution, in the course of one year, a minimum of 50 lectures, 50 demonstrations and 100 practical classes will be held. Every student should attend at least 75 per cent. of the total number of lectures, demonstrations and practical classes held. This course of training will be followed by the first examination at which he must obtain at least 50 per cent. of the total marks and not less than 50 per cent. of the marks allotted to the practical part of the examination.

(b) The second year of training will be taken after passing the first examination and will consist of an apprenticeship for a period of one year in a chemist's or druggist's establishment, or hospital or charitable dispensary which has been already duly recognised for this purpose or may hereafter be recognised by the Governing Body of the State Medical Faculty of Bengal. The Governing Body will fix the number of apprentices who may be under training at any one time in each establishment or institution."

The Drugs Enquiry Committee appointed by the Government of India in 1930-31 very carefully examined the syllabus and course of study prescribed for the training of pharmacists (compounders) all over India including those of Bengal and came to the conclusion that the system was utterly inadequate in the light of modern developments in the field of pharmacy and could not possibly turn out men who could be relied upon to carry out the responsibilities attached to the profession of a modern pharmacist. The All-Bengal Compounders' Association (the nucleus of the present Bengal Pharmaceutical Association) made repeated representations to the authorities of the State Medical Faculty to improve the syllabus of studies and the course of training of compounders in such a way as to bring them in line with the recommendations made in the Report of the Drugs Enquiry Committee. In 1934, this Association submitted a draft syllabus to the Faculty and sent a deputation to wait on the members of the Governing Body asking for a reconsideration of the system of training in vogue for the compounders. In response to this demand, a sub-committee was appointed by the Faculty consisting of the following members:— Colonel R. N. Chopra, I.M.S., (Chairman), Colonels A. D. Stewart, F. C. Boyd and H. E. Murray, Dr. U. P. Basu and Dr. Sundari Mohon Das to enquire into the present system of training and to make recommendations. After a thorough enquiry, the sub-committee reported as follows:—

“(a) That the change in the training of compounders brought about in 1928, e.g., increasing the course of training to 2 years (in place of one year) was essential and that the economic condition of the students is in no way opposed to it.

(b) That although the period of training was increased, the actual instruction has not been materially altered and the training during the second year is very unsatisfactory.

(c) That the state of affairs should be remedied as soon as possible.

(d) That most of the two years of training be spent in a proper educational institution, though there should be no objection to a part of the training in practical compounding being done in recognised dispensing establishments.”

This sub-committee further drafted a syllabus in the light of the recommendations of the Drugs Enquiry Committee which was approved

by the Faculty and submitted to the Government of Bengal for necessary action. No definite steps have yet been taken by the Government to give effect to these proposals.

(b) **Institutions for pharmacy training.**—There are no separate institutions for pharmacy training as such in the province. At present the training of compounders is carried on in some of the medical schools like the Campbell Medical School, Calcutta, the Mitford Medical School, Dacca, the Lytton Medical School, Mymensingh, the Ronaldshay Medical School, Burdwan, the Chittagong Medical School, and in a few missionary hospitals operating in the province like the Medical Mission Hospitals at Ranaghat, Kalna, Krishnagar, (female candidates only) and Kalimpong and the London Missionary Society's Hospital, Jiagunj, Murshidabad. There is usually no separate teaching staff or separate laboratory facilities provided for students in most of the above institutions. The teacher of materia medica in the medical schools is entrusted with the supervision of these students and the demonstrator of materia medica is responsible for teaching both the theoretical and the practical aspects of pharmacy in addition to his own duties.

As the teachers are not primarily employed for the pharmacy students and as they have other responsible duties to perform, the teaching naturally suffers from lack of adequate attention. Students are often left to pick up whatever they can of practical pharmacy and dispensing under the guidance of "compounders", who cannot themselves pretend to any high degree of proficiency. In some of the smaller institutions, the state of affairs cannot be described as anything but chaotic. There is seldom any systematic course of training and almost nothing in the way of equipment for demonstration or practical work in the various branches of pharmacy. At the expiry of the first year at these institutions, the successful candidates generally go out and get themselves attached to some drug store or retail establishment.

The "apprenticeship" training according to the Faculty regulations should be taken in some recognised chemists' and druggists' establishments. In actual practice however this provision exists only in letter, and can seldom be enforced. There are so few pharmaceutical establishments in Bengal of high standing who employ really qualified pharmacists, capable of guiding the student-pharmacists in their practical work that it is often impossible for many to secure a suitable "apprenticeship engagement." The result is that most of the would-be compounders are forced to get themselves attached to any type of store doing wholesale and retail trade in drugs and to spend a whole year of apprenticeship without having much opportunity of practical experience in dispensing and operative pharmacy. Not uncommonly they unlearn or forget the principles of theoretical pharmacy that was taught in the teaching institutions. It will appear, therefore, that the existing arrangements for the training of compounders in the various medical schools and other institutions are very poor and are hopelessly inadequate.

(c) **The profession of pharmacy in Bengal.**—The Drugs Enquiry Committee (1930-31) investigated very carefully the status and conditions of the profession of pharmacy in India including Bengal and opined, that "There is no organised and self-contained profession of pharmacy in India in the sense in which it exists in other parts of the world. The profession here is represented by a set of people known as "compounders" whose status, functions and duties are ill-defined and

improperly understood. They carry on compounding, dispensing and selling of drugs and chemicals from day to day. They handle drugs and poisons with the utmost ease and freedom and in many cases, in ignorance of their properties and potency. They also work as dressers and laboratory assistants in some of the hospitals and dispensaries. Anaesthetists and operation assistants are sometimes drawn from their ranks. In some place, they pose as "physicians and surgeons". The picture presented above is unfortunately too true and during the last 8 or 9 years that has elapsed since the publication of the Report of the Drugs Enquiry Committee, there does not seem to be any indication towards a change for the better. There is no gainsaying the fact that in Bengal there is no clear division of labour between the physician and the pharmacist and that the compounders associate themselves with work of a very heterogenous nature. A correct conception of the nature of the profession of pharmacy and its functions and importance in the health service of the country does not yet seem to be appreciated by either the members of the profession or the public.

Status of pharmacy in progressive countries.

Pharmacy has attained a very high standard of development in most of the Western Countries and is considered to be a noble profession and an essential public service. It has come to be recognised as an important branch of applied science and highly equipped independent institutions for imparting training in pharmacy have sprung up in almost all the countries in Europe and America. Systematic courses of training are available in these "Colleges of Pharmacy", and the subject forms part of the curriculum of many universities. In Great Britain alone, there are about 20 institutions specially designed for pharmacy teaching and it takes at least a period of four years after the Matriculation to obtain the minimum pharmaceutical qualification. Degrees in pharmaceutical chemistry are also conferred by the universities of London, Manchester, etc. In the continent of Europe, pharmacy as a profession is even better developed than in Great Britain and the system of training is also of a fairly high standard. The preliminary education required of a pharmacist in Germany, for example, is six years "gymnasium" work (the "gymnasium" may be considered as almost equivalent to our school final examination). To become a *master pharmacist* in independent charge of dispensary, one is required to be a graduate of a two-year University course in pharmacy. Almost all the universities have pharmacy faculties and offer higher degrees in pharmacy. In the United States of America, there are sixty-nine schools and colleges now offering courses in pharmacy leading to a degree. Most of the colleges of pharmacy require from the prospective entrants, "evidence of the satisfactory completion of four years of high school work or its equivalent". Since 1932, the curriculum for graduation requires not less than 3,200 hours of instruction, including at least 1,300 hours of lectures and recitations and at least 1,300 hours of laboratory work, to be given within a period of not less than four full college years of at least 32 weeks each. A degree of "Master of Science in pharmacy" and a degree of "Doctor of Science in pharmacy" are given in many of these Colleges for successful completion of advanced studies in pharmacy. It is not necessary to refer in detail to the qualifications enjoined by the State in some of the other progressive countries. The educational standard required of a pharmacist before he is allowed to hold a licence to practice in countries like

Belgium, Denmark, Norway, Sweden, Finland, France, Switzerland, Spain, Portugal, etc., are almost identical with those existing in Germany. In Russia also, a strict system of training has to be gone through before a pharmacist is recognised by the State. In the Far East, Japan has modelled her pharmaceutical education on the lines of Germany and most of the universities in Japan are provided with special chairs in pharmacy. In Canada, South Africa and Australia, pharmacy training and institutions for research or promotion of pharmaceutical teaching are just as well developed as in Great Britain.

A comparison of the conditions existing in India with those of other civilised countries leaves little room for doubt about the deplorable state of affairs in which pharmacy finds itself in this province as well as in the whole of India. Pharmacy is definitely a neglected profession and the advantages accruing from the promotion of pharmaceutical education have not been sufficiently appreciated. Not only is there no provision for imparting a higher training in pharmacy calculated to turn out a superior class of people belonging to the category of "Graduate Pharmacists" or "Pharmaceutical Chemists" of foreign countries, but also the system of training for the "compounders" is not at all commensurate with the duties and responsibilities attached to their calling.

If the present needs of the country in the matter of an efficient pharmaceutical service are to be adequately met, there cannot be any two opinion that the training of the present-day compounders (pharmacists) should be urgently improved. It seems also desirable to institute an advanced system of training in pharmacy which can produce men capable of undertaking drug manufacturing, drug analysis and similar other highly technical duties which pharmacy graduates in foreign countries are now doing. Dr. Anklesaria, the donor, has indicated that the creation of a class of highly trained pharmaceutical chemists would materially help in the development of the tremendous drug resources of this country by encouraging research towards the utilisation of the indigenous raw medicinal products. We have given careful consideration to this aspect of the question and are of opinion that the time is more than ripe when serious attention should be given to the re-organisation of pharmaceutical profession and the development of a superior grade of pharmaceutical education in the country. This will not only help the drug industry of the province in various ways but may further provide employment to a number of educated young men of the province, as was indicated by the United Provinces Unemployment Committee presided over by Sir Tej Bahadur Sapru.

We have examined very carefully the possibility of taking advantage of the existing medical schools and colleges for imparting this higher training in pharmacy as contemplated above. Mr. J. C. Ghosh, Principal, School of Chemical Technology, Calcutta, suggested that the existing medical and science colleges with possibly a slight addition of staff and equipment can be made to serve as high-grade institutions for pharmacy teaching. This will undoubtedly save both capital and recurring expenditure, but we are of opinion that such a strengthening of the existing institutions will not serve the purpose in view. Pharmacy has now grown to be an independent science with an importance and potentiality second to no other scientific study. The linking of its fate with existing medical and science colleges and schools would in our opinion be a retrograde step and may have the effect of preventing its

free growth and development, which it seems to be our clear duty to foster. Even if the existing institutions could be utilised for the purpose of imparting training for the minimum qualification required for the intelligent practice of pharmacy (e.g., Diploma in Pharmacy course), it will necessitate a complete remodelling and a thorough change of their present pharmacy laboratories, equipment and personnel. We do not think that the superior course of pharmacy training as envisaged by us can be arranged in any of the existing institutions without incurring quite as much expenditure as would be required in the launching of a new project in the shape of a separate college of pharmacy. In almost all the civilised countries, separate pharmacy colleges exist and their sphere of usefulness is sufficiently well recognised. We do not see any reason why Bengal, the premier province in India and easily the leading province in the drug manufacturing industry, should not have her own college of pharmacy. Through the generous offer of Dr. Anklesaria an opportunity has presented itself and no time should be wasted in giving concrete shape to the donor's proposals. All our expert witnesses representing the various shades of opinion of the pharmaceutical profession, trade and industry are emphatic in their demand for such an institution. We fully subscribe to these views and are unanimously of opinion that the Government should take up the project for the establishment of a College of Pharmacy in right earnest and immediately.

CHAPTER II.

Syllabus and Course of Study and Staff.

The second term of reference to the committee includes three distinct heads, namely, (a) the syllabus, (b) the course of study, and (c) the staff that would be required for the proposed College of Pharmacy. The first two heads are so intimately related to each other that it will be both convenient and preferable to deal with them together as far as possible. The question of the staff that would be necessary for the teaching, administrative, and other miscellaneous requirements of an educational institution is again bound up with the third term of reference, viz., the expense likely to be involved in the proposal, and hence this branch of the enquiry will be dealt with partly in this chapter and partly with the third term of reference in Chapter III.

(A) Syllabus and course of study.—In the first chapter, we have come to the conclusion that the present system of training of the compounders, which is hopelessly inadequate, should be replaced by a better and more thorough training which will ultimately lead to the creation of a class of people who can be relied upon to undertake confidently the responsibilities associated with the handling of potent drugs, poisons and narcotics. We have further suggested the development of another class of people who, by virtue of their superior qualification and better training, would be able to practice all the higher phases of the science and art of pharmacy. There seems some justification for encouraging and supporting this dual system of training in the pharmaceutical field. The practice of pharmacy can be separated roughly into its practice in retail pharmacies and in hospitals and manufacturing concerns. In theory, and probably to some extent in practice, the same standard of scientific training is not needed in both branches. In Great Britain, it is seen that the majority of those practising pharmacy in retail establishment possess the statutory qualification of "chemist and druggist", calling for a minimum period of two years academic training, while those practising pharmacy in hospitals and factories in the majority of cases possess either the "pharmaceutical chemist" qualification or a university degree, both requiring a three years academic course. Two years practical training is required in addition for both the "Chemist and Druggist" and the "Pharmaceutical chemist" qualifications. In formulating our proposals for the two courses of study and in drawing up the details of the curriculum, we have been largely guided by the "Chemist and Druggist" course and the "Pharmaceutical chemist" course of the Pharmaceutical Society of Great Britain. We have also drawn freely from the syllabus and course of instruction outlined for the "Bachelor of Science degree in Pharmacy" by the National Pharmaceutical Syllabus Committee of America. The "Diploma in Pharmacy" course which we have detailed below corresponds roughly with the "Chemist and Druggist" course and our "Bachelor of Pharmacy" course with the "Pharmaceutical chemist" course of Great Britain and the "Bachelor of Science in Pharmacy" course of America. The conditions, status and prospects of pharmacy training and a career in the profession are so different in India and foreign countries that the British or the American system cannot be

transplanted *in toto*. Modifications both in the length of the courses of study as well as in the subjects proposed to be taught have therefore been made to suit the peculiar conditions existing in our province.

(i) **The Diploma in Pharmacy Course.**—The Drugs Enquiry Committee (1930-31) suggested that the minimum educational requirement necessary for the practice of pharmacy in modern times was the possession of a two years' intensive course of training plus a period of apprenticeship (which may be taken along with the second year of study) in a recognised drug store, hospital or dispensary. The committee appointed by the State Medical Faculty of Bengal in 1934 also came more or less to the same conclusion and adopted with minor modifications the curriculum outlined in the above report. We have considered the whole position very carefully in the light of the evidence submitted before us by some expert witnesses and the Bengal Pharmaceutical Association and we do not find any necessity for altering materially the recommendations of the two previous committees with regard both to the length of the course of study (2 years) and the curriculum. One of our witnesses, Mr. J. N. Lahiri of Bengal Chemical and Pharmaceutical Works, Ltd., maintained that for the purpose of mere selling and dispensing drugs, such a heavy curriculum as proposed by us was not at all necessary. In view of the amount of general and specialised knowledge required of a pharmacist to-day, we however feel that for those who intend to make pharmacy, the chief calling of their lives, there should be enjoined a thorough acquaintance with the whole course of study outlined by us in the syllabus (presented below). Any piecemeal course of study would defeat its own object by encouraging cramming and weakening the scientific background of the students.

The most important difference between the syllabus drawn up by us for the "Diploma in Pharmacy" and the syllabuses recommended by the Drug Enquiry Committee and the special sub-committee appointed by the State Medical Faculty of Bengal lies in the period of "apprenticeship" enjoined for the pharmacy students. According to the previous recommendations, a period of apprenticeship for one year should be undergone along with the second year's course of study. We feel that the problem of arranging and providing apprenticeship engagements for all the students in respectable and well-equipped chemists' shop or in hospitals, dispensaries, etc., will not be as easy as previous committees thought. The simultaneous carrying on of academical training and apprenticeship duties is another objectionable feature. We have therefore divided the two years course into two periods of 9 months duration for theoretical and practical work and have allocated 3 months (both including vacations) at the expiry of each annual term for apprenticeship training. This period is obviously meagre in comparison to the previous recommendations. It must not, however, be forgotten that the gradual limitation of the pharmaceutical operations which a retail pharmacy of modern times is required or is equipped to perform is making apprenticeship in such establishments gradually less valuable as a part of the course of training in practical pharmacy. The opinion is also gaining ground in many countries, particularly among teachers, that the apprenticeship system has served its day and that it is to the school of pharmacy that the student must now look for training in manufacturing methods and extemporaneous dispensing which he at one time obtained as an apprentice in retail drug stores. An unusually long apprenticeship period therefore is not likely to do very much good in these days of rapidly changing conditions of retail pharmacies.

Some of the other noteworthy features in the syllabus presented by us are the increased emphasis on chemistry, pharmacognosy, anatomy, pharmacology and physiology, and hygiene, first aid and dressing courses. After mature deliberation we have felt that with judicious planning, it is not impossible to introduce a few extra lectures and demonstrations to the students on these subjects without unnecessarily overloading the curriculum. The advantages to be gained from the inclusion of such additional instruction are obvious. The sub-committee of the State Medical Faculty opined that the training of compounders and dressers should be completely separated, the curriculum for the latter being so designed as to be on parallel lines with those of Junior Nursing certificate examination. In view of the fact that even to-day, pharmacists are often required to assist doctors in the discharge of various duties connected with the day-to-day practice of medicine particularly in the rural areas we feel it would be a mistake to remove completely from the curriculum of the modern pharmacists a short course of training in dressing and first aid. The pharmacist that we are proposing to create will be an educated man, much superior to the present-day compounder, and he should possess some knowledge of ordinary hygiene and sanitation not only for his own benefit but for the well-being of the community of which he will undoubtedly be a useful member.

***Syllabus for the diploma course in pharmacy.**

Admission requirements, etc.—Matriculates or candidates with equivalent qualification will be eligible for admission to this course. Students with additional training in mathematics and science subjects will be given special preference at the time of admission. The candidates must be not less than 15 years of age at the date of admission. The Matriculation certificate or a certificate from the head of the institution in which the candidate last studied will alone be accepted as evidence of age.

Persons who have passed the Compoundership Examination under the State Medical Faculty of Bengal may join the Diploma in Pharmacy Course, if desired. Such students will be required to undergo training for one year only. The course of studies and special exercises which they will have to take will be decided by the Pharmaceutical Council that will be created, subject to the final sanction of the local Government.

Terms, lectures, etc.—The course of study will be for two years. A year shall be split into two terms of four and half months each, inclusive of holidays, for theoretical lectures and practical work in the institution. The last three months of the year shall be set apart for practical work either in recognised drug stores, hospitals, or manufacturing firms (apprenticeship period). If this cannot be arranged, this period may be spent in the college laboratory doing special practical

* The "Syllabus" is intended to indicate the subject-matter that may be profitably taught, the minimum amount of time that should be spent in presenting such material to the students and the examinations that should be conducted to test the professional and applied knowledge of the candidates. It is not designed to interfere with any flexibility in course of study or freedom in methods of instruction as may be thought fit by the teaching staff.

exercises under the guidance of teachers. The first term may be fixed from 1st July to 14th November and the second term from 15th November to 31st March. The apprenticeship period will therefore fall from the 1st April to 30th June of each year.

Every lecture shall cover a period of not less than 45 minutes inclusive of time allowed by the college rules for the assembling of the students. A period of practical work or class exercise or class examination of not less than 45 minutes shall be considered to be equivalent to a lecture.

No student shall be considered to have prosecuted a regular course of study in any subject for an examination unless he has attended at least 75 per cent. of the lectures delivered in that subject.

The candidates must maintain laboratory note-books for all practical classes which shall be examined and marked by the examiners. The note-books must be signed at frequent intervals by the Professor under whom the candidates work.

Class examinations, etc.—The candidate shall be required to pass an examination in each term which will generally be held in the last week of each term and shall consist of written, oral and practical examinations in which due consideration shall be given to the credits obtained by the examinees during their whole sessional work. A student failing to pass in two subjects in a term will not be promoted to the next higher class. For those who fail in one subject only, a provisional promotion to the next higher class may be permitted, provided he submits to a fresh examination in this subject during the period of the second term. Fresh attendance at theoretical lectures and practical demonstrations need not be insisted upon unless the candidates have also failed in the practical part of the test examination or have proved themselves particularly backward in sessional work. A candidate who has secured the minimum pass marks in sessional work in any subject at any examination, if re-appearing at the same examination in any subsequent term, may have his previous pass marks in the sessional work in that subject re-credited to him.

Final examination.—The final examination shall be conducted under the auspices of a Board authorised to grant the diploma. The examination shall be held twice a year and shall consist of written, oral and practical examination. Sessional work will also be taken into consideration. Diploma will be granted after passing the final examination and on satisfactory completion of at least two apprenticeship terms in a recognised institution to be decided upon by the "Pharmaceutical Council".

A candidate who fails to pass the final examination may be admitted to one or more subsequent examination provided that he has attended a fresh course of instructions to the satisfaction of the Principal of the college. After four failures, a candidate shall not be admitted to any further examination.

Fees, etc.—The fee for the final examination will be Rs. 20. A candidate who fails to pass or present himself for examination, shall not be entitled to claim a refund of the fee.

An amount of Rs. 20 will be kept as caution money, which will be adjusted against breakage and other dues if any.

Curriculum for the Diploma in Pharmacy Course, showing the distribution of subjects to be taught in each term and the number of lectures and practical classes.

					Theoretical classes per week (hours).	Practical classes per week (hours).
First year—First Term—						
1. Biology—						
(I) Botany	..	..	..	..	2	4
(II) Zoology	..	..	..	..	2	4
2. Physics	..	..	..	..	2	2
3. Inorganic Chemistry	..	..	..	..	2	2
4. Anatomy and Physiology	..	..	..	..	4	4
5. Pharmaceutical Arithmetic	..	..	..	..	1	..
			Total	..	13	16
First Year—Second Term—						
1. Physics	..	..	..	..	2	2
2. Inorganic Chemistry	..	..	..	..	2	2
3. Theory and Practice of Pharmacy	..	..	..	..	4	4
4. Pharmaceutical Latin	..	..	..	..	1	..
5. Hygiene, First Aid and Dressing—						
(i) Hygiene and Sanitation	..	..	..	..	2	..
(ii) First-Aid	..	..	..	..	2	2
(iii) Dressing	..	..	..	..	1	2
			Total	..	14	12
Second Year—First Term—						
1. Organic Chemistry	..	..	..	..	4	4
2. Pharmacognosy	..	..	..	..	3	4
3. Theory and Practice of Pharmacy	..	..	..	..	2	2
4. Dispensing Pharmacy	..	..	..	..	2	4
5. Forensic Pharmacy	..	..	..	..	2	..
6. Pharmaceutical Economics	..	..	..	..	3	..
7. Quantitative Analysis	..	..	..	..	..	8
			Total	..	16	22
Second Year—Second Term—						
1. Pharmaceutical Chemistry	..	..	..	..	4	6
2. Theory and Practice of Pharmacy	..	..	..	..	4	8
3. Dispensing Pharmacy	..	..	..	..	2	4
4. Pharmacognosy	..	..	..	..	3	4
5. Materia Medica, Pharmacology and Toxicology	..	..	..	..	4	..
			Total	..	17	22

**The Two-year curriculum for the Diploma in Pharmacy Course showing
the number of lectures and practical classes required.**

	Lecture hours.	Laboratory hours.	Total hours.
Biology—			
(i) Botany	25	30	55
(ii) Zoology	25	30	55
Anatomy and Physiology	60	30	90
Physics	60	60	120
Inorganic Chemistry	40	60	100
Qualitative and Quantitative Analysis, including clinical examination of urine .. .. .	..	120	120
Organic Chemistry	60	60	120
Theory and Practice of Pharmacy (including Pharma- ceutical Technique and Operations, Examination of Pharmacopoeial substances, etc.)	150	150	300
Dispensing Pharmacy	60	120	180
Pharmacognosy	50	90	210
Pharmaceutical Chemistry	80	60	140
Pharmaceutical Latin	20	..	20
Pharmaceutical Arithmetic	20	..	20
Pharmaceutical Economics	20	..	20
Forensic Pharmacy	30	..	30
Hygiene, First-Aid and Dressing—			
(i) Hygiene and Sanitation	30	..	30
(ii) First-Aid	30	30	60
(iii) Dressing	15	30	45
Materia Medica, Pharmacology and Toxicology	60	..	60
Total	835	870	1,705

I. FIRST YEAR—FIRST TERM.

Candidates will get instruction in the following subjects during the first term:—

- (1) Biology.
- (2) Physics.
- (3) Inorganic Chemistry.
- (4) Human Anatomy and Physiology.
- (5) Pharmaceutical Arithmetic.

The detailed study in the above subjects will be as follows:—

(1) Biology.

Theoretical.—(a) Elementary General Morphology of roots, stems, leaves, flowers, fruits and seeds of selected plants.

(b) Elementary Histology—structure and formation of cells, tissues and tissue systems. Structure and development of roots, leaves and floral organs. Glands and glandular organs.

(c) Principles of classification as illustrated by common plants and by referring plants to their natural orders.

(d) Elementary Plants Physiology, illustrated by simple experiments—Absorption of water; movement of water and gases within the plant; food materials of plants; their sources and form, digestion, assimilation and transpiration; nutrition, metabolism; reserve materials. Growth. Reproduction—sexual and asexual.

Practical.—Dissection of flowers with the help of a pocket lens, needle and a pen-knife. Simple experiments on plant nutrition, transpiration, respiration and germination.

The course shall include the drawing of parts of plants and of sections.

Part II.—Zoology.—(a) The structures and properties of the cell and the general characters and functions of the tissues including the epithelia, blood, lymph, and the nervous, muscular connective and skeletal tissues.

(b) The general structure, life-history and physiology of *Amœba* and *Paramœcium* as unicellular organisms.

(c) The general structure, vital activities and life-history of *Pheretima posthema* (Indian Earthworm) and of cockroach as invertebrate organism.

(d) The structure, life-history and elementary physiology of Vertebrate as illustrated by *Bufo* (toad).

Practical.—The dissection, microscopical examination and description of specimens or parts of the animals mentioned above.

The examination in biology shall comprise of—

(i) A written examination—one paper of three hours' duration.

(ii) An oral and practical examination.

(2) Physics.

The course in Physics shall be mainly experimental. The students will be expected to show general acquaintance with the apparatus by which elementary principles of Physics are illustrated and applied.

Theoretical.—(a) Units of measurement—length, mass, time, motion.

(b) General properties of matter—solids, liquids and gases. Elementary motions of the kinetic theory. The properties of solutions, osmotic pressure and the means of measuring it.

(c) Elasticity—Hydrostatic pressure. Syphon, Barometer and Air Pump.

(d) Heat—Expansion of solids, liquids and gases by heat. Thermometry, Calorimetry. Effects of heat on solids, liquids and gases. Transference of heat, conduction, convection and radiation. Heat and work. Working of steam engine.

Practical.—Measurement of length. Use of spirit level and plumb line. Use of balance. Verniers—linear and angular. Measurement of areas on squared paper and angles by protractors. Determination of specific gravities of solids and liquids. Reading of barometer. Determination of fixed points of thermometer.

The examination in physics shall comprise of—

- (i) A written examination—one paper of three hours' duration.
- (ii) An oral and practical examination.

(3) Inorganic Chemistry.

Theoretical.—States of aggregation of matter. Indestructibility of matter. Chemical and Physical changes. Elements and compounds. Common laboratory processes—mixture, solution, crystallisation, distillation, evaporation, precipitation, filtration, decantation, etc., Atomic theory, symbols, formulæ, equations, oxidation, reduction, valency, acids, bases and salts, neutralisation.

Study of the following:—Hydrogen, Oxygen, Ozone, Catalytic agent, allotropic modifications of elements, water, hydrogen peroxide, nitrogen, nitric acid, sulphur, sulphuretted hydrogen, sulphur dioxide, sulphur trioxide, sulphuric acid, carbon, carbon monoxide, carbon dioxide, coal gas, chlorine, hydrochloric acid, hypochlorous acid, bleaching powder, chlorate of potassium, bromine, hydrobromic acid, iodine, hydriodic acid, phosphorus, phosphoretted hydrogen, phosphorus trioxide, phosphorus pentoxide, orthophosphoric acid, silicon, silica, dialysis, composition of glass.

Practical.—Fitting up of simple apparatus, e.g., wash-bottle, water distillation, etc., Performance of experiments involving solution, filtration, distillation, crystallisation, oxidation and reduction. Simple blowpipe analysis.

The examination in inorganic chemistry shall comprise of—

- (i) A written examination—one paper of three hours' duration.
- (ii) An oral and practical examination.

(4) Anatomy and Physiology.

Part I—Anatomy—Theoretical.—(1) A preliminary knowledge of the human skeleton and its component parts.

- (2) The muscles of the body.
- (3) Heart and blood-vessels.
- (4) The spinal cord and the peripheral nerves.
- (5) Brain and the cranial nerves.
- (6) Abdominal viscera.
- (7) Kidney and the excretory apparatus.
- (8) Glands of internal secretion.

A course of demonstrations with models, charts, etc., will accompany the lectures in anatomy and physiology as far as practicable.

Part II—Physiology—Theoretical.—The structure of the blood, coagulation; the transport of oxygen and carbon dioxide.

The properties of cardiac, striated and unstriated muscle.

The mechanism of the heart and valves. The coronary circulation. The effect of the inflow and rate on the output of the heart.

The importance and maintenance of the blood pressure.

The structure of the glands of internal secretion. The effects following their removal, and the properties of extracts prepared from them including (a) pituitary body, (b) thyroid and parathyroid, (c) pancreas, (d) suprarenals, (e) testicles and ovaries.

The physiology of the alimentary tract. The chemistry of the common food substances, meat, eggs, milk and bread and properties of the digestive juices and bile. Nutrition—Deficiency diseases—Vitamins—satisfactory diet.

Practical.—Students will not be expected to do practical work for themselves but will be given practical demonstrations. Microscopical demonstrations of the structure of various tissues and organs.

The examination shall comprise of—

- (i) One theoretical examination—one paper of three hours' duration.
- (ii) An oral examination.

(5) **Pharmaceutical Arithmetic.**

A working knowledge of certain applications of arithmetic needed by the pharmacist to solve problems which arise in connection with his work in manufacturing, testing and dispensing medicine; also in connection with his study of chemistry, physics and other subjects.

Common weights and measures and their relation with each other:—Imperial, Metric, Apothecaries, Indian and United States system.

Calculation of Doses—Reducing and Enlarging Recipes. Density and Specific Gravity. Percentage solutions. Thermometric scales. Allegation. Proof spirit. Calculations of Dry Extracts. Isotonic solutions.

The examination on Pharmaceutical Arithmetic will be held along with Pharmaceutical Latin at the end of the second term (first year).

The examination shall comprise of—

- (i) Theoretical examination—half paper of one and half an hours' duration.

II.—FIRST YEAR—SECOND TERM.

Candidates will get instruction in the following subjects during the second term:—

- (1) Physics.
- (2) Inorganic Chemistry.
- (3) Theory and Practice of Pharmacy.
- (4) Pharmaceutical Latin.
- (5) Hygiene, First Aid and Dressing.

The detailed study in the above subjects will be as follows:—

(1) **Physics.**

Theoretical.—Light. Propagation and velocity of Light. Meaning of the term—luminosity, translucency, and opacity. Reflection and refraction including spectrum. Formation of images by single lens. Power of lens. Eye vision, spectacles, microscopes. Phosphorescence and fluorescence.

Electricity and Magnetism—Properties of magnet, earth as a magnet. Nature of electricity. Properties of conductors and insulators. Voltaic cells, electric current, primary and secondary batteries. Effects of current—heating, magnetic, and electrolytic.

Practical demonstrations only of the things mentioned in theoretical class.

The examination shall comprise of—

- (i) Theoretical examination—one paper of three hours' duration.

(2) **Inorganic Chemistry.**

Theoretical.—Study of the following metals (without going into metallurgical details) and their simple and important compounds commonly used in Pharmacy, such as oxides, hydroxides, chlorides, nitrates, sulphates and carbonates:—Lithium, potassium, sodium, copper, silver, gold, magnesium, calcium, barium, radium, zinc, mercury, aluminium, tin, lead, arsenic, antimony, bismuth, chromium, iron.

Practical.—Qualitative analysis of simple substances containing not more than one acid and one basic radical included in the following list:—

Ammonium, sodium, potassium, magnesium, barium, calcium, iron, copper, bismuth, cadmium, mercury, lead, and their oxides, hydroxides, chlorides, bromides, iodides, sulphates, carbonates, phosphates and nitrates.

The examination shall comprise of—

- (i) Theoretical examination—one paper of three hours' duration.
- (ii) An oral examination. (Sessional report shall also be considered.)

(3) **Theory and practice of pharmacy.**

Pharmaceutical operations.—The whole subject shall be dealt with in a simple and popular way. The lectures should, as far as possible, be illustrated with charts, or lantern slides and apparatus and accompanied by experiments and demonstrations as far as practicable.

General study of the following processes as applied to pharmacy:—

Vegetable Drugs—their collection, drying, storing, etc. Comminution of Drugs (bruising, cutting, pulverising, grinding, etc.).

Mechanical mixing. Apparatus used in heating processes. Evaporation, distillation, operations conducted under reduced pressure. Separation of liquids from solids. Filtration. Extraction processes. Expression. Osmotic pressure. Colloidal solutions. Emulsification. Methods employed in the purification of chemicals. Water content of chemicals. Refrigeration processes.

The examination shall comprise of—

(i) Theoretical examination—one paper of three hours duration.

(4) **Pharmaceutical Latin.**

It is important that pharmacist shall have some knowledge of Latin, for he must be able to interpret and understand the prescriptions, written wholly or partially in Latin, that he has to dispense.

In teaching Latin, emphasis must be placed upon those practical things that are most necessary or desirable for the pharmacist to know. Vocabularies must be limited in the main to words of pharmaceutical application. The study of verbs will be confined to a very few forms and widely used forms and phrases may be committed to memory.

The examination in pharmaceutical Latin and pharmaceutical Arithmetic will be held together.

The examination shall comprise of—

(i) A written examination—half paper of one and half and hours' duration.

N.B.—Students will be expected to obtain pass marks in each of the two subjects—Pharmaceutical Arithmetic and Pharmaceutical Latin.

(5) **Hygiene, First Aid and Dressing.**

(a) **Hygiene and Sanitation.**—Health and disease—how is good health to be obtained and retained? The formation of good and healthy habits early in life. How is disease spread?

Preliminary talk on contact disease, etc., venereal disease and leprosy. "Droplet" infections, e.g., cholera, typhoid, dysentery, etc. Diseases carried by insects, mosquitoes and house flies, e.g., malaria, cholera, etc.

Ventilation—elementary principles of ventilation importance of sunlight.

Disposal of refuse and excreta.

Personal Hygiene—skin, bathing, teeth, exercise, recreation, etc.

(b) **Principles of First Aid.**—Theoretical—General Principles of First Aid—Injuries and Emergencies—cuts, bruises, sprains, snakebite.

Fractures—Causes, varieties, signs and symptoms.

Treatment of Fracture—General rules, wounds and hæmorrhage—arterial bleeding and pressure points for compression of arteries.

Burns, scalds, etc., and their emergency treatment.

Foreign bodies in eyes, ear, nose.

Respiration—natural and artificial, asphyxia.

Insensibility—head injuries.

Transport of the injured—principles.

Preparation for the reception of accident cases.

Practical.—The triangular bandage and its application to the head, chest, back, shoulder, elbow, hand, hip, knee and foot. Arm slings (large, small and St. John). Roller bandage and its application. Application of splints. Compression of arteries in the normal subject. Artificial respiration—methods. Hand seats and stretcher exercise. Preparation of the sick bed, removing clothes, etc.

(c) **Dressership.**—In accordance with the syllabus in the Dressership course of the State Medical Faculty. This includes a study of the methods and technique involved in bandaging, preparation of antiseptic lotions, sterilization of dressings and instruments dressing of wounds, etc.

N.B.—Arrangements will be made, if possible, for the students to visit local hospitals from time to time accompanied by the teachers to get first-hand knowledge of hospital dressing.

The examination shall comprise of—

- (i) Theoretical examination—one paper of three hours' duration.
- (ii) An oral examination.

III. Apprenticeship period of three months in a recognised place of practical training or in College Laboratory under the guidance of teachers.

I. SECOND YEAR—FIRST TERM.

Candidates will get instructions in the following subjects during the first term:—

- (1) Organic Chemistry.
- (2) Pharmacognosy.
- (3) Theory and Practice of Pharmacy.
- (4) Dispensing Pharmacy.
- (5) Forensic Pharmacy.
- (6) Pharmaceutical Economics.
- (7) Analytical Chemistry.

The detailed study in the above subjects will be as follows:—

(1) Organic Chemistry.

The whole subject shall be dealt with in a very simple and popular way without going into any complicated details. The lectures should, as far as practicable, be accompanied by experiments and demonstrations. The students are expected to have only a general idea about the alkaloids, glucosides and simple synthetic drugs and are not expected to go into any chemical details.

Theoretical.—Definition of Organic compounds. Isolation and preparation of pure organic compounds. Criteria of purity; melting and boiling points. Composition of organic compounds. Detection of the elements—carbon, hydrogen, nitrogen, sulphur, phosphorus, and the halogens. Quantitative analysis. Study of the following:—

Methane, ethane, ethylene, acetylene, chloroform, carbon, carbon tetrachloride, iodoform. Alcohols—methyl, ethyl, amyl. Ethyl ether. Formaldehyde, chloral. Acetone, Acids—formic, acetic lactic, oxalic, tartaric, citric, uric, etc. Acetic ether. Fats, oils and waxes. Saponification. Carbohydrates—glucose, fructose, cane-sugar, maltose, lactose, starch, dextrin. Gums and resins. Cyanides. Aromatic compounds—sources, preparation and properties of benzene, toluene, nitrobenzene, aniline, benzoic acid, phenol, salicylic acid, pyridine. Alkaloids—nicotine, atropine, caffeine, cocaine, cinchonine, quinine, strychnine, brucine, ephedrine, morphine, codeine, emetine, Glucosides—digitalin, stropanthin, etc., Study of a few simple synthetic drugs: (aspirin, antipyrin, sulphonal, etc.).

The examination shall comprise of—

- (i) One Theoretical Examination. One paper of three hours' duration.
- (ii) An oral examination.

(2) Pharmacognosy.

Theoretical.—Study of commonly used crude drugs, their cultivation, geographical distribution, collection, identification, preparation for market. Commercial distribution, storage, deterioration and adulteration.

Practical.—Identification of crude drugs by macroscopical examination and chemical tests.

The examination shall comprise of—

- (i) Theoretical examination—one paper of three hours' duration.
- (ii) An oral and practical examination.

(3) Theory and Practice of Pharmacy.

Theoretical.—Preparation of the official Galenicals—General study of the following:—Alcohols and medicinal spirits. Extracts, tinctures, medicated waters, infusions and decoctions, syrups and allied preparations, Glycerines, powders, pills, tablets and lamellæ, capsules, lozenges and pastilles, effervescent preparations, ointments and pastes, plasters and poultices, suppositories, bougies and pessaries. Miscellaneous preparations.

Practical.—Exercises in galenical pharmacy. Preparation of tinctures, infusions, syrups, pastes, ointments, etc.

The examination shall comprise of—

- (i) Theoretical examination—one paper of three hours' duration.
- (ii) An oral and practical examination.

(4) Dispensing Pharmacy.

Theoretical.—Qualities that a dispensing pharmacist should possess. Receiving and reading of prescriptions—Refusal when advisable. Numbering, dating, filling, checking, copying, renewal when advisable, preserving, ownership of the original prescription. Assembling ingredients, containers, labels, wrapping, pricing, cautioning the customers, errors and omissions of the prescriber, narcotic and medicinal liquor, liability to and insurance against errors. The dispensing dependent—location and equipment. General knowledge (*viz.*, reasons for use, advantages and disadvantages, precautions, properties, etc.), necessary for handling the following:—Powders, cachets, capsules, solutions, emulsions, mixtures, collodions, liniments, lotions, gargles, pills, tablets, suppositories, ointments, plasters, poultices. Medicated gauzes. Sterilisation. Ampoules. Biological products.

Practical.—Compounding and dispensing of medicines and handling of those mentioned above in the light of the instructions received in the theoretical lectures.

The examination shall comprise of—

- (i) Theoretical examination—one paper of three hours' duration.
- (ii) An oral and practical examination.

(5) Forensic Pharmacy.

The candidate shall be required to possess such information concerning the enactments and regulations as are applicable to the practice of pharmacy in shops and hospital.

A study of the Poisons Acts, Dangerous Drugs Acts and Bengal Municipal Act, etc., or any other pharmacy law that may in future be enacted.

The examination shall comprise of—

- (i) A written examination—one paper of three hours' duration.

(6) Pharmaceutical Economics.

(a) Elementary knowledge of Book-keeping.

(b) Business methods—Merchandising, advertising and salesmanship.

The examination shall comprise of—

- (i) A written examination—one paper of three hours' duration.

(7) Analytical Chemistry.

(a) Qualitative Analysis—Continuation of the inorganic analysis done in the first year (second term) under Inorganic Chemistry (practical).

(b) Volumetric Analysis—Acidimetry and Alkalimetry.

(c) Clinical examination of human urine.

II. SECOND YEAR—SECOND TERM.

Candidates will get instructions in the following subjects during the second term:—

- (1) Pharmaceutical Chemistry.
- (2) Theory and Practice of Pharmacy.
- (3) Dispensing Pharmacy.
- (4) Pharmacognosy.
- (5) Materia Medica and Pharmacology including Toxicology.

The details in the above subjects will be as follows:—

(1) **Pharmaceutical Chemistry.**

The whole subject shall be dealt with in a very simple way without entering into any complicated and chemical detail.

(a) Study of the important inorganic and organic compounds, both official and non-official.

(b) Study of the most important and simple synthetic organic compounds.

(c) Study of important pharmacopœial fixed and essential oils.

(d) Study of most important vegetable alkaloids and glucosides.

(2) **Theory and Practice of Pharmacy.**

Theoretical.—Principles of sterilisation and the preparation of Medicaments for Parenteral Administration.

(b) Physical and Chemical Examination of Pharmacopœial substances: Study of physical characters, thermal methods, hydrogen-ion-concentration, esters and their saponification, official limit tests, Fixed oils and allied substances. Volatile oils and their constituents, natural exudations. The official "Liquores". The official gases. Vaccines, sera and surgical dressings, biological tests.

Practical.—Examination of pharmaceutical substances by simple pharmaceutical methods, with special reference to their identity and purity tests.

(3) **Dispensing Pharmacy.**

Theoretical.—Study of incompatibilities—

(a) Pharmaceutical Incompatibility.

(b) Chemical Incompatibility.

Practical.—Compounding and dispensing of medicines. Continuation of the work done in the previous term. Practical work with incompatible prescriptions.

(4) **Pharmacognosy.**

Continuation of the course followed in the previous term. Study of drugs of animal origin and microscopical examination and study of some commonly used and selected crude drugs.

(5) **Pharmacology including Toxicology.**

Elementary knowledge of the actions and uses of the commonly used remedies with their methods of preparations and doses.

Toxicological manifestations following the ingestion of common poisons with their antidotes.

III. Apprenticeship period of three months in a recognised place or practical training in College Laboratory.

Diploma Course Final Examination.

Subjects.		Nature of examinations.	Full marks.
First Paper	.. Pharmaceutical Chemistry.	Written, three hours Practical, six hours	.. 50 .. 50
Second Paper	.. Theory and Practice of Pharmacy.	Written, three hours. Oral and Practical including sessional reports.	50 50
Third Paper	.. Dispensing Pharmacy ..	Written, three hours. Oral and Practical including sessional reports.	50 50
Fourth Paper	.. Pharmacognosy ..	Written, three hours. Oral and Practical including sessional reports.	50 50
Fifth Paper	.. Pharmacology and Toxicology.	Written, three hours. Oral and Practical including sessional Reports.	50 50
Sixth Paper	.. Forensic Pharmacy ..	Written, three hours	.. 50

Reference Books.**Author.**

British Pharmacopoeia and Addendum to B. P. 1932	..	....
Pharmacopoeia of the United States	..	....
British Pharmaceutical Codex	..	....
German Pharmacopoeia	..	....
Companion to British Pharmacopoeia	..	Squire.
Extra Pharmacopoeia	..	Martindale and Wescott.
National Formulary (American Pharm. Assn.)	..	....
The Science and Practice of Pharmacy	..	Bennett and Cocking.
Practice of Pharmacy	..	Remington.
Indigenous Drugs of India	..	Chopra.
Dispensing for Pharmaceutical Students	..	Cooper and Dyer.
Inorganic Chemistry	..	Newth.
Theoretical Organic Chemistry	..	Cohen.
Qualitative Chemical Analysis	..	Mollwo Perkin.
Analytical Chemistry	..	Treadwell and Hall.
Pharmaceutical Arithmetic	..	Bradley.
Aids to the Mathematics of Pharmacy	..	Lupton.
Latin for Pharmaceutical Students	..	Cooper.
Aids to Pharmaceutical Latin	..	Trease.
Detection of Poisons	..	Autenreith.
Text-book of Botany	..	Lowson.
Analytical Key to Natural Orders (Pub. Cal. Univ.)	..	....

Reference Books.	Author.
Compendium of Human Anatomy	Potter.
Introduction to Biology for Students in India	Lloyd.
Biology for Beginners	Nandy.
Elements of Book-keeping	Sodhi.
Business Building for Pharmacists	Carter.
Drug Store Business Methods	Pearson.
Pharmacy, Materia Medica and Therapeutics	Whitla.
Materia Medica, Pharmacy, Pharmacology and Therapeutics.	Hale and White.
Materia Medica	Ghosh.
Analysis of Drugs and Medicine	Nelson.
Introduction to the Qualitative Analysis of Medicine	Fuller.

Books recommended.

*Text Books.	Author.
Inorganic Chemistry	Mitra.
Every Day Chemistry	Partington.
Practical Chemistry	Neogi.
A Manual of Practical Inorganic Chemistry	Reisenfeld-Ray.
Elementary Organic Chemistry	Kemp.
Organic Chemistry	Ghosh and Boyd.
A Text-book of Botany for Medical and Pharmaceutical Students.	Small.
Manual of Indian Botany	Majumder and Banerjee.
A Text-book of Pharmacognosy	Cooper and Denston.
Practical Pharmacognosy	Wallis.
A Course of Physics	Ablett.
Pharmaceutical Arithmetic	Schroff-Srivastava.
Pharmaceutical Latin and Prescription Reading	Schroff-Srivastava.
Aids to Dispensing	Cooper.
Aids to Dispensing	Bentley.
Incompatibilities	Ruddiman.
Manual of Chemistry for Dispensers (H. M. Stationery Office, London.) .. .. .	....
Tutorial Pharmacy	Cooper.
Text-book of Pharmaceutics	Bentley.
Elementary Book-keeping	Spicer and Pegler.
Merchandising of Drug Products	Olsen.
A Manual of Zoology	Mukherjee.
Anatomy	Fagge.
Manual of Human Physiology	Hill.
Aid to Materia Medica	Newn.
Introduction to Pharmacology and Therapeutics	Gunn.
Treatise on Hygiene and Public Health	Ghosh.
Ambulance Hand Book (St. Andrew's Ambulance Association).	Gerstenberg and other.

*A tentative list of suitable text-books is presented here. The professors may recommend books which they consider to be useful.

(ii) Syllabus and course of study for degree in Pharmacy.

In drawing up the syllabus and course of study for a Degree Course in Pharmacy, the committee's task had not been very easy. Though there was general agreement amongst the members as well as the witnesses who tendered evidence before the committee that a fairly advanced standard of training should be provided for, considerable difference of opinion existed as to how this could be achieved. The first point that came up for consideration was the preliminary educational qualification to be demanded from the prospective entrants to this course. The Bengal Pharmaceutical Association in their valuable memorandum maintained that a four years' course of study after the Matriculation examination should lead to a Degree in Pharmacy. Dr. K. N. Bagchi, Professor of Chemistry, Medical College, Calcutta, on the other hand, maintained from his long teaching experience that matriculates of Indian Universities with their meagre knowledge in basic sciences would not be able to do justice to a degree course in modern pharmacy. Such a course in his opinion, would have to embrace, in addition to professional and applied subjects, a fair amount of training in basic subjects like physics, chemistry, mathematics, etc., which, though not specifically pharmaceutical in nature, are nonetheless essential for a sound scientific training in pharmacy. He therefore strongly recommended that Intermediate in Science with physics, chemistry and mathematics should be considered the minimum qualification for entrance into the degree course. In connection with the question of instituting a Degree in pharmaceutical chemistry, the Calcutta University Medical Faculty appointed a special sub-committee in 1934 consisting of Colonel T. C. Boyd, Colonel R. N. Chopra, Prof. B. N. Ghosh and the late Prof. P. Nandi and this sub-committee recommended that such a course should be taken after the Intermediate in Science examination. The committee felt that there is considerable force in the argument put forward by Prof. Bagchi and in view of the findings of the University Faculty Sub-committee, decided to recommend Intermediate in Science as the preliminary educational qualification for the students of the degree course.

The length of the degree course and the subject matter that should be profitably taught in this course also came in for much comment. A few of our members and an influential group of our witnesses leaned heavily towards adopting a two-year course of study. The chief argument put forth was that an unnecessarily long period of training in a subject which is only in its infancy in India might not attract a sufficient number of youths to take up the course. It was further stated that the course for a Bachelor in Pharmacy degree should not occupy a period longer than is demanded for Bachelor Degrees in other science subjects. Very cogent arguments were however advanced for a three to four years' course of study by another group of our members and witnesses. All the expert witnesses representing pharmaceutical education that we had the privilege of examining like Prof. Bagchi, Prof. Ghosh, Mr. Bal and Dr. Gupta, who could be expected to speak with considerable teaching experience and authority on pharmaceutical questions, maintained that the modern developments in the science of pharmacy demanded a system of training which could not with justice to the students be condensed into a course of less than three years' duration. Mr. Bal, who is a member of the Board of Studies of the Benares Hindu University where a Degree Course in Pharmacy had already been started a few years ago, stated that the experience in Benares

indicated, in no uncertain terms, that a two-year period was absolutely inadequate to cover a satisfactory syllabus and curriculum in pharmacy. We have given very anxious thought over the question and have examined with great scrutiny the detailed curriculum and courses of study for the degree course, with special reference to the minimum amount of time that should be spent in presenting to the students the subjects proposed therein. To facilitate careful examination, a special sub-committee chosen from amongst our own members and a few outside experts was convened. The members of this sub-committee are emphatically of opinion and we subscribe to the same view, that in the interests of a sound training in pharmacy, a three years' course after the Intermediate in Science should be recommended. If these three years are usefully spent in the way we have indicated in the syllabus, we believe that the successful candidates passing through these courses would have a fairly sound background of modern pharmacy and would be able to take their place side by side with pharmacy graduates of progressive Western countries. For the "Pharmaceutical Chemist" diploma or a similar degree course in pharmacy in Great Britain and other foreign countries, a certain period of "apprenticeship" training is usually enjoined. We have purposely omitted any "apprenticeship" requirements in this course, as we believe that the present standard of pharmaceutical trade and practice in the province is such that a proper apprenticeship training, as obtainable in Great Britain, the continent of Europe and America, cannot be provided for this class of superior pharmacists. Fully realising however the importance of learning the many details of the professional and business side of the calling of pharmacists as a class, we have provided liberally for training in operative, dispensing and manufacturing pharmacy in the laboratories and workshop of the proposed college. A course in "Pharmaceutical economics and Business Methods" has also been included in our syllabus and is calculated to give the necessary acquaintance with the methods of book-keeping, ledgering, accounting, etc., so necessary for the conduction of manufacturing businesses of all kinds. The students will also be expected to visit neighbouring manufacturing establishments escorted by their teachers, who will explain to them the various processes involved in manufacturing and commercial pharmacy. Bengal is particularly lucky in having quite a number of well developed drug manufacturing concerns in and around Calcutta, and with their co-operation, it is expected that our pharmacy graduates will have the unique advantage of learning first-hand manufacturing pharmacy on a commercial scale which cannot possibly be arranged in an educational institution.

The degree course in pharmacy, like all other graduate degree courses, should preferably be affiliated to the University of Calcutta. Dr. Anklesaria has indicated his desire for such a step and we are in full agreement with his views. The syllabus and course of instruction have been drawn up with particular attention to the requirements of similar degree courses in scientific subjects of the Calcutta University. A high standard is maintained throughout and it is hoped that the University of Calcutta will not find any objection in extending approval to it. As the course of study in pharmacy is going to be of three years' duration, we recommend that the degree be entitled as "Bachelor of Science in Pharmacy" (abbreviation, *B Pharm.*). This will differentiate the pharmacy graduates from the ordinary science graduates who undergo training for two years only after their Intermediate in Science examination. It has been pointed out to the committee that the

University of Calcutta might raise some technical objection to our recommendation of granting a Bachelor's degree after three years study following Intermediate in Science examination. However, Dr. K. N. Bagchi has drawn our attention to a recent announcement in the Calcutta Gazette, dated the 29th June 1939, (Part I B., page 1585), that a three years course of study leading to Bachelor of Metallurgy degree (*B.Met.*) has been approved by the Calcutta University on the ground that it is a professional qualification. A pharmacy degree may justly be regarded as a thoroughly professional qualification like Medicine, Engineering, etc., and as such there should not be any difficulty on the part of the University in sanctioning approval to a three-year course leading to *B.Pharm.* degree also.

In the admission requirements for the degree course, a provision has been made that only Intermediate in Science students or students with equivalent qualification will be admitted. No mention has been made about the competency of the diploma holders to go up for the Degree Course. The propriety of this step has been seriously questioned by some of our witnesses. Mr. J. C. Ghosh, Principal, School of Chemical Technology, maintained that the door should not be closed against the diploma holders wishing to qualify further in their chosen calling of life. Mr. S. N. Bal and Prof. S. Ghosh laid stress on the same viewpoint. The Chairman, the Secretary and the Assistant Secretary of the Pharmacists' Branch of the Bengal Pharmaceutical Association emphatically protested against this preferential consideration shown to the Intermediate in Science candidates to the total exclusion of the (pharmacy) diploma holders. They contended that there should be nothing to choose between the two classes of people, both having undergone a two years' course of study after their matriculation examination. On the other hand, in view of their specialised training in the pharmaceutical field, the diploma holders should have a slight advantage over the ordinary I.Sc. students in the pharmacy degree course. The question has engaged the serious attention of the Committee. Theoretically, there should not be very much difficulty in according permission to the diploma holders to join the degree course but there are certain technical difficulties which require careful consideration. According to Calcutta University regulations, the possession of an Intermediate in Science certificate is an essential prerequisite for admission to a degree course. The diploma in Pharmacy which will be granted by a Pharmaceutical Council, not affiliated with the University in any way, may not be recognised by that body as equivalent to the Intermediate in Science examination conducted under its auspices. Then again, it should not be forgotten that for a successful career in the pharmacy degree course as drawn up by us, a good background of physics, chemistry and mathematics is obviously required. It is not possible for the students passing through a pharmacy diploma course to learn enough of the basic science subjects, as most of their time and attention would have to be directed towards mastering pharmaceutical and allied subjects. Unless extra provisions are made in the proposed college for such students to complete their studies of the basic science subjects on a par with the Intermediate in Science students, permission granted to the pharmacy diploma holders to enrol themselves for the graduate course will not be to their best interests and may ultimately lead to a lowering of the standard of the degree course. Though we sympathise with the legitimate ambition of the diploma holders in pharmacy wishing to qualify for a degree course, we feel

that for the present it will be better to keep the two classes of people separate. Diploma holders may however join the degree course provided they pass the Intermediate in Science examination. Such candidates may be allowed a shorter course of two years' duration, as is done, for example, in the case of the Licentiates of Medical Faculty who desire to go up for the M.B. degree of the Calcutta University. In any event, we do not think that many diploma holders will elect the degree course and the bar that we are placing will not affect a large section of the profession. The outlook, endeavour and the sphere of usefulness and activity of the two classes of people will be essentially different. To cater to the interests of only a fractional number of diploma holders, we do not think that we will be justified in lowering the standard of training of the degree course by allowing diploma holders without sufficient training in basic sciences to enrol themselves for it. With the growth of the institution, arrangements can perhaps be made for a supplementary course of science training for the diploma holders wishing to take up the degree course, and the University authorities may then be moved to accord recognition to these students for entrance to the degree course.

*Syllabus for the degree in Pharmacy (B. Pharm. Degree).

The degree course for bachelor of science in Pharmacy (B.Pharm.).

Admission requirements, etc.—Candidates who have passed the Intermediate Examination in Science of the Calcutta University or any equivalent qualification from other Universities or recognised examining bodies, will be eligible for this course. Candidates must have physics, chemistry and mathematics in the I.Sc. or an equivalent course. Special training in subjects like botany, zoology and physics will be an added qualification for admission.

Lectures, etc.—The course of instruction will be for three years. There will be 845 theoretical lectures and about double the number of practical classes.

Every lecture shall cover a period of not less than 45 minutes inclusive of the time allowed by the college rules for the assembling of the student. A period of practical work or class exercises or class examination of not less than 45 minutes shall be considered to be equivalent to a lecture.

No student shall be considered to have prosecuted a regular course of study in any subject for any examination unless he has attended at least 75 per cent. of the lectures delivered in that subject.

The candidates will have to maintain laboratory note-books for the practical classes which shall be examined and marked by examiners. The note-books must be signed at frequent intervals by the Professor under whom the candidates work.

Examinations.—Candidates for the Bachelor of Pharmacy Degree shall be required to pass the following examinations which will be conducted either by or under the guidance of the Calcutta University. The degree will be conferred by the University:—

(1) *Preliminary Pharmacy Examination.*—Those who have prosecuted a regular course of study in the subjects prescribed for this examination for not less than one academical year will be eligible for this examination.

(2) *Intermediate Pharmacy Examination.*—Those who have passed the preliminary Pharmacy Examination and have subsequently prosecuted a regular course of study in the subjects prescribed for the examination for not less than one academical year will be eligible for this examination.

(3) *Final Pharmacy Examination or Degree Examination.*—Those who have passed the Intermediate Pharmacy Examination and have subsequently prosecuted a regular course of study prescribed for the final examination for not less than one academical year will be eligible for this examination.

In order to pass the examination a student must obtain—

- (a) At least 45 per cent. of marks in the aggregate of all the subjects.
- (b) 45 per cent. in the aggregate of the oral and practical.
- (c) 40 per cent. in each theoretical paper.

* The "Syllabus" is designed to present the essentials that should be included in college curricula and to serve as a rational basis for instruction. The teaching staff will be competent to bring in modifications, etc., according to requirements.

The results of the examination shall be declared in the following three classes:—

- (a) *First Class*.—Those obtaining 65 per cent. of the full marks.
 (b) *Second Class*.—Those obtaining 55 per cent. of the full marks.
 (c) *Pass*.—Those obtaining 45 per cent. of the full marks.

A candidate who fails to appear or pass in any examination may, on payment of a fresh fee, appear in any subsequent examination.

A candidate failing in one subject only will be eligible for study in the next higher class provided that he will not be entitled to appear for the next higher examination until he has subsequently passed in the subject in which he has failed. Such a candidate will not be required to prosecute a fresh course of lectures in the subject in which he has failed, unless he has failed in a practical test or in his regular sessional work. A candidate who has secured the minimum pass marks in sessional work in any subject at any examination, if re-appearing at the same examination in any subsequent year, may have his previous pass marks in the sessional work in that subject re-credited to him.

Fees, etc.—Fees for the Preliminary, Intermediate and Final Examination will be Rs. 15, Rs. 20 and Rs. 45, respectively.

A candidate who fails to pass or to present himself for examination, shall not be entitled to claim a refund of the fee.

An amount of Rs. 30 will always remain in deposit as caution money which may be adjusted against breakages and other dues, if any.

The Three-Year Curriculum for the Degree of Bachelor of Science in Pharmacy showing the number of lectures and practical classes required.

	Lecture hours.	Lab. hours.	Total hours.
Inorganic chemistry (including at least twenty lectures on analytical chemistry)	60	100	160
Organic chemistry	120	200	320
Physical chemistry	60	60	120
Botany	40	60	100
Pharmacognosy	100	200	300
Pharmaceutical chemistry (including biochemistry and chemotherapy)	150	300	450
History of Pharmacy	10	..	10
Pharmaceutical Arithmetic	10	..	10
Pharmaceutical Latin	10	..	10
Operative pharmacy	60	200	260
Manufacturing pharmacy .. .. .	..	90	90
Dispensing pharmacy	30	60	90
Drugs assaying and pharmacopoeial testing	30	360	390
Food and water analysis	10	50	60
Chemical toxicology and clinical chemistry	10	50	60
Insecticides' etc., and food preservatives	10	..	10
Forensic pharmacy	20	..	20
Pharmaceutical economics	30	..	30
Zoology	30	30	60
Anatomy and physiology	60	30	90
Bacteriology	30	60	90
Pharmacology, materia medica, toxicology and bio-Assay	80	40	120
Total ..	960	1,890	2,850

The Curriculum for the Degree of Bachelor of Science in Pharmacy showing the distribution of subjects to be taught in each year.

				Lecture hours.	Lab. hours.	Total hours.
<i>First year—</i>						
Inorganic chemistry	..	..	..	60	100	160
Organic chemistry	..	..	..	60	20	80
Botany	..	..	..	40	60	100
Pharmaceutical mathematics	..	..	..	10	..	10
Pharmaceutical Latin	..	..	..	10	..	10
Operative pharmacy, including history of pharmacy				40	80	120
Zoology, anatomy and physiology	..	..	..	90	90	180
			Total	310	350	660
<i>Second year—</i>						
Organic chemistry	..	..	..	60	180	240
Physical chemistry	..	..	..	60	60	120
Pharmacognosy	..	..	..	60	100	160
Operative pharmacy	..	..	..	30	120	150
Dispensing pharmacy	..	..	..	30	60	90
Insecticides, etc., and food preservatives			..	10	..	10
Pharmaceutical economics	..	..	..	30	..	30
Bacteriology	..	..	..	30	60	90
			Total	310	580	890
<i>Third year—</i>						
Pharmaceutical chemistry	..	..	..	150	300	450
Pharmacognosy	..	..	..	40	100	140
Manufacturing pharmacy	..	..	..	..	90	90
Drug Assaying and pharmaceutical testing			..	30	360	390
Food and water analysis	..	..	..	10	50	60
Chemical toxicology and forensic pharmacy			..	35	50	85
Pharmacology, materia medica, Toxicology and bio-Assay	..	..	..	80	40	120
			Total	345	990	1,335

Degree Course Examination.

[The grouping of subjects, Nature of Examinations and the full marks.]

Subject.	Nature of examination.	Full Marks.
1. Preliminary Pharmacy Examination—		
First paper—Inorganic chemistry	Written, three hours	100
Second paper—Analytical chemistry.	Written three hours	50
	Oral and practical	100
Third paper—Botany ..	Written, three hours	100
	Oral and practical	50
Fourth paper—Pharmaceutical Latin and mathematics.	Written, three hours	100
Fifth paper—Pharmacy—Historical and operative	Written, three hours	100
	Oral and practical	100
Sixth paper—Zoology, anatomy and physiology.	Written, three hours	150
	Oral and practical	50
2. Intermediate Pharmacy Examination—		
First paper—Organic chemistry	Written, three hours	100
	Oral and practical	100
Second paper—Physical chemistry.	Written three hours	100
Third paper—Pharmacy—Operative and dispensing.	Written, three hours	100
	Oral and practical	100
Fourth paper—Insecticides, etc., and food preservatives.	Written, three hours	50
Fifth paper—Pharmaceutical economics.	Written, three hours	50
Sixth paper—Bacteriology ..	Written, three hours	100
	Oral and practical	50
3. Final pharmacy Examination—		
First paper—Pharmaceutical chemistry.	Written, three hours	100
	Oral and practical	100
Second paper—Pharmacognosy	Written, three hours	100
	Oral and practical	100
Third paper—Operative and manufacturing pharmacy.	Written, three hours	100
	Oral and practical	100
Fourth paper—Drug assaying, pharmacopoeial testing; food and water.	Written, three hours	100
	Oral and practical	100
Fifth paper—Forensic pharmacy and clinical toxicology.	Written three hours	100
	Oral and practical	50
Sixth paper—Pharmacology, materia medica, toxicology and bio-assay.	Written, three hours	100
	Oral and practical	50

N. B.—In giving credit in the "Oral and Practical" Examinations the records of sessional work will be taken into account.

Syllabus and Course of Study for Degree in Pharmacy (B. Phar.).

(1) Chemistry.

(A) **Inorganic Chemistry—Theoretical.**—In addition to a fuller treatment of the subjects prescribed for the I.A. and I.Sc. course, the following subjects should be taught:—

Atom and atomic theory, classification of the elements, isotopes basicity of acids and acidity of bases, allotropy, compound radicals.

Study of the following elements and their chief compounds:—oxygen, hydrogen, chlorine, bromine, iodine, fluorine, sulphur, nitrogen, phosphorus, arsenic, antimony, bismuth, boron, carbon, silicon, tin, sodium, potassium, lithium, ammonium, barium, strontium, calcium, radium, magnesium, zinc, cadmium, mercury, lead, copper, silver, gold, aluminium, chromium, molybdenum, tungsten, uranium, iron, manganese, nickel, cobalt, platinum.

Radioactivity—Degradation of radium and uranium.

Practical.—(a) Qualitative analysis of inorganic mixtures containing not more than six radicals, positive and negative from the following list:—Potassium, sodium, ammonium, manganese, nickel, cobalt, mercury, lead, bismuth, copper, cadmium, arsenic, antimony, tin, silver, and their oxides, hydroxides, chlorides, hypochlorites, chlorates, bromides, bromates, iodides, iodates, fluorides, sulphides, sulphites, sulphates, thiosulphates, chromates, carbonates, phosphates, hypophosphites, nitrites, nitrates, borates, silicates, cyanides, ferrocyanides, ferricyanides, thiocyanates.

(b) Volumetric analysis—acidimetry and alkalimetry, oxidation and reduction methods, iodometry and precipitation methods.

(c) Gravimetric estimation of copper, silver, iron, aluminium, tin, manganese, mercury, lead, bismuth, antimony, arsenic, chromium, zinc, nickel, calcium, barium, magnesium, sodium, potassium, sulphuric acid, hydrochloric acid, including separation and estimation from their simple mixtures.

(d) Preparation of selected inorganic compounds in the pure state.

(B) **Organic Chemistry—Theoretical.**—Definition and recognition of organic compounds. Isolation and preparation of pure organic compounds, criteria of purity, determination of melting and boiling points. Fractional distillation.

Composition of organic compounds. Detection of elements. Quantitative analysis. Calculation of results. Determination of molecular weights. Empirical, molecular and structural formulæ. Isomerism, metamerism, polymerism, stereoisomerism and tautomerism, optical activity. Classification of organic compounds.

A comprehensive study of the preparation, general properties and relationship of the following classes of organic compounds and their derivatives, with special reference to those used in pharmacy.

Hydrocarbons—saturated and unsaturated—of the paraffin, olefine and acetylene series, and their halogen derivatives.

Monohydric Alcohols, Ethers, Aldehydes and Ketones.

Monobasic Carboxylic Acids (Fatty acids) and their derivatives—acid chlorides, acid anhydrides, acid amides and esters, halogen, substituted acids, amino-acids, monobasic hydroxy—acids, etc.

Amines and Nitro-compounds (nitroparaffins).

Cyanogen compounds—nitrites, carbamines, alkyl thiocyanates, etc.

Alkyl compounds of sulphur, phosphorus, arsenic, silicon, and the organo-metallic compounds—mercaptans, thioethers, cacodyl, etc.

Polyhydric alcohols and their derivatives.

Unsaturated alcohols, aldehydes and acids.

Polybasic acids and their derivatives.

Carbonic acid derivatives.

Ketonic acids and related compounds.

Carbohydrates—Mono—, Di—, and Polysaccharides.

Ureides and purines.

Proteins—composition, classification, hydrolysis, and derivatives.

Fermentation and enzyme action—alcoholic, acetic, lactic, butyric, etc.

Cycloparaffins and aromatic hydrocarbons—Benzene and its homologues.

Halogen—and Nitro—Derivatives of the aromatic hydrocarbons.

Aromatic amino compounds.

Diazo—and Azo compounds.

Aromatic sulphuric acids and arsenic compounds.

Phenols.

Aromatic alcohols, aldehydes, ketones, and quinones.

Aromatic carboxylic acids.

Multiple ring compounds.

Hydroaromatic compounds—terpenes and camphors.

Hydroaromatic compounds of physiological importance (sterols—cholesterol, phytosterol, ergosterol, etc.).

Heterocyclic compounds.

Alkaloids—the classification, source, extraction and tests of alkaloids with special reference to conine, nicotine, atropine, hyoscyamine, cocaine and its substitutes, cinchonine, quinine, quinidine, strychnine, brucine, morphine, codeine, narcotine, papaverine, emetine, aconitine, ephedrine, ergotoxine, ergometrie, heroin, apomorphine, homatropine, etc.

Glycosides and Glucosides.

Practical.—(a) Detection of carbon, nitrogen, sulphur, halogens, phosphorus, arsenic, antimony, mercury, etc., in organic compound.

(b) Preparation at least twenty selected organic compounds.

(c) Identification of the individual components of and qualitative analysis of a mixture of two organic compounds from the following

list:—Methyl alcohol, ethyl alcohol, formaldehyde, acetone, chloroform, carbon tetrachloride, oxalic acid, tartaric acid, acetic acid, glycerol, citric acid, succinic acid, urea, dextrose, glucose, canesugar, starch, benzene, benzaldehyde, benzoic acid, lactose, aniline, phenol, dimethyl aniline, salicylic acid.

(d) General tests for alkaloids and also for opium.

(C) **Physical Chemistry**—*Theoretical*.—Atomic theory, Determination of atomic and molecular weights. Kinetic theory of gases. Properties of gases, liquids and liquid mixtures. Theory of solutions. Osmotic pressure and its measurements. Theory of indicators. Thermochemistry chemical equilibrium and velocity of chemical reactions. Law of mass action. Absorption and catalysis. Allotropy. Colloids. Laws of electrolysis. Electrolytic dissociation. Applications of the dissociation theory. Significance and determination of pH values. Buffers. Simpler uses of spectroscopic methods in chemistry. Electromotive force. Electrochemical series of the elements. Laws of thermodynamics.

Practical.—Experiments on density and surface tension of liquids. Solubilities of salts. Velocity of hydrolysis. Ionization constant. Determination of molecular weights, refractive index, osmotic pressure and partition co-efficient. Measurements of pH. Dialysis. Preparation of colloidal solutions. Determination of solubility curve and distribution, co-efficient in analysis. *Polarimetry*. Photometry, Spectrophotometry, determination of conductivity of solutions.

(2) Botany and Pharmacognosy.

(A) **Botany**—*Theoretical*.—(I) General Morphology of Phanerogams, including a study of the following subjects:—Branch system, root system and phyllotaxy. General morphology and metamorphosis.

(II) *Histology*.—Cell contents and their microchemical reactions. Structure and development of the cells and tissues. Cell division, comparative anatomical studies of root, stem and leaf of a few important medicinal plants.

(III) *Physiology*.—Treated experimentally. Absorption of water; movement of water and gases within the plant; chemistry of the plant body; food materials; photosynthesis; digestion; assimilation; transpiration; nutrition; metabolism, growth and movement. Reproduction—sexual and asexual.

(b) Ecology—General outline.

(IV) *Cryptogams and Gymnosperms*.—Life-history of the following should be studied:—

(a) (i) *Fungi*—Yeast and Mucor. (ii) Poisonous fungi of India (outline). (b) *Algae*—Spirogyra, Ulothrix, Vaucheria. (c) *Bryophyta*—Moss, Marchantia, (d) *Pteridophyta*—Fern, Equisetum, Lycopodium and Sellaginella. (c) *Gymnosperm*—Cycas and Conifer.

(V) *Systematic Botany*.—The principles of plant classification. A number of families of medicinal and economic importance as stated

below should be particularly studied with reference to Indian examples :—

Apocyanaceae aristolochiaceae, berberidaceae, caprifoliaceae, chenopodiaceae, compositae, cruciferae, cucurbitaceae, dioscoreaceae, droseraceae, euphorbiaceae, graminaceae, culliferae, hypericaceae, labiatae, leguminosae, liliaceae, malvaceae, meliaceae, moringaceae, myrtaceae, orchidaceae, palmaceae, papaveraceae, plantaginaceae, polygonaceae, ranunculaceae, rosaceae, rutaceae, santalaceae, scitamineae, sterculiaceae, tamaricaceae, liliaceae, umbelliferae, uritticaceae, verbenaceae.

Practical.—(1) Making, staining and description of microscopical sections of plants.

(II) Referring plants to their respective families with complete description of specimen to facilitate diagnosis.

(III) Drawing and dissections of flowers and of microscopical sections.

(IV) Physiological experiments: (a) Water culture experiments. (b) Experiments on root pressure, transpiration, respiration and photosynthesis.

(B) **Pharmacognosy**—*Theoretical.*—Study of the commonly used crude drugs of vegetable and animal origin, their cultivation, geographical distributions and biological courses; collection, commercial varieties, identification, constituents, preparation for market; the commerce in drugs, their storage, deterioration and adulteration; the macroscopical characters and the chemical tests.

The following drugs may be studied :—

<i>Acacia</i>	<i>Cinnamomum.</i>	Mel.
<i>Aconitum.</i>	Coca.	Myrrha.
<i>Agar.</i>	Coccus.	<i>Myristica.</i>
<i>Aloe.</i>	Colchici cormus.	<i>Nux Vomica.</i>
<i>Amylum.</i>	Colchici semen.	Opium.
<i>Anethum.</i>	<i>Colocynthis.</i>	Podophylum.
<i>Asafoetida.</i>	Colophonium.	Podophylum indicum.
<i>Aurantii Cortex.</i>	Copaiba.	Prunus serotina.
<i>Balsamum Peruvianum.</i>	<i>Coriandrum.</i>	Quillaia.
<i>Balsamum Tolutanum.</i>	<i>Creta.</i>	<i>Quassia.</i>
<i>Belladonnae Folium.</i>	<i>Digitalis folium.</i>	<i>Rheum.</i>
<i>Belladonnae Radix.</i>	Dryopteris Filixmas.	Savin.
<i>Benzoinum.</i>	<i>Ergota.</i>	<i>Scilla.</i>
Buchu	<i>Foeniculum.</i>	Senega.
Calumba	Galatinum.	<i>Sennae folium.</i>
Cannabis.	<i>Gentiana.</i>	<i>Sennae fructus.</i>
Cantharis.	<i>Glycyrrhiza.</i>	Serpentaria.
Capsicum.	Hamamelis.	Stramonium.
<i>Cardamomum.</i>	<i>Hyoxyamus.</i>	Strophanthus.
Carum.	<i>Ipecacuanha.</i>	Styrax.
<i>Carryophyllum.</i>	<i>Jalap.</i>	Tamarindus.
<i>Catechu.</i>	Krameria.	<i>Tragacantha.</i>
Cera flava.	Limonis Cortex.	Valeriana.
<i>Cinchona</i>	<i>Linum.</i>	<i>Zingiber.</i>
<i>Cascara Sagrada.</i>	Lobelia.	

The extraction of fixed and volatile oils as illustrated by the following:—Castor oil, clove oil, cod liver oil, olive oil, hydnocarpus oil.

The study of the more important classes of constituents of crude drugs with reference to their behaviour when used in making pharmaceutical preparations, and when dispensed; the methods used for the microscopical examination of crude drugs, including the isolation and identification of tissues and cells microchemical tests for tissues and cell contents. Microscopical measurements.

The materials used for filtering and the fibres used for surgical dressings.

The evolution of crude drugs.

Practical.—The candidates must be prepared: (1) to recognise, in the entire conditions, crude drugs most frequently used in pharmacy.

(2) To examine, dissect, identify and describe, in the entire or broken condition, the drugs mentioned in the above list, by means of macroscopical characters and by qualitative chemical tests.

(3) To prepare for microscopical examination such of the crude drugs printed in the above list in italics, to describe their structure, to identify and describe their powders and to detect adulteration in them.

To examine fibres and fabrics used for surgical dressings and materials used for filtration.

(3) Pharmacy.

(A) **General Pharmacy**—*Theoretical.*—(I) *Pharmaceutical operations.*—General study of the following processes as applied to pharmacy:—

Comminution of Drugs—bruising, cutting, pulverising, grinding, etc. Mechanical mixing. Apparatus used in heating processes. Evaporation, distillation, operations conducted under reduced pressure. Separation of liquids from solids. Filtration. Extraction processes. Expression. Osmotic pressure. Colloidal solutions. Emulsifications. Methods employed in the purification of chemical. Water contents of chemicals. Refrigeration processes.

(II) *Preparation of the Official Galenicals.*—General study of the following:—Alcohols and medicinal spirits. Extracts. Tinctures. Waters. Infusions and Decoctions. Syrups and applied preparations. Glycerines. Powders. Pills. Tablets and lamellæ. Capsules. Lozenges and pastilles. Effervescent preparations. Ointments and pastes. Plasters and poultices. Suppositories. Bougies and pessaries. Miscellaneous preparations—liniments, lotions, mucilages, confections, etc.

(III) *Sterilisation and the Preparation of Medicaments for parenteral Administration.*—Principles of sterilisation. Ampoule injections. Vaccines and sera.

(IV) *Physical and Chemical Examination of Pharmacopœial Substances.*—Study of Physical characters. Thermal methods. Hydrogen-Ion-Concentration. Esters and their saponification. Official limit

tests. (Fixed oil and allied substances.) Volatile oils and their constituents. Natural exudations. The official "Liquores". The official gases. Unclassified substances—thyroid, pancreatin, pepsin, aloin, cantharidin, chrysarobin, salicin, santonin, extract of male fern, extract of malt, spirit of nitrous ether, aromatic spirit of ammonia, creosote, ichthammol, crude vegetable drugs. Microchemical tests.

(B) **Dispensing Pharmacy—Theoretical.**—Desired qualities of a dispensing pharmacist. Receiving and reading of prescriptions. Refusal when advisable. Numbering, dating, filling, checking, copying, renewal when advisable, preserving, ownership of the original prescriptions. Assembling ingredients, containers, labels, wrapping, pricing, cautioning the customer, errors and omissions of the prescriber, narcotic and medicinal "liquores" liability and insurance against errors. The dispensing department—location and equipment. General knowledge necessary for handling the following (reasons for use, advantages and disadvantages, precautions, properties, etc.). Powders, cachets, capsules, solutions, emulsions, mixtures, collodions, liniments, lotions, gargles, pills, tablets, suppositories, ointments, plasters, poultices. Medicated gauzes, sterilisation. Ampoules. Biological products.

Study of Incompatibility—

- (a) Pharmaceutical Incompatibility.
- (b) Chemical Incompatibility.
- (c) Physiological Incompatibility.

(C) **Pharmaceutical Chemistry—Theoretical.**—(a) Study of Inorganic and Organic Chemistry with the special reference to preparation, properties, purification and uses of members of various classes of Inorganic and Organic compounds used in pharmacy, specially those recognised by the B.P., B.P.C., and U.S.P.

(b) **Elementary Principles of Bio-chemistry—**

- (i) Chemistry and metabolism of carbohydrates, fats and proteins.
- (ii) Chemistry and function of blood.
- (iii) Elementary knowledge of enzymes and their functions in the organism.
- (iv) Elementary knowledge of vitamins and hormones. (Thyroid, adrenaline, pituitary, sex hormones, insulin.)

(c) Elementary principles of chemotherapy with special reference to synthetic organic derivatives used in the treatment of malaria (quinine, atabrin, plasmoquine), amoebiasis (emetine, acetarsol, carbarsone), syphilis and other allied diseases (nearsphenamine, tryparamide), bacterial infections (sulphanilamide, sulphapyridine, etc.).

(d) Study of important synthetic organic compounds used in pharmacy with special reference to the pharmacopœial preparations—Hexamine, ethyl, chloride, cocaine substitutes resorcinol, guaiacol, betanaphthol, barbitone, fluorescein, phenolphthalein, acriflavine, methylene blue, neorphenamine, sulpharsphenamine, saccharin, chloramine, sulphonal, phenazone, amidopyrine, phenacetin, adrenaline, cinchophen, thyroxine-sodium.

(D) **Insecticides, etc., and Food Preservatives**—*Theoretical*.—A general study and classification, general importance, methods of application of agents used, source, properties, uses formulae, antidotes, etc., of the insecticides, fungicides, parasiticides and podenticides.

A study of the nature and properties of the agents commonly used as food preservatives.

(E) **Pharmacy**—*Practical*.—(a) *Preparation of Official Galenicals*. The preparations of different varieties are to be manufactured in quantities not exceeding 1,000 c.c. or 1,000 gm. If time permits some difficult preparation that require skill and careful manipulation should be made.

(b) *Drug Assaying and Pharmacopœial Testing*.—This course will cover the testing and assaying drugs and chemicals including galenicals and other products, mainly pharmacopœial by physical, chemical and bio-chemical methods (identity and purity test, limit test, assay, etc.) as required by the B.P., B.P.C., U.S.P.

Determination of—freezing-point, melting-point, solidifying point, refractive index, optical rotation, viscosity. Estimation of lead and arsenic. Limit test for chlorides, sulphates, iron, lead and arsenic. Determination of—acid value, saponification value, iodine value unsaponifiable matter. Determination of—esters, free alcohols and aldehydes in volatile oils. Determination of—carvone cineole, balsamic acids. Determination of—ash, extractives, alcohol contents, methoxyl, sulphur dioxide. Alkaloidal assay. Antimony trichloride test for Cod Liver Oil.

(c) *Toxicology*.—Consideration of a few indigenous plant poisons of particular medico-legal significance to India—

- (1) *Plumbago rosea*—(*Chitra*).
- (2) *Plumbago zeylanica*—(*Chitra*).
- (3) *Calotropis gigantia*—(*Akanda, Madar*).
- (4) *Cerbera thevetia*—(*Yellow oleander*).
- (5) *Nerium odorum*—(*Karabi*).
- (6) *Datura allia vel fastuosa*—(*Dhatura*).

Detection of poisons commonly used in pharmacy: (i) Chloroform, chloral, hydrocyanic acid, phenol phosphorus, (ii) Alkaloids—atropine, aconitine, strychnine, morphine, and its derivatives, cocaine, (iii) Synthetic drugs—antipyrin, acetanilide, phenacetin, veronal, (iv) Metals—arsenic, antimony, lead, copper, mercury, (v) Oxalic acid, oxalates, carbon monoxide, etc.

(d) *Manufacturing Pharmacy*.—Manufacturing pharmacy deals with quantity production of pharmaceuticals. The work in manufacturing pharmacy should be largely laboratory. Preparations that cannot be made extemporaneously may also be included under this heading although in smaller quantities. Theory and technique learned in operative pharmacy will be useful and find new application in large scale production. Since all preparations must be made to comply with the required standards, physical, chemical and biological, the students must necessarily have had courses in quantitative chemistry and drug analysis.

Assignments should be made, in advance so that each student will have time to consult the proper reference works before reporting to the laboratory. The students should record in their note-books—reference consulted, special precautions and procedure, cost of materials, time and all other data thought to be desirable by the instructor.

Among these preparations one should select official galenicals, ointments, extracts, tinctures, powders, capsules, suppositories, cold creams, effervescent powders, the preparation of volatile oils by steam distillation, recovery of alcohol at atmospheric and reduced pressure, the preparation of tablets by compression, etc.

(e) *Food and Water Analysis*.—(i) Analysis of milk, cream, butter, ghee, edible oils, artificial foods, flour, vinegar, synthetic dyes used in colouring foodstuffs.

(ii) Chemical analysis of samples of drinking and industrial water (about five samples to be analysed). Interpretation of results.

The chemical principles underlying the analysis of food and water will be explained by lectures.

(f) *Clinical Chemistry*.—(i) Chemical examination of urine—Qualitative tests. Proteins; chemical deposits; urinary calculi; reducing substances; acetone bodies; blood and its derivatives and other abnormal substances; bile salts and pigments; important inorganic constituents.

(ii) Identification of urinary deposits under the microscope.

(g) *Pharmaceutical Chemistry—Practical*.—Preparation in a pure state of a few selected inorganic and organic particularly synthetic compounds used in pharmacy.

(h) *Dispensing Pharmacy*.—Compounding and dispensing of medicines and handling of those mentioned in the theoretical lectures in the light of the instructions received in those lectures.

(4) Allied Subjects—Theoretical.

(a) *History of Pharmacy*.—History of Pharmacy may be taught to stimulate professional interests amongst the students: It certainly is deserving of consideration as a review of the past, so that one may understand the present, and thus be able to plan intelligently for the future. History of pharmacy should not be taught for the sake of memorizing names and dates.

(b) *Pharmaceutical Mathematics*.—A working knowledge of certain applications of arithmetic needed by the pharmacist to solve problems which arise in connection with his work in manufacturing, testing and dispensing medicines; also in connection with his study of chemistry, physics and other subjects.

Common weights and Measures and their relation with each other—Imperial, Metric, Apothecaries; Indian and United States system.

Calculation of Doses—Reducing and enlarging recipes. Density and specific gravity. Percentage solutions.

Thermometric scales. Allegation. Proof spirit. Calculation of dry extracts. Isotonic solutions.

(c) *Pharmaceutical Latin*.—Pharmaceutical Latin is defined as the Latin which pertains to the art or science of pharmacy. It is essential

that the pharmacist shall have some knowledge of Latin, for he must be able to interpret and understand the prescriptions, written wholly or partially in Latin that come to him in the practice of his profession. He must be able to translate and to use correctly the Latin titles of medicinal materials of chemicals, biological and pharmaceutical origin. He should understand the derivation of as many scientific words and name as possible.

In teaching Latin, emphasis must be placed upon those practical things that are most necessary or desirable for the pharmacist to know. Vocabularies must be limited, in the main, to words of pharmaceutical application; the study of verbs will be confined to a very few forms; but four cases of nouns and adjectives need be considered, and widely used forms and phrases may be committed to memory.

(d) **Forensic Pharmacy.**—A study of the Poisons and Dangerous Drugs Acts, Bengal Municipal Act or any other enactments and regulations which may be applicable to the practice of pharmacy.

(e) **Pharmaceutical Economics and Business Methods.**—Elementary knowledge of the following subjects:—

(i) Elements of Accounting.

(ii) Business methods—Merchandising, advertising and salesmanship.

(5) Zoology—Theoretical.

(a) The structures and properties of the cell and the general characters and functions of the tissues including the epithelia, blood and lymph and the nervous, muscular, connective and skeletal tissues.

(b) The general structure, life-history and physiology of *Amœba*, *Paramecium* and Malaria parasite.

(c) The general structure, vital activities and life-history of *Ascaris lumbricoides*, and *Tænia solium*.

(d) The general structure and life-history of Indian pond snail (*Pila globosa*).

(e) The structure, life-history and elementary physiology of vertebrata as illustrated by *Bufo* (toad).

(f) The structure and elementary physiology of the guineapig or rabbit. The brain and heart of the sheep should be taught separately.

(g) A short description of the poison apparatus of snakes and the distinction between poisonous and non-poisonous snakes. The history and characters of the germ cells, the chief types of segmentation of the fertilised Ovum. The outline of the embryology of the frog and the chick.

(i) The elementary facts of heredity, variation and evolution.

Practical.—The dissection, microscopical examination and description of specimens or parts of the animals mentioned above.

The examination shall comprise of—

(i) A written examination—one paper of three hours' duration of each.

(ii) An oral and practical examination.

(B) Anatomy and Physiology.

Anatomy—Theoretical.—(1) Elementary knowledge of the human skeleton and its component parts

- (2) The important muscles of the body.
- (3) Heart and the principal blood-vessels.
- (4) The spinal cord and the peripheral nerves.
- (5) Brain and the cranial nerves.
- (6) Viscera—Abdominal and Thoracic.
- (7) The Excretory apparatus.
- (8) Glands of internal Secretion.

A course of demonstration with models, charts, etc., will accompany the lectures in anatomy and physiology as far as possible.

Physiology—Theoretical.—Blood and its coagulation; the transport of oxygen and carbon dioxide.

The properties of cardiac, striated and unstriated muscle.

The mechanism of the heart and valves. The coronary circulation. The effect of the inflow on the rate and output of the heart.

The importance and maintenance of the blood pressure.

Elementary knowledge of the structure of the glands of internal secretion. The effects following their removal, and the properties of extracts prepared from them including (a) pituitary body, (b) thyroid and parathyroid, (c) pancreas, (d) suprarenals, (e) testicles and ovaries.

The physiology of the alimentary tract. The chemistry of the common food substances, meat, eggs, milk, and bread and properties of the digestive juices and bile. Nutrition—Deficiency diseases—Vitamins—satisfactory diet.

Bacteriology—Theoretical Lectures.—The course should contain sufficient information to enable the pharmacist to co-operate effectively with the public health agencies. He should be thoroughly familiarised especially with the technique of sterilisation, disinfection and fumigation. He should know the principles underlying the use of biological and related products.

General characteristics of bacteria—Morphological classification of Bacteria—Activities of bacteria—Destruction of bacteria—Sterilisation by heat—Chemical agents injurious to bacteria—fumigation and aseptic manipulation. Fundamental factors of pathogenicity and infection. Special reference should be given to (1) Biological products, e.g., anti-toxins, therapeutic sera, immune sera, bacterial vaccines, antigens, etc., (2) Biological tests as aids in diagnosis, e.g., widal and other agglutination tests, precipitin test, etc.

Practical.—Demonstration of growth of micro-organisms in plants. Preparation of culture media. Identification of microbes by staining and cultural methods. Fermentation reaction. Animal inoculation.

Brief consideration of the technique, their interpretation and value in diagnosis of agglutinin and precipitin tests.

Industrial Bacteriology.—Students should be familiar with brewer's yeasts, wild yeasts, different kinds of moulds, acetic and lactic acid

organisms, etc. A knowledge of the morphology and life history of these organisms.

Materia Medica and Pharmacology, including Toxicology.—Materia Medica general as in the second M.B. course of the Calcutta University. The course should be so adapted that the pharmacy students may know most of the drugs and their uses in medical practice so as to be able to dispose of them intelligently and give advice to the customers in the absence of the doctor.

Toxicology.—Definition of poisoning—cumulative poison—systemic poison—local poison—treatment of systemic poisoning—Antidotes for common poisons—Poisonous gases—prescription errors—sale of poisons.

Bio-assay.—Introduction—Necessity for biological assay—Drugs requiring biological assay—standards—Minimum lethal dose—Animal idiosyncrasies—Apparatus—Materials—Experimental surgical technique—Methods of recording—Interpretation of results—accuracy.

Biological assay of digitalis, epinephrine, posterior pituitary, arsphenamines, vitamins, etc., if possible.

Elementary knowledge of the actions and uses of the commonly remedies with their methods of preparations and doses.

Toxicological manifestations following the ingestion of common poisons with their antidotes.

Books recommended.

Text-books.	Author.
Text-book of Inorganic Chemistry	Partington.
Inorganic Chemistry	Mellor.
A Manual of Practical Inorganic Chemistry ..	Reisenfeld-Ray.
Analytical Chemistry, Vols. I and II	Treadwell and Hall.
A Systematic Hand-book of Volumetric Analysis ..	Sutton.
Organic Chemistry	Prescott and Ridge.
Organic Chemistry	J. Schmidt translated by Gordon Rule.
Organic Chemistry	Beruthsen and Sudborough.
A Hand-book of Organic Analysis	Clarke.
Laboratory Methods of Organic Chemistry ..	Gatterman.
Practical Organic Chemistry	Sudborough.
Qualitative Chemical Analysis	Mollow Perkin.
Introduction to Physical Chemistry	Walker.
Laboratory Experiments on Physics-Chemical Principles	Sherrill.
Outline of Theoretical Chemistry	Getman.
Practical Physical Chemistry	Findlay.
Practical Physical and Colloid Chemistry ..	Michaelis.
A Text-book of Pharmaceutical Chemistry ..	Venley-Driver.
The Science and Practice of Pharmacy	Mackie.
A Course in Practical Pharmacy	Cooper and Appelyard.
Principles of Pharmacy	Army.
Chemistry and Analysis of Drugs	Fuller.

Text-books.	Author.
Introduction to the Qualitative Analysis of Medicine ..	Fuller.
British Pharmacopoeia and Addendum .. ..	..
Laboratory Manual of Food and Water Analysis ..	Amrhein.
Pharmaceutical Arithmetic	Schroff and Srivastaba.
Pharmaceutical Latin and Prescription Reading ..	Do.
Dispensing for Pharmaceutical Student	Cooper and Dyer.
Incompatibilities	Ruddiman.
A Text-book of Bio-chemistry	Cameron.
A Text-book of Botany for Medical and Pharmaceutical Students.	Small.
Text-book of Botany	Lowson.
Practical Botany	Strasburgen and Hillhouse.
Analytical Key of Natural Orders (Pub. Cal. Univ.) ..	..
A Text-book of Pharmacognosy	Trease (1) Gathacoal and V (2)
Practical Pharmacognosy	Wallis.
Elements of Book-Keeping	Sodhi.
Merchandising of Drug Products	Olsen.
Business Building for Pharmacists	Carter.
Drug Store Business Methods	Pearson.
Compendium of Human Anatomy	Potter.
Popular Atlas of the Anatomy of the Human Body ..	Bailliere.
Manual of Elementary Zoology	Borradaile.
Manual of Zoology	Mukherjee.
Essentials of Physiology	Binbridge and Menzies.
Experimental Physiology	Schaffer.
Hand Book of Bacteriology	Bigger.
Laboratory Manual of General Microbiology. ..	Fred and Waksman.
Introduction to Pharmacology and Therapeutics ..	Gunn.
Manual of Pharmacology	Dixon.
Recent Advances in Materia Medica	Burn.
Materia Medica and Therapeutics	Ghosh.
Methods of Biological Assay	Burn.
Treatise on Hygiene and Public Health	Ghosh.

Reference Books.	Author.
Treatise on Inorganic Chemistry	Roscoe.
Inorganic Chemistry	Lowry.
Quantitative Chemical Analysis	Clowes & Coleman.
Volumetric Analysis, Vols. I and II	Kotthoff & Furman.
Organic Chemistry Vols. I, II and III	Cohen.
Recent Advances in Organic Chemistry, Vols. I and II	Stewart.
Reactions of Organic Compounds	Hicken Bottom.
Essays on Historical Chemistry	Therpe.
Identification of Pure Organic Compounds ..	Mulliken.
Commercial Organic Analysis, Vols. I to X ..	Allen.
The Plant Alkaloids	Henry.

Reference Books.	..	..	Author.
Physico-Chemical Methods	..	..	Reilly & Rae.
Practical Physical Chemistry	..	..	Fajans & Wyst.
Determination of Hydrogen-Ion-Concentration		..	Clark.
Colloid Chemistry	..	..	Alexander.
Inorganic Colloid Chemistry	..	..	Weiser.
Laboratory Manual of Colloid Chemistry		..	Holmes.
Pharmacopoeia of the United States		..	
German Pharmacopoeia	..	..
British Pharmaceutical Codex	..	..	Published by Pharmaceutical Society of Great Britain.
Extra Pharmacopoeia	..	..	Martindale & Westcott.
Text Book of Pharmaceutics	..	..	Bentley.
Inorganic Pharmaceutical Chemistry		..	Rogers.
The National Formulary	..	..	Published by Amer. Pharm. Assn. American.
A Treatise on Pharmacy	..	..	Caspari.
Organic Medicaments	..	..	Fourneau.
Latin for Pharmaceutical Students	..	..	Cooper.
Pharmaceutical Latin	..	..	Muldoon.
Pharmaceutical Arithmetical	..	..	Bradley.
Official and Tentative Methods of Analysis of the Association of Official Agricultural Chemistry.			
Adulteration and Analysis of Foods and Drugs		..	Liverseege.
Grundriss der Modern Arzneistoff Synthese		..	Slotta.
Quantitative Pharmaceutical Chemistry		..	Jenkins & Dumez.
Practice of Pharmacy	..	..	Remington.
Technical Methods of Analysis	..	..	Giffin.
Chemical Investigation of Plants	..	..	Rosenthaler & Ghosh.
Structure and Composition of Foods	..	..	Winton.
Food Analysis	..	..	Woodman.
Food Inspection and Analysis	..	..	Leach.
Semi-micro Methods of Qualitative Chemical Analysis	..	..	Engelder.
Calculations of Quantitative Chemical Analysis	..	..	Hamilton & Simpson.
Text-book of Biochemistry	..	..	Harrow & Sherwin.
Biochemistry of Medicine	..	..	Cameron & Gilmore.
Plant Biochemistry	..	..	Onslow.
Enzymes	..	..	Walddchmidt-Leitz.
Alcoholic Fermentation	..	..	Harden.
Physiological Chemistry	..	..	Bodansky.
Chemistry of Colloids	..	..	Zsigmondy.
Text-book of Botany	..	..	Strasburger.
A Text-book of Pharmacognosy	..	..	Greenish.
Microscopic Examination of Foods and Drugs		..	Greenish.
Indigenous Drugs of India	..	..	Chopra.
Accounting Theory and Practice	..	..	Riltenshouse & Clepp.
Text-book of Zoology for Indian Students		..	Parker & Bhatia.
Life	..	..	Shiple, (Cambridge University.)
Text-book of Anatomy and Physiology		..	Kimber & Gray.
Human Physiology	..	..	Furneaux.

Reference Books.	Author.
Bacteriology and Sanitary Science	Cershenfeld.
Bacteriology Blood Work, etc.	Stitt.
Bio-Assay	Plttenger.
Manual of Pharmacology	Sollmann.
Applied Pharmacology	Clark.
Recent Advances in Chemotherapy	Findley.
The Chemistry of Chemotherapy	Dyson.
Quantitative Clinical Chemistry, Vols. I and II	Van Slyke.
Poisons, their Effects and Detection	Blyth.
Vitamins	Sherman & Smith.
Chemical Methods applied to Practical Medicine	Stewart & Dunlop.
Practical Physiological Chemistry	Cole.
Monograph on Glucosides	Armstrong.
Dangerous Drugs	Woods.
Forensic Chemistry and Scientific Criminal Investigation.	Lucas.
Report of the Drugs Enquiry Committee	Chopra.

(B) Required staff for the College of Pharmacy.

It is difficult at this stage to indicate the exact strength of the teaching staff and other personnel that would be required to run the proposed College of Pharmacy. This will naturally depend to a large extent on the number of students going to be admitted to the College, on the syllabus and course of study that is going to be enjoined and on the financial position of the institution. With the syllabus and courses of study already laid down and assuming that only 100 students will be admitted into the diploma course and about 30 students in the degree course each year, we feel that a self-contained institution of the type that we are going to create cannot be managed without a minimum wholtime teaching staff consisting of 1 Principal, 3 Professors, 2 Assistant Professors, 7 Lecturer-Demonstrators and 12 laboratory technicians. In view of the fact that the proposed pharmacy college will be the first institution of its kind in the whole of India, it is possible that, at least for the first few years of its life, there will be a large demand for admission even from students outside the province of Bengal. This can be met by increasing the accommodation in the diploma course to 150 students and in the degree course to 50 students per year. Under such circumstances, only additional laboratory facilities have to be provided. The teaching staff will have to be also slightly strengthened. Besides the superior staff mentioned above, we have to provide also for a library staff, inferior servants and menial staff.

The Principal should be a man of standing and repute in the scientific world who can command confidence and who possesses

administrative abilities. He may be a medical man with special qualification in one of the major subjects to be taught in the College or otherwise. In the interest of the institution, he should not be overburdened with duties, but should be allowed sufficient time and opportunities to look after the welfare of the institution and develop it from its modest beginning. If, however, due to limitations of the budget, a separate Principal cannot be engaged at present, one of the Professors may be appointed to the post with a charge allowance to carry on the functions of the Principal, in addition to his own duties.

We propose that there shall be three important departments in the College of Pharmacy as follows:—(1) Department of Pharmacy and Chemistry, (2) Department of Pharmacology (including materia medica), Bacteriology and Therapeutics and (3) Department of Botany and Pharmacognosy, and all these departments should be in the independent charge of a full-time professor. The professor of pharmacy and chemistry should be assisted in his work by at least a staff of one assistant professor, 4 lecturer-demonstrators and 8 laboratory technicians. This is the heaviest course and embraces teaching in various branches of chemistry, viz., Organic, Inorganic, Physical and Pharmaceutical Chemistry, and also in the theory and practice of pharmacy. It will be very difficult, if not impossible, to find a professor who will be either competent or willing to teach all the above subjects. A senior assistant professor of experience therefore will be required to take up some of the subjects in this course. The lecturer-demonstrators will be responsible for conducting the tutorial and practical classes. As no provision has been made for a separate department of physics, mathematics, etc., for the diploma course and of pharmaceutical economics for both the diploma and the degree courses, two or three lecturer-demonstrators have been added to this unit with the idea that these gentlemen will be responsible for teaching the abovementioned subjects under the administrative guidance of the head of the department. The lecturer-demonstrators should be aided in their class work and in the preparation of analytical and laboratory reagents by trained technicians. The professor of pharmacology and therapeutics should be a medical man with considerable experience in pharmacological laboratories, who will be able to undertake teaching of materia medica, toxicology, bio-assay, etc., in both the diploma and degree courses. The subjects of Zoology, Anatomy, Physiology, Hygiene, and Bacteriology which are included in the various parts of the curriculum should also be under his charge. To do justice to such a variety of subjects, he will naturally require the help of an assistant professor who can teach some of the subjects. For the practical work and for conducting demonstrations, etc., this department should have the services of 1 lecturer-demonstrator and 2 laboratory technicians. The Department of Botany and Pharmacognosy should have one professor who will be responsible for theoretical lectures in both the subjects. For the practical classes, he should have 2 lecturer-demonstrators and three laboratory technicians at his disposal. The Professor-in-charge should preferably be a Botanist or Pharmacist with special training in Pharmacognosy. Pharmacognosy has grown to be an independent science and requires a specialist to do proper justice to it. We are, however, conscious of the financial liabilities involved in such a proposal for creating two independent professorships of Botany and Pharmacognosy and therefore have suggested the next best alternative of a combined chair for both subjects.

Teaching Staff.

- (1) Department of Pharmacy and Chemistry, including physics, mathematics and pharmaceutical economics—One Professor, one Assistant Professor, four Lecturer-Demonstrators, eight laboratory technicians† and seven Bearers.
- (2) Department of Botany and Pharmacognosy—One Professor, two Lecturer-Demonstrators, two Laboratory Technicians† and one Bearer.
- (3) Department of Physiology, Pharmacology, Bacteriology and Public Health studies—One Professor, one Assistant Professor, one Lecturer-Demonstrator, two Laboratory Technicians† and one Bearer.

At the start the following office and library staff may be provided. With the increase in work and functions of the College, this staff may have to be augmented from time to time:—

Office—

- One Head Clerk and Accountant.
- One Clerk and Cashier.
- One Reference Clerk and Typist.
- One Duftry.
- One Bearer.

Store—

- One Store-Keeper.
- One Assistant Store-Keeper.
- One Bearer.

Library—

- One Librarian.
- One Bearer.

Workshop—

- One Mechanic.
- One Cooli.

Miscellaneous—

- Four Sweepers.

* The services of the staff will be permanent and pensionable and governed by usual Government service Regulations.

† Laboratory Technicians must be qualified graduates in their respective subjects who should help the demonstrators and the students in the practical classes.

CHAPTER III.

Capital and Recurring Expenditure.

By the third term of reference, we are expected to give an estimate of the total expenditure, capital and recurring, involved in the scheme for the establishment of a College of Pharmacy in Bengal. As the committee is not aware as to the amount of money the Government may be able to provide towards the development of this useful institution, our proposals have necessarily to be tentative. In formulating our proposals however, we have exercised the greatest caution and judgment and have provided for the minimum requirements consistent with efficiency. We wish to emphasize further that our budget proposals are designed to meet only the cost of conducting a "teaching" institution. We have not provided for many other useful and cognate activities which are essential for the growth and development of the science of pharmacy in the province, e.g., propaganda, research, etc. In a country like India which possesses a wonderful range of vegetable materia medica, researches into the pharmacognosy, chemistry and pharmacology of the indigenous drugs is urgently called for. Though a fair amount of work has been done in this direction by the School of Tropical Medicine, Calcutta, and other similar research institutions like the Haffkine Institute in Bombay, much still remains to be done and there is little doubt that institutions like the proposed College of Pharmacy would be particularly well suited to undertake such investigations in their laboratories. We realise that the ultimate benefit of such research and investigation will be of immense benefit to the country as they will provide many hitherto unknown remedies for medical treatment and medical relief. They will also stimulate and develop trade and industry in indigenous crude drugs generally. But at the present moment, we do not feel that it will be fair to include any such schemes for research, investigation and methods of utilisation of drugs, etc., in our proposals for a College of Pharmacy. We would wait till the parent institution is well-established and proves useful to the Province. Schemes for its further development and for increasing its range of utility and service on the lines indicated above might be drawn up by the authorities in direct touch with the institution at a later date.

(A) Capital Expenditure.

Building.—This item does not give rise to very much difficulty. Dr. Anklesaria has offered a donation of 2 lakhs of rupees on the condition that the Government of Bengal will contribute an equal amount (at least 2 lakhs), plus a free site of land for the college building. It is therefore clear that in the event of the Government's agreeing to accept the donation, there will be available for the purpose of the project a capital sum of at least 4 lakhs of rupees together with a free site of land to be handed over to the institution by the Government.

Dr. Anklesaria, the donor, suggested in one of his letters to the committee that the site for the college buildings, etc., should be selected very carefully, keeping in view its future expansion and development. To acquire a fairly good plot of land for the proposed college in the central districts of Calcutta, in the neighbourhood of medical and science colleges, would have been ideal. The close association of a school of pharmacy with a medical college and hospital is a great

advantage, as it brings students of pharmacy in contact with students of medicine, enabling them to have a practical insight into modern therapeutic methods and to give a practical turn to their training. The extreme congestion in these localities (Central Calcutta) and the prohibitive cost of land in these areas however have been considered. The committee feels therefore that the Government would be better advised to select a piece of land measuring about 20 to 25 acres in the suburban districts of Calcutta, not too far from the busy localities but at the same time easily accessible by public conveyances like bus, tram or railway. Near the northern districts of Calcutta, e.g., Dum Dum municipality, as well as close to the southern districts of Calcutta, e.g., in Jadavpur areas, land at a fairly cheap rate is still available which will answer the conditions laid down above. An area of 10 to 15 acres of land in these localities or contiguous areas may be easily secured at a cost of about Rs. 50,000 to Rs. 60,000. This area may be fenced up for the present, part of it being used for the college building and menials' quarters. In future, this area will allow for the expansion of the college, and may also be utilised for students' play grounds, students' hostels, botanical garden for medicinal herbs and plants, staff quarters, etc. An independent, self-contained institute of pharmacy will then grow up in Bengal which will compare very favourably with similar institutions in Great Britain, in the continent of Europe and in America.

In estimating the expenditure to be incurred for the erection of the college building, we have considered the probable floor space likely to be required for the laboratory accommodation for 200 students in the diploma course (in 2 years) and 90 students (in 3 years) for the degree course. A tentative calculation of the probable floor space distribution is presented below:—

	Sq. ft.
Office, 30' × 20'	600
Library, 30' × 40'	1,200
Store and Godown, 30' × 40' × 2	1,200
Students' Common Room, 30' × 40'	1,200
Students' Tiffin Room, 30' × 40'	1,200
Lecture Galleries, 40' × 40' × 2	3,200
Preparation rooms, 30' × 15' × 2	900
Tutorial Class room, 30' × 20'	600
Botany and Pharmacognosy Laboratory, 30' × 40'	1,200
Professors' Room 15' × 10' × 3	450
Pharmacology and Physiology Laboratory, 30' × 40'	1,200
Hygiene and Bacteriology Laboratory, 30' × 20'	600
Staff Room, 30' × 20'	600
Physics and Physical Chemistry Laboratory, 30' × 40'	1,200
Manufacturing Pharmacy, 30' × 60'	1,800
Dispensing Pharmacy, 30' × 40'	1,200
Inorganic, Organic and Drug Testing Laboratory:	200
Diploma students in two batches of 100 students each, working for 3 days of 4 hours per week, 30' × 80'	2,400
Inorganic, Organic, Analytical, including Food and Drug Analysis Laboratory for 30 × 3 Degree Course students working over 20 hours a week, 30' × 40' × 3	3,600
Elementary Analysis and Combustion Room, 30' × 20'	600
Balance Room, 30' × 15' × 2	900
Optical Instrument Room, 30' × 15'	450
Drug Museum, 30' × 40'	1,200
Workshop and Boiler room, etc., 30' × 15'	450
Students and Staff Lavatories, 30' × 20'	600
Microchemical analysis and Staff Laboratory, 30' × 20'	600
Total	28,950

In addition to this floor space, the area likely to be covered by the verandahs, staircase, etc., will have to be considered. The floor space for this cannot be anticipated now as this will depend to a large extent on the plan and design of the building.

We propose in the initial stages to have a two-storied college building, with foundation for three stories, on approximately 15,000 sq. ft. base. Calculating on the basis of Rs. 10 per square foot of constructional work, which is the average rate charged by contractors according to current market prices for a two-storied structure, such a building will cost approximately Rs. 1,50,000. Electric installation, gas, water, and sanitary fittings, distilled water plants, lecture gallery fixtures, etc., will cost another Rs. 27,000 to Rs. 30,000, as per details shown below:—

	Rs.
1. (a) College building—two storied with foundation for three on approximately 15,000 sq. ft. base. A portion should be three storied or more, on the top of which water reservoirs, etc., may be placed.	
(b) Quarters for menial staff (for about ten persons) ...	1,50,000
2. Electric installation—Light and fans, including exhaust fans ...	10,000
3. Gas and water fittings; Water reservoirs, motors and pumps. Compressed air, steam and refrigeration service, including distilled water plant ...	10,000
4. Lecture galleries—two for 200 students each ...	7,000
Total ...	1,77,000

The laboratory equipment including working benches, etc., and the initial cost of general equipping will be as follows:—

	Rs.
5. (a) Manufacturing pharmacy laboratory* ..	25,000
(b) Pharmaceutical, organic, inorganic, physical and analytical, including foods and drugs analysis and clinical chemistry laboratory ...	40,000
(c) Dispensing laboratory ...	6,000
(d) Optical instruments and chemical balances, etc. ...	10,000
(e) Botany and pharmacognosy laboratory including herbarium ...	10,000
(f) Physiological laboratories including pharmacology and bacteriology sections ...	18,000

N.B.—The details of items (b), (c), (d), (e), etc., may conveniently be worked out by the departmental heads when the institution will be actually functioning.

	Rs.
(g) Initial stores, chemicals, apparatus, etc., for store room, lecture and student classes ...	15,000
6. Library—Equipments, books and journals to start with ...	15,000
7. Furniture for staff, office, stores, etc. ...	10,000
8. Machine shop equipment for repair work, glass blowing, etc. ...	6,000
9. Miscellaneous expenses	3,000
Total ...	1,58,000
Grand Total ...	3,35,000

According to our present estimates, therefore, the total capital expenditure will be in the neighbourhood of Rs. 3,35,000. We have tried to save Rs. 65,000 out of the donation made by Dr. Anklesaria as it will be the nucleus of a reserve for further extension of buildings and to meet other expenditure of a capital nature. Experience has shown that a reserve is a necessity if the institution is to run smoothly and develop. If the college begins to fulfill the purpose for which it is being brought into existence, we feel that an extension of the building will be required in the near future. For equipment also, additional sums of money are bound to be required when the college begins to work in full swing. It is not possible at this stage to provide for all the necessary apparatus, fittings, etc., and therefore only rough estimates are presented above.

The above is an approximate estimate and it is suggested that an all-round figure of Rs. 25,000 be allotted for this purpose to cover any additional items which may be required.

N.B.—The expenses likely to be incurred for a Manufacturing pharmacy laboratory has been calculated as follows :—

	Rs.
One Small Vertical Boiler	1,250
Fittings, Steam Pipes, etc.	200
One 5 H. P. Electric Motor	250
Shafting Pulleys, etc.	200
One Still for Distilled Water	700
One Power Driven Tablet Machine	1,000
One Drying Cabinet and Racks	250
One Ointment Mill	750
One Vaccum Pump (Power Driven)	500
One Vaccum Driver (Steam heated)	500

	Rs.
One Vacuum Still and Condenser	1,000
One Copper Still and Condenser	650
One Essential Oil Still and Condenser	650
One Tincture Press	500
3 × 5 Gallon Percolators (Copper)	300
2 × 10 Gallon Percolators (Copper)	275
One Earthenware Still and Condenser	650
One Marc Recovering Still	500
One Emulsifying Machine	475
One Tube-filling Machine	150
One Copper Tablet—Coating Pan	600
One Tablet—Polishing Pan	350
One Copper Steam Pan (Tilting)—10 gallons capacity	500
One E. I. Steam Pan (Tilting)—20 gallons capacity	500
One E. I. Steam Pan (Tilting)—50 gallons capacity	850
One Small Centrifugal Machine (Power Driven)	700
2 × 20 gallons E. I. Mixing Pans	400
2 × 10 gallons E. I. Mixing Pans	250
One Power Driven Filter Press	600
One Small Ball Mill (Power Driven)	300
One Suppository Machine and Dies	150
One Drug and Grinding Mill	650
1 × 50 gallons Earthenware Elutriation Tank	250
One Set Pill Machinery (Power Driven) including mixing Machine, Piping Press, Rotary Cutter, Pill Coater, Finish- ing Machine	3,500
Sieves Glass Ware, etc.	200
Two Storage Vessels (Aluminium)—50 gallons capacity	125
Two Storage Vessels (Aluminium)—20 gallons capacity	80
Two Storage Vessels (Aluminium)—10 gallons capacity	70
Total	<u>20,825</u>

—Recurring Expenditure.

The annual recurring expenditure will naturally depend largely on the staff employed and their scales of pay. In Chapter II, we have already given our tentative proposals as to the staff that will be required. It remains for us here only to calculate the average annual expenditure likely to be incurred. The question of fixing a suitable scale of pay for the three important chairs to be created in the College of Pharmacy has been a difficult matter. On the one hand, the committee had to consider the present financial condition of the province and the difficulty that may be felt by the Government at this transitional stage of the province's growth and administration to divert a substantial sum for professional and vocational education. The establishment of a College of Pharmacy is naturally one of the many other useful nation-building activities which the Government will be called upon to subsidize and any recommendation for a huge recurring expenditure on this score might be rejected and the scheme will necessarily be delayed. On the other hand, the committee could not be unmindful of the fact that if the College of Pharmacy, the first one of its kind in the province and in the whole of India, is to fulfill the functions for which it is being ushered into existence and to serve as a model institution for imparting pharmaceutical and allied education, thus giving a fillip to the drug industry of the province, it must be provided, particularly in its early stages, with competent and highly qualified teachers possessing talent, resourcefulness and leadership. There are not many men in this country capable of teaching the highly technical and specialised subjects of pharmaceutical chemistry, pharmacology and pharmacognosy in this country. These subjects are not being taught in any of the Indian Universities and as such, most of these teachers will have to be either foreigners or Indians with foreign training and experience in the subjects. Dr. Anklesaria has laid down a condition that the entire teaching staff except two must be Indians. We fully subscribe to this view and we have enough evidence in our possession to be able to state that qualified Indians with sufficient training and experience in the above fields will now be available. Such men cannot however be attracted to posts carrying a very small remuneration. After mature consideration, the committee has come to the conclusion that a pay of Rs. 300 to Rs. 550 per month for the professors would be the minimum that can be recommended under the circumstances. This pay with the concomitant security and privileges associated with Government service may offer sufficient inducement for fairly good teachers to come forward. If highly qualified men are available, it will obviously be to the interest of the Government to secure their services if necessary, at the maximum pay offered by the scale. The additional expenditure will be more than compensated by the specialized service received and the increase in the prestige of the College.

Most of the subordinate teaching appointments and establishment staff have been put on scales of pay almost on a line with those existing in similar educational institutions in the province, and as such will, we hope, be found acceptable. The average total recurring expenditure on all items taken together are given below:—

Three Professors (at Rs. 300 to Rs. 550 per month) ...	Rs. 15,300
Two Assistant Professors (at Rs. 200 to Rs. 350 per month) ...	6,600

Seven Lecturer-Demonstrators (at Rs. 100 to Rs. 150 per month) ...	10,500
Twelve Laboratory Technicians (at Rs. 50 to Rs. 100 per month) ...	10,800
One *Dean of the College—Charge allowance (at Rs. 100 per month) ...	1,200
One Head Clerk and Accountant (at Rs. 150 to Rs. 200 per month) ...	2,100
One Clerk and Cashier (at Rs. 60 to Rs. 100 per month) ...	960
One Reference Clerk and Typist (at Rs. 40 to Rs. 85 per month) ...	750
One Librarian (at Rs. 80 to Rs. 125 per month) ...	1,230
One Store-Keeper (at Rs. 60 to Rs. 100 per month) ...	960
One Assistant Store-keeper (at Rs. 40 to Rs. 60 per month) ...	600
One Mechanic (at Rs. 30 to Rs. 50 per month) ...	480
One Jamadar (at Rs. 18 to Rs. 24 per month) ...	252
One Duftry (at Rs. 18 to Rs. 24 per month) ...	252
Twelve Bearers (at Rs. 13 to Rs. 17 per month) ...	2,160
Four Sweepers (at Rs. 15 per month) ...	720
One Coolie for Workshop (at Rs. 15 per month) ...	180
Municipal taxes ...	3,500
Gas and electricity ...	3,500
Books and periodicals ...	1,500
Office contingencies and other miscellaneous expenses	2,500
Laboratory contingencies, chemicals and apparatus including expenses for preparative, operative, manufacturing and dispensing pharmacy ...	7,000
Total ...	73,044

*In view of the remarks made in Chapter II page 84, the pay of a separate Dean has not been included in this estimate. If it is decided upon to engage a Dean, which is naturally desirable, a scale of pay of Rs. 600—1,000 may be fixed for such an appointment.

CHAPTER IV

Legislation to control the profession of Pharmacy.

The fourth term of reference to the committee, viz., "the necessity and feasibility of legislation with a view to ensuring that only qualified pharmaceutical chemists should conduct chemists' and druggists' business" is not directly concerned with the establishment of a College of Pharmacy but is a matter of general policy which is vitally important to the development of a profession of pharmacy in this country. Mere improvement in the standard of training and qualification is not likely to be effective in the absence of restrictive laws to control the profession. If properly qualified pharmacists are not protected from quacks and charlatans, there is legitimate ground for doubt whether many will care to enter the profession seriously and face the unfair competition. Unless the present hopeless situation regarding the practice of allowing anybody and everybody to carry on the work of compounding, dispensing and selling medicines including poisons and narcotics is stopped, the qualified men will not find any avenue of employment open to them and the purpose of creating a College of Pharmacy will be defeated. Dr. Anklesaria, the donor, has realised this aspect of the problem with remarkable foresight and has made it a condition precedent on his award of the donation. The Drugs Enquiry Committee (1930-31) recommended very strongly the enactment of immediate legislation to control the profession of pharmacy in India. In 1933, the Calcutta University authorities considered the question of establishment of a degree course in pharmacy and though there was general agreement that such a course should be opened, it was the unanimous feeling of the Syndicate that no useful purpose will be served unless there was legislation making it obligatory on all pharmaceutical establishments, hospitals and dispensaries to employ only qualified men. Almost all our witnesses representing the pharmaceutical profession, trade and industry, who are likely to be most affected by the introduction of any system of control, welcomed the idea of legislation and actually emphasized the urgent need for a *Pharmacy Act* to control the chaotic state of affairs now existing in the pharmaceutical field in this country.

Pharmacy legislation in other countries.

To indicate that it is desirable that those engaged in the compounding of medicines and in the distribution of drugs to the public should conform to some standards of professional competence and to some surveillance in the conduct of their business, it is probably only necessary to say that in practically every country in the world, there is *legislation* of varying degrees of completeness. With a view to ensure a high standard of efficiency the pharmacist is required to undergo a long period of training and then pass a rigorous and stringent examination before he is permitted to enrol himself as a pharmacist and take out a "licence" to practice his profession. All through his career as a professional man, he is under disciplinary control either by the State directly through the Minister of Health or the Minister of the Interior,

or by a professional organisation endowed by the State with the power of exercising control over themselves through a Council or a Board of elected members. The former system of direct State control is generally prevalent in the continent of Europe while the latter system of voluntary control by professional organisation is operative in Great Britain and America. It will not be out of place here to examine in brief the systems in the two English-speaking countries, as these will have a direct bearing on the system of control that we are going to recommend for India.

Great Britain.—The profession here is controlled by the Pharmaceutical Society of Great Britain. The society was first founded in 1841 and it received a Royal Charter of incorporation in 1843. Chief among its chartered objects are “the advancement of chemistry and pharmacy, and the promotion of a uniform system of education for persons practising the same.” The registration and general control of “Pharmaceutical Chemists” and “Chemists and Druggists” was entrusted to the Society by the Pharmacy Act, 1852, which has been amended and extended in its operation by subsequent Acts of 1868, 1869, 1898, and 1929. The Acts provide for the registration of duly qualified pharmacists. It is an offence to use the titles of “pharmaceutical chemists”, “pharmacists” and “chemist and druggists” without being duly qualified or registered. Registered pharmacists alone have the right to sell the scheduled poisons by retail. The business of a corporate body or a deceased chemist can be carried on, if it is in charge of a duly registered “Chemist and Druggist”. The Society conducts the qualifying examinations for registration under the Acts and for membership on its rolls. Members of the medical profession are not ordinarily entitled to be registered as “pharmacists”. The Act does not extend to the business of a qualified apothecary or a member of the Royal College of Veterinary Surgeons or a wholesale dealer in poisons, or apply to the preparation or sale of patent medicines strictly so called, which are the subject of “letters patent”; nor does it restrict the dispensing of prescriptions which do not contain any poison, by unqualified proprietors of drug stores. The dispensing of poisons otherwise than in a shop, as in a hospital, is not also affected by the Acts.

America.—There are pharmacy laws in almost all the States of America. Pharmacists are all registered in the State in which they practise and are regularly licensed to fill prescriptions and to sell, or supervise the sales of drugs, medicines, and poisons. The laws of the various States generally provide that certain drugs may be sold only by or under the supervision of licensed pharmacists. This regulation does not hold with regard to the sales by manufacturers and wholesale dealers, but pertains only to the distribution of drugs to patients or to agencies using the medicines for medical care. Licences may be revoked by the Boards of Pharmacy set up under the Pharmacy Acts for various causes, e.g., violation of various laws, addiction of the pharmacists to narcotic drugs, chronic inebriety, etc.

Applicants for pharmacists' licences must pass examinations given by the respective “State Board of Pharmacy”. Forty-six States, including the district of Columbia, out of forty-nine, have enacted legislation requiring graduation from high school as a prerequisite to licensure as a registered pharmacist. More than one half of the

States provide, or have at one time provided for the licensure of "assistant pharmacists" who satisfy less stringent educational and professional requirements than the registered pharmacists, but who are permitted to compound prescriptions and remain in charge of a pharmacy during the "temporary absence" of registered pharmacists. The abolition of this system of retaining "assistant pharmacists" however is being attempted by the National Association of Boards of Pharmacy and by the American Pharmaceutical Association and they have succeeded in a large measure already.

Present state of pharmacy legislation in India and in Bengal.

An examination of the Statute books in the Indian legislature indicates that there is no pharmacy legislation of any kind in the true sense of the term. There are however certain allied enactments like the Indian Poisons Act, the Indian Opium Act, and the Dangerous Drugs Act which control the manufacture, sale, possession and import of certain drugs, but they have no direct relation to pharmacy. The objects which mainly underlie them, are the collection of duty and the prevention of illicit traffic in connection with such drugs. They do not ensure that persons selling or keeping open shop for the retailing, dispensing or compounding of poisons and narcotics should possess a competent practical knowledge of their business. The licences issued in certain cases make mention of "chemist" and "compounder" but no statutory enactment controls their qualifications. The Acts are administered by the Excise Department and so long as the official concerned is reasonably satisfied that any person (not necessarily a person qualified to handle and sell drugs) can be trusted to conform to the regulations and conditions laid down in the licences, he is granted a licence.

In Bengal and in certain other provinces there are Municipal Acts which contain provisions requiring the registration of shops for the sale of drugs and prohibiting the practice of the profession by unqualified compounders. Thus, the Bengal Municipal Act of 1884 requires that shops or places for the retail sale of drugs recognised by the British Pharmacopoeia, which are not articles of ordinary domestic consumption, shall have to be registered in the office of the Commissioners and a licence obtained from them. Only persons certified by the Local Government under rules for the purpose shall be allowed to compound, mix, prepare, dispense or sell drugs in any such shop or place. The sale of drugs used by practitioners of indigenous medicines, whether recognised by the British Pharmacopoeia or not, is exempted from these restrictions when such drugs are sold elsewhere than in a shop or place dispensing medicines of the British Pharmacopoeia on prescription.

The Calcutta Municipal Act, 1923, is also on the same lines but is more stringent in one respect; it extends the restriction requiring the registration and licensing of places for sale of drugs to those used by the practitioners of the indigenous systems of medicine also, although the requirements that the vendor, compounder, etc., should be a properly qualified man is not made applicable to such a case. This Act authorises the Local Government to frame rules preventing the employment of non-qualified persons in recognised institutions and private

pharmacies. It further empowers the Local Government to make rules prescribing an educational course for candidates for compounder's certificates and the fees for the course regulating the examination of candidates, the grant of certificates and the registration of certificates so granted, permitting persons having the requisite qualification but not obtaining the certificate to compound, mix, prepare, dispense or sell drugs. The rules authorise the cancellation of any certificates so granted or the withdrawal of permission given to any person who is proved in the course of a judicial trial to have made a serious mistake through ignorance or carelessness in the compounding, mixing, preparing, dispensing or selling of drugs.

Under the existing laws therefore, the provincial Government can exercise a certain amount of control through the Municipal administration in Calcutta and in certain areas in the districts of Bengal over the practice of compounding, dispensing and selling drugs and chemicals. As the Municipalities never encouraged the setting up of a proper machinery for the control of drugs and the practice of pharmacy, these laws have remained practically a dead letter for want of enforcement. For all practical purposes it may, therefore, be stated that there is no control over the profession and practice of pharmacy in Bengal. This remark also applies to the other provinces of British India.

Need for control and the methods of control.

A careful consideration of the organisation and control of the pharmaceutical profession in Great Britain and America, points irresistibly to the urgent need for the creation of some sort of a machinery in this country capable of exercising an efficient and salutary control over the profession. The methods by which this can be achieved have been admirably expressed by Mr. Hugh N. Linstead, O.B.E., Secretary and Registrar of the Pharmaceutical Society of Great Britain and one of the authorities on the subject of pharmaceutical organisation, in his memorandum as follows:—

“The goals to be aimed at in any system of control are—

(i) That the public can rely upon obtaining unadulterated drugs and medicines accurately compounded;

(ii) That the medical profession shall have available a body to whom they can entrust, whether in the retail pharmacy, the hospital or the factory, the preparation of their medicaments and whose advice is available to them on all matters concerning the presentation and administration of drugs; and

(iii) That there shall be available a body of practitioners who can be relied upon by reason of their education and professional standing to exercise care and responsibility in the supply of potent medicaments, drugs of addiction and poisons.”

“The pivot of this machinery” according to Mr. Linstead, “must be an organised pharmaceutical profession whose members have been examined and registered by the State after proper training, a profession subject to such statutory control as local circumstances necessitate and in matters of discipline of its members, master in its own house. No

statutory control however minute its provisions and however efficiently enforced can take the place of such an organised profession."

"To build up this machinery attention must be given to each constituent part in relation to the whole. It is not sufficient that some parts only should be perfected if other parts are incomplete. The complete scheme calls for—

- (i) A system of training.
- (ii) Examination.
- (iii) Registration, including the registration of business premises.
- (iv) Machinery for devising the detailed statutory requirements for carrying on the practice of pharmacy and the trade in drugs and poisons generally.
- (v) Machinery for enforcement.
- (vi) Machinery for the internal control of the pharmaceutical profession itself."

Experience in the working of the Pharmacy Act in Great Britain since 1929 when it was last repealed has shown that a scheme of control built on the above model and worked as a whole with strict attention to individual details, operates very satisfactorily. It is therefore to be hoped that a similar system and a similar legislation may with advantage be introduced into the province of Bengal, with of course, necessary modifications to suit the local conditions. The actual machinery for control that, in the opinion of the committee, should be set up for the purpose is described below.

Machinery for Control.

(a) **Control of training and examination.**—In Chapter II, we have already outlined a system of training leading to a "Diploma in Pharmacy" and another leading to a "Degree in Pharmacy." We have also shown that the practice of pharmacy is an essential public service and that the professional skill necessary to undertake safely and efficiently the onerous and responsible duties involved in the compounding, dispensing, selling, etc., of drugs and medicinal chemicals, cannot be acquired by any system of training of a standard lower than the "Diploma in Pharmacy" Course as outlined by us. The first step in any programme for professional control that obviously suggests itself is to ensure that all types of pharmaceutical service should be exclusively reserved only to those who have successfully undergone the course of study and obtained either a "Diploma in Pharmacy" or a "Degree in Pharmacy". Such a provision means that *no person who is not duly qualified according to standards laid down by us should be allowed to carry on compounding, mixing and selling of drugs and chemicals.* Under the conditions prevailing in Bengal at present such a restriction, though eminently desirable, cannot possibly be made fully comprehensive for many years to come. In the first place, it will take many years for a single college of pharmacy in the province to produce enough qualified men to replace all those practising the profession, which may at a moderate computation be estimated at about 10,000. Secondly, the financial returns from many retail pharmacies doing business in the province are not such that it will be possible

for them to employ, even with reasonable remuneration, the superior type of pharmacists that our system of training will create. Exceptions therefore have to be made in certain cases if we have to keep the essential pharmaceutical service to the people unimpaired during the transitional period. For some years in the preliminary period of imposition of control, we will have to consider all those qualified according to the older system of training (compoundership training of State Medical Faculty) as "fully qualified" for our purpose. Then again, in the case of persons selling drugs and chemicals in the ordinary course of wholesale dealing, of persons selling drugs and chemicals in unbroken packages and of those selling useful household remedies, (subject of course to the regulations, to be imposed from time to time by a "Pharmaceutical Council" to be created), exemptions can be easily made. Qualifications of the type recommended by us are apparently not needed for this class of people, as they will not be called upon to undertake any compounding and mixing of drugs requiring technical knowledge for its performance. A firm or a company or a person who is not properly qualified may also be permitted to own a drug store or pharmacy, so long as the management is undertaken by or under the supervision of a qualified pharmacist.

Apprenticeship Training.—The apprenticeship training provided for in the diploma course should be taken either in a shop, dispensing establishment, or hospital. The difficulty in the province of securing dispensing establishments of sufficiently high standard, willing to receive and capable of imparting a good training in extemporaneous dispensing and practical pharmacy to the apprentices has already been stated and therefore it should not be permissible for the students to spend the apprenticeship period in any and every drug store or hospital that they may choose for themselves. The proposed "Pharmaceutical Council" will publish from time to time, after due inspection, a list of establishments where "apprenticeship" training may be had and no student shall be considered to have undergone the training properly unless he can satisfy the authorities concerned that he has served his scheduled period of training in any one of these "approved" establishments.

Examinations.—The final examination for the "Diploma in Pharmacy" course should be conducted under the direct supervision of a "Pharmaceutical Council" to be created in the same manner as the examination for Compoundership and Dressership is now being done by the State Medical Faculty of Bengal. Both "internal" and "external" examiners should be appointed to maintain as far as possible a high standard of competency of the students. If more than one institution for pharmacy training springs up at a later date in Bengal, it will be necessary to secure an uniformity in the standard of teaching between the different institutions. This should naturally be the primary look-out of the "Pharmaceutical Council" on which we are proposing to vest the sole authority for the control of the profession. The Government may also depute a special officer of the Education Department to supervise the standard of examinations from time to time, as is done, for example, in Great Britain.

The three examinations provided for in the Pharmacy College "degree course"—Preliminary, Intermediate, and Final—should be conducted under the supervision of the Calcutta University. It will

not be advisable in our opinion to make the University Faculty of Medicine responsible for looking after the standard of pharmacy examinations and all other questions pertinent to this subject. A special Faculty consisting predominantly of pharmaceutical interests should therefore be constituted. In this Faculty (Faculty of Pharmacy), the teaching staff of the College of Pharmacy should of course have adequate representation. The Pharmacy Faculty will have power to inspect the College of Pharmacy and advise the staff on the standard of teaching to be maintained and the training to be given to the students of the Degree Course.

(b) **Registration and licensing.**—“To give legal value to the qualification, to provide the courts with a means of differentiating between the qualified and unqualified practitioner and to provide a means of enforcing disciplinary decisions, a statutory register maintained under Government authority is necessary.” It should be made obligatory for all persons following the profession of pharmacy in some form or other to get themselves registered with the “Pharmaceutical Council” on the payment of a prescribed fee. The possession of a “Diploma” or a “Degree” in pharmacy should normally be the proper qualification for the registration of a pharmacist. Holders of certificates in pharmacy from other approved examining bodies, and persons with foreign registrable pharmaceutical qualifications shall be eligible for registration. Graduates in Pharmacy from the Benares Hindu University or Graduates in Technology (Pharmacy Group) from the Andhra University shall also be considered fit persons for registration. Apart from this group of persons who are fully trained in pharmacy, it will obviously be necessary for the reasons already stated, to enrol, on the first setting up of a “Register”, certain other groups of people who do not possess the high qualifications outlined above. Mr. R. D. Lemmon has suggested that (i) all persons who can prove that the practice of pharmacy in any of its branches has been their sole or main source of livelihood for 5 years prior to the imposition or restriction, (ii) all passed “compounders” of 3 years’ standing, and (iii) all doctor pharmacists, be considered as duly qualified persons for the purpose and may be allowed to continue in their profession as “pharmacists”. We think that there is considerable force in his argument and we feel that unless such exceptions are made there is likelihood of a violent disturbance of the existing order of things in Bengal, and it may not be possible to enforce the restrictions that we are going to recommend. In case of the first group of people, i.e., those who are totally non-qualified recognition may be accorded by the “Pharmaceutical Council”, subject to their satisfying a tribunal that their standard of knowledge is such that they can carry on their work without danger to the public. “Compounders” who have passed the State Medical Faculty examination of Bengal and who are actively engaged in the practice of pharmacy for 3 years may be expected to have acquired that amount of skill and confidence in handling medicines as to enable them to discharge their responsibilities in an efficient manner. They may therefore be allowed to register themselves without further examination. In case of “compounders” from other provinces of India where the system of training and examination are of a lower standard, permission for registration should not be given on the same conditions as laid down for the compounders of this province. These people will be eligible for registration only after they have passed a *modified* examination, held under the auspices of the “Pharmaceutical Council”. In case of doctor-pharmacists, it has

been pointed out to the committee by the Bengal Pharmaceutical Association and by Mr. J. C. Ghosh that in almost all foreign countries including Great Britain, members of the medical profession are not allowed to usurp the rights of pharmacists by keeping open shops for compounding, dispensing and selling drugs. India is one of the few backward countries where this is allowed with the result that pharmacy has been kept perpetually in the background. As the medical men owning drug stores cannot usually afford the time to carry on dispensing, etc., by himself, a pernicious practice has developed of employing non-qualified or semi-qualified assistants, in such establishments who carry on the work of the qualified compounders (pharmacists) under the protection of medical men. This pernicious practice has undermined the ethical practice of pharmacy by creating unfair competition and is also a source of constant danger to the public. Our witnesses have emphasized that if the state of affairs is to be remedied as it should be, the practice of pharmacy should be reserved only to the *pharmacist*, in the strict sense of the term, and doctors should be debarred from owning pharmaceutical establishments. The committee has given the matter the serious thought that it deserves and is of opinion that the time is not ripe for taking the step suggested. In the present state of development of pharmaceutical education in India, doctors with their knowledge of chemistry, toxicology, materia medica and therapeutics form a class of people who are as nearly trained to be efficient pharmacists as any other class of people mentioned above, and they may therefore be expected to check inaccuracies in dispensing and posology as easily as any of the class of pharmacists that we are going to create. It will be a mistake to take away the expert service and advice that the public is getting from this class of experts at present. However, to avoid non-qualified people from being employed in *public* pharmacies, the doctor-owners should be compelled to engage pharmacists (qualified) in all such establishments. They will not be required to do so however in serving their own prescriptions in the course of their private practice.

Licensing of premises.—Along with the registration of pharmacists, it is necessary to maintain a register of the premises in which business is carried on. According to Mr. Linstead, “this is important both from the point of view of protecting registered men themselves against unfair competition and to enable the State properly to enforce such statutory requirements as may be laid down with regard to practice.” Every drug store should further be required to take out a licence on the payment of a specified fee to the “Pharmaceutical Council”. This license should be renewed every 2nd or 3rd year as the “Council” may decide. The licence may be revoked by the “Council” as a disciplinary measure under certain conditions to be laid down.

Significance of titles.—The fourth term of reference to the committee specifically refers to a “Chemists” and “Druggists” business. It is necessary to define this correctly at this stage in order to understand its full implication. A business in which are used titles or descriptions or emblems liable to be understood by the public as referring to a pharmacist would, according to Mr. H. N. Linstead, “come within this description”. “It is obviously essential to ensure that all those functions normally performed by a pharmacist and which the public have a right to be performed by him for their own protection, shall be secured to him by law”. Therefore, the titles, “pharmacist”, “pharmaceutical chemist”, “dispensing chemist”, “qualified chemist”

and other similar titles which may create an impression in the minds of the public that the holders thereof are qualified people in the eye of the law should be reserved only to those who are duly registered with the "Pharmaceutical Council". It is a necessary corollary that the use of any sign holding out or implying that a particular individual is a registered pharmacist *by an unregistered individual* should be punishable by the law. To secure some special privileges to holders of a "Diploma" or a "Degree in Pharmacy", and to compensate them for the time and expense of their special training, steps should also be taken to ensure that the titles "Pharmacist" and "Pharmaceutical Chemist" are exclusively restricted to the *diploma holders* and the *University degree holders* respectively. This will give them better status than the rest and their applications for positions of trust and responsibility in the drug trade or hospital pharmacy will be expected to meet with more favourable response. The term "compounder" which is generally used to designate people engaged in the practice of pharmacy in Bengal, is a misnomer and may be completely expunged after the pharmacy legislation comes into force.

(c) **Establishment of a "Pharmaceutical Council".**—The best way in our opinion by which an efficient control can be exercised is by the creation of a professional body responsible to the Minister for Local Self-Government (Medical and Public Health Branch). In the continent of Europe, the control is vested to a very large extent on a particular department of the State (Department of Internal Affairs) but this does not seem to us very satisfactory. The problems of pharmacy are manifold and many of them are of primary interest to the pharmaceutical practitioners rather than to the State. It is therefore advisable that a wide measure of supervision over the profession should be given to a professional body representing the various pharmaceutical interests viz., pharmaceutical education, trade and industry. Such a body may be called a "Pharmaceutical Council" and in its function and composition, it may stimulate more or less such professional bodies as the "Bengal Council of Medical Registration" or the "Bengal Nursing Council."

Functions.—The functions of such a body has been partially described in the previous pages and may here be summarised as follows:—(1) to maintain a *register* of all registered pharmacists of the Province and to register the names of pharmacists on payment of a prescribed fee, (2) to maintain the standard of education of students going in for a "Diploma in Pharmacy", (3) to specify the drug establishments or hospitals where apprenticeship training may be undertaken, (4) to conduct and maintain the standard of "Diploma in Pharmacy" examinations, (5) to maintain such disciplinary control over the practice and profession of pharmacy as may be necessary from time to time, (6) to advise the Ministry in respect of any regulations for the distribution of drugs including poisons, dangerous drugs and drugs of addition, and (7) any other legislative control that may be necessary in this connection.

To exercise these functions, the Pharmaceutical Council should have a Registrar, and the necessary office and inspecting staff at its disposal. It will frequently be necessary for such a body to make enquiries regarding the *bona fides* of persons applying for registration, to institute inspection of premises where retail trade in drugs and dispensing pharmacy are conducted for the issuance of licences and for legal

enforcement generally. For the satisfactory performance of such duties, it will be advantageous to enlist the services of qualified pharmacists, conversant with the laws relating to drugs, medicines, and poisons, as Inspectors. "Such (pharmacist) inspectors" says Mr. Linstead, "are not only a guarantee of the satisfactory enforcement of the statutory requirements but they also help to secure good feeling between those who administer the law and those who are subject to it."

Composition.—The "Pharmaceutical Council" should be so constituted that it may command the confidence not only of the public but also of the pharmaceutical profession itself. Mr. Linstead, the Secretary of the Pharmaceutical Society of Great Britain, is of opinion that the Council "will not achieve this if its composition is substantially medical." Some of our witnesses like Mr. S. N. Bal and Mr. J. C. Ghosh have also voiced the same feeling. It has further been represented before the committee that if the "Council" is to be of real help to the development of pharmacy in Bengal, it must be able to enlist the services of persons who are fully versed in the subject and who have a detailed knowledge of the problems involved in the day-to-day practice of the profession. From the considerations set forth above, we think that the "Council" should be predominantly pharmaceutical in composition. To quote Mr. Linstead again, "It should contain some representatives elected by practitioners of pharmacy, but the majority should be appointed by the Minister, if, as is to be hoped, it is to have a large measure of authority in matters of general public concern." We suggest that the "Council" should consist of 15 members represented as follows:—

A President nominated by local Government—Nominated.

Two members representing the College of Pharmacy—Nominated.

Two members representing the Pharmacy Faculty of the Calcutta University—Nominated.

One member representing the Bengal Council of Medical Registration—Nominated or elected from amongst members.

Two members representing the Medical Colleges of Bengal—Elected

Three members representing the pharmaceutical profession elected by representatives of registered pharmacists, or from independent Associations, e.g., Bengal Pharmaceutical Association, etc.—Elected

Three members representing the pharmaceutical trade and industry elected from such bodies as the Bengal Chamber of Commerce, the Chemical Manufacturers' Association, etc.—Elected.

One member representing the Legal and Judicial branch of the Government—Nominated.

In the initial stages, it may be difficult to get a sufficient number of highly qualified pharmacists in Bengal to form a respectable body ("Council"). If such a contingency arises, the best course will be to nominate medical men with pharmaceutical or pharmacological qualifications to fill up the vacancy. The period of office of each member should be two or three years from the date of election or nomination as the case may be, and therefore, from the next third or fourth year of the

“Council’s” life, the control may gradually pass on to the pharmacists and pharmaceutical chemists, if it is considered desirable in the interest of development of pharmacy in Bengal.

Board for disciplinary control.—Experience of the working of the Pharmaceutical Society of Great Britain has shown that it is both convenient and practical to entrust to a smaller body of professional men (smaller than the “Pharmaceutical Council” referred to above), the responsibility of maintaining the discipline of the members of the profession. The Pharmaceutical Society of Great Britain has a Statutory committee of five members appointed by the Council of the Society and a chairman, having practical legal experience, appointed by the Privy Council. This committee is required to enquire into cases in which a pharmacist (or a corporate body practising pharmacy) has been convicted of a criminal offence or has been guilty of misconduct which may render him unfit to be on the register. We are inclined to think that disciplinary powers are best exercised by a small body rather than by the whole of a large council and accordingly we recommend to the “Pharmaceutical Council” the formation of a similar body of three or five members for the conduction of this aspect of their function in an expeditious manner. In cases of dispute, however, pharmacists will have the right to appeal to the parent council against the decisions of this “Disciplinary Board”.

Legislation.

The carrying out of the recommendations made above will, of course, necessitate fresh legislation. It now remains for us to outline in brief the exact form which this pharmacy legislation should take or in other words, to draft a *Pharmacy Bill* embodying all our recommendations. A pertinent question that has arisen in this connection is whether the pharmacy legislation should be only provincial or all India (central) in scope and operation. The Drugs Enquiry Committee (1930-31) examined this question thoroughly and in view of the intimate relationship of drug control and pharmacy and in the interest of uniformity of control all over India suggested that there should either be a combined *Central* legislation for drugs and pharmacy or a separate *Central Drugs Act* and a separate *Central Pharmacy Act*. Some of our witnesses like Mr. J. N. Lahiri and Mr. J. C. Ghosh also adduced arguments in favour of a *Central Pharmacy Act*. On mature consideration of the problems involved, the committee is of opinion that a *Central Pharmacy Act*, if it can be brought about at an early date, will be to the best interests of the whole country including Bengal. The committee is, however, aware that according to the Government of India Act, 1935 (Decentralisation and Provincial Autonomy Act), the Central Government may have difficulties in taking upon themselves the responsibility of framing legislation on a subject like *pharmacy* which is considered of purely provincial and local interest. The difficulties can only be overcome if all the Provincial Governments request the Central Government to undertake legislation on their behalf and for a common all-India cause, as has been recently done in case of legislation for the control of the import, manufacture, storage, distribution, etc., of drugs in India. As all the provinces are not equally conscious about the need and urgency of a pharmacy legislation, it may take a good deal of time before they may be induced

to follow the example of Bengal, even if Bengal Government agree, on our recommendation, to request the Government of India to go ahead with an all India legislation for the control of pharmacy. The committee is further aware that according to the terms of reference put up before them, it is probably not within its competency to suggest a measure which the Bengal Government cannot undertake to fulfill on its own responsibility and for which it will have to approach the Central Government. The members of a *Provincial* Committee are perhaps expected to devise ways and means by which the Government can, if they so desire, bring about an efficient control of the practice of pharmacy in the province, and thereby remove a public danger and crying evil which is sapping the very foundations of medical practice, public health and drug industry. From all these considerations, the committee feels that it will be to the best interests of all concerned in the Province to recommend to the Government to enact, at an early date, a Pharmacy Act for Bengal. This will be in line with the wishes expressed by the donor, Dr. Anklesaria and will satisfy the conditions laid down for the gift of the donation. Once a Pharmacy Act for Bengal is put into the Statute Book, we have every hope that it will stimulate the legislatures of many other provinces to act accordingly, as the evil arising from a non-controlled profession of pharmacy is widespread and a proper system of control will surely appeal to other legislators. When most of the major provinces have their Pharmacy Acts, some sort of an organisation, either professional or governmental, may be established with an idea to bring about an uniformity in the system of training, licensing, registration, reciprocal recognition, etc., of the pharmacists all over India. As has been pointed out before, individual States in America have their own pharmacy laws and as is natural under such circumstances, their provision and regulations are not always identical. To obviate the difficulties, voluntary professional organisations like the American Pharmaceutical Association, the American Association of Colleges of Pharmacy, the National Association of Boards of Pharmacy, etc., have grown up. These bodies are not actually recognised by the States, but their opinions and decisions carry considerable weight with all the State organisations for the control of pharmacy. Even if a Central Pharmacy Act does not come into force in the near future, it may be possible, through co-operation and co-ordination of work amongst the various provincial pharmaceutical councils, to evolve a system of uniform control of the profession and practice of pharmacy in all the provinces of British India.

In Appendix D, the outlines of a draft Bill is appended which may form the basis of the "Pharmacy Act" to be introduced by the Government. The committee regrets that for want of time and lack of legal experience, it has not been possible for them to draw up a complete Bill, ready for presentation to the Assembly.

Section III.

CHAPTER I.

Finance.

The proposals that we have made in the previous chapters regarding the establishment of a College of Pharmacy and the setting up of a "Pharmaceutical Council" in the Province would naturally involve a good deal of expenditure. In Section II (Chapter III), a careful estimate of the probable capital expenditure of about 3.35 lacs of rupees and an annual recurring expenditure of about Rs. 73,000 has been presented for the establishment and maintenance of a College of Pharmacy. The simultaneous creation of the proposed "Pharmaceutical Council", which as has been explained already, is almost an essential measure for the success of the scheme, with all the paraphernalia associated with its functions of inspection, supervision, registration and law enforcement means additional cost to the Government. The committee deeply appreciates that finance is the crux of the problem in such cases and realises that the acceptance or refusal of its proposals will be determined largely by the financial commitments likely to be imposed on the Government. The committee therefore feels that they should explore all ways and means by which revenue can be legitimately raised to meet at least partially the expenditure involved.

I.—Sources of revenue for the College of Pharmacy.

(A) **Student Fees.**—The most important source of revenue and on which definite reliance may be placed is the annual receipt of fees from the students enrolled in the College of Pharmacy. We have considered the scale of fees to be charged for the diploma and the degree courses and are of opinion that a fee of Rs. 6 per month for the students electing the Diploma Course would be suitable and would not entail great hardship on the economic resources of the students. In fixing these fees, we have been guided by the scales of fees for the students in the Intermediate in Science and the Bachelor in Science courses of the majority of the private colleges affiliated to the Calcutta University. A fee of Rs. 6 for the students of the Diploma Course is however distinctly higher than the fee at present charged for the compounder-ship courses in the various medical schools and it has been represented to us that if a high college fee is demanded, it may result in discouraging and shutting out many deserving students who can now afford to take up the compounder-ship course. We have recorded the oral evidence of some "compounder" members of the Bengal Pharmaceutical Association and they have given us to understand that as far as their information goes, the type of students who present themselves now-a-days for the compounder-ship course would not be averse to the idea of paying a higher college fee, provided they get a better training and education in pharmacy calculated to increase their status and make them better fitted in life to undertake the duties and responsibilities of the profession. We are satisfied that the College of Pharmacy, as planned and constituted by us, and the system of training that has been proposed to be offered there, would turn out better pharmacists than the present-day compounders and therefore we have no hesitation in recommending a higher tuition fee than is levied at present.

An estimate of annual receipts in the "fee fund" calculated on the basis of a tuition fee of Rs. 6 per month for the Diploma Course and Rs. 10 per month for the Degree Course is given below. Receipts from the examination fees have not been taken into consideration in this calculation on the assumption that the money from this head will be almost completely consumed in remunerating the examiners appointed for conducting the various examinations and in meeting other incidental expenses in connection therewith:—

Scale I.—With provision for 100 students in each of the two classes for the Diploma Course and 30 students in each of the 3 classes for the Degree Course.

First Year—

Diploma Course	.. 100 students × 6 × 12	=	7,200
Degree Course	.. 30 students × 10 × 12	=	3,600
Total	.. 130 students	=	10,800

Second Year—

Diploma Course	.. 200 students × 6 × 12	=	14,400
Degree Course	.. 60 students × 10 × 12	=	7,200
Total	.. 260 students	=	21,600

Third Year—

Diploma Course	.. 200 students × 6 × 12	=	14,400
Degree Course	.. 90 students × 10 × 12	=	10,800
Total	.. 290 students	=	25,200

At present, about 130 students on an average appear for the compoundership examination each year. The establishment of a College of Pharmacy will, it is hoped, stimulate further interest in the profession of pharmacy and it will not be long before 150 students will seek admission into the Institution. If this expected demand for a large attendance can be provided for, the income of the College will naturally increase (see Scale II).

Scale II.—With provision for 150 students in each of the two classes for the "Diploma Course" and 50 students in each of the 3 classes for the "Degree Course."

First Year—

Diploma Course	.. 150 students × 6 × 12	=	10,800
Degree Course	.. 50 students × 10 × 12	=	6,000
Total	.. 200 students	=	16,800

Second Year—

Diploma Course	.. 300 students × 6 × 12	=	21,600
Degree Course	.. 100 students × 10 × 12	=	12,000
Total	.. 400 students	=	33,600

Third Year—

Diploma Course	.. 300 students × 6 × 12	=	21,600
Degree Course	.. 150 students × 10 × 12	=	18,000
Total	.. 450 students	=	39,600

In this connection, it may not be out of place to point out certain probable sources of revenue which may be derived if arrangements are made in the College of Pharmacy to provide special courses of instructions, as indicated below, in addition to the regular Diploma and Degree Courses :—

(1) In the section on "Admission requirements" to the Diploma Course, it has been provided that passed compounders will be allowed to go in for the Diploma Course, if they so desire. This course, which has been fixed for one year, will undoubtedly attract a certain number of students to the College. If the fees for such special students are fixed at Rs. 8 to Rs. 10 per month, a small income may be derived from this source.

(2) Dr. Anklesaria, in one of his letters to the Secretary [Appendix (1) General], suggested that practitioners of the indigenous systems of medicine (Ayurvedic and Unani practitioners) desirous of undergoing training in certain specialised branches, e.g., crude drug identification, drug cultivation, compounding and dispensing and other pharmaceutical techniques involved in pill making, preparation of lozenges etc., may be admitted as special part-time students on the payment of a prescribed fee. We do not know whether there will be much demand from this class of people for entrance into the College of Pharmacy which will be run on modern scientific lines. There is little doubt, however, that a well arranged course in pharmacognosy and practical pharmacy may be of very real benefit to this class of practitioners who are usually their own crude drug collectors or buyers and their own manufacturers of finished preparations. With a knowledge of the rudiments of pharmacognosy and pharmacy in certain special branches, these practitioners may be able to improve both the stability and quality of their preparations and can also identify the authenticity and genuineness of some of the crude drugs which they purchase from the open market. When the advantages of having a special course of study in the College of Pharmacy will be appreciated by this class of practitioners, it is possible that a demand for such training may arise. We do not think that the College authorities will find it difficult to provide for such part-time students with the resources at their disposal. The fees that will be realised from such a special course of study will help the College finances.

(3) With the enforcement of pharmacy legislation, there will undoubtedly be demand for food, drug and water analysts of all types. A special course embodying the practical details required for such work may be opened in the College of Pharmacy and a reasonable amount of fee charged for the training. Many science graduates and passed compounders practising in various municipalities, district boards and other corporate bodies and many science graduates seeking employment in factories and corporations may be attracted to this course of study on payment of a reasonable tuition fee with a view to improve their future prospects.

(4) Arrangements may further be made to give to those already in the crude drug trade or who would like to go in for such trade, a special course in pharmacognosy and drug cultivation. This will enable the trained students in the subject to take away gradually the crude drug business from the hands of illiterate and unscrupulous collectors and dealers and thereby the trade in these drugs will improve

considerably. There is genuine need in this country for the supply of crude drugs of quality and unimpeachable authenticity. Because there are very few qualified workers in the field who can ensure a regular supply of good and authentic crude drugs, the export trade of India in crude drugs, which was considerable at one time, has dwindled almost to nothingness. There is now a feeling amongst the people engaged in this field that something must be done to save this Indian crude drug trade from total extinction, and the offer of a suitable training, which by disseminating the necessary technical knowledge may be of great help to the traders, would, we believe, be widely accepted. A small income may be anticipated from this source provided the commercial and applied aspects of the trade is duly stressed in the course of study.

(B) Lump grant or recurring grants from the Corporation of Calcutta.—The Corporation of Calcutta, which grant fairly large amounts to educational institutions and for public health work within the city, may, if the Government so desire, be approached for a capital and a recurring grant to the proposed College. It should not be difficult for the Corporation to help such a laudable project as the establishment of a College of Pharmacy by offering, free or at a nominal price, a suitable plot of land in the outskirts of the city for the College building. A College of Pharmacy in the city will be an useful institution and by training qualified pharmacists, it is expected to exert a wholesome influence on the drug trade and industry of the city which in their turn would bring more revenue to the Corporation. The creation of an ethical profession of pharmacy, which the College would be instrumental in bringing about, will not be a mean contribution to the smooth working of the Food and Drug administration which is one of the primary obligation of the civic government of the city and to the promotion of public health generally. Any reasonable expenditure on this head should be well worth undertaking by the Corporation of Calcutta.

(C) Contributions from neighbouring Governments.—Our colleague, Mr. P. Das, has pointed out that neighbouring Governments like the Governments of Assam, Orissa and Bihar who may not be able, for financial reasons, to establish such colleges of pharmacy in their respective provinces, at least for some years to come, would readily respond to any reasonable proposal of co-operation with the College of Pharmacy scheme in Bengal and would be willing to contribute towards the capital and recurring expenditure of the College, if some accommodation for a limited number of students from the respective provinces is provided for in the proposed Pharmacy College for both the "Diploma in Pharmacy" course and the "Degree in Pharmacy" course. We feel that there is considerable force in this suggestion and recommend to the Government that this avenue of income to the college should be properly explored by suitably addressing the neighbouring Governments referred to above on the subject. If the supreme importance, particularly at this time, of pharmacy training in India is realised, we believe that there will be very little objection on the part of these Governments to come to some sort of a financial understanding with the Bengal Government. For years together, these provinces used to send students to Bengal for medical training and also gave substantial contributions to the Medical Department in recognition of the advantages received therefrom. A similar procedure may be easily adopted in case of pharmacy training also.

II.—Sources of revenue for the “Pharmaceutical Council”.

In section II (Chapter IV) we have recommended that every pharmacist (including doctor-pharmacists) in whatever sphere of activity and every chemist and druggist shop should be registered under the “Pharmaceutical Council” and in addition, the chemists’ and druggists’ shops (wholesale or retail) should be asked to take out a licence, renewable every year or every two years as may be considered proper by the “Pharmaceutical Council”. At present, the State Medical Faculty of Bengal charges a fee of Rs. 5 for the registration of “compounders” and an additional sum of Rs. 5 for registration as “dressers”. In the Diploma of Pharmacy course, as outlined by us, there will be no need, for a separate Dressership Course. A registration fee of Rs. 8 for the holders of “Diploma in Pharmacy” may therefore be easily fixed and will not, we hope, entail any hardship on them. For the holders of the Degree in Pharmacy, a fee of Rs. 12 may similarly be fixed. This fee is slightly lower than the registration fee charged from the medical graduates by the Bengal Council of Medical Registration and, in our opinion, should not be unfair to the Bachelors of Pharmacy. For the drug stores, a small registration fee of say Rs. 2 may be charged along with a renewable licensing fee of Rs. 5 to Rs. 20 according to the nature of the establishment and the volume of retail trade carried on in individual stores. The actual fee that will be fixed may be left to the discretion of the “Council” which will be in a position to have detailed information regarding average daily sales, etc., through its “inspectors”. In Bengal, it has been roughly estimated that there are about 10,000 chemists’ and druggists’ establishments and the revenue from the registration and licensing fees may be expected to be a substantial sum. This revenue should primarily be set apart for the administration, organisation, and functioning of the “Pharmaceutical Council”. Experience of the Pharmaceutical Society of Great Britain in the administration of the Pharmacy Acts (in so far as they affect those who carry on the business of chemist and druggist) indicates that the revenue from the abovementioned sources is more than sufficient for the maintenance of the machinery for control. In Bengal where the system of inspection (and therefore the number of inspectors, etc.) need not, at least in the initial stages, be as comprehensive as in Great Britain, it is to be expected that the administrative expenses of the “Council” may be easily met from the registration of pharmacists and the licensing of pharmaceutical establishments. We do not think therefore that any Government grant need be made under this head at all.

It is not possible for the committee to determine exactly the amount of money that can be realised from the sources of revenue indicated above (in sections I and II), but there is little doubt that the net recurring expenditure will be considerably less than the estimated gross recurring expenditure of Rs. 73,000. Leaving out of consideration for the time being all the probable sources of income from special students’ fees, Corporation grants and grants from neighbouring Governments of Bihar, Orissa and Assam which, by the way, may not be an insignificant amount, we have calculated the net expenditure of the College on the basis of the receipts from the students’ fee fund which can be definitely counted upon. In the table below, a statement of the graded expenditure during the first three years before the college will operate in full swing is given. During the first and second years of the life of the institution, naturally the full complement of students will not be

present and the gross expenditure on the staff and other recurring items will also be less. This has been arbitrarily graded as Rs. 50,000 for the 1st year, Rs. 60,000 for the second year and Rs. 73,000 for the third year:—

Expected receipts and expenditure in the first three years (recurring).

				Recurring expenditure.	Student fees (receipts).	Net expenditure.
Calculated according to receipts of fees—Scale I—				Rs.	Rs.	Rs.
1st Year	..	..	..	50,000	10,000	40,000
2nd Year	..	..	..	60,000	20,000	40,000
3rd Year	..	..	..	73,000	25,000	48,000

Expected receipts and expenditure in the first three years (recurring).

				Recurring expenditure.	Student fees (receipts).	Net expenditure.
Calculated according to receipts of fees— Scale II—				Rs.	Rs.	Rs.
1st Year	..	..	..	50,000	16,000	34,000
2nd Year	..	..	..	60,000	33,000	27,000
3rd Year	..	..	..	75,000	39,000	35,000

We have already shown that for the establishment of the "Pharmaceutical Council" no expenditure need be incurred on the part of the Government. In the initial stages, the estimated recurring expenditure on the "College of Pharmacy" will not exceed Rs. 35,000 to Rs. 40,000. With the growth and development of pharmacy in India, there is every reason to hope that this recurring expenditure will gradually diminish. Even if the college does not become completely self-supporting which is not improbable, the expenses for maintaining it will certainly not be very great. At least the financial commitment does not appear to us to be of such a magnitude as to discourage the Government from taking up the proposition for the establishment of a College of Pharmacy seriously. The gain in the shape of improvement of public health and welfare of the people, on the other hand, will be considerable and possibly such an institution, by creating a new professional field, will offer another solution to the problem of unemployment for the educated youths of the province.

CHAPTER II.

Summary of Recommendations.

1. **Urgent need for a College of Pharmacy in Bengal.**—There is urgent need for the establishment of an independent and self-contained institution for pharmacy training in Bengal. A College of Pharmacy should therefore be started without further loss of time.

2. Pharmacy is intimately connected with medicine and is recognised in every civilised country as an important public health profession. It has played a very important part in checking spurious drug trade and in preventing adulteration of drugs. In the development of modern drug industry also, pharmacy has made significant contributions. Dr. Anklesaria has offered a timely donation of Rs. 2,00,000 for the establishment of a modern institution for pharmacy training in Bengal with the laudable object of stimulating indigenous drug industry. The Committee feels that the offer should be gratefully accepted and the scheme put into effect at once.

3. **Syllabus and Courses of study in Pharmacy College.**—The College of Pharmacy should, to start with, offer two regular courses of study—one of two years' duration after the matriculation examination leading to a "Diploma in Pharmacy" and another of three years' duration after the Intermediate in Science examination leading to the degree of "Bachelor in Pharmacy". The Diploma should be conferred by a "Pharmaceutical Council" to be created by the Local Government, and the degree (B. Pharm.) should be conferred by the Calcutta University.

4. **Diploma in Pharmacy Course.**—There should be at least 870 hours of theoretical lectures and 810 hours of practical work during the whole course. An apprenticeship training of about six months should be spent in an approved drug store, hospital, or factory before a candidate should be allowed to sit for the Final Examination and obtain his diploma. The following subjects should be taught in the Diploma Course:—

First year—

First term—

1. Biology: (I) Botany.
(II) Zoology.
2. Physics.
3. Inorganic Chemistry.
4. Anatomy and Physiology.
5. Pharmaceutical Arithmetic.

Second term—

1. Physics.
2. Inorganic Chemistry.
3. Theory and Practice of Pharmacy.
4. Pharmaceutical Latin.
5. Hygiene, First Aid and Dressing—
 - (i) Hygiene and Sanitation.
 - (ii) First Aid.
 - (iii) Dressing.

*Second year—**First term—*

1. Organic Chemistry.
2. Pharmacognosy.
3. Theory and Practice of Pharmacy.
4. Dispensing Pharmacy.
5. Forensic Pharmacy.
6. Pharmaceutical Economics.
7. Quantitative Analysis.

Second term—

1. Pharmaceutical Chemistry.
2. Theory and Practice of Pharmacy.
3. Dispensing Pharmacy.
4. Pharmacognosy.
5. Pharmacology and Toxicology.

5. **Degree in Pharmacy.**—There should be at least 845 hours of theoretical lectures and 1,770 hours of practical work including demonstrations during the whole course for the Bachelor in Pharmacy degree. The following subjects should be taught in the Degree Course.

First year—

1. Inorganic Chemistry.
2. Organic Chemistry.
3. Botany.
4. Pharmaceutical Mathematics.
5. Pharmaceutical Latin
6. Insecticides, etc., and Food Preservatives.
7. Zoology, Anatomy and Physiology.

Second year—

1. Organic Chemistry.
2. Physical Chemistry.
3. Pharmacognosy.
4. Operative Pharmacy.
5. Dispensing Pharmacy.
6. Insecticides, etc., and Food Preservatives.
7. Pharmaceutical Economics.
8. Bacteriology.

Third year—

1. Pharmaceutical Chemistry.
2. Pharmacognosy.
3. Manufacturing Pharmacy.
4. Drug Assaying and Pharmaceutical Testing.
5. Food and Water Analysis.
6. Chemical Toxicology and Forensic Pharmacy.
7. Pharmacology, Physiology, Toxicology and Bio-Assay.

6. The College, to start with, should engage the following staff, provided not more than 100 students are admitted into the Diploma Course per year and not more than 30 students are admitted into the Degree Course per year. If it is deemed necessary to increase the number of students both in the Diploma Course and the Degree Course, additional staff will have to be provided :—

- (1) Department of Pharmacy and Chemistry, including Physics, Mathematics and Pharmaceutical Economics—
 One Professor.
 One Assistant Professor.
 Eight Laboratory Technicians.
 Four Lecturer-Demonstrators.
 Seven Bearers.
- (2) Department of Botany and Pharmacognosy—
 One Professor.
 Two Lecturer-Demonstrators.
 Two Laboratory Technicians.
 One Bearer.
- (3) Department of Physiology, Pharmacology, Bacteriology and Public Health Studies—
 One Professor.
 One Assistant Professor.
 One Lecturer-Demonstrator.
 Two Laboratory Technicians.
 One Bearer.

In addition to this teaching staff, the miscellaneous staff should be as follows :—

Office—

- One Head Clerk and Accountant.
- One Clerk and Cashier.
- One Reference Clerk and Typist.
- One Duftry.
- One Bearer.

Library—

One Librarian.
One Bearer.

Store—

One Store-Keeper.
One Assistant Store-Keeper.
One Bearer.

Workshop—

One Mechanic.
One Cooli.

Miscellaneous—

Four Sweepers.

7. **Capital expenditure.**—According to the conditions of the donation, the land should be given free by the government, and an amount equal to Dr. Anklesaria's donation of Rs. 2,00,000 should be given by the Government for the College. The total capital expenditure, therefore, for which the Government will be responsible is Rs. 2,60,000, about Rs. 60,000 being the estimated expenditure for the purchase of the land. The minimum gross capital expenditure has been estimated as follows:—

	Rs.
Cost of erecting a college building ...	1,77,000
Cost of laboratory and general equipment ...	1,58,000
Cost of land	60,000
Total ...	<u>3,95,000</u>

A sum of Rs. 65,000 should be kept as reserve fund for the College to be drawn upon as and when necessity arises:

This capital expenditure may be reduced if—

- (i) The Corporation of Calcutta is approached for a free site of land on the outskirts of the city or for a capital grant for this useful institution,
- (ii) The neighbouring Governments of Bihar, Orissa and Assam are approached for capital grant on the basis of a contract to receive in the College a specified number of students from the respective provinces.

8. The gross recurring expenditure for the College including the pay of the staff, laboratory, contingencies, chemicals, apparatus, gas and electricity, etc., has been estimated at about Rs. 73,000. The net recurring expenditure after deducting the receipts from the students

fees has been calculated to be Rs. 35,000 to Rs. 40,000. The recurring expenditure may be reduced if arrangements can be made for the training of part-time special students in the College of Pharmacy and if the Government can induce bodies like Calcutta Corporation, or neighbouring provinces of Bihar, Orissa and Assam to contribute towards the maintenance of the College. Students from these provinces may be given training in the College in lieu thereof.

If the above sources yield satisfactory revenue, the net expenditure (recurring) may in course of years be reduced to a very small amount, and it may even be expected that the institution will be a self-supporting one.

9. Legislation—A Pharmacy Act.—There should be legislation to control the profession of pharmacy in Bengal. This is a crying need of the province and without this legislation, the scheme for the establishment of a College of Pharmacy and imparting pharmaceutical education to the youths of the province will not be successful.

A Central Pharmacy legislation for the whole of India would be ideal but if this cannot be ensured immediately, a provincial legislation should be set into operation without loss of time.

The Pharmacy legislation for Bengal should be modelled on the lines of the Pharmacy legislation existing in Great Britain. The machinery for control should include—

- (i) Control of the training and examination of those desirous of entering the profession of pharmacy;
- (ii) Registration of all qualified pharmacists and the pharmacies where business is transacted;
- (iii) Licensing of all establishments where pharmaceutical business of any description is conducted;
- (iv) Restriction on the use of any titles, descriptions, or emblems liable to be understood by the public as referring to a qualified man, only to those pharmacists who are duly registered;
- (v) Establishment of an organised professional body called the "Pharmaceutical Council" which will be responsible to the Public Health Minister with the following composition and functions:—

(a) Composition (15 members).

A President nominated by the Local Government (nominated).

Two members from College of Pharmacy (nominated).

Two members from the Pharmacy Faculty of the Calcutta University (nominated).

One member from the Bengal Council of Medical Registration (nominated or elected from amongst members).

Two representatives of the Medical Colleges of Bengal (nominated).

Three members from the pharmaceutical profession elected by registered pharmacists and pharmaceutical chemists (elected).

Three members elected from pharmaceutical manufacturers and traders (elected).

One member with legal experience nominated by Government (nominated).

(b) *Functions.*

- (1) To maintain a *register* of all registered pharmacists of the Province and to register the names of pharmacists on payment of a prescribed fee.
 - (2) To maintain the standard of education of students going in for a "Diploma in Pharmacy".
 - (3) To specify the drug establishments or hospitals where apprenticeship training may be undertaken.
 - (4) To conduct and maintain the standard of "Diploma in Pharmacy" examinations.
 - (5) To maintain such disciplinary control over the practice and profession of pharmacy as may be necessary from time to time.
 - (6) To advise the Ministry of Health in respect of any regulations for the distribution of drugs including poisons, dangerous drugs and drugs of addiction and any other legislative control that may be necessary in this connection.
- (vi) *Disciplinary Board.*—Setting up of a smaller Board of three or five members (including a chairman) from amongst the members of the "Council" called the "Disciplinary Board" for carrying on all types of disciplinary functions against the members of the profession or against the premises in which business is conducted.

10. **Cost for legislative machinery.**—The organisation and administration of the "Pharmaceutical Council" with all its staff including inspectors, etc., should be managed from the fees realised by the registration and licensing of the pharmacists and their premises. The Government need not give any grant towards this head.

Signatures.

R. N. Chopra,
(*President*).

B. C. Roy.
U. N. Brahmachari.
B. N. Ghosh.
J. C. Aich.
J. L. Bell (in absentia).
R. De.
P. Das.
B. Mukerji.

B. Mukerji,
(*Secretary*.)

4th October 1939.

PART II—APPENDICES.

Appendix A.

GENERAL.

(1)

Proposal for establishment of a College of Pharmacy.

Copy of a letter dated the 14th January 1938, from Dr. D. E. Anklesaria, L.M. & S., Assistant Surgeon (Retired), Ahmedabad, to the Secretary to the Hon'ble Minister to Public Health and Medical Department, Bengal Government, Calcutta.

I have the honour to request you to put before the Hon'ble Minister a proposal for founding a College of Pharmacy in Calcutta for training pharmaceutical chemists according to the standard of British Pharmaceutical Society, London and of such British Universities which grant a degree in pharmacy for the favourable consideration of your Government.

2. You are aware that there is not a single institution in your province nor in the whole of India where such training is given.

3. India is dependent on foreign countries for medicines to a large extent (about three to four crores rupees worth of medicines are imported annually), the chief reasons being that we have not a single institution imparting education in this line to our young men in contrast with 54 such colleges and schools in Great Britain and hundreds in each country of Europe.

4. I propose to give a donation of Rs. 2 lacs, if your Government contributes an equal sum of Rs. 2 lacs to build on a suitable plot of land to be given free by Government, suitable buildings and laboratory and equip it with modern pharmaceutical apparatus and plant.

(b) That your Government undertake to run it with Indian Teachers or Professors excepting two, the Principal and a Professor for teaching Pharmaceutics, Pharmacology, Pharmaceutical Chemistry. The course should be of three or four years after passing Matric and the College should grant a Diploma in Pharmacy or a Degree in Bachelor of Pharmacy (B. Ph., Calcutta) to be granted by your University. Later on to provide employment for the qualified Pharmaceutical Chemists, it should be enacted by your Government that the Chemist & Druggist's shop could not be run except by a qualified chemist.

5. Kindly let me know your views on the subject which if favourable, I shall correspond further in the subject.

Thanking you for favour of a reply.

(2)

Appointment of Committee and its personnel.

Copy of Government of Bengal, Department of Public Health and Local Self-Government, Resolution No. 1-T.—Medl., dated Darjeeling, the 12th October 1938.

A proposal has been made by Dr. D. E. Anklesaria, Retired Assistant Surgeon of Ahmedabad, for the establishment of a College of Pharmacy in Calcutta for the training of Pharmaceutical Chemists according to the standard of the British Pharmaceutical Society, London, and of such British Universities as grant a degree in Pharmacy. Dr. Anklesaria has offered to make a donation of Rs. 2 lacs towards the above scheme on the following conditions, viz. :—

(i) The Government of Bengal should contribute an equal sum of Rs. 2 lacs for construction of building and laboratory on a suitable land to be given free by Government and equip them with modern pharmaceutical apparatus and plant.

(ii) Government should undertake to bear all recurring expenses of the institution.

(iii) The entire teaching staff shall be Indian except that (a) the Principal and (b) the Professor for teaching Pharmaceutics, Pharmacology and Pharmaceutical Chemistry may be non-Indians so long as properly qualified Indians possessing the requisite qualifications for these two posts are not available.

(iv) The course should be one of three or four years after the passing of the Matriculation Examination and the College should grant a diploma in Pharmacy, a degree in Bachelor of Pharmacy being granted by the Calcutta University.

(v) In order to provide employment for the qualified Pharmaceutical Chemists, the Government of Bengal should enact that no chemists and druggist's shop can be conducted except by a qualified chemist.

2. The Government of Bengal, before coming to any decision on the matter, desire to refer certain matters connected with the proposal for the establishment of a College of Pharmacy to an expert committee for consideration and advice. Government are accordingly pleased to constitute such a committee consisting of the following gentlemen, viz. :—

- (1) Bt.-Col. R. N. Chopra, C.I.E., I.M.S.—*President*.
- (2) One member to be nominated by the Calcutta University (who has been separately addressed).
- (3) The Professor of Pharmacology, Carmichael Medical College, Calcutta.
- (4) Mr. J. L. Bell, Assistant Manager, Messrs. Smith, Stanistreet & Co., Calcutta.

- (5) Dr. B. Mukerji of the Biochemical Standardisation Laboratory, Calcutta.
- (6) Dr. Jatindra Chandra Aich, Teacher of Materia Medica, Campbell Medical School, Calcutta.
- (7) A Medical Practitioner of experience and repute to be nominated by Government.

3. The terms of reference to the committee will be as follows:—

- (i) To investigate the necessity of establishing a College of Pharmacy in Bengal.
- (ii) To report on the syllabus and course of study and the staff that would be necessary.
- (iii) To report on the total expenditure, capital and recurring, involved in the proposal.
- (iv) To enquire into the necessity and feasibility of legislation with a view to ensuring that only qualified Pharmaceutical Chemists should conduct chemists and druggists' business, and make recommendations.

4. No remuneration shall be paid to any of the members for the above work and no financial commitment, direct or indirect, on behalf of Government shall be incurred in respect of the constitution and work of the above committee. The committee will, it is hoped, submit its report to Government within a period of six weeks.

Copy of a letter from the Secretary, Government of Bengal, Department of Public Health and Local Self-Government, dated the 12th January 1939, to the Surgeon-General with the Government of Bengal, Calcutta.

I am directed to refer to Resolution No. 1-T.—Medl., dated the 12th October 1938, appointing a Committee to advise Government on the question of establishment of a College of Pharmacy in Bengal and to say that Government are pleased to appoint the following gentlemen as additional members on the Committee, viz.:—

- (1) Mr. Premananda Das, Ph.C., M.S., in Phar. (Mich.), Organising Secretary, Bengal Pharmaceutical Association.
- (2) Lt.-Col. T. C. Boyd, I.M.S., Superintendent and Principal, Medical College, Calcutta.

and in his absence, Dr. P. De, Professor of Physiology, Medical College Calcutta.

I am to request that the gentlemen may be informed.

Copy of a letter from the Registrar, Calcutta University, No. Misc. 2893/25, dated the 9th November 1938, to the President, College of Pharmacy Committee, Government of Bengal, Calcutta.

In forwarding herewith copy of a letter from the Secretary to the Government of Bengal, Department of Public Health and Local Self-Government, Medical Branch, I am directed to inform you that the Hon'ble the Vice-Chancellor and Syndicate have been pleased to nominate Dr. Bidhanchandra Roy, B.A., M.D., F.R.C.S., M.R.C.P., F.S.M.F. (Bengal), on the Committee for advising Government regarding the proposal for the establishment of a College of Pharmacy in Calcutta.

Copy of a letter from the Additional Deputy Secretary, Government of Bengal, Department of Public Health and Local Self-Government, No. 182Medl., dated the 3rd February 1939, to the Surgeon-General with the Government of Bengal, Calcutta.

I am directed to refer to paragraph 2 of Resolution No. 1-T.—Medl., dated the 12th October 1938, constituting a committee to advise Government on the proposal of Dr. Anklesaria for the establishment of a College of Pharmacy in Calcutta. It was stated that the committee would include a medical practitioner of experience and repute to be nominated by Government. Government are now pleased to nominate Dr. Sir U. N. Brahmachari, Kt., M.A., Ph.D., on the committee. The Chairman of the Committee may be informed.

(3)

College of Pharmacy, Calcutta—Expert Committee—Appointment of Dr. B. Mukerji, M.D., D.Sc., as a member.

Copy of letter No. F. 54-9/38H, dated New Delhi, the 30th November 1938, from the Secretary to the Government of India, Department of Education, Health and Lands, to the Secretary to the Government of Bengal, Department of Public Health and Local Self-Government, Calcutta.

With reference to your letter No. 4285Medl., dated the 12th November 1938, I am directed to say that the Governor-General is pleased to permit Dr. B. Mukerji, M.D., D.Sc., Pharmacologist, Biochemical Standardisation Laboratory, Calcutta, to serve on the committee constituted by the Government of Bengal to advise them on the question of the establishment of a College of Pharmacy in Calcutta on the understanding that his work in connection with the Committee will not interfere with his normal official duties at the Biochemical Standardisation Laboratory.

Copy of a letter from the Additional Deputy Secretary, Government of Bengal, Department of Public Health and Local Self-Government, No. 648Medl., dated the 29th March 1939, to the Surgeon-General with the Government of Bengal, Calcutta.

With reference to your letter No. 1612, dated the 27th January 1939 and subsequent memorandum No. 2695, dated the 11th February 1939, I am directed to state that Government have no objection to the appointment of Dr. B. Mukerji, as Secretary of the Committee provided that his work as Secretary will not interfere with his normal official duties at the Biochemical Standardisation Laboratory.

(4)

Letters to and from Dr. Anklesaria, the donor, containing his views and suggestions.

Copy of a letter, dated the 27th January 1939, No. 141Medl., from the Secretary, Government of Bengal, Department of Public Health and Local Self-Government, Calcutta to Dr. D. E. Anklesaria, Retired Assistant Surgeon, Ahmedabad, Bombay.

With reference to your letter dated the 27th October 1938, I am directed to say that the expert committee appointed by this Government to consider and report on the proposal relating to the establishment of a College of Pharmacy in Bengal has begun its deliberation. It is hoped that it will be possible for this Government to take early action on the report of the committee. As regards the suggestion made in the third paragraph of your letter, I am to say that the committee has been instructed to give due consideration to any suggestion which may be put forward by you from time to time and I am to request that you may communicate to the Secretary of the Committee any suggestions that you may desire to make in any aspect of the matter.

Copy of a letter, dated the 15th April 1939, from Dr. D. E. Anklesaria, L.M. & S., Assistant Surgeon (Retired), Ahmedabad, to the Secretary, College of Pharmacy Committee, Government of Bengal, Calcutta.

I beg to acknowledge receipt of your kind note, dated the 7th instant with enclosures.

At the outset I must express my sincere and grateful thanks to the President, Secretary and Members—one and all of both the Committees, for preparing such an interesting and detailed report to be placed before Government by the College of Pharmacy Committee shortly and I beg to submit the following observations thereon:—

The two separate courses one of a Diploma in Pharmacy and another of Degree Course in Pharmacy are very desirable and essential.

The syllabus may be varied according to the discretion of the professors as they may deem necessary from time to time according to their experience.

The Degree Course should be of four years but in the first two years along with the subjects of Inter. Science, Pharmacy, Pharmacognosy and Pharmaceutical Chemistry may be taught so that in the third and fourth years the burden may be less. In subjects of Inter. Science group, the student's burden in Mathematics and Physics may be lessened and more importance given to practical training in the Pharmaceutical Laboratory, which should be on a semi-commercial scale to give a thorough and practical training to the students of the various modern methods of pharmaceutical manufacturing processes and operations.

The preparations manufactured by the senior students may be sold to local practitioners, municipal and local board dispensaries, charitable dispensaries and other institutions at fixed prices to recover cost plus ten per cent. on account of overhead charges. The manufacture of medicinal preparations should be so regulated that private firm may not have any ground to complain of competition by Government in their trade.

About the site of building for a college and laboratory, it should have been much better had the committee also considered this question and suggested three or four available sites from which Government may give one. I would suggest to have a large plot of land at some convenient distance from the busy localities but easily accessible by tram, bus or rail so that hostels for students, playground, botanical garden of medicinal herbs and plants may be developed in future.

I fully approve of the scheme as drawn up by your Committee and hope that Government will now be pleased to sanction it at an early date.

Copy of a letter, dated the 15th April 1939, from Dr. D. E. Anklesaria, L.M. & S., Assistant Surgeon (Retired), Ahmedabad, to the Secretary, College of Pharmacy Committee, Government of Bengal, Calcutta.

I beg to acknowledge receipt of your letter No. P/74, dated the 12th instant.

2. Both the Committees have gone into the matter so fully that no further suggestions at this stage seem called for excepting:—

- (a) The selection of a site for the location of the College premises keeping in view its future expansion and development.
- (b) Provision for more students as the College is to be the premier institution of India for some years till other provinces have pharmacy colleges in their capitals.
- (c) Ayurvedic and Yunani practitioners and others may be admitted as casual students in any course of study or practical training.
- (d) The botany and Pharmacognosy of indigenous Indian drugs should receive more attention and intensive study, as in the B. P. only a very limited number of them are included.

Thanking you and your committees for all the trouble they have taken so far to make the proposal acceptable to Government.

(5)

Copy of questionnaire.

1. Do you think that the time is ripe for establishing a College of Pharmacy in Bengal?

2. Are you satisfied with the qualification, training, etc., of the present compounders? The Drugs Enquiry Committee collected evidence from all over India to the effect that the system of training of the compounders is defective and that this should be rectified as soon as possible. Do you subscribe to the same views? If so, would you like that an improved curriculum and a special Institution for training compounders should be started immediately in Bengal?

3. The committee have considered the position and are of opinion that a Diploma in Pharmacy course involving a 2 years' training after Matriculation or an equivalent qualification, be considered the minimum qualification to entitle anybody to undertake the responsible work of compounding, dispensing and selling drugs and chemicals including poisons and narcotics. Do you agree with such a proposal?

4. The committee further opine that a Degree Course in Pharmacy may be instituted involving a two years' training after I.Sc. Examination. A degree in pharmacy has already been introduced in the Benares Hindu University. Do you favour the institution of such a course in the Calcutta University also? The Sapru Committee on unemployment in the United Provinces recommended that more attention should be paid towards pharmaceutical education as a means of turning out technically educated youngmen who would either be able to start pharmaceutical industries or get absorbed in various drug manufacturing industries that are now coming up into the country. Do you agree with such views?

5. The donor, Dr. Anklesaria of Ahmedabad, has offered a donation of Rs. 2 lacs to the Bengal Government on condition that Government shall contribute an equivalent amount plus a free site of land in Calcutta for the College building. Do you think that the Government should undertake the responsibility?

6. The committee have worked out an estimate of capital and recurring expenditure. For erecting the College building and for equipping it with laboratory requisites and manufacturing pharmacy plants on a semi-commercial scale, a minimum amount of about Rs. 3,35,000 will be required. A minimum recurring expenditure of about Rs. 75,000 would be involved, of which about Rs. 30,000 to Rs. 35,000 will be realised from student fees. The Government will have to bear a recurring annual expenditure of about Rs. 35,000 or so.

Do you think the project is of sufficient public importance as to expect such a recurring grant from the Government?

7. Bengal is the most important centre in India for drug manufacturing. Do you think the establishment of a College of Pharmacy in Calcutta would materially help in stimulating drug manufacturing industry here?

8. Do you feel that there ought to be some legislation to control the potency and purity of drugs and chemicals manufactured locally or imported from abroad?

9. The market in India is stated to be flooded with all sorts of drugs and chemicals of defective strength and impure quality. This is affecting the trading interests of the honest manufacturers. What are the methods that you suggest for stopping this? Do you think that the creation of an ethical pharmaceutical profession would prevent this state of affairs to a large extent?

10. In practically all civilised countries in the world, there are laws for controlling the purity of foods and drugs in the interests of public health. There is no such comprehensive all-India enactment here. Do you consider that such a law should be enacted without further delay?

11. If legislation is enacted, there will immediately be a need for a machinery to put the provisions of the legislation into effect, or in other words, a number of public analysts capable of undertaking all ordinary types of food and drug analysis and inspectors for purposes of checking will be required. How are you going to provide for this contingency? Do you think that the proposed College of Pharmacy should be so staffed and equipped as to be able to turn out properly qualified public analysts?

12. Do you think that legislation is necessary to limit the practice of pharmacy only to qualified people?

13. The committee understand that at present many non-qualified people are carrying on the practice of pharmacy, under the protection of medical men owning dispensaries. Do you approve of such practice?

14. Do you consider that a Pharmacy Law should be enacted simultaneously with Drugs Law?

15. If legislation is enacted preventing the practice of pharmacy only to qualified people, what should, in your opinion, be the status of the passed compounders who are already carrying on the profession of pharmacy? Should they be considered on a *par* with those qualifying under the proposed new system? Should the Pharmacy Law, in your opinion, be an All India Law or each Province should be allowed to enact its own measure?

Do you think there will be difficulties if different Provinces enact different Provincial Pharmacy Laws?

Appendix B.

Extracts from answers to the questionnaire.

(i)

On the need for establishing a College of Pharmacy.

The Committee thought that before formulating its own proposal with regard to the various terms of reference, it would be desirable to

seek the opinions of a few selected individuals, associations and bodies interested in the question. Extracts from some of the opinions received regarding the question of the desirability of establishing a College of Pharmacy in Bengal are given below. *It will be seen that there is practically an unanimous opinion as to the urgent need for such an institution from all quarters.*

Mr. R. D. Lemmon, Managing Director, Messrs. Martin & Harris, Ltd., a prominent firm of importers and dealers in pharmaceutical drugs and medicinal chemicals, etc., in his written memorandum states:—

“I am certainly of the opinion that the time is ripe when a College of Pharmacy can be established in Bengal with a good deal of advantage to the province and to those engaged in pharmaceutical trade and industry within the province. I am wholeheartedly in favour of the institution of a degree course in pharmaceutical chemistry and I feel that such graduates will be of immense help in assisting the drug industry in the country. I think that the Government of Bengal should undertake the responsibility of starting a college of pharmacy, and am emphatically of the opinion that this project is of sufficient public importance, to warrant the Government of Bengal bearing the recurring expenses likely to be entailed. The establishment of a College of Pharmacy in Calcutta would not only materially help in stimulating the drug manufacturing industry, but is absolutely essential in the near future if this industry is to develop along proper lines.”

Rai Bahadur Dr. K. N. Bagchi, B.Sc., M.B., D.T.M., F.I.C., Chemical Examiner to the Government of Bengal, Professor of Chemistry, Calcutta Medical College and President of the Institution of Chemists (India) is definitely of the opinion that a College of Pharmacy should be started.

“The present system of training of compounders is undoubtedly inadequate and defective and the time is ripe for overhauling the whole system with a view to modernise the profession and set it on a proper scientific footing so that its members, instead of being dispensers, may also prove useful in chemical and pharmaceutical industries.

The donor has rendered a great service to the cause of scientific education in Bengal and the State should undertake the responsibility of establishing the College of Pharmacy in Calcutta on the lines indicated in the terms of reference. Considering the importance and responsibilities of the project, a net recurring expenditure of about Rs. 40,000 per annum is not much. In fact, I would suggest that a much larger amount should be spent to make the scheme a more comprehensive one by including other important projects within its scope. As Bengal is at present the most important centre for pharmaceutical industry, the establishment of this College in Calcutta will afford facilities for research in proper lines and give impetus to the industry.”

Mr. K. K. Acharjee, Chairman, Pharmacist's Branch of the Bengal Pharmaceutical Association, Mr. B. N. De, Secretary and Mr. N. N. Ghosh, Assistant Secretary in a joint memorandum maintain that—

“There is urgent need for a College of Pharmacy in Bengal, nay the project is long overdue. The whole system of training for the compounders in the Medical Schools is absolutely unsatisfactory, and

because pharmacy teaching is considered as a second string to medical training in these institutions, it has never received the recognition, which it has earned in Western countries, and which is the legitimate due of the science of pharmacy. The sooner the new college starts, the better for the whole country. It will prove to the world that India does not intend to remain backward forever. A College of Pharmacy, by training young men in the science and art of preparing drugs, will play a very important part in the development of the drug industry with consequent relief of unemployment and economic gain to the country."

Prof. S. Ghosh, D.Sc., F.I.C., Professor of Chemistry at the School of Tropical Medicine, also feels that a College of Pharmacy is very necessary in India. He remarks as follows:—

"India is hopelessly behind countries like England, America or Germany where very good organisations exist for training students in this branch of knowledge.

The Benares Hindu University (which has already started a pharmacy course) trains only 8 students every year (*cf.* Prospectus, 1940), and the Andhra University has just started a similar course. I don't know of any other University or province where such facilities exist. There is a large demand for qualified men in India and it will take years for a college in Calcutta to supply enough trained men even for the Province of Bengal. The time is certainly ripe for establishing a College of Pharmacy. The Drugs Enquiry Committee collected evidence from all over India to the effect that the system of training of the compounders is defective and that this should be rectified as soon as possible. A College of Pharmacy should therefore be started immediately in Bengal."

Mr. S. N. Bal, Officer-in-charge, Industrial Section of the Indian Museum and Chairman of the Educational Council of the Bengal Pharmaceutical Association as well as Dr. J. C. Gupta, Assistant Professor of Pharmacology, School of Tropical Medicine, subscribe to the same view as Prof. S. Ghosh.

Mr. J. N. Lahiri, M.Sc., Manager, Bengal Chemical and Pharmaceutical Works, Ltd., Calcutta, however, is not emphatic in his remarks about the need for the establishment of a College of Pharmacy only for the training of the compounder class of people, though he feels that such an institution will be desirable for higher training in pharmacy. He remarks—

"Qualifications, training, etc., of the present compounders are not quite satisfactory. The curriculum and training should be extended but only with a view to embrace more extensively training and practice under those heads of study which are likely to prove useful in compounding and dispensing of drugs and chemicals including poisons and narcotics. The existing institutions for training of compounders slightly remodelled, may serve the purpose for the present. I do not agree that for the purpose of mere selling of drugs, chemicals, etc., any such high qualification is necessary or helpful."

"A College of Pharmacy in Bengal would be desirable for higher training in pharmaceutical chemistry. A course for the degree in Pharmacy would be a useful one. Such a training would undoubtedly be very useful. The Government ought to undertake the responsibility

of contributing two lakhs of rupees plus a free site of land in Calcutta for the College Building.”

Mr. J. C. Ghosh, B.Sc. (Manch.), F.C.S. (Lond.), Principal, School of Chemical Technology, Kalighat, Calcutta, however, is of the opinion that the time is more than ripe for a College exclusively for the training of pharmacists.

“In fact I felt the necessity nearly quarter of a century ago since when I have often been writing on the subject. I entirely subscribe to the views of the Drugs Enquiry Committee. A Pharmacy College, or special classes in existing Institutions, in order to train Matriculates on the basis of an improved pharmacy curriculum, should be started immediately in Bengal.

It is in the interests of Government to undertake the responsibility of incurring fresh expenditure, the proposed Pharmacy College, if rightly directed, being designed (1) to open new avenue of employment, (2) to reduce unemployment, and (3) to contribute to the industrial development of the country, provided the long overdue and contemplated Drug and Pharmacy legislation be introduced forthwith.”

Mr. Md. Hanif, Director, Bharat Laboratory & Chemical Works, Ltd., and a prominent member of the Indian Chemical Manufacturer's Association, says:—

“There cannot be any two opinions about the immediate and public necessity of the project, and as such the Government should not hesitate to contribute the necessary funds. In case of necessity, Calcutta Corporation and Calcutta Improvement Trust who have always unhesitatingly come forward in such ventures may be approached, or in the last resort, the scheme may be submitted for revision to meet the exigencies of the situation. Further, if the proposals regarding the enactment of Pharmacy Law be adopted, the College along with other expenses incidental to the organisation of pharmacy may be expected to have a self-supporting career.

The offer is indeed commendable. The Government of Bengal should indeed take advantage of this generous offer as in these days of budget difficulties this generous donation would go a good deal to meet the financial burden involved in the project, which, to say the least, is a crying necessity for the country and the province.”

(ii)

On syllabus and course of study for pharmacy college.

The Bengal Pharmaceutical Association, an influential organisation representing the pharmaceutical profession, trade and industry in Bengal, appointed a special sub-committee of experts presided over by Mr. S. N. Bal, Officer-in-charge of the Industrial Section of the Indian Museum and Chairman of the Educational Council of the Association and himself a qualified pharmacist, to discuss the question of the syllabus and a suitable curriculum for the proposed College of Pharmacy. This sub-committee submitted through the Association a very useful memorandum covering several aspects of the question of the establishment of a Pharmacy College. This body suggested the adoption of two courses of study, one leading to a “Diploma in Pharmacy” and another higher course leading to a “Degree in Pharmaceutical Chemistry”

The Diploma course should be taken by Matriculates or others similarly qualified and should consist of 2 years' intensive work in the Pharmacy College and 3 months' training in apprenticeship in any recognised drug manufacturing firm. The Degree course should be of 4 years' duration after Matriculation or a similar qualification. The following subjects for study were recommended by the Committee:—

Diploma Course.

First Year—

First Term—

- (a) Elementary Botany.
- (b) Elementary Physics.
- (c) Elementary Inorganic Chemistry.
- (d) Pharmaceutical Arithmetic.
- (e) Elementary Human Physiology.

Second Term—

- (a) Physics.
- (b) Inorganic Chemistry.
- (c) Theory and Practice of Pharmacy.
- (d) Pharmaceutical Latin.
- (e) Public Health Studies, First Aid and Dressing.

Second Year—

First Term—

- (a) Elementary Organic Chemistry.
- (b) Pharmacognosy.
- (c) Theory and Practice of Pharmacy.
- (d) Dispensing Pharmacy.
- (e) Forensic Pharmacy.
- (f) Pharmaceutical Economics.
- (g) Qualitative Analysis.

Second Term—

- (a) Pharmaceutical Chemistry.
- (b) Theory and Practice of Pharmacy.
- (c) Dispensing Pharmacy.
- (d) Pharmacognosy.
- (e) Materia Medica and Pharmacology, including Toxicology.
- (f) Pharmaceutical Economics.
- (g) Clinical Chemistry.

Three months of Apprenticeship training was recommended at the end of each year.

*Degree Course.**First Year—*

First Term—

- (a) Botany.
- (b) General and Inorganic Chemistry.
- (c) Physics.
- (d) Mathematics.
- (e) Elementary Zoology.

Second Term—

- (a) Botany.
- (b) Inorganic Chemistry.
- (c) Physics.
- (d) Mathematics.
- (e) Pharmaceutical Arithmetic.
- (f) Scientific German.

Second Year—

First Term—

- (a) Organic Chemistry.
- (b) Physics.
- (c) Analytical Chemistry (Qualitative).
- (d) Pharmaceutical Latin.
- (e) Theory of Pharmacy.
- (f) Scientific German.

Second Term—

- (a) Organic Chemistry.
- (b) Analytical Chemistry (Quantitative).
- (c) Elementary Human Physiology.
- (d) Theory and Practice of Pharmaceutical operations.
- (e) Public Health Studies, First Aid and Dressing.

Third Year—

First Term—

- (a) Physical Chemistry.
- (b) Organic Chemistry—Preparations and Analysis.
- (c) Dispensing Pharmacy—Preparation of Galenicals.
- (d) Bacteriology.

Second Term—

- (a) Pharmaceutical Chemistry—Inorganic.
- (b) Drug Assaying and Pharmacopoeial Testing.
- (c) Food and Water Analysis.
- (d) Pharmacology—Elementary knowledge about action of drugs.
- (e) Bacteriology (General).

Fourth Year—

First Term—

- (a) Pharmacognosy (General).
- (b) Insecticides and Food Preservatives.
- (c) Drug Assaying and Pharmacopoeial Standardisation.
- (d) Food and Water Analysis.
- (e) Materia Medica, Toxicology and Bio-assay.
- (f) Pharmaceutical Economics and Business Methods.

Second Term—

- (a) Manufacturing Pharmacy.
- (b) Forensic Pharmacy—Toxicology.
- (c) Pharmaceutical Chemistry—Organic.
- (d) Pharmacognosy.
- (e) Clinical Chemistry.

Three months of Apprenticeship training at the end of each academical year was enjoined.

Rai Bahadur K. N. Bagchi, Chemical Examiner to the Government of Bengal and Professor of Chemistry at the Calcutta Medical College, however thinks that the syllabus suggested by the Association is too stiff for the Matriculates and should be modified. He says—

“It has been proposed that the minimum qualification for the compounders would be a Diploma in Pharmacy requiring a training for two years after Matriculation. The subjects chosen for this training are quite suitable but considering the inadequate knowledge and scientific groundwork of an average matriculate of an Indian University, I am of opinion, that such an intensive course is too lengthy and stiff for him. As a teacher of chemistry for about 15 years in the medical colleges of Calcutta and Patna, I hold that a stiff course does not enable the students to grasp the subjects carefully. They would try to cram only the important portions for purposes of examination and consequently the standards will be gradually lowered.”

Regarding the Degree Course, Dr. Bagchi has also certain constructive suggestions to offer—

“The idea of instituting a degree course (B. Sc. in Pharmacy) and of making arrangement for its teaching in the College of Pharmacy is a move in the right direction. It will thus open out a new avenue of employment for our young men and will indirectly help the pharmaceutical industry of this country. Considering the course of study prescribed for this degree. I am of opinion, that the period of 4 years after Matriculation Examination, as suggested by the Bengal Pharmaceutical Association and of two years after Intermediate in Science Examination, as provisionally prescribed by the Government Committee is not sufficient for teaching the subjects, and as it is not desirable to omit any of the subjects or to shorten the syllabus in any way, it will be necessary to prescribe three years after the Intermediate in Science for this degree which may after all, be regarded as a professional training. It may be noted in this connection that a period of training for three years for a degree course is not new to this country—the B.Sc. (Honours) degree of the University of Dacca is an example. During the period of training, students should be encouraged to show their aptitude in research as done by the Hindu University of Benares.”

The institution of a Master's Degree in Pharmaceutical Chemistry is also recommended by Dr. Bagchi as a means for providing suitable training for public analysts:—

“In this connection I may be permitted to suggest that Master's Degree (M. Sc. in Pharmacy) should also be instituted and arrangements for its teaching may be made in the College of Pharmacy. For this degree, the students should devote more attention to research and higher chemistry (general) and to chemistry of food and poisons, so that they may be competent public analysts as required for prevention of adulteration of foods and drugs. Only the B.Sc.'s in Pharmacy should be eligible for this course and the period of training shall not be less than two years. Aptitude in research should be encouraged so that really useful chemists with power of close observation and alertness of preception, may be produced to cope with the existing situation in the country where accurate informations about the composition of most of our foodstuffs and their adulterants are unknown and where no analysis, worth the name, is either required or encouraged for detection of adulteration of foods and drugs. If my suggestion is accepted by the Committee and if the College of Pharmacy is provided with analytical chemists with necessary qualifications (as prescribed by the Ministry of Health for the United Kingdom) and with experience in research, to teach analytical chemistry with special reference to foods and drugs and to stimulate the spirit of research among their students, the problem of a steady supply of competent public analysts in this country will be solved satisfactorily.”

Regarding the Diploma and the Degree Course in Pharmacy proposed to be instituted in the College of Pharmacy, Prof. S. Ghosh has the following comments to make:—

“I am not satisfied with the qualifications, training, etc., of the present compounders. I believe that the syllabus and the course of study suggested by the Bengal Pharmaceutical Association Committee for the training of compounders, called the ‘Diploma in Pharmacy Course’ will be the ideal course for their training. A two years’ course

after I.Sc. is far too short a period for the number and variety of subjects the students have to be acquainted with. I would suggest at least a three years course after I.Sc. as they have recently done in Benares Hindu University (since 1937). Originally they started with a 2 years' course after I.Sc. and they found it was insufficient. The Government Committee seems to agree to most of the subjects suggested by the Bengal Pharmaceutical Association Committee and so the period of three years is essential. The objection to a start with I.Sc. would be that the student had wasted his time in learning things which are not essential for a pharmacy student, whereas a Matriculate could be trained from the beginning in the subjects in a way that would help him better in his special branch of learning. If the Calcutta University does not agree to the proposals of Bengal Pharmaceutical Association Committee as regards the Degree Course, one may even seriously think about having a separate Government Faculty (e.g., State Faculty of Pharmacy) for this course and introduce suitable degrees or diplomas."

Dr. J. C. Gupta, Assistant Professor of Pharmacology, School of Tropical Medicine, feels that if a degree course is instituted, it should have to be a three years' course of study—

"I am of opinion that if a Degree Course in Pharmacy be instituted, the pharmaceutical education should be placed on the soundest basis possible. Anything short of this may be viewed as an ill-advised compromise. For a full collegiate course, a period covering at least three years' is necessary and we should see that every component part of that course must be standard throughout as compared with other colleges of pharmacy. I may add that all leaders and thinkers in pharmacy recognise that the comfort, health and well-being of the public is impossible of realisation without the application of the scientific principles which form the bone and sinew of pharmaceutical practice. To bring us up with the head of the procession which had already started marching in other parts of the continent of Europe years ago, it is essential that the course should be of at least a three years' period after the Inter. Science, if not more."

In the joint memorandum submitted by the Chairman, Secretary and Assistant Secretary of the Pharmacist's branch of the Bengal Pharmaceutical Association, it is maintained that—

"The degree course should involve a two or three years' training after I.Sc. or after Diploma in Pharmacy. We suggest three years after I.Sc. owing to the fact that an I.Sc. student is not required to make any special study in subjects which are directly useful in the pharmacy branch. The field for a Degree in Pharmacy is so wide that three years' course after I.Sc. will not be too much. It should be remembered that graduates in Pharmacy are required more for practical work than for theoretical. It may in the alternative be provided that after completion of two years' study in the proposed pharmacy college, the candidate shall have to undergo one year's apprenticeship in any of the manufacturing chemists' establishment before the Degree is awarded. We place the holders of a Diploma in Pharmacy on the same footing with those who have passed the I.Sc. Examination, on the ground that in view of their exclusive study in Pharmacy for two years after Matriculation they are better suited for undertaking the degree course than an ordinary I.Sc. student. If, however, any constitutional

question is raised by the University for admission of a Pharmacy diploma holder to the degree Course (diploma in pharmacy not being an University affair), the question may be re-examined later on. We want to emphatically impress on the Committee that the doors should be left open for holders of diploma in pharmacy to join the degree course in the proposed Pharmacy College."

In connection with the proposed additions and improvements suggested by the Government Committee in the existing curriculum for compounders, i.e., a comprehensive training for 2 years after Matriculation or similar qualification, Mr. R. D. Lemmon sounds a note of caution—

"I believe the qualifications and training of compounders in the province of Bengal particularly, have been considerably improved within recent years, but this still falls far short of the ideal. I think the system of training can be further improved, but this should be done gradually and within the limitations prescribed by economic conditions in the province."

Mr. J. N. Lahiri of Bengal Chemical & Pharmaceutical Works, Ltd., is another who does not think it necessary to increase the training of the present-day compounders to the standard proposed by the Bengal Pharmaceutical Association or the Government Committee. He thinks that the syllabus provisionally drawn up by the Bengal Pharmaceutical Association for the minimum qualification in Pharmacy (i.e., Diploma) is too heavy. He suggests "more intensive training in (a) Elementary Theory and Practice of Pharmacy including Posology and Toxicology; (b) Dispensing Pharmacy including study of incompatibilities, (c) Forensic Pharmacy, (d) First Aid and Dressing, (e) Working knowledge of Pharmaceutical Arithmetic and reading knowledge of Pharmaceutical Latin, and much less emphasis on Biology, Physics, Inorganic and Organic Chemistry, Anatomy, Physiology, Hygiene and Sanitation, Materia Medica, etc." Mr. Lahiri does not agree that for the purpose of mere selling drugs, chemicals, etc., any high qualification is necessary or helpful, though he concedes that candidates prior to qualifying for compoundership should receive regular training after Matriculation or an equivalent qualification and should pass a certain definite standard of examination before being entitled to take the responsible work of compounding and dispensing drugs and chemicals including poisons and narcotics."

Regarding the degree course in pharmacy Mr. Lahiri has the following comments to make:—

"I agree that a course embracing the syllabus provisionally drawn up by the Government Committee for the degree in Pharmacy would be a useful one and such a course of study ought to be introduced by the Calcutta University. A course of study on Food and Drug testing and analysis should be included in the curriculum. Such a training would undoubtedly be very useful, for the chances of these degree holders entering the various drug manufacturing industries would be superior to the present M.Sc. degree holders. I am afraid, however, that the number of such persons who would be successful in getting absorbed in the industries would be limited, for there are very limited openings. Further, one can safely discount the idea that any appreciable number of these pharmacy degree holders would be able to start successfully pharmaceutical industries of their own."

On the need for Pharmacy Legislation.

The Special Committee appointed by the Bengal Pharmaceutical Association to consider the question of the establishment of a College of Pharmacy states—

“In our opinion it is necessary that legislation should be enacted requiring that only qualified Pharmacists or Bachelor of Science in Pharmacy should be employed in chemists’ and druggists’ shop and that the existing course of study for compounders should be replaced by the two years’ course of study prescribed by the committee, but that those who have passed or will pass the compoundership examination before these rules come into force will be exempted from the operation of the new Act.”

Mr. J. C. Ghosh’s views on the subject are as follows :—

“Taking the best view of the present situation as detailed above, one will find that a qualified compounder is all that is required at present to conduct a pharmacy or to perform similar duties in medical institutions. So long as this ugly state of affairs continues, no one will care to think of a College of Pharmacy and to spend money thereon, for there will be no opening either for employment of the pupils who pass out of this college, or for improvement of the existing standard. What is, therefore needed in the first instance is *to change the present gravely objectionable situation altogether by legislation* and to proceed at the same time with the establishment of the proposed college which is urgently called for. The required legislation, which has long been in incubation, is a Drugs *cum* Pharmacy Act by the Central Government. Already the subject has been much commented upon in the Press and I have elaborately dealt with the point in a series of articles in medical and pharmaceutical journals. If the desired comprehensive legislation is passed, compounders as a class will eventually disappear and will be replaced by a well-organised pharmaceutical profession, as in the West, which will consist of (i) *qualified pharmacists*, (ii) *pharmaceutical chemists* and (iii) *university graduates in pharmacy*. Merging (ii) and (iii) preferably in one class of pharmacy graduates, we shall have only two classes A and B who alone will be legally entitled to be designated as ‘Chemists and Druggists’, to own or to conduct dispensaries, manufacturing as well as analytical pharmacies; Class B being further designated as ‘Pharmaceutical Chemists’ and finally regarded as fully qualified chemists in respect of drugs, as there are chemists in respect of agriculture, leather, dyes, etc. Under such an arrangement there will be no difficulty in completely satisfying the restriction imposed by Dr. Anklesaria.”

Prof. S. Ghosh remarks as follows :—

“Legislation should limit the practice of pharmacy to qualified people if we desire to raise the present standard. It will also create a demand for qualified people. I think that (a) the legislation should be enacted by the Central Government on an All-India basis (b) the legislation should include, in addition to the recommendation for the proposed College of Pharmacy, recommendations that (i) all persons who can prove that the practice of pharmacy in any of its branches has been their sole source of their livelihood for a period, say 5 years, be

licensed or registered and permitted to carry on (ii) the compounders' course be continued and passed compounders be registered as duly qualified person, (iii) doctor pharmacists be recognised as duly qualified persons and (iv) whatever other special privileges are possible for holders of diploma of pharmacy and degree in pharmacy. These modifications are necessary in the legislation for the transitional periods since it will take some time to produce a sufficient number of qualified men. I also agree with Mr. Lemmon in the view that the passed students of the College of Pharmacy should get special privileges in the form of (a) special licences (b) special posts in Government service, e.g., as head compounders, head inspectors, etc., (c) better prospects under their employers, etc. The legislation may provide that these qualified people should be given preference in all dispensaries, pharmacies, etc., and these establishments should take at least one such qualified man. The present compounder's course should therefore be continued if any legislation is to be enacted and the question of diverting the funds of the Government now spent on this item to the proposed College of Pharmacy will not arise, until the college is able to cope with the demand for the requisite number of qualified students."

Rai Bahadur K. N. Bagchi remarks—

"The enactment of Pharmacy Law will be a necessity as soon as the College begins to produce qualified compounders otherwise a new sphere of unemployment will be created. Medical men owning dispensaries should not be allowed to hoodwink the public by carrying on their business with the help of unqualified compounders. The present generation of compounders may be given suitable certificates after testing their efficiency in incompatibilities and in dosages of drugs, in poisons law, bandaging and dressing, etc., as decided by the Committee.

This law (pharmacy law) should be an 'all-India' one but considering the absence of institutions like the College of Pharmacy in other provinces, the monopoly of Bengal in producing up-to-date compounders (Diploma in Pharmacy), may be resented by them. If the other provinces prefer to stick to the existing qualification prescribed by them for their own compounders, we cannot possibly force them to embark upon an expensive scheme. If this is permitted, there cannot be any uniformity in the standard of education. If uniformity is wanted, the standard may have to be lowered to a minimum level which is within the reach of the existing resources of the different provincial governments and I am afraid the consensus of opinion will in all probability be in favour of the present-day training of the compounders which we are anxious to get rid of. In these circumstances, it is desirable to recommend for a provincial Pharmacy Law so that Bengal may take advantage of the liberal and scientific ideas of the donor and may set an example to other provinces as to how to educate the compounders in modern scientific knowledge and how to make them useful for the pharmaceutical industry which is fraught with immense possibilities."

Mr. J. N. Lahiri says—

"Time is not yet ripe for a Pharmacy Law. If legislation is enacted limiting the practice of pharmacy only to qualified people, such a legislation should include the provision that passed compounders who are at present carrying on the profession of Pharmacy are to be considered on a *par* with those qualifying under the proposed new system. The Pharmacy Law should be an All-India Law—no province should be

allowed to enact its own measure. Difficulties are bound to crop up if different provinces enact different provincial Pharmacy Laws."

The Pharmacist's branch of the Bengal Pharmaceutical Association represented by Mr. K. K. Acharjee, Mr. B. N. De and Mr. N. N. Ghosh are of opinion that—

"A comprehensive legislation on the lines contained in the recommendations of the Drugs Enquiry Committee's report is urgently necessary. There should be one Act dealing both with drugs and with pharmacy, and that Act should be uniform for the whole of India. Without improving the profession of Pharmacy, any measure for the control of adulteration of drugs will be incomplete and may result in total failure. There is a Food Adulteration Act in almost every province, although that Act is not satisfactory and sufficient to control the purity of food, it is at least partially operative. There is no law for drugs and pharmacy. We are strongly of opinion that a comprehensive Act for controlling the purity of drugs and the profession of Pharmacy should be passed for the whole of India immediately."

Mr. S. N. Bal says—

"Legislation is necessary and simultaneously there should be provision for establishing a pharmaceutical and pharmacological assaying laboratory for control of sale of such drugs and there should also be a laboratory for testing crude drugs. The passed compounders should be exempted from the operation of the new law and they should be encouraged to go through the new course of studies to better their prospects. The Pharmacy Law should be an All-India law. Different provincial laws will create difficulties."

Mr. R. D. Lemmon remarks—

"I think that legislation is necessary to limit the practice of pharmacy to qualified people, but that in the initial stages it will be necessary to frame such legislation with the utmost caution so that it will be strictly enforceable without damaging the practice of pharmacy within the province, and it should be framed with due regard to the economic conditions prevailing. The simultaneous enactment of a Drugs Act and a Pharmacy Act would represent the ideal, but I do not think that the projected Drugs Act should be held in abeyance while the necessary measures are taken to frame a comprehensive all-India Pharmacy Law. To do this, would probably hold up the projected legislation for the control of drug and medicines, which is very much needed, for a period of years, and I consider that this would be very undesirable. I am definitely of the opinion that all those who practice pharmacy at the time such legislation is passed, and who have carried on the practice of pharmacy as their sole or main source of livelihood for a period of years, must be registered or licensed, and permitted to carry on. It would, in the first place, be definitely unfair to the people who have given a large portion of their lives to this work to deprive them of their source of livelihood, and in the second place, would create immense difficulties in the initial stages, before a sufficient number of fully qualified people are trained and become available. In my opinion, Pharmacy Law would be infinitely better on an all-India uniform basis, than to have each province enact its own legislation,

and I think immense difficulties would arise if different provinces enact different Provincial Pharmacy Laws.”

Mr. Md. Hanif's remarks are as follows—

“The most gratifying feature is the proposal for the enactment of legislation requiring that only qualified pharmacists should be employed in Chemists' and Druggists' shops. It would have been better, in my opinion, if the proposal had been dealt with more explicitly; nevertheless I believe I am not mistaken in my assumption that what is really meant is that “every Chemist's and Druggist's shop doing prescription business should have a qualified pharmacist in its establishment.” It is in full consonance with the agitation carried on for a number of years calling for the reorganisation of pharmacy. Restriction of future recruitment for official requirements for hospitals, dispensaries, etc., to qualified pharmacists is an avowed implication. Frankly, I personally feel highly sceptical about the success of this very institution in the absence of legislation.

Provision for exemption need not detain us for very long because wherever such enactments have been attempted, exemptions have been granted, generally speaking, to—

- (i) Persons having supposedly inferior qualifications of former times, or
- (ii) Persons, not otherwise qualified, but engaged in the practice of pharmacy say, for 3 to 5 years, and
- (iii) sometimes to doctors.

There is no law in India for dealing with pharmacy in an organised manner. Indian Poisons Act, Indian Opium Act and the Dangerous Drugs Act control the manufacture, sale, possession and import of specified drugs only but they have no relations to pharmacy as such.

Although there are various Municipal Acts at different places governing the profession of pharmacy, organised effort in order to prevent unqualified persons from combining mixtures and carrying on the professions is lacking. Pharmacy Act is of equal importance to Drugs Act, as the training, education and registration of pharmacists would cut down to a great extent the sale of spurious and worthless drugs. Profession of pharmacy is strongly governed elsewhere. In Great Britain the profession of pharmacy is controlled by the Pharmaceutical Society. Only qualified pharmacists registered with the society have the right to sell poisons and dispense. In New York for instance, only licensed pharmacists can dispense drugs in a registered pharmacy.

Besides, the financial aspect of a pharmacy legislation is also an attractive feature. The revenue expected from examinations, licensing, retention fees, etc., would certainly leave, after meeting all supervising expenses, a substantial amount that would not only (a) render pharmaceutical education self-supporting, (b) create appreciable avenues of employment, (c) improve the conditions of the present pharmacists, and (d) satisfy a long-felt demand, but would also, without any financial burden to the Government, provide a powerful, progressive and productive element in the national reconstruction.”

Appendix C.

SPECIAL MEMORANDUM.

By Mr. H. N. Linstead, O.B.E., Secretary and Registrar, Pharmaceutical Society of Great Britain, London.

1. I can offer no opinion upon the first three terms of reference which deal with problems depending for their solution almost entirely upon local conditions in Bengal.

2. The fourth term of reference deals with a matter of general policy upon which opinions can be offered in the light of experience gained in the administration of the Pharmacy Acts in Great Britain, although conditions in Bengal are bound to differ substantially from conditions in Great Britain.

3. To demonstrate that it is desirable that those engaged in the compounding of medicines and in the distribution of drugs to the public should be subject to some standards of professional competence and to some surveillance in the conduct of their business, it is probably only necessary to say that in practically every country in the world there is legislation—of varying degrees of completeness—with these objects.

4. The goals to be aimed at are—

- (i) that the public can rely upon obtaining unadulterated drugs and medicines accurately compounded;
- (ii) that the medical profession shall have available a body of trained and qualified pharmaceutical practitioners to whom they can entrust, whether in the retail pharmacy, the hospital or the factory, the preparation of their medicaments and whose advice is available to them on all matters concerning the presentation and administration of drugs; and
- (iii) that there shall be available a body of practitioners who can be relied upon by reason of their education and professional standing to exercise care and responsibility in the supply of potent medicaments, drugs of addiction and poisons.

5. The pivot of this machinery must be an organised pharmaceutical profession whose members have been examined and registered by the state after proper training, a profession subject to such statutory control as local circumstances necessitate and in matters of the discipline of its members, master in its own house. No statutory control however minute its provision and however efficiently enforced can take the place of such an organised profession.

6. To build up this machinery attention must be given to each constituent part in relation to the whole. It is not sufficient that parts only should be perfected if other parts are incomplete. The complete scheme calls for—

- (i) A system of training.
- (ii) Examination.
- (iii) Registration, including the registration of business premises.
- (iv) Machinery for devising the detailed statutory requirements for carrying on the practice of pharmacy and the trade in drugs and poisons generally.

(v) Machinery for enforcement.

(vi) Machinery for the internal control of the pharmaceutical profession itself.

In the following paragraphs the problems arising under these headings is discussed.

7. System of Training.—The practice of pharmacy can be separated into its practice in retail pharmacies and in hospitals and factories. In theory, and probably to some extent in practice, the same standard of scientific training is not needed in both branches. In Great Britain the majority of those practising pharmacy in retail establishment possess the statutory qualification of Chemist and Druggist, calling for a minimum period of two years' academic training, while those practising pharmacy in hospitals and factories in the majority of cases possess either the Pharmaceutical Chemist qualification or a University degree, both requiring a three years' academic course. Two years' practical training is required in addition for both the Chemist and Druggist and the Pharmaceutical Chemist qualifications. In Great Britain those who intend to make pharmacy their life work obtain the highest qualifications that is open to them irrespective of the branch in which they will practice. There is much to be said for having one common qualification for all students which will open the door to practice in any province of pharmacy and which can be supplemented by post-graduate qualifications for those who desire to specialise. The increasing complexity of the medicaments used in modern medicine and of the methods of administration suggest that the standard of qualification should represent a pass degree standard obtained as the result of three years' academic study. If this is found in the early stages of a new scheme unduly to limit members, the academic course might be reduced to two years as is the Chemist and Druggist course in Great Britain, but experience has shown the extreme difficulty of condensing into a two years' course the amount of general and specialised scientific knowledge required of a pharmacist to-day.

8. In Great Britain, the majority of the training institutions are University colleges or technical colleges catering for students of many faculties. There are great advantages in such an arrangement. While a school devoted to pharmacy alone may be able to co-ordinate its training in all subjects with greater efficiency than a polytechnic institution, where a compromise has to be reached between the claims of different departments, the students miss one of the valuable features of a polytechnic institution, namely contact with students preparing for other callings. This out-weighs the conveniences of a self-contained school of pharmacy. The ideal arrangement would be that pharmaceutical students should receive their training in their pure science subjects in a general science course with students of other faculties and their training in physiology and pharmacology with medical and dental students. The close association of a school of pharmacy with a teaching hospital is a great advantage. It brings students of pharmacy into contact with students of medicine, it enables them to have a practical insight into modern therapeutic methods and it gives a practical turn to their training, since much of the material which they prepare can be utilised in the hospital with a consequent economy of material and reality of teaching.

9. **"Apprenticeship"**.—In Great Britain apprenticeship was at one time the normal way by which a pharmacist learnt his business. It

survives to-day through the requirements in the examination regulations of the Pharmaceutical Society that a student must have received not less than four thousand hours' practical training in the compounding and dispensing of medical prescriptions either in a shop, hospital or factory. Hospitals and factories are inspected by the Society before they are approved for training. The institution of some form of approval of shops is under consideration at the moment. This practical training must be taken (in the case of the Chemist and Druggist qualification) before entry of the qualifying examination. In the case of the Pharmaceutical Chemist qualification (and any of the University degrees) it can be taken either before or after the qualifying examination. If it is taken after that examination, registration as a pharmacist is deferred until it has been completed. This practical experience of his calling is essential if a student is to learn the many details of the professional and business side of his calling which cannot be reproduced in a training college. The gradual limitation of the pharmaceutical operations which a retail pharmacist is required or equipped to perform is however making apprenticeship gradually less valuable as a part of the course of training in pharmaceutical operations. The opinion is gaining ground in Great Britain, particularly among teachers, that the apprenticeship system has served its day for this purpose and that it is to the School of Pharmacy that the student must now look for the training in manufacturing methods and extemporaneous dispensing which he at one time obtained as an apprentice. These observations apply in the main to apprenticeship served in the retail pharmacy, which is the normal type of apprenticeship in Great Britain. Conditions in Bengal are bound to differ from those in Great Britain but the changing conditions of retail pharmacy must be borne in mind if it is contemplated that some form of apprenticeship is to be part of the course of training of a pharmaceutical student.

10. **Examination.**—The duplication of final examinations should be avoided. Provided the training institutions are of the proper standing, there is no reason why they should not on behalf of the State conduct a qualifying examination which would also be their own degree or diploma examination. There is much to be said for the system of internal examination whereby the final examination is conducted by the teachers responsible for training the students. The maintenance of the standard between the different institutions can be secured by a system of external examiners associated with the teaching examiners (these external examiners being common to all teaching institutions if there are more than one). The whole of the examiners would work under the general oversight of an officer appointed by the State who would supervise the standard of the examinations in the public interest.

11. **Registration.**—To give legal value to the qualification, to provide the courts with a means of differentiating between the qualified and the unqualified practitioner, and to provide a means of enforcing disciplinary decisions, a statutory register maintained under Government authority is necessary. The normal method of admission to the register would be by means of a certificate of qualification issued by the examiners, but there should also be provision for the admission of the holders of certificates of other approved examining bodies. Upon the first setting up of a register it will probably be necessary to make provision for the admission of existing practitioners subject to their satisfying a tribunal that they have been actively engaged in the

practice of pharmacy for such period as may be laid down. For some of these, and for their assistants of some years standing, it may be desirable to provide a modified examination. It may be added that a register of premises is important both from the point of view of protecting registered men themselves against unfair competition and to enable the State properly to enforce such statutory requirements as may be laid down with regard to practice.

12. A Pharmacy Board.—The general control of the practice of pharmacy will presumably fall within the province of the Ministry responsible for public health matters. It is however not satisfactory to hand over the control of the profession directly to a department. The problems of pharmacy are manifold and many of them of primary interest to the practitioners rather than to the State. It is therefore advisable that a wide measure of supervision over the profession should be given to a professional body responsible to the Minister. It would be a body requiring his consent to many of its actions, but nevertheless clothed with as much authority and independence as is possible in the public interest. Such a body might be called a "Pharmacy Board". It should be overwhelmingly pharmaceutical in its composition. It should contain some representatives elected by practitioners of pharmacy, but the majority should be appointed by the Minister if, as is to be hoped, it is to have a large measure of authority in matters of general public concern. It should be responsible to the Minister for the standard of education of pharmaceutical students, for the standard of the examinations, for the maintenance of the statutory register and for the disciplinary control of the profession; it should advise the Minister upon those drugs which should be subject to legislative control and should have at its disposal the necessary staff for inspection and enforcement.

13. The creation of such a Board is fundamental to the satisfactory organisation of the practice of pharmacy. It must be a body commanding the confidence not only of the Minister and of the public but of the pharmaceutical profession itself. It will not achieve this if it is a section of a Government department nor if its composition is substantially medical. If the new profession of pharmacy is to flourish and to contribute whole-heartedly to the advancement of public health matters in the country, it must be, to as large an extent as possible, mistress in its own house and free to plan and carry out schemes for its development with all the enthusiasm which comes from freedom from unnecessary supervision and the natural desire of a profession to develop along its own lines.

14. The complicated schedules attached to the Poisons Rules, 1935, of Great Britain indicate the complex scientific problems which must be faced if adequate pharmacy legislation is to be devised. Consideration of these problems demands the services of persons fully versed in the subject and it is for dealing with these problems that the Pharmacy Board can be of particular value to the Minister. Similarly in devising regulations controlling the practice of pharmacy a detailed knowledge of the practical problems involved is necessary and it will probably be found in practice that the drafting of these regulations can appropriately be entrusted to the Pharmacy Board. In any case, they should have the right to be consulted by the Minister before regulations are made by him.

15. **Disciplinary control.**—In Great Britain it is the general practice to entrust to a professional organisation the responsibility for the discipline of the members of the profession. In pharmacy there is a Statutory Committee of the Pharmaceutical Society consisting of five members appointed by the Council of the Society and a chairman, having practical legal experience, appointed by the Privy Council. This Committee is required to enquire into cases in which a pharmacist (or a corporate body practising pharmacy) has been convicted of a criminal offence or has been guilty of misconduct which may render him unfit to be on the register. If a Pharmacy Board were to be set up in Bengal it would be the appropriate body to be entrusted with the similar disciplinary powers. The experience of the General Medical Council in this country suggests that such powers are best exercised in the first instance by a small committee rather than by the whole of a large council.

The Statutory Committee of the Pharmaceutical Society has none of the powers of a court of law to compel the attendance of witnesses to administer an oath, or to award costs, but it is free to receive evidence which would not be admissible in a court. For this reason, the attendance of witnesses is of less importance and the Committee has not found itself handicapped by the absence of compulsory powers. The decisions of the Committee are subject to appeal to the High Court, although during the five years of the Committee's existence no appeal has been brought. As in the case of similar domestic tribunals, proceedings in the High Court would not be a re-hearing of the case, but primarily an enquiry into the procedure at the hearing and the absence of bias on the part of members of the Committee.

There has been some misunderstanding of the functions of the Statutory Committee and it has on several occasions been necessary for the Committee to make it clear that they are not concerned to impose a penalty in addition to that already imposed by a court of law. They are concerned only with the question whether or not a person who has been guilty of certain conduct is fit to remain on the register.

16. In considering the control necessary over the distribution of drugs, the Minister and the Pharmacy Board will doubtless find it necessary to consider such matters as following:—

- (i) Which are those drugs to be supplied to the public only upon a medical prescription, subject to provisions for repetition.
- (ii) Which are those drugs which by reason of their special potency, need for care in storing, or liability to deterioration or other necessity for circumspection in their sale, should only reach the public through the hands of pharmacists.
- (iii) Which are those drugs known to be capable of use for abusive purposes and the distribution of which should similarly be controlled.
- (iv) Which are those substances capable of being used as poisons for criminal purposes or otherwise dangerous, upon which it is desirable that special restrictions should be placed.

Another matter requiring attention may be the supervision of the manufacture of medicaments. In Great Britain it is provided that

medicaments intended for the internal treatment of human ailments shall be manufactured only under the supervision of specially qualified persons.

17. **Poisons.** It may be found both convenient and practical to entrust to the Pharmacy Board the power of making recommendations to the Minister concerning the control of poisons, although it is desirable that legislation controlling the distribution of poisons shall be as far as possible kept distinct from legislation controlling the distribution of drugs and the practice of pharmacy.

18. The last of the terms of reference refers specifically to a "chemists' and druggists' business". It will presumably be a matter for consideration by the Pharmacy Board how such a business is to be defined. A business in which are used titles or descriptions or emblems liable to be understood by the public as referring to a pharmacist would come within this description; the compounding and dispensing of prescriptions would of necessity be included; as well as the distribution of drugs and medicines falling within the classes indicated in paragraph 16 above. It may, however, be found in practice difficult to define the business of a chemist and druggist as such. But regulations relating to individual matters such as titles, compounding and dispensing, the supply of drugs and medicines and the distribution of poisons provide what will in fact be a definition of the business. However it is achieved, it is essential to ensure that all those functions normally performed by a pharmacist and which the public have a right to have performed by him, shall be secured to him by law. It is only in this way that a satisfactory pharmaceutical profession can be built up, the members of which will be adequately recompensated for the labour and expense of qualification and through which the public will be reasonably protected.

19. **Enforcement.**—In Great Britain the business of a chemist and druggist is affected by many statutes for the enforcement of which different authorities are responsible. For example, the Food and Drugs (Adulteration) Act is administered by the local authorities, the Pharmacy Acts by the Home office through the police, the National Health Insurance Acts by the Ministry of Health through Insurance Committee and the Spirits Acts by the Board of Customs and Excise through its local officers. There is not only a multiplication of administrative bodies but also of inspectors and there are obvious advantages in simplification. It has been advocated that the law relating to the adulteration of drugs, weights and measures, national health insurance, pharmacy and poisons and dangerous drugs should be administered by local authorities through inspectors who are pharmacists. The practicability of such a consolidation of inspection depends largely on local conditions, and although its advantages are many it is not necessarily the only or the best way of ensuring observance of statutory provisions by chemists and druggists. Whatever the machinery, it is important that the inspectors concerned with the law relating to drugs, medicines and poisons shall be pharmacists. Such inspectors are not only a guarantee of the satisfactory enforcement of the statutory requirements but they also help to secure good feeling between those who administer the law and those who are subject to it. If a Pharmacy Board were to be set up in Bengal on the lines indicated in these notes there would be advantages in entrusting to pharmaceutical

inspectors under the direction of the Board the duty of enforcing legislation relating to purity of drugs and medicines, the practice of pharmacy and the sale of poisons.

20. **Costs.**—In Great Britain the cost of the administration of the Pharmacy Acts, in so far as they affect those who carry on the business of chemist and druggist, is met by the Pharmaceutical Society out of the fees paid for the registration of individuals and of premises. These suffice for the maintenance of the statutory registers and to meet the cost of inspection, and the whole of this administration is done without a Treasury grant.

21. **The Pharmacist and Legislation.**—The suggestions made in these notes provide for the setting up of a form of control which may not at first sight commend itself to those at present engaged in the practice of pharmacy. There are many understandable reasons why this should be so. Where a profession has been free to carry on its work without Government supervision it has become accustomed to freedom and cannot be expected to welcome control. Pharmacists must however realise that such a state of affairs plays into the hands of the less scrupulous practitioners and penalises those who maintain high standards. The latter have nothing to fear and much to gain from the imposition of reasonable statutory control over the practice of their calling. Furthermore, the absence of such control in the field such as pharmacy, where there are so many opportunities for unscrupulous practice by the quack, cannot be in the best interests of the public and it is inevitable that the Government should concern itself with the conditions under which the public are supplied with their drugs and medicines. In these circumstances it is better that the profession of pharmacy should take the initiative and assist in the establishment of a reasonable control over its activities. By so doing it has opportunities of influencing the Government's plan from the earliest stage and its reasonable representations are likely to receive a sympathetic hearing.

A careful examination of the proposals contained in these notes should commend them to those already engaged in the practice of pharmacy and should legislation on these lines ever be brought into operation, those who are already maintaining a high standard in the practice of their profession should find little in these proposals which will adversely affect them in the conduct of their business.

22. **Summary.**—These notes suggest that an organised pharmaceutical profession should be set up under a Pharmacy Board predominantly pharmaceutical, mainly appointed by the Government.

That Board would be responsible for the supervision of pharmaceutical education and registration; for advising the appropriate Minister as to the statutory requirements for the control of drugs, medicines and poisons; for the disciplinary control of the profession and for inspection and enforcement. An educational system is advocated which will provide a standard qualifying examination following a three years' course of instruction in an institution training students for their qualification, preferably a school associated with a teaching hospital.

A system of internal examinations is advocated and the maintenance of a standard between the different institutions should be secured by the appointment of common external examiners under the general supervision of an officer representing the Government.

Experience in Great Britain shows that such an organisation is of great benefit to pharmacists and that it can be maintained without cost to the State.

(2)

By Rai Bahadur K. N. Bagchi, B.Sc., M.B., D.T.M. (Bengal), D.T.M., (L'pool); F.I.C. (Lond.), Chemical Examiner to the Government of Bengal; Professor of Chemistry, Calcutta Medical College; Fellow of the Institute of Chemistry of Great Britain and Ireland; Member of the Society of Public Analysts and other Analytical Chemists, London; President of the Institution of Chemists (India).

Improved training of compounders—its possibilities.

1. The present system of training of the compounders is undoubtedly inadequate and defective and the time is ripe for overhauling the whole system with a view to modernise the profession and set it on a proper scientific footing so that its members, instead of being dispensers, may also prove useful in chemical and pharmaceutical industries.

2. The donor has rendered a great service to the cause of scientific education in Bengal and the State should undertake the responsibility in establishing the College of Pharmacy in Calcutta on the lines indicated in the terms of reference. Considering the importance and responsibilities of the project, a net recurring expenditure of about Rs. 40,000 per annum is not much. In fact, I would suggest that a much larger amount should be spent to make the scheme a more comprehensive one by including other important projects within its scope (*vide* paragraph 7). As Bengal is at present the most important centre for pharmaceutical industry, the establishment of this College in Calcutta will afford facilities for research on proper lines and give impetus to the industry.

Diploma in Pharmacy and its syllabus—too stiff for the Matriculates.

3. It has been proposed that the minimum qualification for the compounders would be a Diploma in Pharmacy requiring a training for two years after matriculation. The subjects chosen for this training are quite suitable but considering the inadequate knowledge and scientific groundwork of an average matriculate of an Indian University, I am of opinion that such an intensive course is too lengthy and stiff for him. As a teacher of Chemistry for about 15 years in the medical colleges of Calcutta and Patna, I hold that a stiff course does not enable the students to grasp the subjects carefully. They would only try to cram the important portions for purposes of examination and consequently the standards will be gradually lowered. I may be permitted to suggest the following modifications in the course of study prescribed for the diploma course.

(a) *Inorganic Chemistry (1st year—2nd term)*.—"Study of all the important metals" and "qualitative analysis of acid and basic radicals" are rather too lengthy for a matriculate to complete in two years.

(b) *Organic Chemistry (2nd year—1st term)*.—"General knowledge of all the important aliphatic and aromatic compounds. Alkaloids and glucosides, simple synthetic compounds commonly used in Pharmacy"—very lengthy and stiff even for I.Sc.'s. Unless they understand the

structures and properties of various organic compounds they cannot possibly acquire even a general knowledge of alkaloids, glucosides and synthetic organic compounds which are unfortunately not very simple.

(c) *Quantitative analysis (2nd year—1st term)*.—“Gravimetric estimation of simple substances like Copper, Silver, Iron, Barium, Sulphuric Acid and Hydrochloride Acid”—this is too stiff even for the B.Sc. (Pass) of this University.

(d) *Pharmaceutical Chemistry (2nd year—2nd term)*.—It is a very lengthy programme. “Study of the most important synthetic organic compounds” is a difficult matter even for the I.Sc.’s. who join the Medical College—not to speak of the matriculates.

(e) *Physical and chemical examination of Pharmaceutical substances (2nd year—2nd term)*.—Physical examination of B.P. drugs requires a skill in handling refractometers, polarimeters potentiometers, etc, and chemical examination requires the skill of an analytical chemist who has got to prepare and standardise his own reagents for carrying out the B.P. tests which include the determination of limits of lead and arsenic and other delicate chemical tests.

(f) *Pharmacognosy (2nd year—2nd term)*.—This course comprising microscopical study of various plant products used in medicine, may be included in a modified and shortened form, in the same course in the 1st term.

Subjects taught and their examination.

4. The curriculum as prescribed by the Committee is suitable for a matriculate of the London University but too high and lengthy for a matriculate of the University of Calcutta or in fact of any other Indian University. If the prescribed courses of study are not carefully taught in the classes and if the students are not examined properly in the terminal examinations qualifying them for promotion to the higher classes, the subjects are entirely neglected by the students (and perhaps by the teachers) and the time thus spent on these subjects is largely wasted.

B.Sc. Degree in Pharmacy—two years' training insufficient.

5. The idea of instituting a degree course (B.Sc. in Pharmacy) and of making arrangement for its teaching in the College of Pharmacy is a move in the right direction. It will thus open out a new avenue of employment for our young men and will indirectly help the pharmaceutical industry of this country. Considering the courses of study prescribed for this degree, I am of opinion that the period of 4 years as suggested by the Bengal Pharmaceutical Association and of two years as provisionally prescribed by the Government Committee is not sufficient for teaching the subjects, and as it is not desirable to omit any of the subjects or to shorten the syllabus in any way, it will be necessary to prescribe three years for this degree which may after all, be regarded as a professional training. It may be noted in this connection that a period of training for three years for a degree course

is not new to this country—the B.Sc. (Honours) degree of the University of Dacca is an example. During the period of training, students should be encouraged to show their aptitude in research as done by the Hindu University of Benares.

Syllabus not adequate—suggestion for improvement.

6. The syllabus prescribed for practical chemistry for the degree course appears to be inadequate. The following suggestions may be considered in drawing up the syllabus finally:—

I. (a) *Inorganic*.—The standard for quantitative analysis should be similar to that of B.Sc. Honours course of the University of Calcutta. The students should be familiar with modern methods of microanalysis especially for poisonous metals like arsenic. The significance of minor elements in nutrition and their determination should be borne in mind.

(b) *Physical*.—Selected experiments on dialysis, osmotic pressure, colloids, pH, cryoscopy, etc. should be incorporated in the course. The clause "if time permits" should be deleted. Without a training in such experiments under an expert, a graduate cannot be considered as a competent hand in a chemical or a pharmaceutical industry where he is likely to be employed.

(c) *Organic*.—Quantitative determination of some important organic compounds like aspirin, quinine, cocaine and other alkaloids, phenol, aniline compounds, barbiturates, etc., should be included in the curriculum. "Quantitative analysis as per B.Sc. Honours course" is not sufficient for this degree.

II. *Bacteriology*.—Should include a portion of industrial bacteriology. Students should be familiar with brewer's yeasts, wild yeasts, different kinds of moulds, lactic acid organism, etc. A knowledge of the morphology and life history of these organisms is essential for a higher study in this line and also for a successful career as analytical chemists in other spheres.

III. *Zoology*.—The course should specifically mention some helminthic parasites which are found in fish and meat and thus infect man.

Proposal for M.Sc. in Pharmacy and its possibilities—Providing suitable training for Public Analysts.

7. In this connection I may be permitted to suggest that a Master's Degree (M.Sc. in Pharmacy) should also be instituted and arrangements for its teaching may be made in the College of Pharmacy. For this degree the students should devote more attention to research and higher chemistry (general) and to chemistry of foods and poisons, so that they may be competent public analysts as required for prevention of adulteration of foods and drugs. Only the B.Sc.'s in Pharmacy should be eligible for this course and the period of training shall not be less than two years. Aptitude in research should be encouraged so that really useful chemists, with power of close observation and alertness of perception, may be produced to cope with the existing situation in the

country where accurate informations about the composition of most of our foodstuffs and their adulterants are unknown and where no analysis, worth the name, is either required or encouraged for detection of adulteration of food and drugs. If my suggestion is accepted by the Committee and if the College of Pharmacy is provided with analytical chemists with necessary qualifications (as prescribed by the Ministry of Health for the United Kingdom) and with experience in research, to teach analytical chemistry with special reference to food and drugs and to stimulate the spirit of research among their students, the problem of a steady supply of competent public analysts in this country will be solved satisfactorily. The Food Adulteration Act is already in the Statute Book but it appears to be a dead letter—the reasons are not far to seek. This question I have already discussed in my address to the Institution of Chemists (India) (vide page 9—a copy enclosed).

Importance of Research in analysis of food and drugs—Plea for appointment of chemists highly qualified in this line.

8. The question of appointing analytical chemists with experience in research, is of supreme importance. We do not want teachers just to help the students to pass their examination. The country wants intensive research in every direction. The pharmaceutical industry is in its infancy in our country and at this stage we require competent teachers to produce research workers in large numbers so that the industry may develop on proper lines and take advantage of its indigenous resources and talents. It may not be out of place to mention here that the Pharmaceutical Society of London which appears to be the model for the proposed College of Pharmacy in Calcutta, has got, in its laboratories 37 research workers engaged in research on various aspects of pharmacy, pharmacology, pharmaceutical chemistry and the corresponding industry. If the idea of stimulating research along with imparting higher education in pharmaceutical chemistry is not taken into consideration when the College is started, the result will be far from satisfactory and the new industry will continue to be in its depth of quagmire without any progress and absence of progress in any industry means its ultimate death. It is better to be satisfied with the Diploma in Pharmacy only and to arrange for a mass production of dispensers, pharmacists, compounders or whatever they are called, and not to take up the question of any higher education in pharmacy if the question of funds stands on the way of a really first class institution.

Plea for appointment of at least one chemist qualified in chemistry of food and drugs on a liberal pay.

9. It may be noted that the director or the principal of the college possessing necessary qualifications for teaching chemistry of drugs and food should be appointed on liberal emoluments. As there are no facilities for such training in India, best men may be obtained, if necessary, from the United Kingdom, on contract basis. Very few Indians possess the requisite qualification. At present I know one Indian (a Parsee) who has got this qualification and who has made a

name in the field of research. But the Committee should be liberal in fixing up attractive pay for this post which should not be less than that prescribed for the professors of the Calcutta Medical College, viz., Rs. 600 to Rs. 1,000 per mensem.

Flooding of markets with drugs of doubtful efficacy—Inaccurate dispensing of prescriptions—Remedies suggested.

10. The market appears to be flooded with drugs of defective strength and doubtful efficacy. The provincial Pure Food Act (as in the Punjab, Assam and Bombay) or Food Adulteration Act as in Bengal and Madras if amended to include drugs as has been done in Bihar and Orissa [Bihar and Orissa Food Adulteration (Amendment) Act of 1923] for purpose of checking this evil, no new legislation or enactment on "all-India" basis, is called for at this stage. The B.P. specifications for purity of drugs, should be strictly adhered to in giving opinion on samples of official drugs. The standards for non-official or indigenous drugs, may be laid down by a suitable board formed by Government for this purpose. Every province has by now got its Food Adulteration Act and if each of them gets its Food Adulteration Act amended to cover drugs (as in the case of Bihar and Orissa) and if B.P. standards are followed (and must necessarily be followed in cases of official drugs) all over India, the result will be uniform and equivalent to an enactment of "all-India" basis. What we want is the machineries for the administration of the existing Act and no more new Acts. There are sections in Indian Penal Code, Bengal Municipal Act and Food Adulteration Act which are competent to check this evil successfully but where are the will and determination on the part of the public and the local bodies to take advantage of the existing laws? We want more energetic efforts on the part of the public, police and local bodies to bring offenders to justice. We want larger number of qualified public analysts and food and drugs laboratory for administration of the existing Acts—these are the machineries without which no improvement in the present state of affairs can be expected. The College of Pharmacy if properly organised and staffed may produce suitable public analysts for the purpose but where is the fund for establishing large number of laboratories in the province? Apart from drugs of defective strength, there is another danger which appears to have been overlooked by the Committee—that is, inaccurate dispensing of prescriptions—supplying half the amount or even less, of expensive medicines like Potassium Iodide, Quinine salts, etc. prescribed by the doctor. This is a dangerous practice and appears to have been gradually spreading in rural areas. It is imperative to tackle the situation vigorously and fight it out on all fronts with sufficient resources, possibly from other magnanimous donors if the State is unable to find necessary funds. A solution of the problems may however be found in my address (*loc. cit. vide* pages 20-21).

Difficulties in the way of administration of various Acts to check the evil.

11. Let us admit for the sake of argument, that we have got sufficient number of qualified public analysts and well equipped laboratories to carry out the analysis. But the question arises as to who will seize

the drugs in the open market and take the trouble of packing them suitably as required by law and send them to the public analysts? The usual objection of want of funds for appointing suitable men as inspectors and other officers will again stand on the way. The public, especially in the country side, are not likely, at this stage of our education, to take intelligent interest in this question. The police and district board officers have perhaps got more time to devote to this direction and may be compelled by the authorities to make honest efforts in bringing the offenders within the range of the law but there are so many pitfalls in these undertakings that personally, having an experience of over a quarter of a century in this line, I entertain no hope for its fruition.

Pharmacy Law.

12. The enactment of Pharmacy Law will be a necessity as soon as the college begins to produce qualified compounders otherwise a new sphere of unemployment will be created. Medical men owning dispensaries should not be allowed to hoodwink the public by carrying on their business with the help of unqualified compounders. The present generation of compounders may be given suitable certificates after testing their efficiency in incompatibilities and doses of drugs, poisons law bandaging and dressing, etc., as decided by the Committee.

All-India or Provincial?

13. This law should be an "all-India" one but considering the absence of institutions like the proposed College of Pharmacy in other provinces the monopoly of Bengal in producing up-to-date Compounders (Diploma in Pharmacy) may be resented by them. If the other provinces prefer to stick to the existing qualification prescribed by them for their own compounders, we cannot possibly force them to embark upon an expensive scheme. If this is permitted, there cannot be any uniformity in the standard of education. If uniformity is wanted, the standard may have to be lowered to a minimum level which is within the reach of the existing resources of the different provincial governments, and I am afraid the consensus of opinion will in all probability be in favour of the present day training of the compounders which we are anxious to get rid of. In these circumstances, it is desirable to recommend for a provincial Pharmacy Law so that Bengal may take advantage of the liberal and scientific ideas of the donor and may set an example to other provinces as to how to educate the compounders in modern scientific knowledge and how to make them useful for the pharmaceutical industry which is fraught with immense possibilities.

(3)

By Mr. J. C. Ghosh, B.Sc. (Manch.), F.C.S. (Lond.), Principal, School of Chemical Technology, Calcutta.

Dr. D. E. Anklesaria offers a princely, but a conditional grant of Rupees two lakhs for the proposed College. Of the conditions mentioned

he most important is to insist on a qualified chemist for conducting a pharmacy. Under existing practice or rule there is no such restriction in this country. Moreover, medical men are reported to have employed under their protection, non-qualified compounders to carry on responsible duties which should have been performed by *at least qualified compounders*. The alleged misuse by medical men of their privilege is most regrettable and could only cease if, on ethical grounds or under legislation, they would refrain from dispensing and from having connection in any shape with a drug or pharmacy business.

2 Taking the best view of the present situation as detailed above, one will find that a qualified compounder is all that is required at present to conduct a pharmacy or to perform similar duties in medical institutions. So long as this ugly state of affairs continues, no one will care to think of a college of pharmacy and to spend money thereon, for there will be no opening either for employment of the pupils who pass out of this college, or for improvement of existing standard. What is, therefore, needed in the first instance is *to change the present gravely objectionable situation altogether by legislation* and to proceed at the same time with the establishment of the proposed college which is urgently called for in Calcutta.

3. The required legislation, which has long been in incubation, is a Drugs *cum* Pharmacy Act by the Central Government. Already the subject has been much commented upon in the press and I have elaborately dealt with the point in a series of articles (copies enclosed). If the desired comprehensive legislation is passed, compounders as a class will eventually disappear and will be replaced by a well-organised Pharmaceutical Profession, as in the West, which will consist of (i) *qualified pharmacists*, (ii) *pharmaceutical chemists* and (iii) *university graduates in pharmacy*. Merging (ii) and (iii) preferably in one class of pharmacy graduates we shall have only two classes (A and B) who alone will be legally entitled to be designated as "Chemists and Druggists" and to own or to conduct dispensaries, also manufacturing as well as analytical pharmacies, Class B being further designated as Pharmaceutical Chemists and finally regarded as fully qualified chemists in respect of Drugs as there are chemists in respect of Agriculture, Leather, Dyes, etc. Under such an arrangement there will be no difficulty in *completely satisfying the restriction imposed by Dr. Ankle-saria*. Qualified medical men who have, by further work, qualified as Pharmacologists, are, however, competent to undertake *bio-chemical and biological analysis* of drugs, but they have nothing to do with the chemical and microscopical analysis which constitutes a large volume of work pertaining purely to the province of Pharmaceutical Chemists (Pharmacy Graduates).

4. Institutions like the proposed College of Pharmacy, or existing Universities in specialised classes, will provide suitable courses of instruction for training in Pharmacy in either 2 or 4 years after Matriculation according as the case is either for qualifying as a Pharmacist or as a Pharmaceutical Chemist roughly according to the syllabus recently drafted by the Education Committee of the Bengal Pharmaceutical Association. The minimum two years shall be a period of intensive training, in order to provide for 3,000 hours of work. A diploma in pharmacy will be considered as equivalent to the I.Sc. to enable a student to proceed for the Degree course. As the syllabus

is meant for application to all Provinces, the final draft will rest with the Central Pharmaceutical Board which needs to be created forthwith by the Government of India if the required legislation is to be given effect to without any further delay.

5. The question that now arises is how the extra cost involved will be met. The simple answer is that donors like Mr. Anklesaria will be forthcoming more and more, Universities will open specialised classes as at the Benares University, provide enterprise, as in European countries, of which a humble example is furnished in the Calcutta School of Chemical Technology (1919), will gradually multiply, and finally sufficient funds will be raised by imposition through *Central legislation* of import in order to make the *whole organisation self-supporting*. More information in this connection has already appeared in the publications of the School of Chemical Technology, Calcutta, as also in the issues of the "Indian and Eastern Chemist" for January, May and October 1938, respectively, and for January 1939, to which I beg to invite a reference.

6. My further suggestions for the self-required and for economising expenditure were editorially published in the "*Indian and Eastern Chemist*" for November 1938 and it is earnestly hoped that members of the Central Legislature, who devote much of their time sometimes to less important measures, will, in the circumstances explained, take such interest in the long overdue *Drug and Pharmacy Bill* as will render it impossible for the measure to hang fire any longer. The Government of Bengal may perhaps consider it their worth while to submit a strong telegraphic representation to the Government of India (Department of Education, Health and Lands), inasmuch as the Bill affects the health of millions of people and refers to an educational programme designed for public service, welfare and public utility, both economic and social.

Appendix D.

Draft of a Bill.

To regulate the education, examination and registration of pharmacists, to regulate the registration and licensing of all premises where pharmaceutical business of any description is carried on, and to regulate the use of titles, emblems or devices only by people duly qualified in pharmacy.

1. **Objects.**—Whereas it is expedient—

- (1) to ensure that all persons exercising the calling and business of pharmacist shall possess a competent knowledge of their art;
- (2) to prohibit the dispensing of medicines and biological products at hospitals and dispensaries (public and private) except by registered medical practitioners or pharmacists;

- (3) to prohibit the sale (wholesale and retail) of drugs and/or chemicals or biological products used for medicinal purposes except by qualified pharmacists and compounders and by licensing, registration and inspection to exercise a control of all chemists and manufacturing business places where their sale or manufacture (wholesale or retail) is carried on;

is hereby enacted as follows:—

2. Short title, extent and commencement.—(1) This Act may be called the “Pharmacy Act”.

(2) It shall extend to the whole of the province of Bengal.

(3) It shall come into force on such date as the local Government may by notification in the Government Gazette direct.

(4) “Registered Pharmacist” means a pharmacist registered under this Act.

(5) “Council” means the “Pharmaceutical Council” constituted under Section 4 of this Act.

(6) “Rule” means a rule made by local Government.

(7) “Registered Medical Practitioner” means a person registered under the Medical Act of this Province.

(8) “Bye-law” means a bye-law made by the Council.

(9) “Local Authority” in the case of a municipality means the Municipal Board, and in the case of any other local area, the District or the Subdivisional Magistrate.

3 Pharmaceutical Council.—(1) A Council, herein referred to as the “Pharmaceutical Council”, shall be established for this Province.

(2) The Pharmaceutical Council shall consist of fifteen members who shall be appointed in the following manner:—

- (i) A President nominated by the local Government (Ministry of Local Self-Government).
- (ii) Two members nominated by the College of Pharmacy to be established.
- (iii) Two members nominated by the Pharmacy Faculty (to be set up) of the Calcutta University.
- (iv) One member either nominated by or elected from amongst the members of the Bengal Medical Council.
- (v) Two members representing the Medical Colleges of Bengal.
- (vi) Three members registered under this Act elected by registered pharmacists and pharmaceutical chemists.
- (vii) Three members registered under this Act, elected by such bodies as the Chemical Manufacturers’ Association, the Chambers of Commerce, etc., representing the pharmaceutical trade and industry of the province.
- (viii) One member with legal experience nominated by Local Government.

(3) Elections of members shall be held at such time and place and in such manner as the Pharmaceutical Council shall direct by rules or regulations made from time to time in this behalf.

4. Tenure of Office.—(1) The members of the Pharmaceutical Council shall hold office for a term of three years and shall be eligible for reappointment.

(2) Any member may at any time resign his appointment by letter addressed to the President of the Pharmaceutical Council.

(3) Upon the death or resignation of any member of the Pharmaceutical Council, some other persons shall be appointed a member of the Pharmaceutical Council in his place by nomination or election, as the case may be, in accordance with the provisions of sub-section (2) of section 3, and such person shall hold office for the remainder of the period for which the member in whose place he is appointed was nominated or elected.

(4) (a) Leave of absence from India may be granted by the Pharmaceutical Council to any member thereof for a period not exceeding six months.

(b) If any member of the Pharmaceutical Council leaves India without the leave of the Pharmaceutical Council, or does not return to India within the period of leave granted, the Pharmaceutical Council may forthwith declare his seat vacant and such declaration, shall have the same effect as resignation of his seat by the member concerned.

(c) In any case not provided for in clauses (a) and (b) if any member of the Pharmaceutical Council shall absent himself from three consecutive meetings of the Pharmaceutical Council, the Pharmaceutical Council may forthwith declare his seat vacant and such declaration shall have the same effect as resignation of his seat by the member concerned.

5. Time and place of meeting of Council.—The Pharmaceutical Council shall make such rules and regulations as may be necessary with respect to the time and place of meetings of the Pharmaceutical Council, and the mode of summoning the same. In the absence of any rule or regulation as to the summoning of a meeting of the Pharmaceutical Council, it shall be lawful for the President to summon a meeting at such time and place as to him shall seem expedient by letter addressed to each member, and at every meeting, in the absence of the President, some other member, to be chosen from the members present, shall act as President, and all acts of the Pharmaceutical Council shall be decided by the votes of the majority of the members present at any meeting, the whole number present not being less than eight, and at all such meetings the President for the time being shall, in addition to his vote as a member of the Pharmaceutical Council, have a casting vote in case of any equality of votes.

6. Registrar and Officers.—(1) The Pharmaceutical Council, shall appoint a Registrar, and may from time to time grant leave to the Registrar and appoint a person to act in his place. Any order of the Pharmaceutical Council appointing, granting leave to or dismissing a Registrar or appointing a person to act as Registrar shall be subject to the previous approval of the Local Government. The Registrar shall be paid by the Pharmaceutical Council such salary and allowances as

they may from time to time determine. Any person duly appointed to act as Registrar shall be deemed to be Registrar for all the purposes of this Act.

(2) The Pharmaceutical Council, with the previous approval of local Government, may appoint such other officers, inspectors, supervisors, or clerks as may be necessary for the purposes of this Act.

(3) The Registrar and any other officer or clerk appointed under the section shall be deemed to be a public servant within the meaning of section 21 of the Indian Penal Code.

7. **Registers.**—The Registrar shall keep a register of pharmacists and pharmaceutical chemists in accordance with the provisions of this Act. The Register shall be kept in such form as the local Government from time to time direct. The name, residence and qualifications of every person who is registered under this Act shall be entered in the register with the date on which each qualification is granted. It shall be the duty of the Registrar under the orders of the Pharmaceutical Council to keep the register correct and from time to time enter any necessary alterations in the addresses of persons registered, and to enter any additional qualifications which any registered person may have obtained subsequent to his registration, and to erase the names of all registered persons who have died. To enable the Registrar duly to fulfil the duties imposed upon him it shall be lawful for him to write a letter to any registered person according to his address on the register to enquire whether he has ceased to practise or has changed his residence, and if no answer is returned to such letter within a period of six months from the sending of the letter, it shall be lawful to erase the name of such person from the register; provided that the same may be restored by direction of the Pharmaceutical Council if they think fit to make an order to that effect.

8. **Persons entitled to be registered.**—Persons of not less than 17 years of age who have undergone such course of training and have passed such examinations or who fulfil such other conditions as may be prescribed and who are of good character shall on payment of the prescribed fee and on making application in the prescribed form be entitled to registration:

Provided that—

(a) a compounder who at the time this Act comes into force is not less than 20 years of age and is practising his art at a Government, Municipal, Local Board or private-aided hospital or dispensary, or at a shop, business or dispensary, controlled by a qualified pharmacist or medical practitioner or produces satisfactory evidence of having received training in such an institution for three years prior to this Act coming into force shall on making application within two years of the Act coming into force in the prescribed form and submitting a certificate of competency from his employer be entitled to registration as a pharmacist;

(b) Any person who can prove that the practice of pharmacy in any of its branches has been their sole or main source of livelihood for 5 years prior to the imposition of restriction shall, on satisfying a tribunal that their standard of knowledge is such that they can carry on their work without danger to the public, be eligible for registration;

(c) Qualified pharmacists with foreign pharmaceutical qualifications, and holders of pharmacy degrees from Indian Universities shall be entitled on production of their registration certificate to be registered under this Act as pharmacists;

(d) Any person holding a diploma entitling him to practice pharmacy in another country shall on the production of his certificates be eligible, at the discretion of the Council, for registration;

(e) Any registered medical practitioner wishing to own and run a drug establishment may on production of his medical Registration Certificate be entitled to be registered with the Pharmaceutical Council. He will be compelled to employ qualified pharmacists in all public pharmacies. He can, however, dispense his own prescriptions if he wishes to do so.

(f) The Pharmaceutical Council may refuse to permit the registration of any person who has been convicted of a cognizable offence as defined in the Code of Criminal Procedure, 1898, or who being or having been subject to military law, has been convicted under the Army Act or under the India Army Act, 1911, of an offence which is also a cognizable offence as so defined.

9. Appeals and erasures of incorrect entries.—(1) Any appeal against the decision of the Registrar respecting a first registration or any subsequent alteration shall be heard and determined by the Pharmaceutical Council under regulations which shall be made by the Pharmaceutical Council in this behalf.

(2) Any entry in the register which shall be proved to the satisfaction of the Pharmaceutical Council to have been fraudulently or incorrectly made may be erased from the register under the orders of the Pharmaceutical Council.

10. Removal from the Register.—(1) If a registered pharmacist or a person employed by him in the carrying on of his business has been convicted of any such criminal offence, or been guilty of such misconduct as, in the opinion of the Pharmaceutical Council renders him, or in the case of an employee, would if he were a registered pharmacist or compounder render him, unfit to be on the register, the "Council", after making enquiry into the case may, subject to the provisions of this Act, direct the Registrar to remove the name of the pharmacist or compounder from the register.

(2) If the Pharmaceutical Council thinks fit in any case so to do, it may, either of its own action or on the application of the persons concerned, direct the Registrar to restore to the register, either without fees or on payment of such fee, not exceeding the fee payable on registration as a pharmacist, as may be prescribed by bye-laws, any name or entry which has been removed from the register.

11. Duties and Powers.—The Council may make bye-laws not inconsistent with this Act or the rules—

(1) for regulating the compilation, maintenance and publication of the register and the conditions of admission to the register;

(2) for regulating the conduct of any examination which may be prescribed as a condition for admission to the register and any matters ancillary or connected with such examination including the courses of training which the candidates for the examination shall undergo;

(3) for the approval of any institution for the purposes of such training and the granting of diplomas to candidates passing the examination;

(4) for appointing a Registrar and such other servants as may be necessary;

(5) for regulating and supervising the practice of their profession and for any other disciplinary action against members of the profession as may be called for through a "Disciplinary Board" consisting of 5 members (including the chairman), 4 of which must be chosen from the members of the Council.

(6) for regulating the publication of the names of register pharmacists and pharmaceutical chemists and their residences;

(7) for regulating the conditions under which such pharmacists and pharmaceutical chemists in other provinces or other countries may be admitted to the "Register";

(8) for regulating the summoning of meetings of the Council and its proceedings;

(9) for determining the manner in which all fees levied under this Act and all moneys received by the Council shall be accounted for, audited and applied for the purposes of this Act and for regulating the expenditure of the Council generally;

(10) for prescribing the travelling and other expenses payable to the members of the Council or of the committees;

(11) generally for the provision of any matters in respect of which the Council considers provision should be made for the purposes of this Act. No bye-law made by the Council shall come into force until it has been confirmed by the Local Government with or without modifications or amendment.

All bye-laws made under this section shall be published in the Government Gazette.

12. The College of Pharmacy to be established shall be competent to train pharmacists and to send them for examination for the qualifying certificates of the Council.

(2) The Council may grant recognition to any such institution established hereafter, after due inspection by representatives of the Council.

13. **Licensing of business and manufacturing premises.**—(1) Every shop or business open for the retailing, compounding and dispensing of drugs, pharmaceutical preparations and/or biological products shall be licensed under local authority concerned. It shall be a condition of licensing that such a shop or business establishment shall be under the control of a registered pharmacist or pharmaceutical chemist as follows:—

(a) a person registered under this Act as a pharmacist or pharmaceutical chemist;

- (b) a corporate body of pharmacist or partnership if they have a pharmacist or compounder registered under this Act as a Superintendent of the Company and, if the Superintendent is not personally present, the business is conducted under the supervision of a manager or assistant who is a registered pharmacist;
- (c) the person in charge is a duly qualified medical practitioner subject to the provision in clause (e), section 8;
- (d) the executor, administrator or assistant of an establishment of a deceased pharmacist if and so long as the business is conducted by a duly qualified assistant.

(2) Every establishment where the process of manufacturing pharmaceuticals and/or biologicals is carried out must be separately licensed for that purpose and must be under the direct supervision of a duly registered pharmacist or a doctor-pharmacist who cannot act in the same capacity for any other individual or concern.

(3) Ordinarily an annual licence or registration fee shall be recoverable by the local authority who shall credit a proportion of not less than $\frac{1}{3}$ to Government for the maintenance of the Pharmaceutical Council.

14. Conditions to be fulfilled by Pharmacists keeping open shop.—Every pharmacist or pharmaceutical chemist who keeps an open shop for the sale and dispensing of drugs shall exhibit in English and local vernacular a notice stating his name and qualifications. He shall maintain a register of such drugs specified as “dangerous” which shall be subjected to inspection at any time by a duly authorised person. Also a register of drugs coming under the “Poisons Act” shall be maintained in which all transactions concerning the use or sale of such drugs shall be recorded.

15. Hospitals and Dispensaries.—Dispensaries and other medical institutions, Government, Municipal, Local Board, Private-aided, shall be in charge of a qualified pharmacist or pharmaceutical chemist.

16. Penalty for dishonest use of certificate.—Any person who—

- (1) dishonestly makes use of any certificate of registration issued under the provisions of this Act to him or to any other persons;
- (2) procures or attempts to procure registration under the provisions of this Act by making or producing or causing to be made or produced any false or fraudulent declaration, certificate or representation whether in writing or otherwise; or
- (3) wilfully makes or causes to be made any matter relating to the register or certificate issued under the provisions of this Act shall be punishable with fine not exceeding two hundred and fifty rupees.

17. Penalty for unlawful assumption of titles.—(1) Any person who not being a registered pharmacist or pharmaceutical chemist takes or uses the name or title of a registered pharmacist or pharmaceutical chemist or uses any name, title, description, prescribed uniform, object or sign board with the intention that it may be believed or with the knowledge that it is likely to be believed that such person is a registered pharmacist or pharmaceutical chemist be punishable with fine not exceeding one hundred rupees.

(2) No person who is not a registered pharmacist or a pharmaceutical chemist should be allowed directly or indirectly—

- (a) to use the name or title of “Registered Chemist” “Pharmacist”, “Pharmaceutical Chemist”, “Chemist”, “Dispensing Chemist”, “Chemist or Druggist” or
- (b) to use or exhibit any name, title or sign holding out or implying that he is a registered pharmacist, or pharmaceutical chemist;
- (c) no person who is not a graduate in pharmacy of an Indian or foreign University shall be allowed to use the title of “Pharmaceutical Chemist”. The “Pharmaceutical Chemists” shall be allowed to use the title of “Pharmacist” if they so desire.