of the sixty subjects are divided into different sections, corresponding to the separate branches of the same trade, or to the practice of the trade in separate localities.

In the new Programme we notice many important additions. A practical test, which is the surest preventive of cram, and excludes those who are not engaged in the trade from presenting themselves for examination, has been added to the syllabus of nearly all the subjects. Thus, next year, for the first time, there will be practical examinations in such widely different subjects as photography and boot and shoe manufacture. In many subjects dealing largely with the practical applications of science the syllabus has been entirely re-written. This is the case with "Electrical Engineering," which is now divided into two main subjects—"Telegraphy" and "The Transmission of Power"—the former being again subdivided, in the honours grade, into "Telegraphy" and "Telephony," and the latter into "Electrical Instruments," "Electric Lighting," and "Dynamos, Motors, &c." The subject of "Mechanical Engineering" is similarly divided into different sections. The Programme has been increased by the addition of a syllabus of instruction in "Goldsmiths' Work," in which subject a large class has been already established in Birmingham, and of a syllabus in "Ship Carpentry and Joinery," which is intended to meet the requirements of artisans engaged in the different shipbuilding yards throughout the country.

The continuous increase in the number of candidates for these examinations, and in the number of students receiving instruction in the different centres throughout the country, shows that there is a genuine demand among artisans for practical and concrete instruction dealing, in the first place, with the facts with which they are familiar in their every-day work, and, afterwards, with the scientific principles explanatory of those facts. From the table found on p. 17 of the Programme, it appears that this year 7322 candidates presented themselves, as against 6667 in the previous year, and that the number of students under instruction increased from 12,022 to 13,202.

The memorandum issued to County Councils, to which we have already referred in these columns, is re-published in the Programme. It draws the attention of County and Borough Councils to the fact that, after the examination in May 1892, the grants hitherto paid on the results of the examination will be withdrawn, and that a substantial portion of the funds thus set free will be devoted to the improvement of the machinery of the examinations. Indications of the direction in which these improvements will be made will be found in the new Programme. It is important that the managers of technical classes should fully understand that, in future, the maintenance of such classes will depend entirely on local support. The large sums placed at the disposal of County Councils clearly render it no longer necessary that the City Guilds Institute should continue to make grants on results, which, although amounting in the aggregate to a large sum of money, proved to be quite inadequate to properly support the classes. It is, however, to be feared that the grant-earning tendency of the teachers and managers of local schools may cause the distinctly technological subjects of instruction to be neglected for the sake of science subjects by which grants may still be obtained from South Kensington. To prevent this, it is necessary that County Councils should realize the full importance of the work which Parliament has thrown upon them, and should recognize that in future they will be the authorities responsible for the conduct of the technical and, indeed, the secondary education also of the county. In the competition for money grants, technical subjects will be placed at a distinct disadvantage as compared with ordinary science subjects, and it is the more necessary, therefore, that the teaching of these subjects should receive adequate support from local authorities.

In order that the teaching in different localities may be duly adapted to the trades practised in those localities, and may be regulated by these requirements, and not by the grant-earning capacity of the subjects of instruction, it is very desirable that County Councils should organize, independently, or in connection with the City Guilds Institute, a system of inspection of local classes. The value of examinations is immeasurably increased when they are supplemented by inspection by competent experts, and it is to be hoped that some system of inspection of technical schools, which shall include the methods of instruction adopted, will soon be organized.

The Institute's Programme offers to different localities a wide choice of trade subjects, ranging from simple handicrafts to industries involving some of the most difficult applications of physical and chemical science. To the syllabus of each subject is added a valuable list of works of reference, which forms by itself a very complete guide to books in technology. The list of examiners, many of whom have this year been newly appointed, includes well-known experts in each branch of trade, and is a guarantee of the efficiency of the examinations. The future development of technical education is now very largely under the control of County Councils. They possess the funds without which no real progress can be made. But, besides funds, experience and organization are needed, and there can be no doubt that the members of County and Borough Councils will derive much valuable information, and many serviceable suggestions, from the new edition of the City Guilds Institute's Programme of Technological Examinations.

BOTANICAL SURVEY OF INDIA.

THE organization of a Botanical Survey of India, which has been under consideration since 1885, has been finally settled by the following resolution of the Government of India, dated Calcutta, February 26, 1891:—

(1) The scheme for carrying out the botanical survey of India, which has been under consideration for some time, was finally completed a year ago, and His Excellency the Governor-General in Council considers that it is now desirable to publish the details for the general information of local Governments and Administrations.

(2) In February 1885, Mr. Thiselton Dyer, Director of the Royal Gardens at Kew, prepared for the Government of Madras a Memorandum on the constitution of a Botanical Department for the Madras Presidency, one result of which was the eventual establishment of a Botanical Department for that Presidency. In sanctioning the Madras Department, the Secretary of State for India took the opportunity to suggest for the consideration of the Government of India whether, without interfering with the control exercised by the Provincial Governments, it would not be possible to bring into communication the various Botanical Departments of the different Provinces, the desirability of such an association having been prominently noticed by Mr. Thiselton Dyer in his Memorandum of February 1885. The wider scheme thus suggested by the Secretary of State was accordingly considered; and the first step taken for the organization of a Botanical Survey for all India, which was to have its centre in the Royal Botanical Gardens at Seebpur, Calcutta, was the transfer from the control of the Government of the North-Western Provinces and Oudh, to that of the Government of India, of the Superintendent of the Botanical Gardens at Saharanpur. This measure was demanded by the need for botanical survey in the Punjab, Rajputana, Central India, and the Central Provinces, which had hitherto been unrepresented by any

botanical officer, as well as by the necessity for having a botanical officer at the disposal of the Government of India to accompany military expeditions beyond the frontier.

Arrangements were then made, with the concurrence of the local Governments concerned, under which the following territorial division of India was prescribed for the purposes of botanical survey :—

Under the Superintendent, Royal Botanical Gardens, Calcutta.—The Provinces of Bengal, Assam, and Burma, the Andamans and Nicobars, North-East Frontier Expeditions.

Under the Government Botanist, Madras.—The Presidency of Madras, the State of Hyderabad, the State of Mysore.

Under the Principal, College of Science, Poona.—The Presidency of Bombay, including Sind.

Under the Director, Botanical Department, Northern India.—The North-Western Provinces and Oudh, the Punjab, the Central Provinces, Central India, Rajputana, North-West Frontier Expeditions.

The distribution above stated was reported to Her Majesty's Secretary of State, and his Lordship has been pleased to express his satisfaction with these arrangements.

(3) The Government of India now desire to communicate the following observations as to the central position which, in conformity with the suggestions of the Director of the Royal Botanical Gardens at Kew, the officer at Seebpur will occupy in the scheme for the botanical survey of India, and as to the sphere and nature of duties of each botanical officer, so far as they are connected with botanical survey.

It is desirable that the Seebpur Institution—which, as remarked by Mr. Thiselton Dyer, "though technically Provincial, must, at any rate in external estimation, from its age (it has passed its centenary), from its scientific traditions, and from the splendour of its maintenance, rank as Imperial"—should, without any interference with the Provincial control over the Royal Botanical Gardens, be officially recognized as the acknowledged centre of the Botanical Survey of India, and that to it should be referred the solution of all problems rising out of the practical or scientific study of Indian botany. In view of the important position which the Superintendent of the Royal Botanical Gardens, Calcutta, will thus occupy as the central authority in the Botanical Survey of India, the Government of India have, with the concurrence of the Secretary of State, added to Dr. King's present designation the official title of "Director of the Botanical Survey of India," and it is requested that in all correspondence dealing with subjects relating to general botanical exploration the latter title should be employed. The more effective botanical survey of Burma and Assam has also been intrusted to the Director, who will arrange a definite programme each year for the purpose in communication with the Chief Commissioners of those Provinces. He will also submit a separate Annual Report on the botanical exploration and researches effected during the year. The Government of India record with satisfaction that the local Administrations of Burma and Assam have each contributed an annual grant from Provincial revenues as an addition to the Imperial grant for the botanical survey of their provinces.

The investigation of the flora of the Madras Presidency and of the Hyderabad and Mysore States has been intrusted to Mr. M. A. Lawson, the Government Botanist and Director of Cinchona Plantations, who has expressed his opinion that the whole survey of the territories in question might, if diligently prosecuted, be completed in three or four years.

In Bombay, a scheme involving an annual expenditure of Rs. 4500 per annum on botanical work has been sanctioned, and Dr. Cooke, Principal of the College of Science, Poona, is officially recognized as in charge of botanical research in that Presidency. A herbarium exists at the College of Science, and a botanical collection is in course of formation at the Victoria Gardens, Bombay. The former place is to be the head-quarters of botanical research and collections, and the existing herbarium there is to be developed.

By the transfer of the services of the Superintendent of the Government Botanical Gardens, Saharanpur—who now bears the designation of Director of the Botanical Department, Northern India—the services of this officer are, as already explained, available for scientific investigation in all Provinces and States in Northern and Central India, as well as on expeditions beyond the north-west frontier. Mr. Duthie, the officer now holding the appointment, was thus in 1888, by his deputation to accompany the Black Mountain Expedition, enabled to acquire information concerning the flora of a country which had not hitherto been botanically explored. During the last three years, Mr. Duthie has also been deputed to Simla in the hot weather to assist in the preparation of the "Dictionary of the Economic Products of India," and during the same period he has been engaged in the botanical exploration of Rajputana and of the Central Provinces.

M. FAYE'S THEORY OF CYCLONES.

IN his admirable work on "The Principles of Science," the late Prof. Jevons thus sums up the characteristic mental attributes of the great scientific discoverer :—

"He must be fertile in theories and hypotheses, and yet full of facts and precise results of experience. He must entertain the feeblest analogies and the merest guesses at truth, and yet he must hold them as worthless till they are verified in experiment. Where there are any grounds of probability, he must hold tenaciously to an old opinion, and yet he must be prepared at any moment to relinquish it when a single clearly contradictory fact is encountered."

In his theory of cyclones, M. Faye has abundantly proved himself to possess those attributes that are defined in the first phrase of each of these sentences, and particularly the final one. Whether, however, in his treatment of this subject, the manifestation of the remaining and qualifying attributes is equally recognizable ; whether he has fairly grasped and duly weighed all the established facts that are relevant and even essential to his hypothesis ; and whether, among those that he has overlooked, there are not some that are "clearly contradictory" to the requirements of his theory, and therefore fatal to it—these are the questions that I propose to inquire into in the present article.

A true theory of cyclonic storms has not merely a scientific interest, it has also practical bearings of very high importance. When a ship is involved in the outer circle of a tropical cyclone, the vital problem which the seaman has to solve is, how to escape the fearful squalls of the inner vortex and the tremendous cross-seas of the central calm. In order to do this he must be able to judge of the bearing of the storm-centre from the actual position of his ship, and, to determine this point with even approximate accuracy, his sole guide is the direction of the wind. It may well be, then, that the safety of his ship, his own life and those of his fellow-seamen, are involved in the right answering of this question, "Does the storm-centre bear at right angles to the local direction of the wind, or is it from two to four points in advance of this position?" M. Faye's theory assumes and inculcates the former ; the latter is consistent only with the hypothesis of an indraught from all sides, and an ascending current over the storm, the existence of which M. Faye persistently denies.

M. Faye's views on the nature of cyclonic storms are