

infectivity for a period of at least two years after the native population has been removed." Whether this very discouraging result is to be explained by longevity of the flies, by hereditary transmission of the trypanosomes in the flies, by the existence of "reservoir" hosts, or by leakage and transgression of official orders, cannot be decided positively at present. Time alone can show if the measures adopted will be efficacious in stamping out the disease and the result will be awaited anxiously by all who have the interests of our African colonies at heart.

E. A. M.

DEVELOPMENT OF UNIVERSITY (AND OTHER) EDUCATION IN INDIA.

THE recent publication of the "Fifth Quinquennial Review of the Progress of Education in India, 1902-7," by Mr. H. W. Orange, C.I.E.,¹ Director General of Education in India, indicates clearly that very considerable and satisfactory progress is being made in India in all branches of education, and that the university standards in particular are being raised and made more real and effective. The review deals with the period 1902-7, and it is probable that during no previous five years has there ever been such rapid and sound progress.

The best indication of the increased amount of attention which education is securing will be found in the expenditure, which is mainly met from public funds. Thus in 1902 the total expenditure on education in India was 401 lakhs of rupees, while in 1907 it had advanced to 559 lakhs, or an increase of nearly 40 per cent. This increased expenditure has been accompanied by a very large increase in the number of pupils in all stages and branches of education. Thus there were nearly 1200 more pupils studying university courses, nearly 77,000 more secondary school pupils, and about 860,000 more primary school pupils under instruction in the year 1907 than there were five years previously. In certain cases much more progress was made in the five years, 1902-7, than had been made in the previous fifteen years. This is specially the case in the matter of training of teachers, in female education, in the special education of Mohammedans, and in the primary standards for boys generally, of whom, of course, the great majority are Hindus. These are all very healthy signs, and perhaps the first and second named may be considered as of almost vital importance to the satisfactory progress of Indian education and of India as a nation.

These great improvements have been mainly brought about by the fact that, under Lord Curzon's government as Viceroy, a general inquiry was held which extended to all kinds and grades of educational institutions, from the universities to the primary schools. This inquiry brought under examination the methods, organisation, tendencies, and results of Indian education as a whole, and resulted in the meeting of various committees, conferences, and commissions. As the result of these, certain general lines of policy were laid down by the Imperial Government, and these have since been continuously applied by the various local governments and authorities in meeting the local educational needs of the various provinces.

In the case of university education in India, a good deal of leeway had and still has to be made up. In many cases standards of teaching had become antiquated, and were also unsuitable. In previous years a great many art colleges had been started by persons wishing to help forward the great cause of

education, and these had been affiliated to the various universities. Many of these were known to be insufficiently staffed and very imperfectly equipped generally, the main cause for such conditions being the exceedingly slender financial resources of these institutions. This has been due to their having no endowments and to the exceedingly small fees charged to the students, an annual fee of two to three pounds being commonly paid by a student for education up to B.A. and M.A. standards. Added to this, many colleges were endeavouring to teach a great variety of subjects instead of confining their attention to one or more simple courses, which could have been efficiently carried through with the means at their disposal. As a result of these conditions, a considerable proportion of the students sent up for examination had only received an imperfect training, and this state of affairs having gone on for a considerable period, it had almost insensibly reacted on the standards of the examinations themselves, which had become much lower than was desirable.

To remedy this state of affairs, after certain preliminary inquiries a University Commission was appointed which exhaustively examined into university education in all parts of India, and this reported in June, 1902. As a result a new Act was passed early in 1904 which reconstituted the five existing universities. Under the previous Acts of Incorporation the work of the universities was confined practically solely to the examination of students, while the new Act declared that the universities were "incorporated for the purpose (among others) of making provision for the instruction of students, with power to appoint university professors and lecturers, to hold and manage educational endowments, to erect, equip, and maintain university laboratories and museums, to make regulations relating to the maintenance and conduct of students, and to do all acts which . . . lead to the promotion of study and research."

This contrast shows the different aspect in which Indian universities are now being regarded, and these provisions will probably gradually exercise a powerful influence, though from their nature their effect can only come slowly, but even now, in certain branches of study, university courses of lectures are being delivered.

Certain other provisions also appear in the new Act which even in the short time which has elapsed since it was passed are having important and far-reaching effects.

The senates were reconstituted, and steps were taken to make them more representative of those actually engaged in teaching in the affiliated colleges than had hitherto been the case, and appointments to the Senate were limited to five years instead of for life. These new senates are now working much more efficiently than was formerly the case. Under the Act also, new sets of regulations had to be prepared for all branches of study, and the Government of India was given the power, after consulting the Senate, to make such additions and alterations as might be considered necessary. Speaking generally of the new regulations, they are a very great improvement on the old ones, for they require a much higher standard of study, and also that such study shall be practical rather than of a theoretical nature. Indeed, in all the science subjects practical work is made an essential part of the course of study, whereas formerly theoretical book-work frequently sufficed to carry a student successfully through some of the science examinations.

Perhaps, however, the clauses of the Act which are having the most immediate and tangible effect are those dealing with the affiliation of colleges to the

¹ Published in Calcutta by the Superintendent of Government Printing in India, 1909.

various universities. Formerly, if a college was once affiliated, the university had practically no control of any kind over it, and though it might be known that a college was doing very inferior work, no effective remedial action could be taken. Under the new Act the connection between the college and university is much closer and more effective than it has hitherto been. The conditions which a college must fulfil in order to receive and retain the privileges of affiliation are prescribed in some detail in the Act, and in order that the university may be satisfied as to the fulfilment of these conditions, systematic and periodic inspection of colleges by university inspectors is established, and this is coupled with the power of calling upon a college so visited to amend within a specified period any points over the wide range of requirements laid down by the Act. These inspections took place almost immediately after the passing of the University Act, and it is not too much to say that the condition of affairs disclosed showed abundantly the absolute necessity of the action taken to secure the passing of the new Act. Some colleges, indeed, have already had, or will have, to disappear if they do not rise to the required standard within a reasonable time. In other colleges where defects were found, due mainly, perhaps, to want of funds, arrangements are being made to remedy them, and these efforts are being supplemented by annual grants of money made by Government, which grants are administered by the universities.

Another direction in which radical changes are taking place under the new Act and its consequent regulations is in the matter of the residence of students. Formerly, in many cases, these conditions were deplorable, but gradually a much better state of things is being evolved, and here again the change is largely due to improvements made with money given for building hostels, &c., by Government and by other donors.

That educational activity is increasing is also shown by the fact that at Allahabad in January of this year, the foundation stone of some important new university buildings was laid by Sir John Hewett, the Lieut.-Governor of the United Provinces, who is also Chancellor of the Allahabad University, and by a demand which is now coming from Burma for a new university to be established there, in addition to the existing universities at Calcutta, Bombay, Madras, Allahabad, and the Punjab. As time goes on, indeed, there will probably be room, not only for the Burma University, but for others at such places as Nagpore, in the Central Provinces, and perhaps at Aligarh, which is now the centre of a large and exceedingly well-managed Mohammedan college.

Such are the main lines on which the improvements in university education in India are being conducted, but the effect of the new University Act does not end here, and it has also had an important bearing on the schools for secondary education. In most Indian universities, students usually can only go up for the matriculation examination if they have studied at a high school recognised by the university. The standard set by the university matriculation, therefore, largely influences the secondary schools. Formerly these standards were low, and in many ways unsatisfactory, while the schools which had been "recognised" were many of them most inferior in every way, specially in teaching and discipline, and they could not possibly impart sound education or develop character. Now the standards for the matriculation examination have been revised and generally raised, while also the conditions under which the secondary schools receive recognition have been formulated under the various university regulations, and unless

a school is shown by inspection to be satisfactory in respect of constitution, management, and financial stability, premises and equipment, staff, instruction, and discipline, it cannot be recognised by the university, and hence cannot send up its pupils for examination. Inspection, therefore, has to be made of schools as well as of colleges, and this is rapidly raising the tone of the education given.

Hence the new University Act of 1904 is having a very marked and beneficial effect on all forms of college and high-school education, and India appears to be entering on a more prosperous era in the matter of higher education in all its branches than has hitherto been possible.

THE NUTRITIVE VALUE OF BLACK BREAD.

DURING the last General Election much was heard about the hard lot of the German workmen and peasants who are compelled to eat black bread, and much political capital was made of it. It may therefore be interesting to inquire how much of a hardship this is from the point of view of nutritiveness and also of tastiness. The so-called black bread is made of rye, and has the property of keeping moist for a much longer time than wheaten bread, although if kept too long it is apt to turn sour. It is quite a mistake to suppose that it is nasty; in New York, where wheaten bread is the staple article of diet, the German bakeries almost always also sell black bread, even in the best quarters of the town, and it is said that black bread is always to be found on the Emperor's table. So those who habitually buy white bread by no means entirely discard the use of black bread, though it does not appear to have found very much favour except with those of German extraction.

From the various analyses which have been published, the amount of nitrogenous material contained in the different cereals does not differ greatly nor constantly; but wheat has its nitrogenous matter partly in the form of gluten, a sticky material almost wanting in the other cereals. So far, then, as nitrogenous constituents are concerned, everything turns upon whether gluten is more nutritious than the other nitrogenous bodies. There is no reason to suppose that it is, but its adhesive properties are valuable in causing the dough, when permeated by carbonic acid gas, as a result of fermentation, to rise into a more porous, spongy mass. The nitrogenous material contained in the flour of all cereals when it is made into dough commences to decompose, and in this state acts as a ferment, breaking up a portion of the starch into dextrin and glucose, whilst some part of the starch undergoes a further fermentation into alcohol and carbonic acid gas. In this state the dough is called "leaven," and small portions of it are capable of setting up the same action in much larger masses of dough.

This is the old way of preparing bread, and is still employed in the making of black bread; in the making of finer breads it is not wholly discarded, although yeast is used for the initiation of the process. If this change goes far the bread loses in whiteness, and the addition of alum as an adulterant is made with the view of checking the fermentation. It is not generally known that the comparatively dark colour of whole-meal bread is not due to the particles of bran which it contains, but to the fermentative changes having gone further. This is due to the husk containing another nitrogenous body, which also acts as an active ferment. In fact, in white bread a large proportion of the starch remains unchanged.

But whole-meal bread is well known to have a