which the article relates. The cost of the three sets of catalogues in the latter and more useful form is about 12*l*. The sets now issued bring the indexing down to 1903, but the work will be continued, and supplementary sets will be printed from time to time. Students who do not desire references to all branches of agricultural science may obtain sets of cards dealing with special subjects, such as soils, plant diseases, or forestry. Particulars of the eighteen subject-groups under which the cards are classified are given in *Bulletin* No. 9, issued by the Catalogue Division of the Library of Congress, Washington, D.C.

In the fourth report on the Woburn fruit farm, the Duke of Bedford and Mr. Spencer Pickering, F.R.S., discuss the results of several years' experiments in the manuring of fruit crops. In an introduction the soil of the fruit station is described, and chemical and mechanical analyses are given; the report then describes experiments on strawberries, gooseberries, currants, raspberries, and apples. For various reasons the experiments on currants and raspberries were unsatisfactory, but trustworthy data were obtained in the work on the other crops. It was found that 12 tons of farmyard manure per acre increased the strawberry crop by 12 per cent. to 15 per cent., and that the size and quality of the fruit were greatly improved. A mixed artificial manure supplying about the same quantities of nitrogen, phosphoric acid, potash and magnesia as the dung similarly increased the yield, but did not improve the quality. Farmyard manure much increased the gooseberry crop, but the artificial mixture failed to do so, and it is explained that the increase in the former case was probably due to the greater quantity of moisture retained by the dunged soil. Nitrate of soda applied in summer was found to benefit apples in certain seasons, but with this exception no kind of manure had any marked effect on the apple crop.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

BIRMINGHAM.—Mr. Chamberlain, the Chancellor of the University, presided at the annual meeting of the Court of Governors held on February 6. Speaking after the adoption of the annual report, Mr. Chamberlain said that when the governors of Mason College met some five or six years ago and came to the decision that the time had come to give Birmingham its own university, it was thought that the least sum of money which would justify them in applying for a charter was 100,000*l*. But very shortly afterwards they found that there was a great opportunity, not only for themselves, but for other great provincial cities, to create a series of universities which in the first place would bring home to all the population the advantages of the highest education, and in the second place, would specialise this highest education with some more definite idea of its application to science than hitherto had been found to be possible. The moment they decided on a departure of that kind they found that it meant something quite different from what they had previously supposed. New buildings had to be specially devised, a very large and expensive equipment had to be provided, and new chairs had to be created; altogether a completely new ideal had to be developed. And then they put their demand—a demand which, indeed, they did not strictly limit themselves to, but they thought it would probably be sufficient for the present generation—they put their demand at the expenditure of one million of money. They had received at once nearly half that sum, largely from Birmingham. And he might say in passing that the liberality of the local contribution was a ground for the claim which they made for some further State support. "It is something," he said, "that we have found that the Government are becoming alive to our needs and to our deserts, and that they have been able to double the sum previously given for the university education. But we may bear in mind at the same time that the present Chancellor of the Exchequer has promised to double it again in his next Budget, and, therefore, I anticipate that from that source we shall receive a very considerable addition. I do not at all accept it as in any way a satisfaction of our demands, because it is my conviction that public opinion will soon insist upon larger sums being devoted to this purpose. When I think that we are spending 13 millions a year at least on primary education I say the sum now given for the purpose of the highest education, the most profitable of all the investments we can make in that direction, is altogether inadequate."

CAMBRIDGE.—The voting on the report of the Studies and Examinations Syndicate will take place on Friday, March 3, and on Saturday, March 4, on both days from 1–3 p.m. and from 5–7 p.m. No votes will be taken after 7 p.m. on Saturday, March 3.

In view of the discussion on the report the syndicate has issued the report in an amended form. The chief changes include as alternatives in the papers in classical languages (1) passages for translation from a selected book or books; (2) unprepared passages for translation, a vocabulary of unusual words being supplied, also the abolition of distinct grammar papers, although questions on syntax and accidence will be set in connection with the translation papers; further, one of the Synoptic Gospels is Greek, is now proposed as an alternative to one of the Synoptic Gospels, together with the Acts of the Apostles in English, and logic is included amongst the optional subjects in part iii. These proposals are embodied by the Council in five graces. It is on the second of these, which deals with the question of compulsory Greek, that attention will be centred.

LONDON.—Sir Michael Foster has consented to offer himself for re-election to the next Parliament as member for the University of London. He seeks re-election as a representative of science and higher education; if re-elected he will take his seat as a member of the Liberal Party. A committee, with Sir Thomas Barlow as chairman, has been formed to promote his election. This committee comprises graduates belonging to different political parties who are supporting Sir M. Foster on the ground of his many public services and in the belief that his special knowledge will continue to prove of great value to the House of Commons.

OXFORD.—Mr. George Longstaff, New College, has presented 50*l*. to the Hope Department of Zoology, and has offered to provide an extra assistant in the department for the years 1905 and 1906.

A SHEFFIELD gentleman, who does not wish his identity to be disclosed, has, says the *Sheffield Telegraph*, intimated in connection with the Sheffield University movement that he is prepared to subscribe 10,000*l*. towards the endowment fund, provided four other sums of 10,000*l*. are contributed. As an alternative, he is willing to give 5,000*l*. provided nine similar donations are promised. Under either condition a sum of 50,000*l*. would be raised, and, roughly, this is the amount still required to complete the fund.

AT a public meeting held under the auspices of the University of Leeds on February 6th, Mr. Alfred Mosely, C.M.G., gave an address on "Some Lessons learned by the recent Mosely Commission of Educationists to the United States." In the course of his remarks he said: Much remains in England to be done so that she may be brought into line with the United States and Germany in the matter of education. In America the people realise that if the nation is to be made and saved it must be through the medium of education. The time has come for us to reconsider our position, and above all to realise that the Board schools and the primary schools are but the prelude to secondary education, which in the United States has made such satisfactory strides—as it has also in Germany. The great difference in the education of the United States and that in our own country is the appreciation there of everybody, from the highest to the lowest, of the value of education. The Government has realised its obligations, and private citizens pour out their money like water. The University at Chicago, for instance, has been built up through the liberality of one man, who has given millions of pounds sterling. Why is there not the same spirit in England?

THE current number of the *Quarterly Review* contains an article entitled The Direction and Method of Education." The writer passes in review many of the official publications of the English Board of Education and the

Scotch Education Department, Prof. Sadler's report on secondary education in Liverpool, and other publications. Men of science would do well to note what is given as the sum and substance of official activity in education since the passing of the recent Education Act. The writer says, "If we were asked to describe in one word the whole tendency of English education as manifested at the present time, we should speak of a humanistic renaissance." And again later, "English education, we believe, is working round to the humanistic ideal." Literary studies are included in every satisfactory scheme of elementary and secondary education, and the man of science recognises fully the value of the humanities in the work of schools and colleges. But whatever "humanistic renaissance" there may be dawning upon the world of education, it is to be hoped that the danger of a return to the conditions of fifty years ago, when instruction in the methods of science was unknown in our schools, and no opportunity to become acquainted with natural objects was offered, will be borne in mind by all education committees and other authorities.

THE Hon. Maude Lawrence has been appointed to a newly-established post of Chief Woman Inspector under the Board of Education. Miss Lawrence will direct a staff of women inspectors of special qualifications and varied experience, who will assist the Board in dealing with many questions for the treatment of which they have hitherto been somewhat imperfectly equipped. Instruction in various domestic subjects, such as needlework, cookery, laundry work, household management, and hygiene, has for some time past been given under the regulations of the Board for schools of different grades. But the report of the Inter-Departmental Committee on Physical Deterioration points to the need of a reform in the methods now commonly employed in the teaching of these subjects. It is considered that this instruction has been less effective than it should have been, because it has been too theoretical and has not been kept sufficiently in touch with the needs and habits of daily life. The new branch of the inspectorate will be employed to assist local authorities in providing, as part of their educational system, ample opportunities for girls of various ages to obtain a training for home life simple, practical, and adapted, where necessary, to the special circumstances of each locality. There are also many questions of importance involving the national physique, as affected by the studies, the life, and the treatment of children, and especially of very young children, from day to day in elementary schools, which women inspectors are specially qualified to investigate and to advise upon.

THE council of the Association of Technical Institutions has published its report of an inquiry, undertaken in May, 1904, as to the conditions of admission to evening classes in technical institutions and evening continuation schools throughout the country. The council considers that the returns and expert opinions recorded in this report justify the following conclusions:—(1) That it is undesirable to establish any general system of free admission to evening continuation schools, or of free admission or admission at specially reduced fees to evening classes in technical institutions. (2) That it is unnecessary to grant entirely free admission, to evening classes in technical institutions, to any special class or body of students or workers engaged in skilled industries, such as apprentices or persons under twenty-one years of age. (3) That there is need for the establishment in all technical institutions of sufficient "free studentships" or "scholarships" to secure the admission of all qualified and deserving students who are unable, by reason of their limited means, to pay the usual class fees without more sacrifice than should reasonably be expected of them. The plan to secure information adopted by the council was to issue a letter and form of inquiry to the education authorities and technical institutions throughout the United Kingdom asking for information as to the existence of the following conditions of admission to evening classes: (*a*) entirely free, (*b*) at less than normal fee, (*c*) by scholarships, (*d*) by arrangement with employers. Replies were received with reference to sixty evening continuation school areas and from eighty-three technical institutions. Of the technical institutions, fifty-five are not in favour of free admission, and one only in favour of it. The remaining institutions gave no definite answer. Thirty-eight education committees are against free admission to evening continuation schools, two are in favour of it, sixteen expressed no opinion, and four suggest scholarships.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, November 24, 1904.—"The Flow of Water through Pipes.—Experiments on Stream-line Motion and the Measurement of Critical Velocity." By Dr. H. T. **Barnes** and Dr. E. G. **Coker.** Communicated by Prof. Osborne Reynolds, F.R.S.

In a brief note published in the *Physical Review* (vol. xii. p. 372, 1901), the authors described a thermal method of observing the change from stream-line to eddy motion for water flowing through pipes of different diameters.

The impossibility of heating a column of water uniformly throughout while flowing in stream-line motion has been previously observed. It was shown that, when water is heated electrically while flowing through a tube of two or three millimetres diameter by a central wire conductor, the heat is carried off by the rapidly moving stream, which forms a cloak of hot water around the wire, and leaves the walls of the tube almost entirely unheated.

The change from stream-line to eddy motion can be very clearly observed in a tube heated on the outside, since the temperature of the emerging stream immediately increases when the flow rises above the critical point. The point of change is very sharp, and the disappearance of the stream-lines instantaneous.

It is clear from a study of the work of Osborne Reynolds that the change from stream-line to eddy motion may take place within a wide range of velocities. Critical velocity is measured in two ways: either by observing the velocity at which the stream-lines break up into eddies, or by obtaining the velocity at which the eddies from initially disturbed water do not become smoothed out into stream-lines in a long uniform pipe. The first change may be at any velocity within certain limits depending on the initial steadiness of the inflowing water, while in the second, the change can take place at only one velocity.

Osborne Reynolds's experiments were carried out by the method of colour bands in a long rectangular tank. By using a very much larger tank under a high head of water the authors were able to obtain a higher degree of steadiness than was obtained in the comparatively small tank used by Reynolds. A large number of experiments were obtained, an account of which forms the main part of the present paper.

Briefly, the result of the work may be summarised as follows:—

(1) The attainment of exceedingly high velocities of stream-line flow for certain sizes of pipes fed by perfectly quiet water under a high head.

(2) The re-formation of stream-lines in certain cases after eddies had formed, with a subsequent breaking up of the stream-lines at a very much higher velocity.

(3) A small divergence from the law of the change in viscosity with temperature for the upper-limit of stream-line flow.

(4) A verification of the viscosity temperature law for the lower-limit of stream-line flow by separate methods.

January 19.—"Further Histological Studies on the Localisation of Cerebral Function.—The Brains of Felis, Canis, and Sus compared with that of Homo." By Dr. A. W. **Campbell.** Communicated by Prof. Sherrington, F.R.S.

This addendum to a work on cerebral localisation, presented by the same author to the Royal Society in November, 1903, aims at elucidating certain obscure functional analogies and structural homologies pertaining to the brain.

The points emphasised are as follows:—Giant cells characterise the cortex of the lower mammalian cruciate zone, and this represents the motor area, as defined by Profs. Sherrington and Grünbaum in the anthropoid ape,