

go has slackened: Mr. Adam does not go faster now than 5 miles an hour. The learned serjeant (Spankie) says he should like to have 7, but he would be content to go 6. I will show he cannot go 6; and probably, for any practical purposes, I may be able to show that I can keep up with him by the canal. . . . Locomotive engines are liable to be operated upon by the weather. The wind will affect them; and any gale of wind which would affect the traffic on the Mersey would render it impossible to set off a locomotive engine either by poking the fire or keeping up the pressure of steam till the boiler was ready to burst." The committee, after hearing the arguments of Mr. Harrison, threw out the Bill for the Liverpool and Manchester Railway by a majority of 19 to 13. In order to realise that the above ideas were general, the following may be quoted from the great journal of the day, *The Quarterly*:—"What can be more palpably absurd and ridiculous than the prospect held out of locomotives travelling twice as fast as stage coaches? . . . We trust that Parliament will, in all railways it may sanction, limit the speed to eight or nine miles an hour, which we entirely agree with Mr. Sylvester is as great as can be ventured on with safety."

Even in more recent times we see the struggle for the road locomotion question turned on one of speed, and the supporters of the new departure were unable to make any headway for many years, partly because the speed limit was put at between 3 and 4 miles an hour, that is, the limit of a walking man. A few years ago the speed of 12 miles an hour which, after a great struggle, was obtained, gave place to 20 miles an hour. You can see from the diagrams which Mr. Legros gave in a recent paper before the Institution of Mechanical Engineers, and which have been brought up to date, how the speedier self-propelled vehicle is leading to the disappearance of the horse, at any rate in London, and the difficulty which most people seem to feel is not how to get above the speed limit, but how to keep within it, and the papers show, by a daily crop of sad examples, how only too painfully easy it is not to do so.

Nothing points more clearly to what I have indicated as the basis of our instinctive desire for speed, as the fact that our measure of speed is entirely relative. Thus 60 miles an hour would be a slow speed for a motor-car on a racing track, as seen by the speeds of the motor races at Brooklands last Saturday (April 25th), but this speed, which would be even quite good along the open road to Brighton, would be considered decidedly on the high side for motoring along the Strand. Our ideas of what is slow and what is fast are largely derived from habit, and particularly from surrounding conditions and from our mode of estimation. For instance, we have been carried in this hall during the last hour with the surface of the earth round its axis a distance of about 600 miles. This speed would require a line on our speed chart about as high as the dome of the hall to represent it graphically. But if we judge the speed from observing the apparent rate of motion of the moon and stars overhead, we could never realise this. Far less could we realise by the change in the seasons the speed at which we are travelling with the earth round the sun, accomplishing a distance, as we do, of 540 million miles in 365 days, which represents, roughly, a distance of 60,000 miles per hour. We have thus travelled together, since we came into this hall, a speed of 60,000 miles. The line required on our chart for this speed would be about as high as St. Paul's Cathedral. But these speeds fall far short of those of certain heavenly bodies with which we are familiar, such as the meteors, some of which are travelling at 160,000 miles an hour, and the recent comet, which probably exceeded this speed one part of its journey round the sun; whereas the fastest speed which man has, up to the present, been able to produce, even in a projectile, amounts to between 2000 and 3000 miles an hour (the Krupp 10.7 centimetre having a velocity of 3201 metres per second, and a 6-inch Vickers, 3100 metres per second). The highest projectile speeds we have attained are thus only about one-tenth of the speed at which Jules Verne fired M. Barbicane and his friends off, in order to overcome the earth's gravity and reach the moon, since the speed he required was 12,000 yards per second, or 24,000 miles per hour. Such an idea we are quite justified in

thinking absurd, but we might have been justified in thinking many of the things absurd which Jules Verne wrote about, only forty years ago, and which have since come to pass. Take "Round the World in Eighty Days." In that case it cost Phineas Fogg 19,000*l.* to take himself and his servant round the world in eighty days. A telephone inquiry of Messrs. Cook an hour or two ago elicited the fact that anyone present can start to-morrow morning and go round the world, with a servant, in less than half the above time, and for less than one-fiftieth of the above sum.

Thus though, impelled by instinct, man will ever continue to strive to increase his speeds of travelling, and with the refinement of machinery and invention doubtless succeed in doing so, it may be safely said that, notwithstanding the still increasing upward angle on some of the speed lines of the charts I have shown to-night, this rate of increase will before long begin to take place at a continually diminishing rate. Such feats as the journey from Paris to London within the hour may be regarded as quite a feasible engineering proposition in the future, though possibly a tube will be used for the purpose, without the employment of wheels, and with a modification of the pneumatic system of that great genius Brunell. We should, however, in doing this journey, be only travelling at half the rate we are actually moving at this spot round the earth's axis, while to do it at the rate we are travelling round the sun, we should only occupy a quarter of a minute. This latter speed, apart from the fact that it is getting very near the point at which meteors fuse with the friction of the earth's atmosphere, seems to be quite outside the limit of the possibilities of artificial locomotion by man, but who can tell how far we shall go towards it!

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—It is proposed to confer the degree of Doctor of Science, *honoris causa*, upon Dr. T. W. Richards, professor of chemistry in the University of Harvard.

On Thursday, May 11, a Grace will be offered to the Senate proposing that the Most Reverend St. C. G. A. Donaldson, D.D., of Trinity College, Lord Archbishop of Brisbane, be appointed as the representative of the University at the inaugural ceremony of the Queensland University to be held at Brisbane on June 1.

The special board for biology and geology has nominated Mr. E. S. Goodrich, fellow of Merton College, Oxford, to use the University table at Naples for one month.

Mr. A. R. Hinks will deliver a lecture on Monday, May 8, at 2.30 p.m., on "Recent Progress in the Measurement of the Earth."

On Friday, April 28, a meeting was held in Trinity College to consider the formation of a Cambridge University Eugenics Society to promote the study of heredity in its bearings on racial and social questions. The Dean of St. Paul's presided. It was resolved to form such a society, and the following officers were elected:—*President*, Prof. Seward, F.R.S.; *council*, the Rev. the President of Queens', Mr. Horace Darwin, Prof. Punnett, Mr. L. Doncaster, Mr. W. C. D. Whetham, Mr. J. M. Keynes, Mr. R. A. Fisher, Mr. C. S. Stock, Mr. R. W. Pyne, Mr. G. K. M. MacMullan, and Mr. E. P. Stapleton.

OXFORD.—The Halley Lecture for 1911 will be delivered in the examination schools on Monday, May 22, at 8.30 p.m., by Prof. H. H. Turner, F.R.S., the Savilian professor of astronomy. Subject:—"The Movements of the Stars."

A COURSE of eight lectures will be delivered by Dr. W. M. Bayliss, F.R.S., on "The Mechanism of Oxidation in Plants and Animals," at University College, on Fridays at 4.30 p.m., beginning on May 5. These lectures are open free to all internal students of the University of London and to such other persons as are specially admitted.

DR. H. N. ALCOCK has been appointed to the chair of physiology in McGill University, Montreal, Canada. Dr. Alcock holds at present the post of lecturer on physiology

to the St. Mary's Hospital Medical School, and is also examiner in physiology to the Royal College of Physicians and to the National University of Ireland. He has published numerous papers on physiological subjects, and is the joint author of a text-book of experimental physiology.

MR. IVOR BACK, assistant surgeon to St. George's Hospital, lecturer on and teacher of operative surgery in the Medical School, St. George's Hospital, and Prof. D. H. Macgregor, professor of economics in the University of Leeds, have been elected to A.K. travelling fellowships. Mr. E. A. Benions, fellow and lecturer of St. John's College, Cambridge, has been elected to the fellowship rendered vacant by the resignation of Prof. I. Gollancz in December last.

THE Berlin correspondent of *The Morning Post* states that the Senate of the City of Hamburg has passed a resolution recommending that the Colonial Institute established there some years ago to train men for the Colonial Service shall be developed into an independent institution. This is regarded as the first official step in the movement to found a university in Hamburg. The city already devotes 100,000*l.* annually towards the cost of its scientific institutions, and the project evidently is to merge the latter into one university, though this word is as yet avoided.

PROF. H. E. ARMSTRONG'S old students at the Central Technical College have arranged to mark their appreciation of the services he has rendered to science, industry, and education for upwards of a quarter of a century, by entertaining him at a banquet to be held at the Hotel Cecil, at 7 p.m. on Saturday, May 13. It has further been suggested that either an illuminated address or an album signed by his old students should be presented to him as a memento of the occasion. The gathering promises to be an unusually large one, and will include many of Prof. Armstrong's friends as well as old students. The chairman of the committee is Prof. W. J. Pope, F.R.S., and the vice-chairman, Mr. Maurice Solomon. Applications for tickets should be sent to one of the honorary secretaries, Mr. F. F. Renwick, Norland House, Avenue Road, Brentwood, Essex, or Mr. G. W. Tripp, 58 Little Heath, Charlton, Kent.

It is stated in *The Pioneer Mail* that efforts are being made by the promoters of the proposed University of India and the Hindu University to amalgamate the two schemes and to work jointly rather than separately. The suggestion is that the University should be known as the University of Benares. In the beginning the University would only be an examining body like the Government universities in India, but the promoters trust that it will later on become a teaching body, and so fulfil the true ideal of university life. It is estimated that with the amalgamation of the two proposed universities the total funds available would come to 50 lakhs. It is further suggested that the King should be asked to lay the foundation of the Muslim University and the University of Benares after the Delhi Durbar.

ATTENTION has been directed already in these columns to the movement which has been inaugurated to secure the more efficient education of Europeans and Eurasians in India. An influentially signed appeal to the people of this country for a fund for this object of not less than 250,000*l.* appeared in *The Times* of May 1. An All-India Committee, representing the schools for Europeans and Eurasians established in India by the various religious organisations, has been formed, and it proposes with the fund to be raised:—(i.) to provide adequate salaries for teachers; (ii.) to increase the number of qualified teachers; (iii.) to provide facilities in India for training teachers; (iv.) to bring out qualified teachers to India until the training colleges to be founded shall have made such a course unnecessary; (v.) to provide opportunities for university education for promising students; (vi.) to improve the curricula of existing schools, especially in respect of science and manual training; (vii.) to found scholarships to assist deserving students at different stages of their education. A gift of 50,000*l.* has been received, and another gift of 5000*l.* has been contributed to the general fund in England. Further contributions may be sent to Sir Capel Wolseley, Bt., 157, 158, St. Stephen's House, Westminster, S.W., hon. treasurer of the fund.

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ON April 5 the Governor of Bombay, Sir G. Clarke, laid the foundation-stone of the Central Science Institute and the Cowasjee Jehangir Hall in Bombay. In the course of his address, which was reported in *The Pioneer Mail*, the Governor said the mill owner and merchant want men accustomed to accurate thinking and capable of bringing practical consideration to bear upon realities. To both, the possessor of literary culture imperfectly assimilated is of no value, as he lacks some essential qualifications even if his literary attainments were more solid. Both look forward to the developments of the natural resources of India and the consequent creation of industries which await the diffusion of practical science among Indians. The example of Japan is frequently held up to the people of India, but the moral is not grasped. The Japanese instinctively absorbed western science and proceeded to turn it to account, and as soon as they could stand alone they showed that they could rival their European instructors in carrying on scientific progress. In India, scientific habit of thought is rare. Even in Bombay, where malaria could easily be stamped out, the proved results of harbouring the mosquito have not sufficed to carry conviction in many cases, and the spread of infection continues. Direct and indirect need of scientific training face the people of India at every turn. A patient investigator is required who will solve for India problems upon which great industries depend, problems many of which are purely Indian. A constructive power is wanted which depends upon training, that deals with forces and with facts, not with abstract speculation. The need is felt every day of the full recognition of the reign of law in the natural world and of the inexorable relations between cause and effect now widely ignored. An antidote to mere book learning is wanted, a faculty which can concentrate itself upon the practical side of the questions of the day and can discern fallacies of rhetoric, preferring action to talk and practical achievement to visions. All this and much more can be conferred upon India only by sound scientific training widely diffused.

SOCIETIES AND ACADEMIES.

LONDON.

Mathematical Society, April 27.—Dr. H. F. Baker president, in the chair.—Lieut.-Colonel A. **Cunningham**: The number of primes of given linear forms.—H. **Hilton**: The properties of certain linear homogeneous substitutions.—W. P. **Milne**: A symmetrical method of generating cubic curves by apolar pencils.—Prof. M. J. M. **Hill**: The proofs of the properties of Riemann's surfaces discovered by Lüroth and Clebsch.—G. N. **Watson**: The solution of the homogeneous linear difference equation of the second order (second paper).—G. B. **Mathews**: A cartesian theory of complex geometrical elements of space.

Zoological Society, April 25.—Dr. S. F. Harmer, F.R.S., vice-president, in the chair.—Dr. W. **Nicoll**: Three new trematodes from reptiles, from material received from the society's prosectorium. The specimens were interesting as forming an important addition to our knowledge of the large variety of forms which inhabited the air-passages and anterior coil of the alimentary canal of reptiles and batrachians.—Dr. R. T. **Leiper**: Some parasitic nematodes from Tropical Africa. The author gave a brief description of a number of new genera. The paper was based on helminthic material he had collected during a visit to East Africa, Uganda, and the Sudan in 1907, and on material sent to him by members of the Colonial Medical Service.—Oldfield **Thomas**: Mammals collected in southern Shen-si, central China, by Mr. Malcolm Anderson, for the Duke of Bedford's exploration of eastern Asia. The region explored was in the Great Pe-ling (or Tsin-ling) range, that divides northern from southern China, many of the specimens coming from the sacred mountain Tai-pei-san, where several of the most interesting forms were obtained. Of these, by far the most striking was a new species of takin (*Budorcas*), readily distinguishable by its uniform golden buffy colour from the Sze-chuen species (*B. tibetanus*). In the adult of this fine animal the coloration was wholly buffy, the darkening of the ears, dorsal line, hinder back and limbs found in