

by the opponents of the statute was so artfully worded as to rouse theological suspicions. Reference was made to the undesirability of the comparative study of religions, and it was obvious that a considerable proportion of those who attended to vote against the measure, had come in obedience to a summons to resist the enemy, and were in no way qualified to form a judgment on educational matters. The larger proportion, however, consisted of those classical teachers whose belief it is that science may safely be ignored in a nineteenth century education, and that a "good general education" means only a training in the Greek and Latin languages, with a smattering of ancient history and philosophy. The result of the vote was a great disappointment to those who had hoped that the work of Prof. Tylor, Prof. Arthur Thomson, and Mr. H. Balfour, would find its fruition in a small but earnest school of anthropologists in Oxford.

THE National Association for the Promotion of Technical and Secondary Education has made arrangements for a Conference of the representatives of Technical Education Committees to be held at the Royal United Service Institution, on July 11, when the Duke of Devonshire, President of the Association, will take the chair. The object of this Conference is to discuss means whereby the various authorities charged with the provision of technical education may be brought into closer relationship, and may be enabled to avail themselves of the results of the experience of others as regards many important details of their work. Among the subjects which it is proposed to deal with are (a) scholarships (local conditions and uniformity in respect to award and tenure), (b) evening continuation schools (the co-ordination of their work with that of evening science, art, and technical classes), (c) trade and technology classes and their relation to the various trades.

The chemical and engineering societies formed by the members of many of our polytechnic institutes might emulate, with advantage, the Engineering Society of the School of Practical Science, Toronto. We have lately received a volume of 253 pages containing the papers read before the Society during the session 1894-95. The papers refer to both the theoretical and practical sides of engineering, and their publication cannot but encourage investigation among the students. A plan adopted by this Society, and by a number of American societies of a similar kind, is worth noting. Before a paper is read, 150 proofs of it are distributed among engineers and specialists interested in the subject with which it deals, and their opinions upon any particular point are invited. The replies received are read after the paper, and help to make the discussion more general and of greater value than it otherwise would be.

THE Corporation of the Massachusetts Institute of Technology, Boston, have a good understanding of what technical education means. The following paragraph, from the *Calendar* of the Institute received a few days ago, should be borne in mind by the organisers of technical education in this country:—"The foundation of all sound technological education requires not only thorough theoretical training, but also prolonged, well-directed laboratory drill which shall first give the student the power of close and accurate observation, and then bring him into direct contact with the material problems of his future profession." It is by acting upon this educational principle that the Massachusetts Institute has gained such a large measure of success.

TABLES showing the number and proportion of pupils attending secondary schools in London are given in the *Technical Education Gazette*. The returns obtained show that the number of pupils receiving education in 84 public endowed and public proprietary schools is 19,072, and the number receiving education in 126 private or semi-private schools is 7107. The proportion which pupils attending secondary schools bear to those attending public elementary schools, may be gathered from the fact that the number per 100,000 of the population attending secondary schools is 623, while the number per 100,000 of the population attending public elementary schools is 16,904.

SCIENTIFIC SERIALS.

Bulletin of the American Mathematical Society, vol. i. No. 8 (May 1895).—Kinetic stability of central orbits, by Prof. Woolsey Johnson, contains an investigation, of an elementary character, of a problem not discussed in the fourth edition

(p. 125) of Tait and Steel's "Dynamics of a Particle." It is a satisfactory discussion of the problem so far as it relates to central orbits. The note was read before the Society at its April meeting.—Dr. J. Pierpont, in a short paper, read before the Yale Mathematical Club, entitled "Lagrange's place in the Theory of Substitution," though he cannot vindicate Lagrange's right to the title of creator of the theory of substitutions, presents a few examples of his methods in order to show the importance of considering him from this point of view. "Lagrange was led to the study of this theory by his attempts to solve equations of degree higher than the fourth."—Gauss's third proof of the fundamental theorem of algebra, by Prof. Bôcher, indicates the connection between Gauss's third proof that every algebraic equation has a root and those branches of mathematics which have since been developed under the names of the theory of functions and the theory of the potential. The notes, among other details, give the different courses of lectures in mathematics at American and European colleges.—There is the usual long list of new publications.

Wiedemann's Annalen der Physik und Chemie, No. 5.—Wave-lengths of ultra-violet aluminium lines, by C. Runge. The lines of the spark spectrum near 186μ wave-length are of great intensity, and may be used as standards of reference. They were therefore carefully determined by means of a Rowland concave grating and sensitive plates prepared by Schumann's method. They were compared with the spectrum of iron, and referred to Rowland's standard wave-lengths for that substance. The figures for the four lines at 760 mm. pressure and 20°C . were $1854\cdot09$, $1862\cdot20$, $1935\cdot29$, and $1989\cdot90$. The wave-lengths reduced to a vacuum would be about $0\cdot6$ units greater.—On the dichroism of calcspar, quartz, and tourmaline for infra-red rays, by Ernest Merritt. The absorption of the infra-red rays in these substances depends upon the plane of polarisation. Especially in calcspar and in tourmaline the two curves representing the transmittency for the ordinary and the extraordinary ray, respectively, are quite different, so that they appear to be independent of each other. The following absorption bands were observed in these curves: Calcsp. at $2\cdot44\mu$ and $2\cdot74\mu$ for the ordinary ray. These are very sharp. Some broad bands also appear at $3\cdot4\mu$, 4μ , and $4\cdot6\mu$. The extraordinary ray is absorbed at wave-lengths of $3\cdot28$, $3\cdot75$, and $4\cdot66\mu$. Quartz shows an absorption band for the ordinary ray at $2\cdot9\mu$. When the wave-length exceeds $4\cdot75\mu$ the substance is practically opaque for both rays. Tourmaline absorbs the ordinary ray of wave-length $2\cdot82\mu$. The two curves intersect at $2\cdot30\mu$ and again at $3\cdot84\mu$, so that between these two points the dichroism of tourmaline is reversed.—On the transmittency of solid bodies for the luminiferous ether, by L. Zehnder (see p. 153).—On the measurement of high temperatures with the thermo-element and the melting-points of some inorganic salts, by John McCrae. The melting-points of a number of salts, chiefly alkaline haloids, were determined by means of a platinum and platinum-rhodium couple, whose E.M.F. is proportional to the temperature between 300° and 1400° . The temperature of the alcohol flame, as shown by the same couple, was 1488° , and that of the Bunsen flame at its hottest part, 1725°C .—On electric resonance, by V. Bjerknes. This is an important contribution to the theory of Hertzian oscillations. The author considers the effect of the periods of the oscillator and the resonator, and their logarithmic decrements, together with a constant measuring the intensity of the oscillations. He thus arrives at several fundamental laws, such as: The secondary spark potential is proportional to the square of the period of the resonator, the magnetic or thermal integral effect to its cube, and the electric integral effect to its fifth power.

SOCIETIES AND ACADEMIES.

LONDON.

Physical Society, June 14.—Captain W. de W. Abney, President, in the chair.—Mr. Burstall continued the reading of his paper on the measurement of a cyclically varying temperature. Three sizes of platinum wire have been employed for the thermometers in order that some idea might be formed as to the magnitude of the error caused by the lag of the temperature of the wire behind that of the gases. The constants of the platinum thermometers were determined either by comparison with a standard Callendar platinum thermometer or by means of