

limit imposed in previous years to the number of hours of instruction which may be counted for the purposes of grant has been relaxed, a fact which will encourage local education authorities to plan prolonged and well-organised courses of evening instruction and help to remove a reproach that much of the work in evening classes has been scrappy, unrelated to local industries, and not part of a coordinated scheme. Greater encouragement than formerly is being given to vacation courses for teachers, and the sensible advice contained in the prefatory memorandum as to the necessity of securing due recreation for teachers during the progress of the holiday work deserves the careful study of the organisers of such courses. It is now laid down by the Board that there shall in future be a principal, or head teacher, in those institutions where in the past unrelated classes in charge of separate teachers, responsible only to the managers, have been held. The new regulation will, if the right type of head teacher is appointed, lead to a greatly improved state of things. Students will be able to receive much needed advice in planning suitable courses of study to assist them in their industrial pursuits, and the work of succeeding sessions will form part of a complete scheme. The changes as a whole are conceived in a broad spirit, and should assist to develop still further the excellent work which is being done in technical and other schools.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, May 7.—"A Tantalum Wave-detector, and its Application in Wireless Telegraphy and Telephony." By **L. H. Walter**. Communicated by Prof. J. A. Ewing, C.B., F.R.S.

It has hitherto not been possible to employ a metal in conjunction with mercury as a wave-detector which is spontaneously restored to the sensitive condition, without some artifice which assisted decoherence; much less has it been possible to use a noble metal for this purpose. The only metal that has been found usable is iron, and this latter is, owing to its tendency to rust, manifestly not adapted to stand prolonged use, besides being otherwise not satisfactory.

The author has found that the metal tantalum gives an effect with mercury which greatly exceeds that obtainable with iron, the sound being very loud and of a pure tone. The tantalum, in the form of a fine wire point, dips into a pool of mercury so that the point is only just immersed. An external applied potential difference of about 0.2 to 0.4 volt gives the best results, the tantalum point being connected to the negative terminal.

As now generally constructed, the device comprises a glass containing-vessel into which are sealed two platinum wires. One of these wires dips right into the mercury, and serves to make contact therewith, while the other has its end hammered out into a form of clip which is made to hold the tantalum point.

The level of the mercury is adjusted while the usual telephone receivers are connected to the detector, and this adjustment, when once properly carried out, during the filling process, renders all further adjustment unnecessary. The whole arrangement is hermetically sealed in the glass bulb, which may previously have been exhausted.

The detector has been tried at various wireless telegraph stations, and has shown that for not too weak signals the sound is several times louder than the same signals with the electrolytic detector, it being understood that the most suitable telephones for each type of detector are employed. At a distance of 450 miles from a ship station fitted with a 2-kilowatt plant the signals obtained on the electrolytic and the tantalum detectors were of about equal loudness, although in this case the telephones were not at all suited to the tantalum detector.

The device just described is rather sensitive to shaking, and so a second form of detector is described which, owing to its construction, is quite indifferent to vibration and even to shock. Experiments were afterwards made with numerous other metals, but no other case of an imperfect contact

of this nature was observed; the behaviour of tantalum is apparently unique.

From the physical standpoint the chief interest lies in the fact that by a suitable choice of materials it has been possible to revert to the primitive simplicity of a metal point in contact with another metal, and yet all the attributes of a modern detector be retained.

EDINBURGH.

Royal Society, July 7.—Prof. Crum Brown, F.R.S., in the chair.—The craniology of the aborigines of Tasmania: Sir William Turner, K.C.B. This race had become extinct in 1877, and of the eighty skulls which were known to be deposited in various museums of this country and the Continent, no less than ten were in Edinburgh. The main features of these dolichocephalic skulls were described in detail, the curious roof-shaped top and the thick orbital ridges specially being noted. A cast of the face which belonged to the University Anatomical Museum was shown. The woolly or frizzled hair which differentiated the Tasmanians from all neighbouring races had been described by several travellers. The question of the affinities of the race was very obscure. All attempts to find relationship with the indigenous races of the Malay Peninsula and islands, with the Polynesian races, or with the inhabitants of Australia or New Zealand, could not bear close inspection. When first discovered by European travellers, there could not have been more than 70,000 Tasmanians in an island almost as large as Ireland. Throughout their isolation there must have been in-breeding for centuries, leading to an accentuation of any peculiarities which might have arisen, and so giving to the race its own peculiarities.—Inversion temperatures and the form of the equation of state: Prof. W. Peddie. It was shown that a number of equations of state, all fairly satisfactory otherwise as representative of facts, lead to the conclusion that the inversion temperature of air decreases as the initial pressure rises, which is contrary to Olszewski's experiments. Also the discrepancy cannot be explained as due to difference of initial and final kinetic energies. Some other source of error has probably affected the results. Observations of the critical temperature and its variation with pressure might discriminate among various equations of state.—Magnetic quality in the most open cubic arrangement of molecular magnets: Prof. W. Peddie. It was found that such an arrangement, unlike the closest packed arrangement, cannot explain the magnetisation of magnetite, but presents analogies to the magnetic properties exhibited by pyrrhotite.—Energy accelerations and partition of energy: C. W. Follett. From this discussion it appears that equipartition is not possible amongst the freedoms in some of the cases.—Combustion analysis: Prof. J. Walker and T. Blackadder. The paper described certain modifications of Liebig's method, which enabled the experimenter to use a smaller combustion tube and to carry through the operations in much shorter time and with less expenditure of gas.

PARIS.

Academy of Sciences, July 27.—M. Bouquet de la Grye in the chair.—The necessity of making use of the three dimensions in space for the successive directions of the two moving right lines joining the sun and a planet to the earth, for determining in a simple manner the relative variations of magnitudes of these lines: J. Boussinesq.—The total sugar of the blood: R. Lépine and M. Boulud. It has been stated by MM. Hugouneq and Morel that larger amounts of sugar are found after hydrolysis with hydrofluoric acid than with sulphuric or hydrochloric acids, and they regard this as being due to the less destructive action of the hydrofluoric acid. The authors of the present paper confirm this fully, and have applied this reagent to the determination of the virtual sugar in the blood. Details of the technique are given, and it is shown that the amounts of sugar obtained by hydrolysis of the blood clot with hydrofluoric acid are of the same order as those obtained from the serum, the sum of the two representing the total sugar of the blood.—

The apparent dispersion of light in interstellar space and the hypothesis of M. Lebedew: J. **Stein**. A discussion of the theory put forward by M. Lebedew to explain the experimental results of Nordmann and Tikhoff. The theory would appear to be insufficient to explain all the phenomena observed with β Aurigæ.—A new variable star with very short period discovered at the Observatory of Paris: Jules **Baillaud**. The existence of this star was noted from the photographic charts of P. and Pr. Henry, of 1900. The magnitude varies between 12.8 and 14.3, the passage from the maximum to the minimum taking about 1 hour 41 minutes.—A left-handed circular sextic: M. **Stuyvaert**.—The name of Fleurieu in geography: M. **de Fleurieu**.—A comparison of the different modes of action of imperfect contacts with variation of resistance and thermoelectric contacts as detectors of electric oscillations: C. **Tissot**. Replying to the criticisms of M. Branly, the author points out an essential difference between the detectors working by imperfect resistance and those depending on thermoelectric power; the latter require no auxiliary electromotive force in the form of a battery.—The ultra-violet spectrum of silicon: A. **de Gramont** and C. **de Watteville**. A comparison of the wave-lengths and intensities of the line obtained in the spark spectrum and in the flame spectrum.—The magnetic susceptibility of solutions: P. **Pascal**. The author finds that whenever an aqueous solution of a metal ion of a salt changes with its valency into a complex ion or into a colloidal compound, there is a diminution of the magnetic or diamagnetic properties superadded to the diamagnetism of the water by the simple metal ion. There may even be an inversion of the magnetic rôle of the metal on the solution. These phenomena are repeated when the complex ion passes over into a more complex ion.—The gases occluded in a special nickel steel: G. **Belloc**. The chief point of interest was the marked difference between the quantities of gas extracted from the same metal in the form of wire and turnings. The cause of the difference has not yet been ascertained.—A new method of estimating the fixed and volatile acids in wines: Emm. **Pozzi-Escot**.—The oxidation of isoeugenol. On dehydro-diisoeugenol: H. **Cousin** and H. **Mérissey**. By the oxidation of isoeugenol in alcoholic solution by ferric chloride, a substance having the composition $C_{20}H_{22}O_4$ is obtained. This corresponds to the formation of a double molecule following on the removal of two atoms of hydrogen by the oxidising agent. The properties of the new compound and the preparation of three of its esters are described.—A new method of preparing the mixed anhydrides of organic acids: J. **Bougault**. The method of preparation is peculiar in that the reaction takes place in aqueous solution and in presence of sodium carbonate. Phenylisocrotonic acid, treated with iodine in presence of a considerable excess of sodium carbonate, is converted quantitatively into benzoylacrylic acid. If the sodium salt of an aromatic acid is present during this reaction the mixed anhydride is precipitated. The mixed anhydrides of benzoylacrylic acid with benzoic, cinnamic, phenylacetic, and benzoylpropionic acids have been obtained in this way.—The constitution of vicianine: Gabriel **Bertrand** and G. **Weisweiler**. Vicianine is a glucoside obtained from the seeds of *Vicia angustifolia* and of several other species of the same genus. Under the hydrolysing action of diastases it gives hydrocyanic acid. In the present note vicianin is shown to resemble amygdalin in being a derivative of *l*-phenylglycollic nitrile.—The formation of jadeite in crystalline schists: Const. A. **Ktenas**.—Folotsy and Voharanga, two new Asclepiadæ from Madagascar: MM. **Constantin** and **Bous**.—The formation of the conidia in the Aspergillaceæ: L. **Mangin**.—Contribution to the study of the serum of animals whose thyroid glands have been removed: L. **Lauroy**. Poisonous properties have been attributed to the blood serum of animals the thyroid glands of which have been excised; the experiments of the author here given do not confirm this.—The influence of ferrocyanides and ferricyanides of the alkalis on the coagulation of the blood: J. **Larguier des Bancels**.—The diastatic hydrolysis of lactose, maltose, and their derivatives: H. **Bierry** and J. **Giaja**.—The

inequality of the volume of the mammary glands in woman: the physiological consequences: G. **Variot** and P. **Lassablière**. In 550 cases, in only 24 per cent. was there equality in the size of the mammary glands; in 51 per cent. the left predominated, and in 25 per cent. the right. When the inequality is very pronounced the smaller gland appears to atrophy, and can only furnish a very small quantity of milk relatively to the other, and these variations in quantity are accompanied by changes in the composition of the milk.—The experimental study of the transmissibility of tuberculosis by dried sputum: G. **Kuss**. Petersson, Cadéac, and Calmette have emphatically denied the possibility of tuberculous infection by dried sputum, Cadéac affirming that the drying and loss of virulence go together. The author details fresh experiments made to settle this important point. It was found that when the conditions are favourable to desiccation tuberculous sputum dries readily in a few days, and was easily converted into dust, the virulence of which was proved by inoculation experiments. The inhalation of these powders caused tuberculous infection with extreme readiness, a result diametrically opposed to those of Calmette and Cadéac.—The kidney of the bony fishes: Louis **Roule** and I. **Audigé**.—Experimental researches on the adipose bodies of the Amphibia: R. **Robinson**.—The localisation of the sense of alimentary discrimination in the Limnæa: Henri **Piéron**.—The classification of the Tertiary strata of the Guelma region, Algeria: J. **Darreste de la Chavanne**.—The Calabrian earthquake of October 23, 1907: G. **Mercalli**.

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