

continue the course, commenced during the school age, at the University or at a Polytechnic Institution such as there is now some hope that the Science School at South Kensington may become.

Although I have excluded instruction in technical manipulation from the subject of this paper, I think it right to add that the students of King's College and of King's College School save much time and drudgery during their pupilage by the practical skill acquired in the workshops attached to the College, and that according to competent observers like Mr. Nussey, of Leeds, the artisans of Elberfeldt, Crefeld, and other continental towns derive great advantage from the schools of design and so-called weaving schools.

I should not fulfil my duty if I were to conclude this paper without acknowledging, though no alarmist in regard to foreign competition, that other nations, less energetic, less rich in accumulated capital and practical experience, and without the advantage of our great mineral resources, are, thanks in a great measure to their superior technical training, making relatively greater advances than ourselves in many branches of industry, and that the conviction of the necessity for such training has not arisen amongst ourselves a day too soon. Happily it has arisen, and in the most desirable quarters. Manchester, by the judicious enlargement of Owens College, to which its merchants and manufacturers have quite recently contributed a sum approaching 200,000*l.*; Yorkshire, by the establishment of the College of Science at Leeds, to which secondary schools of science are to be affiliated; the Company of Clothworkers, by the foundation of scholarships, and the endowment of a chair of textile technology in the Yorkshire College; the University of Durham, and the coal-owners and manufacturers of the North of England, by their joint foundation of the School of Science at Newcastle; Oxford, by its patronage of the College to be established at Bristol; and the Company of Merchant Adventurers, by the aid which it is giving to the Trade School of the same city—are not only directly promoting the higher technical instruction amongst the populations in which their work is done, but will furnish competent teachers to the elementary and secondary schools of their own and other localities. I think there is no fear that a work of such national importance once so actively begun will suffer any relapse; but it will be in the power of this Association to promote by discussion and advice its intelligent and economical organisation.

SOCIETIES AND ACADEMIES

PARIS

Academy of Sciences, Oct. 5.—M. Bertrand in the chair.—The following papers were read:—Researches on the conditions of resistance in cylindrical boilers, by M. H. Resal.—On the exact values of the angles in the crystals of titaniferous iron, by M. N. de Kokscharow.—Report on the machine for freezing by the evaporation of methylic ether, invented by M. Ch. Tellier; and on the preservation of meat in the air, cooled by this apparatus, by the Commissioners, MM. Milne-Edwards, Peligot, and Bouley.—On the temperature of the sun, by M. J. Violle. The author

starts with the fundamental equation  $a^{\omega} - a^{\epsilon} = \frac{\omega}{s} a^{\epsilon}$ , and from determinations of the intensity of solar radiation assigns the value 1550° to what he calls the *effective temperature* of the sun. The true mean temperature of the surface of the sun is estimated at 2,000°.—Note on magnetism, by M. J. M. Gangain, a continuation of former researches.—Seventh note on the conductivity of ligneous bodies, and of other substances which are bad conductors, by M. Th. du Moncel.—Experimental researches on explosive substances, by MM. Roux and Sarran.—On a register giving continuous indications for the determination of the law of variation of pressures produced by the gases of gunpowder, by M. Ricq.—On the synthesis of purpurine, and of some analogous colouring matters, by M. A. Rosenstiehl.—New observations on the chemical composition of the waters of Bagnères-de-Luchon, by M. E. Filhol.—Method of determination of copper by means of titrated liquids, by M. Pr. Lagrange.—Comparative and critical examination of the hypotheses which have been advanced to explain the figure of comets and the acceleration of their motion, by M. H. Champion. The author attempts to show in this memoir: (1) that a force directed along the radius vector develops in the two opposite parts of an elliptical orbit separated by the major axis, two tangential components of contrary signs, of which the effects are exactly compensating; (2), that the force gives rise to a third component opposed to gravitation, of which the

final result is to increase the dimensions of the orbit; (3), it is shown that at the distance at which comets' tails commence to be seen, the rays of the sun would not produce an appreciable elevation of temperature in a highly rarefied substance.—On the comparative chemical composition of the different parts of the vine when healthy and when attacked by *Phylloxera*, by M. Boutin.—Experiments made at Cognac on phylloxerised vines with the coal-tar recommended by M. Petit, by M. P. Mouillefert.—Experiments made at Montpellier with the same substance, by M. Alph. Rommier.—Observations on the points gained by science concerning the known species of the genus *Phylloxera*; a letter from M. Signoret to the perpetual secretary.—Observations concerning the recent communication of M. Balbiani on the different known species of the genus *Phylloxera*, by M. Lichtenstein.—Trial of infection of a healthy vine by putting *Phylloxera* in contact with its roots, by M. Delorme.—On the means proposed to check the propagation of *Phylloxera*, the method of uprooting in particular, by M. P. Naudin.—Experiments on a method of treatment of phylloxerised vines, by the sap of a Euphorbia, by M. L. Balme.—On the appearance of *Phylloxera* in the canton of Geneva, and on different curative measures proposed, by M. E. Ador.—The Minister of Foreign Affairs transmitted further details of the recent eruption of Etna.—M. Dumas announced that the news received from the first four Transit of Venus expeditions was satisfactory on all points.—On the pretended Saharan Sea, by M. A. Pomel.—Observations on the ancient central sea of the Tuniso-Algerian Sahara, by M. Virlet d'Aoust.—On the theory of curves in space of *n* dimensions, by M. C. Jordan.—Electro-diapason of variable period, by M. E. Mercadier.—Electro-spectral tube, or "fulgurator," for the observation of the spectra of metallic solutions, by MM. B. Delachanal and A. Mermet.—Note on supersaturation, by M. Lecoq de Boisbaudran.—On the action of bromine on certain alcohols, by M. E. Hardy.—Note on the production of oxamic acid by the oxidation of glycol, by M. R. Engel.—Action of heat on diphenylmethane and phenyl-toluene; on the products of the reduction of benzophenone, by M. Ph. Barbier.—Curious association of garnet, idiochase and datholite, by M. J. Lawrence Smith.—Balloon meteorological observations, by M. G. Tissandier.—Note on the spectroscopic observations made during the balloon ascent of Sept. 24, for studying variations in the extension of the colours of the spectrum, by M. W. de Fonvielle.—On the feeble influence which diluvian waters have exercised on the formation of the valleys of the Paris basin, by M. E. Robert.

BOOKS RECEIVED

BRITISH.—Synopsis of an Arrangement of Invertebrate Animals in the Free Museum of Liverpool, with Introduction by Rev. H. R. Higgins (Marples).—Babington's Manual of British Botany. 7th edit. (Van Voort).—Mineralogy: Frank Rutley, F.G.S. (T. Murby).—The Sanitary Condition of Oxfordshire: G. W. Child (Longmans).—Symond's Rainfall for 1873.—Sixteenth Report of the East Kent Natural History Society (Canterbury).—Amateur's Photographic Guide Book: Stillman (Smith, C.D.).—The Principles of Modern Pantheistic and Atheistic Philosophy: C. A. Row (Hardwick).—Micrographic Dictionary. Parts xiii. and xiv.: Griffith and Henfrey (Van Voort).

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