Science.	Art.
1. Payments to the Local Committees of Schools and Classes on the results of instruction, as tested by Examination, of Students of the Industrial Classes.	
(*a*) £2 and £1 for a 1st and 2nd class respectively in the Elementary and Advanced Stage of each subject. (*b*) £4 and £2 for a 1st and 2nd class respectively in Honours. (*c*) In Practical Chemistry and Practical Metallurgy £2 and £1 for a 1st and 2nd class respectively in the Elementary Stage, £3 and £2 in the Advanced Stage, and £4 and £3 in Honours.	(*a*) £1 and 10*s.* for a 1st and 2nd class respectively in each subject of the 2nd Grade Examination, *including Modelling*. (*b*) £1 10*s.* and £3 for a 1st and 2nd class respectively in 3rd Grade Examination. (*c*) £2 or less per student for works executed in local classes. (*d*) £3 each on account of Free Students (being artisans) under certain conditions. (*e*) £15 each for not more than two Art Pupil Teachers. (*f*) £5 for each student who obtains a National Scholarship or who obtains admission to Training Class.
2. Prizes and medals are awarded to candidates.	
(*a*) Prizes to students obtaining a 1st Class in the Advanced Stage of each subject, and Bronze Medals to those obtaining a 1st Class in Honours. Certificates or cards to all successful candidates.	(*a*) Prizes of books or instruments, to the value of 8*s.* and 12*s.*, to students obtaining the mark "excellent" in the 2nd and 3rd Grade Examinations, respectively; and Gold, Silver, and Bronze Medals, and other prizes of Books, for the best works submitted in the National Competition of works of all the Schools of Art and Art Classes.
3. Science and Art Scholarships for Students of the Industrial Class, held locally, £4, £7, and £10, for the 1st, 2nd, and 3rd year respectively, on condition that a local contribution of £5 a year is made.	
4. Local Exhibitions, to be held by Students of the Industrial Classes at the Normal School of Science and Royal School of Mines, London, the Royal College of Science, Dublin, or at an approved Provincial Science College, £25 to meet an equal sum locally raised.	
5. Grants for Buildings, Fittings, and Apparatus.	
(*a*) Not exceeding 2*s.* 6*d.* per square foot of internal area up to a maximum of £500 for buildings. (*b*) Grants towards the purchase of fittings, apparatus, examples, &c., not exceeding 50 per cent. of their cost within certain limits.	(*a*) Not exceeding 2*s.* 6*d.* per square foot of internal area up to a maximum of £500 for buildings. (*b*) Grants towards the purchase of fittings, apparatus, examples, &c., not exceeding 50 per cent. of their cost and within certain limits.
6. Special Grants to Organized Science Schools in addition to the foregoing. 10*s.* and 5*s.* respectively for each student who attends a day or an evening school not less than 250 or 75 times in the year.	
7. Aid to Students in attending the Normal School of Science and Royal School of Mines, London, the National Art Training School, London, and the Royal College of Science, Dublin.	
(*a*) 21 Royal Exhibitions (seven awarded each year) with maintenance allowance of £50 a year tenable for three years. (*b*) 36 National Scholarships (twelve awarded each year) with maintenance allowance of 30*s.* a week for 40 weeks in the year tenable for three years. (*c*) 18 Free Studentships (six awarded each year) tenable for three years, at Normal School of Science and Royal School of Mines, London.	(*a*) National Scholarships tenable for not more than three years at National Art Training School with maintenance allowance of 20*s.* a week. (*b*) Free Studentships in National Art Training School.

Science.	Art.
8. Aid to teachers and persons preparing to become teachers in attending the Normal School of Science and Royal School of Mines, London, the National Art Training School, London, the Royal College of Science, Dublin, and Provincial Colleges at which advanced instruction in Science is given.	
(*a*) Grants of £2 each with travelling expenses to local teachers selected to attend short courses of instruction at Normal School of Science and Royal School of Mine (*b*) Grants of 21*s.* a week each with travelling expenses to teachers in training selected to attend the sessional courses of the Normal School of Science and Royal School of Mines. (*c*) Grants in aid of fees to local teachers selected to attend Provincial Science Colleges. (*d*) Free admission (subject to payment of examination fee) to courses of lectures at Normal School of Science and Royal School of Mines and Royal College of Science, to Science teachers.	(*a*) Grants to enable masters and students to visit various metropolitan Art Institutions, and, in special cases, foreign towns, schools, and galleries. (*b*) Grants of from 10*s.* to 35*s.* a week with travelling expenses to teachers in training selected to attend the National Art Training School.
9. Grants to Local Museums and Loans of works of Science and Art, Books, and specimen sets of teaching Apparatus, to Science and Art Schools.	
10. Aid to Training Colleges for Instruction in Science and Art.	
(*a*) Grants of £3 and £1 10*s.* respectively for each 1st and 2nd Class obtained at the Annual Examination. In Practical Chemistry £3 and £2. (*b*) Grants not exceeding 50 per cent. of the cost for apparatus and fittings.	(*a*) Grants of 10*s.* in respect of each subject of examination in which a resident student passes. (*b*) Grants of 50 per cent. towards the cost of examples.
11. Aid to Elementary Schools for Instruction in Drawing.	
	(*a*) Grants of 1*s.*, 1*s.* 6*d.*, or 2*s.* on average attendance of Schools examined in Drawing. (*b*) Grants of 10*s.* for each pass in 2nd Grade Examinations.
12. Aid towards expenses of Examinations.	
(*a*) Grants of 50 per cent. towards the fees of Special Local Secretaries and their Assistants for conducting annual examinations of Science and Art Schools and Classes.	

SCIENTIFIC SERIALS.

American Journal of Science, July.—The viscosity of steel and its relations to temperature, by Carl Barus. In this paper the author's studies are mainly restricted to a discussion of the relation between torsional viscosity and temperature as observed with steel in different states of hardness. Reference is also made to the effect of stress on the amount of viscous motion in solids, and to a more general method by which the instantaneous deformation and the gradual deformation produced by stress may be co-ordinated. It is shown that imperceptible gradations lead from the purely viscous deformation which follows strains within the elastic limits to the sudden permanent set which follows strains beyond those limits.—Kilauea in 1880, by William T. Brigham. A detailed account is given of the results of the outbreak of May 1, 1880, with a description of the changes that had taken place since the author's previous visit in 1865. The trigonometrical survey then made was found to be already antiquated, the whole boundary perceptibly changed, and Kilauea apparently 5 per cent. larger than eighteen years previously.—Recent explorations in the Wappinger Valley lime stone of Dutchess County, New York (continued), by W. B.

Dwight. In this paper (No. 6 of the series) the author deals with the discovery of additional fossiliferous Potsdam strata and pre-Potsdam strata of the Olenellus group near Poughkeepsie. This review of the latest palæontological facts makes it evident that the strata in Dutchess County are simply the continuation of the strata characterizing the Taconic and adjoining series lying northward. But while proving a grand unity, they indicate also an interesting and unexpected variety of rock structure.—Image transference, by M. Carey Lea. By image transference are here denoted curious effects produced on sensitive films, and specially interesting in connexion with the subjects of papers which appeared in the May and June numbers of the journal. In supplement to those papers the possibility is here shown of developing on a film of silver haloid a complete image, a print from a negative for example, without either exposing the silver haloid to light, or to the action of hypophosphite, or subjecting it to any treatment whatever, between the moment of its formation and that of its development. The film of silver haloid comes into existence with the image already impressed upon it.—The theory of the wind vane, by George E. Curtis. The author's theoretical studies lead to the inference that the oscillations of both spread and straight vanes are smaller as the vanes are longer and larger; that the spread is always more stable than the straight vane; and that this advantage in stability is greater for long than for short vanes, and is independent of the wind velocity,—On the manner of deposit of the glacial drift, by O. P. Hay. The author's studies of this great geological problem lead to the following conclusions: (1) an ice-sheet moving over a nearly level surface would possess far less abrading power than it would have while descending at a higher angle; (2) through subsidence of the glacial mass by the earth's heat and other causes a constantly increasing proportion of inert matter would collect in the lower-layers of the moving ice; (3) this accumulated material would tend to retard and finally arrest the motion of the lower portions of the glacier, and a permanent deposit would then be gradually made; (4) other detritus might accumulate at the foot of the glacier as a terminal moraine, and still other masses on the top of the already formed deposit when the glacier finally melted.

SOCIETIES AND ACADEMIES.

PARIS.

Academy of Sciences, September 5.—M. Hervé Mangon in the chair.—Photochronography applied to the dynamic problem of the flight of birds, by M. Marey. Having in a previous note shown that the kinematics of flight may be completely illustrated by photochronography, the author here proves that the same process contains all the elements necessary for solving the dynamic problem of flight; that is to say, for measuring the muscular forces and the work performed by the bird. Here is applied the mechanical principle that, if the mass of a body and the movements animating it be known, it is possible to deduce the value of the forces by which those movements are produced. On the photochronograph are measured all the displacements of the mass of the bird on the wing, together with the velocities of these movements. On the other hand the weight, that is, one of the forces to which the mass is submitted, is also known, while the resistance of the air, another of these forces, may be determined experimentally. Consequently the unknown quantity to be eliminated will be the muscular force of the bird with its momentum of action, and the value of its two components, one acting vertically against the weight, the other horizontally against the inert resistance of the mass and of the air. In these experiments the displacements of the bird are successively measured according to these two vertical and horizontal elements.—Measurement of luminous sensations in function of the quantities of light, by M. Ph. Breton. Since the invention of Bouguer's photometer it is known that if a dull white surface be disposed in contiguous zones receiving equi-different quantities of light, the perceptible contrasts between such zones are very far from being equal. To explain this phenomenon it has been suggested that the eye perceives the *relation* between two contiguous lighted surfaces. But the law (attributed to Fechner and Weber) based on this assumption—to the effect that, if several contiguous luminous surfaces are in geometrical progression, the sensations of the contrasts are equal—is shown to be incorrect by the experiment here described.—Observations of Brooks's new comet, made at the Observatory of Algiers with the 0·50-metre telescope, by MM. Trépied, Rambaud, and Sy.—Observations of the same comet made at the Observatory of Lyons with the 6-inch Brunner equatorial, by M. Le Cadet. The positions of this comet for August 29 and 30 and September 1 are also given from measurements taken by M. Gruey at the Observatory of Besançon. Its brightness is that of a star of the tenth magnitude.—Differential formulas for the variation of the elements of an orbit, by M. R. Radau. To correct a provisional system of elements it is often preferable to have recourse to the equations supplied by the ephemerides, rather than repeat the direct calculation of the elements. But the method is somewhat laborious, as the equations generally include six unknown quantities. The author, however, here shows that it is possible to give them a form in which the number of unknown quantities will be diminished without causing any complication in the calculation of the coefficients.—Note on M. Bertrand's problem, by M. Désiré André. A direct solution is given of this problem, followed by some remarks by M. Bertrand himself, pointing out its application to the question of chances in games of hazard as treated by Huygens, Moivre, Laplace, Lagrange, and Ampère. He offers a fresh solution of the problem: if a player stake the nth part of his fortune and continue the game indefinitely, what is the probability of his being ruined within a given number of rounds?

BOOKS, PAMPHLETS, and SERIALS RECEIVED.

A Revised Currency System: H. Bull (Hamilton).—Laws and Definitions connected with Chemistry and Heat: R. G. Durrant (Rivingtons).—Educational Ends: S. Bryant (Longmans).—*Challenger* Report, Zoology, vol. xx. (Eyre and Spottiswoode).—A Short Introduction to the Study of Logic: L. Johnstone (Longmans).—The Instability of Gold as a Standard of Value: H. Bull (Hamilton).—The Eruption of Tarawera, N.Z.: S. P. Smith (Wellington).—The Icerya or Fluted Scale (Washington).—U.S. Department of Agriculture, Division of Entomology, Bulletins No. 13 and 14 (Washington).—Kryptogamen-Flora von Schlesien, iii. Band, 3 Liefg. (Kern, Breslau).—Beiblätter zu den Annalen der Physik und Chemie, 1887, No. 8 (Barth, Leipzig).

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