

question as to the proportion of popularly elected managers which should act as bodies controlling the work of voluntary and denominational schools. The clause as amended provides that the management board of every public elementary school not provided by the local educational authority shall consist of four foundation or trust managers and two managers appointed by elected bodies. This principle has been accepted as part of the Bill. The discussion of the whole question of the machinery by which the managers of voluntary schools are to be elected has been postponed until the autumn session.

THE Ministerial changes consequent upon the resignation of Lord Salisbury, and the appointment of Mr. Balfour as Premier, involve a reconstitution of the representatives of the Board of Education in Parliament. Sir John Gorst, who has been Vice-President of the Committee of Council for Education since 1895, has resigned, and his office becomes extinct. The Duke of Devonshire remains Lord President of the Council, but ceases to preside over the Education Department. The newly constituted Board of Education has for its President the Marquis of Londonderry, who was chairman of the London School Board some years ago, and as Parliamentary Secretary Sir William Anson, member for the University of Oxford and a leading authority upon educational matters. The Duke of Devonshire will therefore no longer be directly concerned with departmental work in education, though he will have charge of the Education Bill when it reaches the House of Lords.

THERE is a feminine and a masculine type of mind. The former depends chiefly on memory and being reproductive; the other relies upon reasoning and being creative. The mind of the man of science is masculine, that of the clergyman is feminine. Not every woman possesses a feminine mind, though many men have little else. The whole of our education from top to bottom is essentially feminine, chiefly because in its origin and continuance it is clerical. Such are but a few of the opinions expressed by Mr. James Swinburne in an article on "Feminine Mind Worship" in the current number of the *Westminster Review*. The whole article is a powerful appeal for a fuller recognition of the value in education of a rational training in the methods of science, so that boys may obtain at school such a practical acquaintance with experimental physics and chemistry as will lead them to develop their reasoning faculties and endow them with those powers of initiative which are essential, since the whole welfare and existence of a commercial country like ours depends on the application of science and the work of the despised masculine mind. Mr. Swinburne's essay deserves to be widely read.

### SCIENTIFIC SERIALS.

*Bulletin of the American Mathematical Society* (2) viii. No. 9, June.—T. J. P. A. Bromwich, on the infinitesimal generators of parameter groups. The author gives a simplified method of calculating the generators of a group of known structure, and compares his results with those of Slocum (*Bulletin* for January).—E. V. Huntington, a second definition of a group. The definition is reduced to four independent postulates, to which a fifth must be added if a distinction is to be made between finite and infinite groups.—G. A. Miller, determination of all the groups of order  $p^m$ ,  $p$  being any prime, which contain the Abelian group of order  $p^{m-1}$  and of type  $(1, 1, \dots)$ .—L. E. Dickson, a class of simply transitive linear groups.—D. N. Lehmer, errors in Legendre's tables of linear divisors.—Reviews of Gray's "Treatise on Physics," vol. i., Cellérier's "Cours de Mécanique" (E. B. Wilson), and Kiepert's "Grundriss der Differential- und Integral-Rechnung" (E. W. Davis).

*Annals of Mathematics* (2) iii. No. 4, July.—H. S. White, note on a twisted curve connected with an involution of pairs of points in a plane.—R. E. Allardice, on some curves connected with a system of similar conics.—J. Westlund, note on multiply perfect numbers.—W. R. Ransom, a mechanical construction of confocal conics.—P. F. Smith, on Sophus Lie's representation of imaginaries in plane geometry. This is an interesting commentary on Lie's first paper, published in the *Transactions of the Academy of Christiania* in 1869.—G. A. Miller, note on the group of isomorphisms of a group of order  $p^m$ .—L. D. Ames, evaluation of slowly convergent series.

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### SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, June 19.—"On the Measurement of Temperature." Part i.—On the Pressure Coefficients of Hydrogen and Helium at Constant Volume and at different Initial Pressures. Part ii.—On the Vapour Pressures of Liquid Oxygen at Temperatures below its Boiling Point on the Constant Volume Hydrogen and Helium Scales. Part iii.—On the Vapour Pressures of Liquid Hydrogen at Temperatures below its Boiling Point on the Constant Volume Hydrogen and Helium Scales. By Morris W. Travers, D.Sc., Fellow of University College, London, George Senter, B.Sc., and Adrien Jaquerod, D.Sc. Communicated by Prof. William Ramsay, F.R.S.

Part i. (M. W. T. and A. J.).—The pressure coefficients were determined by measuring the pressure which the gases exerted when the bulb of the constant-volume thermometer was surrounded with melting ice, or with steam at the boiling point. The apparatus employed cannot be described in this abstract; it was completely constructed of soda-glass, and as all junctions were sealed in the blowpipe flame, leakage of the gas was impossible. By enclosing the manometer column and *dead space* between parallel glass plates in a water jacket, it was possible to measure the temperature of these parts of the apparatus to  $0^{\circ}02$  C. and thus eliminate errors which might seriously affect the results.

The pressure coefficient at an initial pressure of 700 millimetres in the case of either gas appears to have the value  $0^{\circ}00366255$ , which does not differ appreciably from that obtained by Chappuis for hydrogen at an initial pressure of 1000 millimetres of mercury. At a pressure of 520 millimetres no appreciable decrease in the value of the coefficient could be detected. As has hitherto been assumed, the pressure coefficient for hydrogen, and also for helium, appears to be independent of the pressure, so far as thermometric observations are concerned.

Part ii. (M. W. T., G. S. and A. J.).—Previous investigators have measured the boiling point and vapour pressures of liquid oxygen by immersing the thermometer in a mass of the liquid and measuring the pressure under which it was evaporating. This method is unsatisfactory on account of the difficulty of obtaining pure oxygen in sufficient quantity, and of the tendency of the liquid to become superheated.

In the experiments described in this paper, a bulb in which a small quantity of pure oxygen could be liquefied was immersed, together with the bulb of the thermometer, in a vacuum vessel containing liquid air or oxygen, through which a rapid current of air was passed. The bulb containing the pure oxygen communicated with the lower chamber of a barometer, so that measurements of the vapour pressures were quite independent of the atmospheric pressure.

Four thermometers were employed in these experiments, the capacities of the bulbs being approximately 90 c.c., 12 c.c., 26 c.c. and 27 c.c. The large thermometer was employed in one series of measurements only, as it was found to be difficult to maintain so large a bulb at a constant and definite temperature without employing very large quantities of liquid air. The temperatures obtained by means of the three smaller thermometers rarely differed by more than  $0^{\circ}03$  from the temperature, corresponding to the same pressure, taken from the smoothed vapour-pressure curve. The pressure on the gas at the ice point was in every case about 1000 mm. of mercury.

The thermometers were so constructed that the pressure on the gas could be measured independently of the atmospheric pressure. The temperature of the dead space was determined by means of a mercury thermometer, and the temperature of the vertical portion of the stem above the thermometer bulb was measured by means of an auxiliary gas thermometer, of similar construction, with a narrow cylindrical bulb of the same length as the stem. The coefficient of expansion of the glass was found to be  $0^{\circ}000284$  between  $0^{\circ}$  and  $100^{\circ}$  C., and  $0^{\circ}000218$  between  $0^{\circ}$  and  $-190^{\circ}$  C.

| Pressure in millimetres. | Vapour Pressures of Liquid Oxygen. |                              |       |
|--------------------------|------------------------------------|------------------------------|-------|
|                          | Temperature on hydrogen scale.     | Temperature on helium scale. |       |
| 800                      | 90°60                              | 90°70                        | 90°70 |
| 760                      | 90°10                              | 90°20                        | 90°20 |
| 700                      | 89°33                              | 89°43                        | 89°43 |
| 600                      | 87°91                              | 88°01                        | 88°01 |
| 500                      | 86°29                              | 86°39                        | 86°39 |
| 400                      | 84°39                              | 84°49                        | 84°49 |
| 300                      | 82°09                              | 82°19                        | 82°19 |
| 200                      | 79°07                              | 79°17                        | 79°17 |