

Annual income of parents	B ys		Girls		Total	
	No.	Per cent.	No.	Per cent.	No.	Per cent.
Less than £160 ...	604	82.1	1062	85.5	1666	84.2
More than £160 and less than £300 ...	99	13.4	151	12	250	12.6
Above £300 ...	33	4.5	31	2.5	64	3.2
Total... ..	736	—	1244	—	1980	—

Up to 1906 the council offered 1200 probationer scholarships, without income limit, of the value of 15*l.* a year, in addition to free education. These scholarships are tenable for one or two years, and are awarded on condition that the scholars undertake to enter the teaching profession on the completion of the scholarship course. During the year the council awarded 749 such scholarships, together with twenty-eight free places at secondary schools, to students residing outside the county. From 1907 provision will be made for the award of only 800 such scholarships, and the actual number awarded each year may not amount to this number.

The council awards 100 intermediate county scholarships annually to pupils between fifteen and seventeen years of age, tenable until the end of the school year in which the pupils attain the age of eighteen, with possibilities of extension for another year. During the year seventy such scholarships were awarded to boys (including twenty commercial intermediate scholarships) and thirty to girls. The scholarships consist of free education at a cost not exceeding 25*l.* a year, together with maintenance grants rising from 20*l.* a year to 35*l.* a year. The income restriction is 400*l.* a year. The commercial scholarships are tenable in the commercial department of the Camden or Hackney Downs London County Council secondary schools.

The council awards fifty senior county scholarships or exhibitions annually; they confer free education (not exceeding 30*l.* a year) and such maintenance allowance (not exceeding 60*l.* a year), at such rate and for such periods, not exceeding four years, as the council may in each case determine. They are tenable at such universities or university colleges as the council may from time to time approve for that purpose, not more than five such scholarships awarded annually being tenable for one year at the London Day Training College. The council has also at its disposal a certain number of free places for day students at schools of the University of London. As the number of applications was not so great as in previous years, the council awarded during the year thirty-nine senior county scholarships and exhibitions, together with fourteen free places at various colleges.

It is generally admitted that the scholarship systems, both of the late Technical Education Board and of the council, have been remarkably successful. The county scholarship system has really formed a ladder to carry promising scholars from the public elementary to the secondary schools, university colleges, and universities. That the council has secured able candidates for its scholarships is shown by the fact that each year the council's scholars have obtained scholarships in the universities or institutions of university rank. Five such scholarships were obtained at Oxford and Cambridge during the year under review, and many senior county scholars have obtained degrees with honours.

On the more technical side, exceptional distinction has been gained by scholars in research work, while others have obtained good appointments owing to their technical and artistic achievements.

By the regulations of the Board of Education a secondary school "must offer to each of its scholars an education of a wider scope and higher grade than that of an elementary school, and provide a progressive course of instruction (with the requisite organisation, teaching staff, curriculum, and equipment) in the subjects necessary to a good general education upon lines suitable for scholars of

an age-range at least as wide as from twelve to sixteen or seventeen. Provision made for scholars before the age of twelve must be similarly suitable, and in proper relation to the work done in the main portion of the school." The pressing need for further inducements and facilities for children to proceed to a secondary school after leaving the elementary school has long been recognised by the council, and by means of a system of scholarships a bridge by which even the poorest children may pass from the elementary to the secondary school has been provided. The course of instruction in secondary schools, approved by the Board of Education, is framed so as to lead up to a definite standard of attainment, and not to stop short at a merely superficial introduction to any branch of instruction.

Apart from the council's own secondary schools, there are a large number of secondary schools in respect of which the council makes both maintenance and equipment grants, and which are regularly inspected by the council's officers; the total number of such schools is now fifty-two. The total amount of grants made in respect of secondary schools for the educational year ending July, 1908, was 93,970*l.*

In accordance with a scheme approved by the late Technical Education Board in 1902, the annual grant of 10,000*l.* to the University of London, to be divided equally between the four faculties of arts, science, engineering, and economics, has been continued. In addition, annual grants have been made since 1895-6, together with occasional equipment grants, to four of the constituent colleges of the University, the council thereby obtaining the right to a certain number of free places.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

It is proposed, says *Science*, to collect 1500*l.* with which to purchase the valuable chemical library of the late Prof. W. O. Atwater, and present it to Wesleyan University, Middletown, Conn. The library contains more than 5000 volumes, including about 2500 volumes of periodicals.

Two courses for teachers, arranged in connection with the London County Council Education Committee, will begin at University College on January 23. Dr. Woodland will begin a course of lectures on "The Structure and Natural History of some Common Animals," and Dr. Fritsch will begin a similar course on "Fundamental Principles of Botany." On Tuesday, February 23, Prof. Pearson will deliver a lecture on "The Purport of the Science of Eugenics." This will be the first of a course of lectures on national eugenics, to be given on Tuesdays in the second and third terms, by Prof. Pearson, Mr. Heron, and Miss Elderton.

THE annual meeting of the Public School Science Masters' Association will be held at Merchant Taylors' School, Charterhouse Square, E.C., on January 12. In the morning, at 10 a.m., an exhibition of scientific apparatus and books will be opened, and at 10.30 a business meeting will be held. The president, Sir Clifford Allbutt, K.C.B., F.R.S., will afterwards deliver an address upon the relation of general to technical science teaching. At the close of the morning session Mr. M. D. Hill, of Eton College, will speak on anthropometry in schools. The afternoon meeting will be devoted largely to a discussion upon science curricula in public schools, and the debate will be opened by the following papers:—Mr. G. F. Daniell, on the report of the British Association upon the sequence of studies in science; Mr. W. D. Eggar, of Eton College, on geography considered as a science subject; Mr. R. G. Durrant, of Marlborough College, on to what extent and at what stage should prevalent views on the nature of solution be taught in schools; and Mr. G. H. Martin, of Bradford Grammar School, on science for the "classical side." At the close of the discussion, Mr. C. I. Gardiner, of Cheltenham College, will deal with the question of the refusal of the General Medical Council to recognise public schools as institutions where medical education can be commenced.

THE annual meeting of the Association of Directors and Secretaries for Education was held on January 1 in the council chamber of the London County Council, when an address on "The Finances of Education" was delivered by Mr. W. Avery Adams, chairman of the association and secretary to the Bristol Education Committee. In opening his address, Mr. Adams said that the scheme for raising the Bristol University College to the rank of a university, owing to the generosity of Mr. H. O. Wills, promises shortly to be carried into effect, thus securing for the west of England the same opportunities for intellectual and professional training as are available in other parts of the country. Alluding to the Scottish Education Act, he directed attention to the powers which are to be granted to school boards in Scotland to compel attendance at continuation classes up to the age of seventeen. If such a remedy for the educational leakage which now went on is practicable in Scotland, said Mr. Adams, surely it is not unreasonable to suggest that it is practicable in England. The principal theme of the address was the finances of education, and Mr. Adams insisted that one of the chief hindrances to progress is the financial strain now put upon the local education authorities (1) by the imposition on the part of the State of new and onerous duties; (2) by the continual growth of what may be termed the ordinary items of expenditure; and (3) by the failure of Whitehall to contribute a fair share of the total burden of the increasing cost. The development of our educational system, which has advanced enormously during the last six years, has also entailed a large annual increment to the rates; and, apart from what has already been accomplished, there are still many urgent educational reforms which would doubtless be undertaken by local authorities if it were not for the reluctance of Whitehall to bear a fair share of the cost involved in carrying out the improvements. Among these reforms may be placed:—(1) the reduction in the size of the classes; and (2) the replacement of supplementary teachers by certificated teachers. The Government grant in support of national elementary education is totally inadequate. In conclusion, Mr. Adams emphasised the fact that the exiguous grant given by the State to the local universities, which have now become an indispensable part of our educational system, is not creditable to a wealthy and progressive nation like ours. The outcry heard against the growing burden of the cost of education is not the expression of a spirit of grudge, but represents a fear that through inadequate Government support the schools may send forth scholars who will not be equipped properly for the warfare of life or for taking their part in the struggle which has to be made unceasingly for the maintenance of the commercial and industrial position of our nation.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, November 12, 1908.—"The Occlusion of the Residual Gas and the Fluorescence of the Glass Walls of Crookes Tubes." By Alan A. Campbell Swinton. Communicated by Sir William Crookes, F.R.S.

In a previous paper¹ the writer has described experiments indicating that the occlusion of the gas is due to its being driven into the glass, in which it forms bubbles on subsequent heating.

The present paper deals with Mr. Robert Pohl's suggestion that the bubbles are not due to the gas at all, but to chemical action on the glass, when heated, of aluminium disintegrated from the electrodes.

The author finds that after prolonged sparking portions of the internal surface of the glass of tubes with external electrodes consisting of caps of tinfoil show numerous but very small bubbles when heated. This, as it would seem, entirely disposes of Mr. Pohl's contention.

The electric discharges passed through the tubes were so weak that the heating of the glass was very slight. The temperature cannot thus have been sufficiently raised either to allow of the gas passing into the glass by ordinary diffusion, as suggested by Sir J. J. Thomson, or

of the gas being evolved inside the glass by chemical decomposition due to heat, as put forward by Mr. Soddy and Mr. Mackenzie.

Grinding away the glass to the extent just necessary to prevent the formation of bubbles on subsequent heating also showed that the depth to which the gas is driven into the glass varied from 0.0025 mm. for tubes with external electrodes to as much as 0.015 mm. with internal electrodes, the distances being in all cases considerably less—about one-tenth—than the distances between the surface of the glass and the centres of the bubbles produced by subsequent heating.

By means of a fluorescent screen placed behind a patchwork screen of different thicknesses of aluminium foil, it was ascertained that the maximum thickness of aluminium through which kathode rays will pass is about 0.014 mm., which agrees very fairly with the above-mentioned figure of 0.015 mm.

Thus neither the explanation of Sir J. J. Thomson nor that of Mr. Soddy and Mr. Mackenzie seem necessary, for the gas in the first instance travels into the glass only about the same distance that kathode rays penetrate into aluminium, and it is therefore reasonable to suppose that the gas is driven in mechanically according to the writer's original contention. Diffusion, however, probably takes place when the glass is softened in the flame, when the gas penetrates further and forms bubbles on cooling, in much the same way that air bubbles are formed in ice.

Experiments were also made on the fatigue of the glass in respect to fluorescence. Except in cases where this fatigue was due to deposits of electrode matter or of carbon, it was found necessary, in order to do away with it, to grind away a thickness of glass approximately the same as had to be removed to prevent the formation of bubbles on subsequent heating. It would therefore appear that fatigue is intimately connected with, and is perhaps the direct result of, the penetration and presence of the occluded gas. That part of this fatigue is very permanent is shown by a tube in the author's possession, which still shows fatigue due to bombardment it received in 1898. Though part of the fatigue is permanent, most of it is but temporary. This may be due to the gradual escape of such portion of the gas as has been driven into the glass only such a very short distance that the latter is unable permanently to retain it.

PARIS.

Academy of Sciences, December 28, 1908.—M. Bouchard in the chair.—The lava of the last eruptions of Vulcano, Eolian Isles: A. Lacroix. In the cases of Mt. Pelée, Vesuvius, and Etna it has been proved that in a given eruption any changes in the chemical composition of the lava are very slight, and are not systematic. Observations published by various authors on the products of the last eruption of Vulcano appear to lead to different conclusions. Various specimens of the lava from this eruption have been analysed, and the existence of such marked differences is not confirmed.—Some properties of the tubercle bacillus cultivated on bile: H. Calmette and C. Guérin. The authors are convinced that experiments in tuberculosis in which cultures in glycerol, gelatin, potato, or broth are used give different results from those of natural infection. They have found that the bacillus grows perfectly on pure bile with 5 per cent. of glycerin and sterilised, and after several successive cultures on this medium it acquires very distinct physiological characters. Full details are given of the mode of working and of the appearance and properties of the bacillus thus obtained. It is easily absorbed through the wall of the digestive tube, and when it has penetrated in sufficient quantity in this way it can create lesions with rapid calcification such as could never be obtained experimentally with cultures in ordinary glycerol media.—M. Villard was elected a member in the section of physics in the place of the late E. Mascart.—Concerning the distribution of the aphelia of the minor planets: Emile Belot. A diagram is given of the distribution.—The use of coloured screens and orthochromatic plates for the photographic observation of the fixed stars: Cesten Bergstrand. The combination of a yellow screen and an orthochromatic plate produces much greater clearness in the images, and also eliminates the

¹ "The Occlusion of the Residual Gas by the Glass Walls of Vacuum Tubes," Roy. Soc. Proc., A, vol. lxxix., pp. 134-7.