

ment appears somewhat paradoxical because it is generally put in the opposite sense in favour of elution chromatography. It may, however, be justifiable in respect of preparative gas chromatography since in this technique one of the greatest problems has been the separation of vapours at low partial pressures from large amounts of carrier gas, and it may be advantageous to avoid the use of a carrier in some circumstances. Phillips has separated hydrogen and deuterium on columns containing molecular sieve 5 Å. in a method which is effectively one of self-displacement. The order of elution is first hydrogen, second deuterium (the opposite to that obtained by Glueckauf and Kitt in their separations on palladium black) and the method is useful for removing small quantities of hydrogen from deuterium-rich mixtures. Up to 300 ml. of sample was passed into the column cooled in liquid nitrogen; the Dewar vessel containing the liquid nitrogen was gradually lowered and the sample itself displaced the hydrogen, which was then followed by the deuterium. At the end of each run the column was filled with deuterium and there was no need to remove this before admitting the next sample; there was thus no need for evacuation of the column or for a carrier gas. Tests showed that molecular sieve had no tendency to promote the formation of HD molecules.

Dr. P. G. Jeffery described the application of gas chromatography to the analysis of gases obtained from rocks and minerals. The rocks he had examined were mostly silicates and these yielded small quantities of carbon dioxide when boiled with dilute phosphoric acid. The reaction had been carried out in a 10-ml. flask on powdered samples of up to 1 gm., and the gas evolved was analysed on columns containing silica gel or activated carbon. The method enabled concentrations as low as 5 p.p.m. to be determined, or, on the other hand, enabled analyses to be made on very small samples, as, for example, when rocks had been hand-sorted under the microscope, if the concentrations were higher. The same method had been used for determining the carbon dioxide content and nitrous oxide content of monoethanolamine solutions. Attempts were also being made to determine the water which is present to the extent of 2–20 per cent in most rocks, either on the surface of the mineral grains, chemically combined, or as hydroxyl ions held by weak forces between the layers of

minerals with sheet structures. The water was driven off by fusing the sample in a silica tube with a suitable flux (for example, a 50/50 mixture of sodium tungstate and borax glass) at temperatures up to 700° C. In early experiments the water had been allowed to react with calcium carbide, but later it was found more satisfactory to determine it directly on a polyethylene glycol column. The method was calibrated by using samples of rocks containing known concentrations of water; in fact it had proved difficult to ensure the liberation of all the water from the samples and there were side reactions which removed water. Other gases, for example, helium from pitchblende, had also been determined by heating rock samples, and in this way hydrogen, helium, argon, oxygen, nitrogen and carbon monoxide had all been obtained from silicate rocks. The volume of the gases was greater than the free space and their presence could only be accounted for by some kind of adsorption. The novelty of this application of gas chromatography aroused considerable interest and many in the audience were intrigued by Jeffery's claim to have found hydrocarbons (even though only to the extent of a few p.p.m.) in granite.

The last paper of the meeting was given by Dr. R. P. W. Scott on resistance to mass transfer in capillary columns. Golay derived an expression for H.E.T.P. in terms of solute and column parameters, but experimentally it has been found that values of H.E.T.P. are significantly higher than those given by the equation. Khan suggested a theory to explain the difference in which he postulated another effect, the interfacial resistance to mass transfer. Scott had tried to determine the reality of this effect; the experiments and their mathematical analysis were designed to distinguish between the effects of all the factors taken account of in the Golay equation. A column consisting of 100 ft. of nylon capillary 0.020-in. diameter was used, and H.E.T.P.'s were determined at different film thicknesses (from zero upwards) and gas velocities for samples of *n*-heptane on dinonyl phthalate with argon as carrier gas. In this system Khan's factor was not found to be significant, but it might well be when a more polar solute is in question. What did appear to be a significant cause of departures from the Golay equation was a factor associated with the wall of the column, presumably adsorption. D. AMBROSE

VEB CARL ZEISS, JENA

GOLDEN JUBILEE OF WORK ON AIDS TO VISION

FOLLOWING a long period of scientific preparatory work the Zeiss Works at Jena organized, fifty years ago, the 'Ophthalmology' Department and began the manufacture of ophthalmic lenses, including specific types of aids to vision as well as ophthalmological instruments.

This article reviews the development of that Department during the past five decades and the considerable extent to which Jena instruments and aids to vision were able to share in the world's progress in ophthalmology and in the sphere of ophthalmic optics.

Despite their manifold drawbacks, the flat forms of spectacle lenses—bounded by like surfaces on both

sides—actually retained that form for more than a period of six hundred years; and this in face of the fact that meniscus-shaped lenses were suggested as early as in the eighteenth century and that time and again after 1800, W. H. Wollaston and L. J. Schlieiermacher in 1842 directed attention to the theoretical importance of rotation of the eye. A few firms produced plano-lenses and, in a few instances, even meniscus lenses on the strength of empirical experiments and, for the correction of astigmatic eyes, spectacle lenses with torical surfaces. However, mercenary motives proved strong enough to override any of these beneficial suggestions, thus permitting the inefficient equilateral lenses and cylinder lenses to hold their own.

Ernst Abbe, who himself wore spectacles with equilateral lenses, was very dissatisfied with this state of affairs concerning spectacle lenses. Yet, overburdened with other Zeiss problems, his illness and early death prevented him from devoting his full attention to the solution of the problem.

Moritz von Rohr, shortly after Abbe's death, energetically occupied himself with the problem. Aided by the suggestive and advisory assistance of Allvar Gullstrand, the Swedish ophthalmologist and Nobel Prize winner, known for his outstanding mathematical and optical talents, this work was considerably promoted. M. von Rohr, H. Boegehold and A. Sonnefeld provided the geometro-optical preliminaries for starting the production of the well-known 'Punktal' lenses of Carl Zeiss, Jena, and other aids to vision associated with them, including Katral lenses, telescopic spectacles, etc. (Although now retired, H. Boegehold and A. Sonnefeld are still active with the Jena Zeiss Works in a scientifically advisory capacity.)

The new point-focal depicting Zeiss spectacle lenses were for the first time put on the market on April 1, 1912. Unparalleled, the Zeiss 'Punktal' lens found open markets thenceforth throughout the world and earned the unqualified recognition of opticians and spectacle wearers. From that time on, often despite considerable visual afflictions, the 'Punktal' lenses afforded visual relief and improved vision to millions of people by helping to restore former working capacity up to old age. Rational and optically highly developed production methods initiated by R. Lincke provided a guarantee that, even on large-scale production, spectacle wearers could be sure of obtaining first-choice Zeiss spectacle lenses of an invariably high quality.

The Jena Zeiss Works also carried out pioneer work on spectacle frames ('Perivist' spectacles) and of specific types of visual aids (telescopic spectacles, reflector spectacles, contact lenses). After 1945, the Jena firm furthermore succeeded in crystallizing the scientific work on the aids to vision by the production of spectacles for kyphotic wearers, of 'Isopal' lenses, anterior-chamber lenses, corneal contact shells, etc. Work is thus still being carried out towards providing the spectacle-wearing public with still better and perfect aids.

Within the same fifty-year period (also as a result of Gullstrand's suggestions and of his co-operation with M. von Rohr), ophthalmologists were provided

with new instruments, under the supervision first of O. Henker and, later on, of H. Hartinger and F. Fertsch. The new instruments rapidly became internationally recognized and elicited many professional suggestions, which again resulted in the establishment of close contacts with eminent ophthalmologists throughout the world and in the design, as a consequence, of other new instruments for professional purposes. The 'Gullstrand' slit-lamp, built and progressively modernized in Jena, may be said to represent an indispensable asset in any ophthalmological consulting room. Further instruments which originated in the Jena Zeiss Works include the following: 'Vertex' refractionometer for measuring the refractive power of spectacle lenses; retinal camera, for the photographic reproduction of the fundus oculi; projection perimeter, for examining the visual field; coincidence refractionometer, for measuring imperfections in the refractive powers of the eye.

While in pre-war times Zeiss ophthalmological instruments held what may be claimed to be a monopoly in the world's markets, new production centres sprung up in many other countries afterwards and afforded to the Zeiss Works an opportunity of proving the worth of their instruments in sound competition. VEB Carl Zeiss, Jena, as a consequence, set up a production programme which practically covers the whole latitude of this particular class of instruments. In pursuance of this programme the Jena firm also developed the new retinal camera 'Retinophot', which permitted the colour-photographic reproduction of the fundus oculi, as well as the Hartinger coincidence refractionometer for measuring imperfections in the refractive powers of the eye, and the Hartinger recording adaptometer for determining the quantitative curve of dark-adaptation. The excellent performance of these instruments resulted in a considerable increase of production and exports to practically all countries in the world. Progressive research and development work justifies the hope that the VEB Carl Zeiss, Jena, will continue to contribute effectively towards the improvement of vision and will efficiently assist ophthalmologists and the optical trade in fighting eye diseases and visual defects.

The June number of the *Jena Review* will publish special articles concerning the fifty-year history of Jena aids to vision and ophthalmological instruments.

AUGUST SONNEFELD

SCIENTISTS IN GOVERNMENT SERVICE

THE ninety-fifth report of the Civil Service Commissioners covers the period April 1, 1960, to December 31, 1961, and future reports will cover the calendar instead of the financial year*.

Much of the detailed information has been relegated to statistical tables which in the present report cover both 1960 and 1961. Recruitment to the administrative class of the Home Service and the senior branch of the Foreign Service is regarded as being specially encouraging: since 1955-56 the numbers of candidates competing and of recruits appointed, especially by Method II, have been rising, and, in

* Report of Her Majesty's Civil Service Commissioners for the period 1st April, 1960, to 31st December, 1961. Pp. v + 50. (Ninety-fifth Report.) (London: H.M.S.O., 1962.) 4s. net.

1961, 447 candidates competed by this method, of whom 38 were successful for the administrative class and 27 for the Foreign Service; the indications are that this will continue to be the more popular method. During the period the upper age-limit for candidates in the normal competitions for the administrative group of appointments was raised from 24 to 28, and the Commissioners, in conjunction with the Treasury, have reviewed the means of publicity used in the modern universities to bring Civil Service posts to the notice of students of good quality. Besides continuing to give serious consideration to the problem of attracting more competitors from universities other than Oxford and Cambridge, the Commissioners have