antidote for the deadening influence of the machine. In the latter portion of his address Lord Sydenham emphasised the importance of a more general knowledge of science, especially amongst members of the Government and the Civil Service, and alluded to the efforts made by the Guild in the dissemination of scientific knowledge and methods. He concluded by quoting Goethe's saying that "there is no more dreadful sight than ignorance in action."

Lord Sydenham then introduced the president-elect, Lord Montagu of Beaulieu, who delivered an address on "Some National Aspects of Transport," and after-wards occupied the chair. Lord Montagu remarked upon the growing difficulties of railways, which, although subsidised by the State, were working with a diminishing margin of profit owing to the vast increases in cost of materials and in wages. Some of the largest tramway systems, such as the L.C.C. in London, were incurring actual loss, and a general increase in fares and rates seemed inevitable. Some economies might be achieved by more scientific methods of handling traffic and the elimination of competition, but the saving from this source appeared relatively small. The possibilities of road transport, therefore, assumed importance. Already the comparative cheapness of short-distance road-borne traffic had deprived the railways of much revenue. Existing roads, however, were unfitted to bear very heavy mechanical traffic. On a tar-macadam road the tractive force was 40-45 lb. per ton, three times the force on rails, and on bad roads up to 100 lb. per ton may be needed. In the pre-railway period roads carrying metal tracks 2 ft. wide were constructed for carts carrying coal, minerals, etc. It might be feasible to lay such a plateway from London to Birmingham with a tractive force of only 20 lb. per ton. The cost of a double track would be about the same as for a single line of railway, as gradients up to 30:1 could be used. The cost of operation would be on a smaller scale than on railways, and goods could be delivered direct from door to door. The idea could be extended to other large towns, and it was conceivable that overhead roadways, for the exclusive use of fast-running vehicles, might be made from the suburbs. The creation of such routes would lead to a material increase in the value of property through which they passed, and part of the cost might be met by a local transport benefit tax, applied in such cases.

Lord Montagu also referred briefly to other possible developments, such as the use of the airship for long distances and aeroplanes for shorter services, and the possible use of gas suction plant for propelling locomotives, motor-lorries, and ships, and of benzol and alcohol in the internal-combustion engine.

In view of the national importance of these problems, the creation of a chair of transport at one of the leading universities would be a deserving object for private beneficence. The two Institutions of Civil Engineers and Mechanical Engineers should be more frequently consulted by the Government in regard to road transport, and the National Physical Laboratory had done excellent work. The problem, however, was so vast as to demand continuous research at a special establishment.

The adoption of the annual report of the Executive Committee was proposed by Lord Bledisloe, and seconded by Sir Gilbert Parker, both of whom are vice-presidents of the Guild. A cordial tribute was paid to the valuable services I ord Svdenham had rendered to the Guild during his tenure of office, and both speakers expressed the general appreciation of Lord Montagu's acceptance of office as the new president.

The report, summarised by Lord Bledisloe, dealt with various aspects of the work of the Guild. The

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second British Scientific Products Exhibition, held in 1919, was honoured by a visit from both King George and Queen Mary, accompanied by Prince Henry and Princess Mary, and demonstrated the growing appreciation by British manufacturers of the value of applied science. During the present year it is hoped to arrange a conference on science and labour in association with the Labour Party. A representative committee is being set up to collect full data on the utilisation of science, not only in the Civil Services. but also in all Government Departments, and the Parliamentary Committee, which has already intervened with good effect in the Forestry Bill, will watch all prospective legislation involving scientific and technical issues. The Education Committee of the Guild is still pressing for a real survey of the existing provision of university and higher technical education in the country, considering that the new Standing Committee on University Grants, acting under the Board of Education, is inadequate as regards composition and reference. The revised specifications of the Technical Optics Committee in regard to microscopes have already been adopted by two British firms.

The adoption of the report having been carried unanimously, the proceedings were terminated by a vote of thanks to the Master and Wardens of the Goldsmiths' Company for permission to hold the meeting in their hall.

Annual Visitation of the Royal Observatory, Greenwich.

DURING the war this annual function was restricted to the official visit of the members of the Board. It has now returned to the conditions that prevailed many years ago, a large and representative gathering of astronomers and their friends being present on Saturday, June 5, to take part in the inspection of the observatory and instruments.

The return of many members of the staff who had been at the Front has naturally brought about a large increase in the number of observations. Those made with the transit circle exceed eight thousand in each element. In addition to the customary observations of sun, moon, planets, and clock-stars, the observing list now includes the stars selected by Backlund and Hough as secondary standards distributed with fair uniformity over the sky. Observations for this cata logue will be completed at the end of 1921.

The error of the moon's place in longitude for 1919, as predicted in the Nautical Almanac, was -12.26'', showing a notable diminution of nearly 2" from the value for the three preceding years. The Astronomer Royal explains that this change is due to the omission in Hansen's tables of several sensible planetary terms. In view of the imperfections of these tables, it is satisfactory to note that Brown's new lunar tables have now been printed and are used in the Nautical Almanac, starting with the year 1923.

Two of the equatorials are now out of use. The 28-in., the mounting of which dates from 1851, requires renewal of the upper pivot; this work has been entrusted to Messrs. T. Cooke and Sons. The driving clock of the astrographic equatorial was sent to Sir H. Grubb for repairs, which are still in progress. The observations of double-stars made with the 28-in. since its erection have been discussed by Mr. Jackson, who has published more than twenty new orbits in the Monthly Notices for March and April last. Fuller details of these and other systems will be printed in the Greenwich annual volumes. There are many systems for which orbits cannot vet be deduced, but where relative motion is shown; hypothetical parallaxes are being deduced in these cases, recent research having proved that such parallaxes are of considerable value for statistical purposes; they are, indeed, as trustworthy as those directly measured when the latter are of the order of oo2''.

The photographic determination of parallaxes with the 26-in. photographic equatorial has been resumed, and twenty new parallaxes have been determined with an average probable error of 0-008". It is anticipated that in future forty new parallaxes will be determined annually. The plan adopted for the measurement of the star images on the eclipse plates (that is, the preparation of a key plate with reversed images, which is placed film to film with the plates to be measured) is now being adopted for the parallax plates. Instead of producing the key plate by photography, short lines will be ruled on a glass plate in a north-and-south direction corresponding with the positions of the stars on each set of parallax plates.

A few photometry plates of the Kapteyn selected areas in N. decl. 30° have also been taken.

Two Star Catalogues are in process of being printed, viz. the zone catalogue of stars down to the 9th magnitude in N. decl. 24° to 32°, and the propermotion catalogue of stars near the North Pole (vol. iii. of the Greenwich Astrographic Catalogue).

The proper motions of the stars in both these catalogues have already been discussed in several papers in the Monthly Notices.

The reduction of the solar photographs fell into arrears owing to the impossibility of transmitting plates from India and the Cape to fill the gaps in the Greenwich series. Work is now being pushed on as rapidly as possible, and has been brought up to the middle of 1917. There were considerable solar outbursts in August and March last, both accompanied by magnetic storms, but the general spot activity is now on the decline.

The Astronomer Royal makes allusion in his report to the successful result of the eclipse expeditions of 1919. Transparencies from the plates secured then were on view, and showed both the star images and the splendid prominence 300,000 miles in length which was on the sun's eastern limb.

It is proposed to repeat the investigation of the starshift at the eclipse of 1922 September 20. According to present plans, Messrs. Jones and Melotte will observe it from Christmas Island, Indian Ocean. They will use the astrographic, mounted equatorially, discarding the cœlostat, which is a source of trouble in work where great refinement is needed. Plans have been mooted for utilising the presence of the instrument in low latitudes to take a series of plates with the view of linking together the northern and southern magnitude scales.

The mean magnetic declination for 1919 is 14° 18.2'; it is diminishing about 9.6' annually, so that it should reach zero about the end of the century.

As regards the weather of the twelve months ended on April 30 last, it is interesting to note that the period October-November was the coldest for eighty years, while the period December-April was the warmest for eighty years. This accounts for the exceptionally early appearance of the blossoms, which was three weeks in advance of the average.

The daily sunshine register has been supplemented since last January by a small fixed camera pointing to the pole, which records trails of circumpolar stars throughout the night, forming a gauge of the clearness of the sky.

The reception of wireless time-signals from Paris, Nauen, Lvons, and Annapolis now forms part of the daily routine. The times of their reception will be printed in the Greenwich volumes, and will be available for longitude determinations. It has lately been

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announced that the Lyons signals can be read at Adelaide, so that it is hoped that improved values of the Australian longitudes will shortly be available.

The Astronomer Royal notes the loss that the observatory has sustained in the recent retirement of Messrs. Maunder, Thackeray, and Hollis, and expresses warm appreciation of their long and zealous services.

Applied Statistics.

J T is only twenty-five years since Prof. Karl Pearson gave at University College, London, his first course of lectures on the mathematical theory of statistics, and the opening at University College, London, on Friday, June 4, of the handsome building provided by the generosity of Sir Herbert Bartlett, Bart., for the Department of Applied Statistics, including the Galton Laboratory and the Drapers' Company Biometric Laboratory, marks another stage in the progress of what is more than a new branch of science, for there is scarcely a single field of scientific work in which the fundamental importance of the methods of research which have been developed by Prof. Pearson and his pupils has not been recognised.

The Drapers' Company in 1902 was the first to provide funds to carry on research work in what was then known as the Biometric Laboratory, and is now appropriately called the Drapers' Company Laboratory, and its annual grants have been continued up to the present time; while nine years later Sir Francis Galton bequeathed the residue of his estate to the University of London for the establishment of the Galton professorship of eugenics. Sir Francis expressed the wish, however, that so far as possible the capital of the endowment should be preserved intact, and the University accordingly issued an appeal for the building and equipment of a Francis Galton laboratory. Immediately afterwards Sir Herbert Bartlett offered to provide a building for both the Galton and Biometric Laboratories.

The building was nearly ready for occupation when, on the outbreak of war, not only had it to be given up for use as a military hospital, but also the voluntary services of the staff of the laboratories were offered to and accepted by the Government. In the early days of the war hundreds of diagrams were prepared weekly of the extent of unemployment in all the important towns of Great Britain, and when unemployment ceased to be a serious problem the laboratories were engaged in statistical inquiries into the seasonal use of shipping and rates of exchange and in investigations into aeroplane propeller stresses and ballistics. The computation of sights for various types of machine-guns to be used against low-flying German aeroplanes was carried out by very strenuous and continuous labour in six weeks.

One result of the delay in completing the equipment of the building is that funds which were insufficient in 1014 are now wholly inadequate, and this splendid building can only be partly used. Equally essential is the provision of funds for the salaries of the staff, and it is estimated that to complete and maintain the equipment of the new building and to carry on and develop the work of the laboratories in accordance with the intentions of its founders there is required an additional income of 50001. a year. The Senate of the University of London has accordingly authorised an appeal for this endowment.

At the opening ceremony, at which Dr. Russell Wells, the Vice-Chancellor of the University of London, presided, Dr. Addison, Minister of Health, said that his work in the Ministry of Munitions had