

of about the same date, such as seems to have been in use in most Roman kitchens. It is of coarse white ware, roughened on the inside with grit. It bears the stamp of the maker—Albinus of Lyons. Samian ware, so-called, is represented by, among other pieces, three bowls and some fragments of the more elaborate decorated work. There are several of the leather soles of the Roman shoes which are frequently found in London in a good state of preservation. Pottery forms a large proportion of the medieval exhibits; but there are also examples of tradesmen's tokens, bronze 'jettons' or 'casters', used in keeping accounts and making calculations in the Middle Ages, wine bottles, and other domestic objects, including examples of the familiar clay smoking pipes of the seventeenth and eighteenth centuries.

University of Prague

DR. GUSTAV ORTNER, of the Institut für Radiumforschung, Vienna, writes in connexion with the paragraph on the future of Czechoslovakia in *NATURE* of October 8, p. 637, that it gives an inadequate idea of the historical development of the universities in Czechoslovakia. He continues, "the University of Prague [was] founded by the German Emperor Karl IV in 1348 and so is the most ancient German university. It was only in the course of the nineteenth century that lectures in Czech were given and in 1882 an independent Czech University was separated off from it. In 1920 the ancient name of 'Karl-Universität' of the German University was transferred to the Czech University. . . ." Obviously it was not possible to go into details in a brief paragraph, but the facts were correctly given. It is true that Charles IV (Karl in German, Karel in Czech) was not only king of Bohemia but Holy Roman Emperor as well, yet it was as king of Bohemia that he founded the University of Prague, and the 560th anniversary of his death was celebrated there on November 27. The Czech character of the University was emphasized by his son, Wenceslas IV, in a special decree in 1409. The University of Vienna dates from 1364, and that of Leipzig from 1409, having been founded in Saxony as a challenge to Prague at a time when Czech was used as well as Latin, which was naturally the main literary language there as everywhere at that time. Thus, the University of Prague is the oldest in Central Europe, but by its foundation it cannot be considered a German university. From 1620 until 1882 it was styled the Charles-Ferdinand University. Afterwards Prague had two universities, the Charles (Czech) and the Ferdinand, or now simply, German University. Another correspondent refers at length to a number of distinguished Prague biologists and the mathematician, Bolzano, not mentioned in the further article, in *NATURE* of November 26, p. 942.

Mathematical Films

THERE has been a considerable increase of interest recently in the use of films for mathematical teaching. The *Mathematical Gazette* of October 1938 and the *American Mathematical Monthly* of the same month both contain reviews of such films, but the majority

of the films mentioned are not available in Great Britain. Mr. B. G. D. Salt, of 5 Carlingford Road, Hampstead, N.W.3, sends us a list of five films that are now available and can be obtained from him. Two of these are geometrical, dealing respectively with the theorem of Pythagoras concerning right-angled triangles, and with the sum of the angles of a triangle. Two others deal with differential equations, by a method devised by Robert Fairthorne, one for the differential equation of free harmonic motion, and the other for harmonic motion when the vibrations are forced. The principle for free vibrations was explained in *NATURE* of October 24, 1936, and that for forced vibrations is somewhat similar. These four films occupy one reel each.

THE fifth film, entitled "A Hypocyclic Motion", which shows much more than its title suggests, is sold divided into three short reels. In reel 1, a rigid bar moves with its end on two fixed straight lines. The instantaneous centre of rotation traces out the body and space centrodes, and it is shown that the motion can be produced by the body centrode rolling on the space centrode. In reel 2, points on the circumference of the rolling circle trace out diameters of the fixed circle, showing simple harmonic motion. The motion is also shown to be derivable by another epicyclic motion. In reel 3, we have an ellipse described as in the tool known as the elliptic chuck, also Oldham's Coupling, and the four-cusped hypocycloid. Finally, the reel shows the generation of an envelope by a moving line. The two geometrical films are on 16 mm. only, but the other three can be obtained on 35 mm., 16 mm., or 9.5 mm. There is still considerable doubt as to the part that films should play in mathematical education. The Mathematical Association has set up a film sub-committee to consider the subject. Anyone who has suggestions to offer, especially suggestions for specific films, should send them to Miss M. Punnett, 17 Gower Street, W.C.1. Approved suggestions will then be passed on to the manufacturers.

British Bird Song Survey

THE preliminary report on the first year's record of the bird song survey in the British Isles, carried out under the auspices of the British Trust for Ornithology during August 1937–August 1938, states that some eighty observers took part and there are records of the song period of the mistle-thrush from 52 localities, the song thrush from 76, blackbird from 74, chaffinch 63, yellowhammer 35 and skylark 48. Sussex and Cheshire were well covered, but there were only two sets of records from Ireland, three from Scotland and one from Wales, and none from Cornwall, Dorset, Lincolnshire, East Yorkshire, Durham, Northumberland, Stafford, Shropshire or Hereford. 10–15 per cent of the records were very incomplete, being made over less than nine months, and scarcely a quarter of the observers lived in the country and could listen to bird song throughout the day. One observer suggests that by no means all the male birds of even these common species sing at all, so that future observations are to give close

attention to this point. The cold spring no doubt reduced bird song considerably in some localities. Several of the best-filled forms came in from clergymen, but fortunately a greater list of observers has been obtained for the repeat of the survey now under progress, especially from Ireland. Most parts of England are fairly well represented. A good many observations, however, have been kept by people whose weekday hours of observation are very limited, especially during the short winter days.

Agricultural Meteorology in India

IN the report of the Agricultural Meteorology Section, India Meteorological Department, for the period August 22, 1935–March 31, 1937, it is stated that after reviewing the work done during the first three years of the scheme, the Imperial Council of Agricultural Research communicated to the Government of India a resolution to the effect that the Agricultural Meteorology Section should now become one of the permanent activities of Government, and that proposals for giving effect to this resolution are now under consideration by the Government of India. Work on the experimental or biological aspects of agricultural meteorology, and the maintenance of co-operation with agricultural institutions and workers in India, have been the principal concerns of the section during the period under review, the biological work being carried on mainly at the Central Agricultural Meteorological Observatory at Poona. Among subjects of research were the invisible condensation of water vapour on the soil at Poona, made evident by the decrease during the night in clear weather of water vapour in the layers of air just above the bare ground and by the increase of surface soil moisture to a maximum just before sunrise without visible deposition of dew. It was found that of all samples of soil tested, the black cotton soil of India was, when desiccated, the most efficient absorber of moisture. Researches carried out into the cooling of the earth's surface and of the lower layers of the atmosphere at night in clear weather led to the discovery that at Poona in winter the air temperature has a minimum some distance above the ground. The radiation received from the sun and sky on unit area of a horizontal surface near the ground was measured by means of a Moll solarigraph, and from the records obtained a diagram was constructed showing the intensity of the radiation at different hours of the day in different months.

Uni-directional Lighting on Roads

THE increasing use of double carriage-way arterial roads has given new problems to the street lighting engineer. Some of these are discussed in a paper on the revealing power of street lighting installations read by J. M. Waldram to the Illuminating Engineering Society on November 8. On a double carriage-way road where each carriage-way carries traffic proceeding in one direction only, an ordinary street lantern throws much of its light in the direction where it may be doing no good, that is, in the same direction as the traffic flow. This light is not only wasted, but sometimes also does harm by lighting up vertical

surfaces and reducing their contrast against the bright background of the road surface. Elimination of light sources not actively producing road brightness, should result in a great increase of comfort to the drivers. The G.E.C. Research Laboratories have evolved a system of uni-directional lighting which they have tested on the carriage-way of the Great Chertsey Road in the Twickenham area. On this road the standards exist on a double staggered formation; the height of the lantern is 25 ft. and the average spacing of the standards about 189 ft. Each lantern was equipped with a 250-watt horizontal burning lamp and was uni-directional. Both visibility and revealing power were found to be very good. Driving in the opposite direction on the other carriage-way, the road lighted with back cut-off lanterns disappeared completely. Traffic moving on it could be distinguished quite easily by the vehicle lights, but apart from this the impression produced was that of driving down a single carriage-way road with no traffic in the oncoming direction. The back cut-off lanterns on the other carriage-way were completely invisible. The conclusions drawn are that it is practicable to light a 'one-way' road with lanterns giving light only in the direction opposed to the traffic. An installation of this nature saves 50 per cent of lamp wattage.

Loud-speaker Systems on Railways

LOUD-SPEAKER systems are being installed on an ever-increasing scale on railway platforms. A critical discussion of them by O. Vogel and K. Rothe is given in the second number for 1938 of the quarterly *Review* published by Siemens and Halske. Until quite recently, orders were shouted to the shunters by the shunting foreman or optical signals were employed. But these methods had certain drawbacks. Shouting was the most satisfactory, partly because it is independent of weather or illumination but mainly because it is heard by the shunters in any position. The transmission of orders by means of loud-speakers is an improvement as it ensures a uniform distribution of ample acoustical energy over the entire shunting yard, and all the requirements of safety and speed are satisfied. The old but satisfactory method of calling out times of departure in railway station waiting-rooms could never be entirely replaced by means of optical devices. The introduction of loud-speaker systems has now supplemented optical train indicators very helpfully and these devices are at the same time available for many other kinds of announcements. The authors also discuss portable loud-speaker systems suitable for race-courses, etc., where the normal traffic is small. To ensure the complete success of a stationary system, it is necessary to study the local conditions in every case. In halls, waiting-rooms and corridors, difficulties are often encountered owing to echoes.

Thickness of Metal Walls

A PAPER by B. M. Thornton and Prof. W. M. Thornton, upon which written discussions are to be sent to the secretary of the Institution of Mechanical Engineers before January 31, 1939, gives a method