Research Items.

Bird Song and Weather.—Changes in weather, and especially sharp frost or snow, influence the amount of bird song, but the influence is different upon different species. H. G. Alexander has made careful observations of the effect of decided spells of hard weather upon birds in Birmingham (*British Birds*, Sept., p. 97). Frost reduces the amount of song, and effects especially the ground-feeding species, such as skylarks and thrushes, but cold winds have the same effect upon more arboreal feeders. Some species respond vocally to sunshine, like the coal-tit, and some are encouraged by rain, like the blackbird. It is suggested that sunshine or rain may affect favourably the food supply of these birds and thus may induce song, but rain stimulates blackbirds more than either thrushes or robins, although the food is very similar. There may be curious idiosyncrasies in the behaviour of closely related species. The song-thrush, the author says, sings in the early morning, and from late November onwards in favourable weather; the blackbird is rarely heard until February, and most of its early song is in the afternoon. Perhaps the 'song' means something different for the two species—more of a normal outlet for surplus energy for the song-thrush, more of a love song for the blackbird.

Nitrogen Content of Apples in Storage.—Pilling and Pearsall point out (Annual Report of the Agricultural and Horticultural Research Station, Long Ashton, 1930) that until now very little attention appears to have been paid to the changes in protein content in apples during storage. In view of the fact that such proteins, an essential protoplasmic constituent, form no less than 2 per cent of the dry matter of the apple, any considerable changes are likely to affect very seriously the continued life of the apples. Their preliminary observations, carried out in connexion with the fruit storage experiments at Long Ashton, seem to open a fruitful line of attack. During storage protein decomposition ensues, and the products—presumably after passing through amino nitrogen and ammonia nitrogen stages—accumulate as 'rest N' compounds of unknown origin and composition. An interesting result of this preliminary work is the fact that break-down in every case investigated seems to occur when the 'rest N' reaches a proportion of more than 17 milligrams per 100 grams of fresh weight.

Properties of the Earth's Crust.—The Geophysical Supplement to the *Monthly Notices* of the Royal Astronomical Society, vol. 2, No. 8, June 1931, contains four seismological papers, and one on forced tides in rotating rectangular basins of uniform depth (S. F. Grace). H. Jeffreys gives new determinations of the times of transmission of P and S waves at short epicentral distances, and E. Tillotson discusses the data for a 1923 earthquake originating in Yugoslavia, and finds that the travel times for P agree best with Jeffreys' tables; he also makes estimates of the thickness of the various layers near the surface, and of the energy of the earthquake (10^{21} ergs). R. Stoneley also discusses the thickness of the continental layers of Europe, from seismic data. H. Jeffreys in a theoretical paper examines the cause of the oscillatory movement in seismograms; in a homogeneous elastic solid an impulsive disturbance is not drawn out into a train of waves. The paper shows that the continuous variation of the earth's elastic properties with depth would not draw out the disturbance into an oscillation, nor can the mutual gravitation of the oscillating medium, nor friction and scattering, have this effect. The only suggestion that survives is that the oscillations are due to reflections of the original pulse within the surface layers, with partial reflection into the lower layers at each arrival at the interfaces.

The Guayra Falls of the Parana.—The Guayra Falls, a few miles above that town on the upper Parana river, have been known since the sixteenth century but have been seldom visited. In the September number of *Discovery*, Mr. E. C. Rashleigh gives an illustrated account of these falls, which, he claims, have the greatest flow of any falls in the world. There is a total drop of 373 feet in about thirty miles, and while no single fall exceeds 130 feet and no sheer leap is more than 65 feet, the volume and speed of the water make up for lack of height. Above the falls the river is 2½ miles wide, but the gorge below the falls is only eighty yards in width. The flow of water above the falls has been measured and averages 500,000 cubic feet per second, while in flood time it may be 1,000,000 cubic feet. This compares with 212,000 cubic feet at Niagara and 100,000 cubic feet at Paulo Affonso on the Rio São Francisco, which would appear to be the largest two of other falls. A Brazilian commission estimated the horse-power of the Guayra falls at 6,000,000, but Mr. Rashleigh points out that if it were possible to divert and canalise the whole river so as to utilise the total drop of 373 feet, the horse-power in flood season would amount to 174,000,000.

Ultra-Violet Window Glass.—Many of the glasses which have been produced capable of transmitting ultra-violet light of wave-lengths between 320 and 280 micro-millimetres, which are the most active therapeutically, deteriorate in their transmission on exposure for a few months to sunlight. The same effect is produced by exposure for a short time to a source, such as the quartz mercury lamp, richer in ultra-violet light. The August issue of the Bureau of Standards *Journal of Research*, Washington, contains a paper by Messrs. A. Q. Tool and R. Stair describing their experiments on the restoration of the transmitting power of such glasses by heating them in an electric furnace to definite temperatures for longer or shorter times extending to several days. They find that the colour of the glass disappears and the transmission is restored as the heating proceeds. At temperatures below 300° C., though the colour disappears, the transmission is only restored for the longer waves, and a temperature of 500° C. is necessary before it is restored for the shorter waves. The restoration is the more rapid the higher the temperature, but de formation of the glass begins about 600° C.

A New Electron-Inertia Effect.—In Maxwell's "Treatise on Electricity and Magnetism", he described three inertia effects which should exist in conductors, such as metals are now imagined to be. Two of these have been verified experimentally, in particular by Barnett and by Tolman, and in the *Philosophical Magazine* for August (p. 349) Prof. Barnett describes the observation of the third. It consists essentially in the angular acceleration of a coil of wire when the current through it is altered; the free conducting electrons are accelerated in one direction, and the coil itself accelerated in an opposite

© 1931 Nature Publishing Group

sense. The apparatus needed is naturally very sensitive, but was already set up in almost the requisite form for an investigation of the Einstein-de Haas effect of rotation by magnetisation. The minute twist imparted to the coil could be measured either by balancing it against another couple applied by the action of a second coil on permanent magnets attached rigidly to the main coil, or by the direct observation of the deflection, the former method proving the more accurate. The results show that the carriers of electricity have a negative charge—from the sense of the deflections—and that the ratio of charge to mass for the conducting particles is close to that found for electrons by other means, the best value obtained for the ratio being $1{\cdot}74 \times 10^7$ e.m.u., and the standard value $1{\cdot}77 \times 10^7$ e.m.u.

Accuracy obtainable with Gas-filled Photoelectric Cells.—In the *Scientific Proceedings* of the Royal Dublin Society for May, Dr. W. R. G. Atkins publishes a useful and interesting paper describing experiments on the accuracy obtainable with gas-filled photoelectric cells. The question arose in connexion with experiments made to determine by means of photometers the light penetration into sea water. Two cells, a gas-filled cæsium hydride cell and a gas-filled potassium hydride cell, were tested. The former was tested for constancy of emission after the glow discharge had been passed momentarily. It was found that when the anode potential was maintained at 143 volts, a variation of about 33 per cent occurred. Immediately after the glow discharge the sensitivity decreases about 2 per cent per minute, but after a time it begins to rise. The potassium cell was tested for constancy of emission in a similar way, and the variation was found to be within two per cent with a current of about five microamperes, the anode potential being 59 volts. At 166 volts the constancy appears to be somewhat less. The rate of decrease of sensitivity after the glow amounts to about 2 per cent at 166 volts and more than 3 per cent at 59 volts. It is therefore advisable to make measurements immediately after the discharge, which should be of momentary duration only. The potassium cell gives results which can be relied upon to within 2 per cent for post-glow readings for currents at least as great as five microamperes. The results refer to measurements made within a short period of time, and offer no evidence as to the constancy or inconstancy of the cell over long periods.

Astronomical Topics.

The Total Eclipse of the Moon on Sept. 26.—The second total lunar eclipse of the year is visible in England in circumstances closely similar to those of the eclipse of April 2. In each case the first contact of the shadow is about the time of moonrise, but as the moon is five degrees farther north on this occasion, the conditions at the end are slightly more favourable. Totality begins at $19^h\ 5^m$ U.T. ($8^h\ 5^m$ P.M. Summer Time), and lasts $1^h\ 25^m$. The moon leaves the umbra at $21^h\ 42^m$ U.T.; the shading of the penumbra remains fairly obvious for some minutes longer.

Total eclipses afford opportunity for observing the occultation of faint stars, which cannot be seen near the moon at other times. In fact, the best determinations of the moon's diameter are those derived from occultations during eclipses.

The study of the colours on the eclipsed moon is full of interest; they vary in different eclipses, and even in different parts of the disc. It is chiefly the lower layers of the terrestrial atmosphere that are effective in bending the sunlight that falls on the eclipsed moon; these layers vary greatly in transparency according to meteorological conditions. Hence, study of the moon reveals the integrated effect of the weather in the regions of earth that have the sun and moon on their horizon at the time. For most of totality the western part of this region will lie in the Atlantic Ocean.

Occasionally lunar eclipses are used for observing faint comets that cannot be seen in a moonlit sky; but it does not at present appear that this eclipse will be of use in this way

It is of some interest to note that the small solar eclipse of Sept. 12, visible in Bering Straits, was the last eclipse of a series in the Saros cycle; one member of that series was the eclipse of May 3, 1715, when the sun was totally eclipsed at the Royal Observatory, Greenwich, for $3^m\ 12^s$. Flamsteed noted that the "weather was perfectly clear for the whole eclipse".

The Recent Opposition of Eros.—*Astr. Nach.*, No. 5815, contains notes by Prof. J. Hartmann and M. Dartayet on the observations of Eros made at La Plata early in the present year. The times of the exposures of the photographs were electrically recorded to one-tenth of a second. No screening of the planet was necessary, as its light did not differ much from that of the comparison stars. A series of photographs were taken at zenith distance 75°, to check the refrangibility of the planet's light; those for obtaining the parallax were at Z.D. 65° to 60°. 359 plates were taken near the meridian, which will be useful for deducing the mass of the moon. The planet and neighbouring stars were observed with the transit circle on eleven nights.

Plates for the investigation of the light-variation were taken on March 10, 21, and 25. The plates on the first night cover almost the whole of the light-period of $5\frac{1}{4}$ hours, in which there is a double maximum and minimum. The light range on the first two days was about three-tenths of a magnitude; on March 25 it did not exceed two-tenths. The times of maximum and minimum conformed well with the formula given by Rolf Müller in *Astr. Nach.*, No. 5768.

Perseid Meteors Observed in America.—The United States have a very active body of meteor observers, under the direction of Dr. Charles P. Olivier, director of the Flower Observatory, and author of a well-known text-book on meteoric astronomy. A bulletin from Science Service, Washington, D.C., dated Aug. 17, reports that the weather was unfavourable in the eastern States, but that successful observations were made at 47 stations in the United States and Canada. These are enough to prove that the maximum was quite a good one: "the rate after midnight rose to two per minute, which is well over the average. . . . Many brilliant meteors accompanied the shower."

As there is likely to be a good display of Leonid meteors about Nov. 17, it is desirable that as many observers as possible should co-operate. Those to whom such work is new should make themselves acquainted with the methods of observing them.

© 1931 Nature Publishing Group