

one of the difficulties to be overcome was the absence of direct shipping, which necessitated the transport of material through the tropics by way of Panama. However, the British Consular Service rendered invaluable assistance and willingly undertook the shipping of consignments from Chile and their transhipment to New Zealand boats at the Panama Canal; this system has worked admirably. The researches in Chile were carried out in collaboration with Bro. Claude Joseph (who had been undertaking researches on behalf of New Zealand for some time), at Temuco and in the surrounding Araucanian territory. Bro. Joseph has taken a supply of *Elaphroptera dimidiata* to France in the hope that it may prove effective in the control of the European cockchafer (*Melolontha melolontha*).

### Correlation of Meteorological Data

IN a recent publication, Sir Gilbert Walker discusses certain meteorological and solar statistical relationships worked out by E. W. Bliss (*Mem. Roy. Met. Soc.*, 4, No. 36). Many years have elapsed since the work of Teseirene de Bort and Hildebrandsson showed that there are regions where the changes of certain meteorological elements are correlated with the changes in the same or different meteorological elements in places so far distant that the discovery of the connexion came as a surprise, and seemed to open up prospects of a greatly increased understanding of the workings of the general circulation of the earth's atmosphere. The work has had practical results in seasonal weather forecasting, for example, in the predictions of the character of the Indian monsoon organised by Sir Gilbert Walker, but has thrown very little light on the physics of the general circulation. So far from providing important generalisations such as would simplify the study of world meteorology, it has resulted in an enormous number of statistical relationships from which cause and effect can seldom be disentangled.

Sir Gilbert's present paper is an attempt at arriving at more definite ideas about the relationships of three important groups of action centres which have been called the North Atlantic, the North Pacific and the Southern oscillations. Each oscillation is defined as the algebraic sum of the deviations of meteorological elements at a number of places in or near the area from which it derives its name. For the North Atlantic, the pressure difference between the Azores and Iceland, and consequently the intensity of the 'westerlies' of that ocean, is an important ingredient in the oscillation. Tables of correlation coefficients are given between the values of the oscillations in individual seasons and pressure, temperature and rainfall at places widely distributed throughout the world, and between the oscillations themselves. As sunspots are believed to be related to the energy radiated by the sun, and it is this energy that maintains the general circulation of the earth's atmosphere, coefficients are also given between the figures for sunspot activity and those for the three oscillations.

The tantalising nature of the results obtained in such studies is well illustrated by the existence of a correlation coefficient of +0.84 between the winter and subsequent summer values of the Southern oscillation. This degree of connexion is remarkable for meteorological conditions separated by an interval of half a year, but the result has not so far been explained on any physical basis.

### University and Educational Intelligence

CAMBRIDGE.—The Rockefeller Foundation has given £500 to the Molteno Institute of Parasitology for the purchase of instruments and for assistance in connexion with investigations to be carried out by Prof. D. Keilin.

The Goldsmiths' Company has presented £12,500 to increase the endowment of the Goldsmiths' professorship of metallurgy. The original offer of £10,000 has been increased to the larger sum in view of the fall in rates of interest.

The Gordon Wigan prize for chemistry has been awarded to Mr. T. P. Hoar, Sidney Sussex College, for a thesis entitled "On the Mechanism of the Corrosion of Iron and Steel".

THE twelfth annual vacation course in spectroscopy, interferometry, nephelometry and refractometry will be held on March 30–April 5, at the Zoological Institute of the University of Jena. Further particulars and a syllabus of the course can be obtained from Messrs. Carl Zeiss, Ltd., Mortimer House, 37–41, Mortimer Street, London, W.1.

THE Board of Education is prepared to consider applications for full-time studentships from teachers with at least five years' teaching experience, who desire financial assistance to follow courses of advanced study at universities or other institutions at home or abroad. Particulars of the awards and application forms are obtainable from the Board of Education, Whitehall, S.W.1.

THE sixth annual list of holiday courses in Europe has been prepared and recently published by the League of Nations' Institute of Intellectual Co-operation, acting under the recommendation of the Directors of National University Offices. The list is very comprehensive but only includes those courses which are open to foreigners. Such details as are available are given with each course, together with descriptions of certificates, etc., awarded, facilities for travelling and residence, and names of officials to whom to apply for further information. The pamphlet is published in English, French and German. The English edition can be obtained from Messrs. George Allen and Unwin, Ltd., 40 Museum Street, London, W.C.1 (price 2s.).

### Calendar of Nature Topics

#### Spring Wheat

Great Britain expects at least twice the yield per acre of wheat that the great producing areas of the world obtain, and distinctly more than the average yield of France and Germany, because the climate is admirably suited to the production of heavy yields. Only Belgium and Denmark obtain greater returns per acre. High yields in Great Britain are associated with the distributed rainfall and long period of growth obtained by autumn sowing. Spring sowing, on the other hand, is the practice in countries having severe winters and hot summers, while elsewhere the use of quickly maturing varieties is necessary when only a few months of the year are really favourable to the growth of wheat. A short growth period is associated with a low level of yield. In the ordinary

way, spring-sown wheat is rare in England and is only grown because some circumstance has interfered with sowing at the normal time. This spring, however, it is to be expected that more wheat will be drilled than usual. The crop now stands in a relatively favourable position to the other cereals since the price is known in advance. Early maturity is the important quality in a spring wheat and special varieties, usually French, are used. The ordinary autumn wheats are not suitable, but one of them, Little Joss, is exceptional in this respect and has quite a good reputation as a spring wheat. In order to give a return approaching that of the ordinary wheat, the spring sown crop requires every help that a mellow and fertile seed-bed can provide, and if these conditions can be secured in February the better the prospect for the crop.

#### The Mole's Winter Store of Earthworms

In the middle of last century Edward Jesse, in his "Gleanings of Natural History", first published the story that, during the winter, moles (*Talpa europæa*) form underground chambers in which earthworms are stored, so mutilated that they cannot escape; but the belief seems to be widespread amongst mole-catchers. On the other hand British naturalists have generally thrown doubt upon the story, regarding it, like Barrett-Hamilton, as "a result of imagination rather than an invention", supported by "no trustworthy evidence". But good evidence did exist even when Barrett-Hamilton wrote. In 1886 Fr. Dahl recorded that he had found in a mole's fortress as many as 1,280 earthworms stored up in the nest-cavity and in the adjoining runs, where they were firmly embedded in the mud walls in small groups of about ten in number; and in 1891 Prof. Ritzema Bos recorded that in February he had received about 300 earthworms found in a mole's fortress. In both cases the worms were damaged: Dahl regarded the damage as being due to forced cramming into the wall; Bos described in careful detail that the mole had bitten off from three to five of the foremost segments of each worm; that the wounded fore end had been covered by a new skin, but no other regeneration had taken place, perhaps because the winter temperature had been too low for this vital process.

#### Experimental Evidence of Storing by Mole

If further testimony to a remarkable habit was necessary, it has been provided by the experiments of Magnus Degerbøl with a mole he kept in captivity for about six months during the winter of 1922-23. When the mole was supplied with more worms than it could eat, and the earth in its box was only a few centimetres deep, it scraped aside the earth in one corner, seized a worm, crammed it into the hole to the accompaniment of a crunching noise, and finally covered it up with earth which it patted into firmness with its snout. Ten worms were thus buried, and when Degerbøl retrieved them he discovered that one or more of the anterior segments had been bitten clean off. When deeper earth was placed in the box so that the mole could make runs below the surface, it carried the worms below, burying 49 large individuals in 40 minutes. When the runs were dug out the worms were found half coiled and embedded in the walls, a thin layer of earth separating each two worms; fourteen had their foremost segments bitten off, a single one had its hind segments nearly bitten off, and 34 were unhurt. This was the only occasion

on which Degerbøl found the anterior end undamaged, and he attributed it to the embarrassment of the mole at the overwhelming supply of worms, a condition of affairs not likely to arise in natural conditions. The mole touched the surface of a worm with its snout before deciding which was the fore end.

#### The Purpose of the Mole's Store

As to the purpose of these stores, the existence of which can now be accepted, more information is required. The general idea is that they form a reserve of provender laid by to serve when food becomes scarce in hard weather. But Jesse stated that the basins "appear to be formed in the winter and to have the chief supply of worms deposited in them during the spring months", and Dahl found that the stores were greatest after a prolonged frost—periods at which a true winter store would be at a low ebb. May it be that the storing impulse is not seasonal, and that the size of the store after frost depends either upon the ease with which worms are caught in cold weather, as Dahl suggests, or upon the slowness of regeneration of the tip in cold weather, so that the worms cannot escape so quickly, as suggested by Degerbøl? Some mystery still surrounds the mole's stores, but simple field observations which could be carried out now and during the spring ought to solve the problems.

#### Spring Increase of Planktonic Diatoms

The latter part of February may show the beginning of the spring maximum of planktonic diatoms in the sea. All-important as food for the small floating animals—especially the larvæ of Crustacea, worms, molluscs and echinoderms which hatch out during and after this large outburst—the diatoms every year multiply in huge numbers during the spring, dwindling again later after depletion by the hordes of creatures feeding on them. In some years this diatom maximum may be early, in other years late, but it always occurs between February and April inclusive.

In 1932 the maximum occurred in the English Channel near Plymouth in March. On March 21, at a point several miles outside the Eddystone Lighthouse, the following diatoms in order of abundance were mainly responsible for the large numbers:—*Coscinodiscus granii*, *Bacillaria paradoxa*, *Skeletonema costatum*, *Chaetoceros sociale*, *Coscinodiscus concinnus*, *Thalassiosira gravida*, *Biddulphia regia*, *Biddulphia sinensis*, *Thalassiothrix nitzschoides*. Most of these species are common members of the spring plankton in these regions, but it is unusual to find *Bacillaria paradoxa* so far from the coast in such huge numbers; and the presence of the two *Biddulphia* species at this time of the year in profusion is abnormal, their usual season being late summer, autumn, and the early winter months.

#### March Winds

The traditional breeziness of March is expressed in numerous proverbs, and in the French Revolutionary Calendar of 1793 the period February 19–March 20 was the month *Ventôse*—'windy'. At Kew Observatory the average wind velocity in March is greater than in any other month, though only slightly exceeding that in February and April, but the impression of windiness is probably to a large extent subjective, resulting from a combination of causes. The relative humidity is decreasing rapidly, giving the air a brisk drying quality, and the mud of

February turns to dust, which is stirred by the breeze. The warming of the ground makes the lower air unstable, sometimes forming small dust-whirls. The broken clouds appear to drift rapidly, forming a 'windy sky'. Boisterous weather is not expected to last throughout the month, however, and it is proverbial that "if March comes in like a lion, it will go out like a lamb".

## Societies and Academies

### LONDON

Royal Society, Feb. 16. P. M. S. BLACKETT and G. OCCHIALINI: Some results of the photography of the tracks of penetrating radiation. About 500 photographs have been taken of these tracks, using an automatic method by which the passage of the particles through two counters causes the expansion to occur. The most striking feature of the results is the extraordinary variety and complexity of the multiple tracks, some of which show more than twenty separate tracks. An analysis of the nature of the particles producing these tracks leads to the conclusion, already put forward tentatively by Anderson (*Science*, Sept. 9, 1932), that some of the tracks are due to particles with a positive charge, but with a mass comparable with that of an electron rather than with that of a proton. These 'positive electrons' seem to be produced during the nuclear collision processes giving rise to the showers. W. E. GARNER and H. R. HAILES: Thermal decomposition and detonation of mercury fulminate. Single crystals of mercury fulminate have been heated in vacuum at temperatures between 100° and 150° C. and a detailed examination made of the decomposition which ensues. In vacuum the thermal decomposition passes into detonation at 105°–115° C. The conditions which govern the inception of detonation have been investigated. The thermal decomposition occurring below the ignition temperature occurs in three stages: (1) a quiescent period during which there is a slight browning of the crystal, the decomposition being mainly superficial; (2) a period of acceleration of the rate of reaction; and (3) a region where the equation of the first order applies. These results have been interpreted as due to the commencement of thermal decomposition in the Smekal cracks of the fulminate crystal and the spread of the reaction to crystallites isolated by the destruction of the cementing material. The critical increment of the thermal reaction is approximately 30 k. cal. C. R. BAILEY and A. B. D. CASSIE: Investigations in the infra-red region of the spectrum. (8) The grating spectrometer previously described has been applied to certain bands in the infra-red spectra of sulphur dioxide, carbon disulphide, and ozone. The upper limit of resolution at which the spectrometer has been used corresponds to a slit width containing some 2 cm.<sup>-1</sup>. As a consequence, a previously unsuspected Q branch has been revealed in one of the sulphur dioxide bands, which makes it certain that this molecule is an isosceles triangle with a vertical angle of 120°. The structure of ozone is briefly discussed, but sufficient evidence is not available for a definite conclusion.

### PARIS

Academy of Sciences, Jan. 9 (*C.R.*, 196, 73–143). L. LECORNU: The variable rotation of a solid of revolution. C. MATIGNON and M. SÉON: The action

of steam on hexane. Description of experiments on the reaction between hexane and variable proportions of steam at 1050° C. in the presence of zirconia as catalyst. The main products were hydrogen and carbon dioxide. Similar results were obtained when benzene was substituted for hexane. LUCIEN DANIEL: The modifications of the reserve function in various plants when submitted to intermittent watering. P. DUBREIL: Mixed total intersections in three dimensional space. S. BANACH and S. MAZUR: The linear dimension of functional spaces. J. SCHAUDER: Linear partial differential equations of the elliptic type. CAIUS JACOB: A mixed problem in the circular ring. J. COLOMB: The Amsler planimeter. Corrections and additions to work on the same subject by Resal. POL RAVIGNEAUX: A new apparatus for calculation with slide rules. G. P. ARÇAY: The influence of vibrations on the rate of chronometers. CONSTANTIN WORONETZ: The influence of temperature on the stability of gyrotory movements of fluids. J. DUFAY: The brightness of the extragalactic nebulae and the absorption of light in the Milky Way. S. SOBOLEFF: A problem of the diffraction of waves. R. DE MALLEMANN and P. GABIANO: The magnetic rotatory power of chlorine and of hydrochloric acid gas. The atomic rotation of chlorine gas is about ten per cent higher than that found in the vapours of chlorine compounds: the value for hydrogen chloride is five per cent higher than the sum of the atomic rotations of its constituents. NY TSI-ZE and CHIEN LING-CHAO: The influence of pressure on the photographic sensibility to various monochromatic radiations. The influence of pressure on the photographic sensibility varies greatly with the wave-length and decreases as the wave-length decreases. Mlle. SUZANNE VEIL: The rhythm of crystallisation caused by the diffusion of alkaline carbonates in gelatine. E. CARRIÈRE and Mlle. CARLINI: The decomposition of thiosulphuric acid in dilute solution at the boiling point. The products of decomposition were sulphur dioxide, sulphur, sulphuric and pentathionic acids. Mlle. A. PINGUET: Oxyallantoin. PARISELLE and BARBIER: Contribution to the study of the cadmium tartrates. P. CARRÉ and D. LIBERMANN:  $\alpha$ -Phenyl- $\gamma$ -oxybutyric acid and its lactone. WIEMANN: The synthesis of vinylpropenylglycol. MME. RAMART-LUCAS and Mlle. WOHL: The colour and structure of amides. The study of the absorption of substituted amides leads to the conclusion that an amide, in the liquid or dissolved state, is a mixture of two isomers in equilibrium, amide and iminoalcohol. MME. BRUZAU: The spontaneous resolution into active isomers of 4-methoxy-methyldeoxybenzoin, C<sub>6</sub>H<sub>5</sub>.CH(CH<sub>3</sub>).CO.C<sub>6</sub>H<sub>4</sub>.OCH<sub>3</sub>. F. ROMAN and M. GAUTIER: The presence of a Bathonian pyritic level in the region of Rar-el-Maden, near Nemours (Oran). IDRAC: An apparatus capable of measuring and recording vertical submarine and sublacustral currents. J. DUCHÉ: Obtaining clones with fixed properties in the Actinomyces. J. MILLOT: The systematic position of the spiders of the genus *Liphistius* according to their internal anatomy. RAYMOND-HAMET: The variability of the effects of sparteine on the intestine in situ. PHILIPPE FABRE and PIERRE FAIDHERBE: The constancy of the limiting slope, inverse variations of the chronaxy and of the linear constant in the course of electrotonus of the nerves. Z. M. BACQ and V. HENRI: A spectroscopic proof of the formation of substances by the stimulation of the cardiac nerves. G. SANDULESCO, WANG WEN TCHUNG and A. GIRARD: Contribution