Research Items

Earliest known Miracle Play. Mr. T. H. Gaster describes in *Folk-Lore*, vol. 44, pt. 4, what he believes to be the text of a mumming play or representation in action of a ritual poem from cuneiform tablets found at Ras Shamra. The text, written in a very obscure proto-Semitic dialect, describes a combat between two gods, which it is suggested was recited by priests while a religious pantomime represented the action. As the tablets date from the middle of the second millennium B.C., if this interpretatien is correct, this would certainly be the oldest extant text of a miracle play. The text describes what is apparently a ritual combat between summer and winter which is familiar in primitive and popular seasonal ritual from many parts of the world. One of the gods is Aleyan-Baal, god of rains and verdure, and the other Mot or Death, god of aridity and blight. The poem opens at the point where Mot has ousted Aleyan-Baal from his dominion. A new king is chosen and his accession to the throne is described. Through the intervention of Anat, the virgin war goddess, Mot is routed, his royal garments torn from him, he is stabbed and gashed, cast into streams, fished out and finally given dominion over the underworld. Aleyan-Baal is restored, the earth revives, sanctuaries are built in his honour, fires are lit for six days, and sacrifices offered. In Syria, Mot, although corresponding to winter elsewhere, would be the period of drought in the summer, when all vegetation dies, and the return of Aleyan-Baal would take place with the coming of rains in the autumn. It is probable, therefore, that the festival at which the pantomime was performed took place at the 'New Year' in September. The details of the poem correspond with the pattern of the ritual adopted throughout the world in ceremonies of 'Expelling the Death'.

The Alizarin–KOH Method of Staining Vertebrate Skeletons. An abstract of a preliminary note on this subject, by Mr. M. Rahimullah and Prof. B. K. Das, appeared in Nature of February 4, 1933, p. 171. The authors now send their published account (*J. Osmania Univ. Coll.*, Hyderabad, Deccan, 1, 1–3; 1933), illustrated by photographs of successful preparations. There is nothing of importance in this paper that is new, for the method is fairly generally used in Great Britain and in the United States, and adequate accounts are published in Gatenby's edition (1928) of Bolles Lee's "Microtomists Vade-mecum", and in the *Museums Journal*, 28, No. 11, 1929. The *Museums Journal* article, by Peter Gray, states that the alizarin–KOH method is not suitable for small fish. It has, however, been used with success for very small fishes by Parr and by Gloria Hollister in the United States, and by the writer of this note in Great Britain, the process often being complete in a few days. Gray records alternative alcohol-alizarin methods, which are probably more suitable for permanent preparations of larval fishes. He acknowledges his indebtedness to Mr. H. W. Parker of the British Museum (Natural History), who was probably the first to perfect the alizarin–KOH method in Great Britain. To the former abstract of the note of Rahimullah and Das it may now be added that, if the soft parts are to be dissected away from the stained skeleton, care must be taken to avoid excessive maceration in the KOH solutions. A skeleton so prepared must be kept in a sealed jar of fluid (glycerin or xylol is suggested) and is not suitable for handling. The authors emphasise the necessity for prolonged hardening in alcohol before using the KOH solutions.

Burmese Earthworms. In a paper recently received, Mr. G. E. Gates continues his researches on Burmese earthworms, reporting on a large collection which has been carefully gathered from many little-known regions ("The Earthworms of Burma." III. The Megascolecinæ. *Rec. Indian Mus.*, **34**. Part 4. Dec. 1932). 192 pages are taken up with this sub-family alone and there are more than fifty species of the genus *Pheretima*. Interesting facts are shown in *Pheretima alexandri*, which is usually heavily parasitised by both nematodes and gregarines or by large numbers of spherical or ovoid cysts in the anterior portion of the body, especially in the seminal vesicles, the dorsal surface of the pharynx and the dorsal blood vessel, and part of the intestine. It is found that abnormalities occur in these parasitised worms in connexion with secondary sexual characters as distinct from the gonads, the worms being quite normal externally and of the usual size. The author states that the development must have progressed normally up to or nearly up to the time when the secondary organs began to develop, the cause of the abnormalities not being embryological but something that must be looked for in much later stages. The subject is an interesting and important one and would probably lead to valuable results if studied in detail. It is unfortunate that most tropical earthworms can only be obtained in certain seasons; for a considerable portion of the year they cannot be found, the period of drought extending in Burma from November well into June.

Ghost Moths of Australia. The Hepialidæ or ghost moths comprise some of the most archaic of all moths and occur in greater abundance in the isolated continent of Australia than in any other region of the globe. They include some of the most gigantic and also some of the handsomest of known moths, while as caterpillars they are mostly subterranean in habit or form galleries in trees. In order to obtain a true conception of the family, therefore, the Australian forms are of prime importance. Mr. Norman B. Tindale, of the South Australian Museum, has undertaken their revision and the results of his studies are in course of publication in the *Records of the South Australian Museum*. Up to date, Parts 1 and 2 have been issued during 1932 and 1933: these are well illustrated and are accompanied by careful diagrams of the venational and other characters of each genus.

Root and Crown Rot of Peonies. An article on "Control of Crown and Root Rot of Peonies in America" on p. 114 of the *Gardeners' Chronicle* of February 17 summarises a paper by Nellie A. Brown in the American Peony Society's Bulletin. Hot water treatment of peony roots has been used to combat eelworm, but will also control crown and root rot and Lemoine disease. Roots are submerged in water at a temperature of 120° F. for half an hour, but it is advisable to cut out rotten portions so far as practicable. Very severely diseased plants may require treatment in two successive years, but this would disturb the plants more than most gardeners would desire.

The Limits of the Antarctic. The limits of antarctic regions have frequently been discussed. One boundary that has found some acceptance is that of floating ice, which with certain deviations makes the parallel of lat. 60° S. the approximate line. Supan suggested the mean isotherm of 10° C. of the warmest month, but inasmuch as that includes the forests of Fuegia within antarctic regions it is clearly unsuitable. Nordenskjöld, laying greater stress on the mean temperature of the coldest month, found a boundary nearer to lat. 50° S. than 60° S. and excluding all Fuegia. The mapping of the antarctic convergence in the waters of the Southern Ocean by *Discovery II* may furnish the best boundary. This change in water conditions was noted in a recent lecture to the Royal Geographical Society by Mr. Dilwyn Jones. It is the junction of the cold heavy antarctic surface water and the warm but more saline sub-antarctic surface water. The *Discovery* found that it was easily detected in all longitudes by a sharp change in temperature accompanied by corresponding climatic changes, almost equivalent to passing from winter to spring. Biologically, the convergence separates the area of *Euphausia superba* to the south from *E. Valentini* and *E. longirostris* to the north. The line runs for the most part in the latitude of about 50° S. but dips to below 60° S. in the longitude of Cape Horn.

Mexican Earthquake of January 14, 1931. Prof. J. Lacoste has made a careful study of the records of this earthquake (Pub. Bureau Cent. Séis. Intern., Monographs, fasc. No. 5, 3–58; 1933), and has prefaced it with a valuable list of 276 Mexican earthquakes during the years 1905–30. The majority of these earthquakes originated in three submarine zones, the centre of the first being in lat. 12·5° N., long. 90° W., of the second and more important in lat. 16° N., long. 97° W., and of the third in lat. 34° N., long. 118° W., all three lying along a band passing through the Acapulco Deep. The earthquake of January 14, 1931, occurred at about 6.55 p.m. and was recorded at all stations throughout the world. The shock, which lasted four minutes, destroyed completely the city of Oaxaca. Prof. Lacoste places the epicentre in lat. 15° 30′ N., long. 96° 25′ W., belonging therefore to the second of the above zones, and lying to the east of the Acapulco Deep, near the isthmus of Tehuantepec. To determine the depth of the focus, he uses Berlage's method based on the interval that elapses between the arrival of the first wave and that of the same wave reflected at the surface. The average of seven estimates is about 45 km. or 27 miles.

New Method of Photographic Photometry. In ordinary photographic photometry, the blackening of the plate is determined by passing a beam of light through the plate and measuring the absorption. A number of microphotometers have been devised for doing this. Brentano, Baxter and Cotton have recently described measurements of the light scattered by the silver particles in the photographic image (*Phil. Mag.* (Supplementary Number), February). In the experiments described, the test plates were made by exposure to X-rays, and for small densities the proportionality between X-ray exposure and scattered light was very close. Much smaller densities may be examined by this method than by absorption microphotometry, and it is therefore interesting to find that no threshold value was found for X-ray exposure before proportionality set in. The method seems very suitable for the photometry of X-ray reflections obtained in the rotation, powder, and Laue examination of crystals, for the proportionality between scattering and exposure enables the photometer to make an automatic integration of the effect over an appreciable area. It seems best to have a fine-grain emulsion and a filtered red light in the scattering photometer, using the light scattered in the range 6°–15°. Scattering from the surface of the emulsion and particularly from scratches is a serious complication, and it was found an advantage to cement a cover glass over the emulsion to reduce this scattering. The authors say that the accuracy obtained may be as good as 0·2 per cent of the limiting blackening for which proportionality can be obtained.

Attempt to Detect a Neutral Particle of Small Mass. Chadwick and Lea have recently published the negative result of an experiment designed to examine the possibility that the continuous β-ray spectrum is accompanied by the emission of penetrating neutral particles (*Proc. Camb. Phil. Soc.*, 30, Part 1). The energies of these particles might be distributed in such a way that they combine with those of the β-particles to form a constant energy of disintegration, a low energy β-particle being associated with a high energy 'neutrino'. A strong source of radium D + E + F (radium E gives a well-marked continuous β-ray spectrum) was placed near a high-pressure ionisation chamber and an absorption curve was taken with lead screens. The radiation was all identified with the radium E and polonium γ-rays. If neutral particles are emitted, it is calculated that they cannot produce more than 1 ion pair in 150 kilometres path in air. A consideration of the possible nature of the particle shows that, if it exists, it must have small mass and zero magnetic moment.

Movement of Flame in Firedamp Explosions. The Safety in Mines Research Board has recently published Paper No. 82 entitled "The Movement of Flame in Firedamp Explosions" by H. F. Coward and R. V. Wheeler. The paper begins with the simplest type of firedamp explosions and goes on to more complicated cases. The scheme of the paper is that of giving the theory first and then of illustrating it by the results of various experiments. The introduction reminds us that "the lower and upper limits of inflammability of firedamp in air are roughly 5 and 14 per cent of firedamp, and that in a 9·5 per cent mixture, the so-called 'theoretical mixture', the firedamp and oxygen are in the proportions required for their complete combustion on explosion". After considering the general theory the paper goes on to discuss the propagation of flame in plain tubes, first as a uniform motion, secondly as a vibratory motion, and then describes the effects of narrow tubes, perforated plates and other types of constriction. The authors point out that the speed of propagation of a firedamp explosion may vary from zero to approximately 2,000 yd. per second, and the paper concludes with a warning that although a thorough knowledge of the theory of the subject is most helpful in interpreting any colliery explosion, the underground conditions, which in a colliery are usually exceedingly complex, must be thoroughly studied before attempting to apply the theoretical considerations set forth in this pamphlet.