

Research Items.

THE MOCK KING AT THE NEW YEAR IN EGYPT.—The December issue of *Ancient Egypt* has as a frontispiece a reproduction of the only illustration extant, fortunately preserved by Rifaud, showing the figure of the mock king degraded as *Abu Nerus*. The only account of this curious survival is given by Dr. Klunzinger in his book, "Upper Egypt: its People and its Products," published in 1878. On the tenth day of September, the first day of the Coptic solar year, each little town chooses from among its own members a king whose rule lasts through a festival of three days. During this period all official rule is abrogated and rigorous criminal investigations are held by the mock ruler, in which heavy penalties are inflicted even on the highest officials, and immense taxes are imposed. Both penalties and taxation are remitted for bakhshish. At the end of the three days the mock king is condemned to death and he (*i.e.* his clothes) is executed by burning. The illustration shows that this festival took place at the date harvest. Sir Flinders Petrie, in a note on the illustration and Klunzinger's account, refers to a title of the XIIth Dynasty, "New Year King of all the Nobles," which was borne by the highest nobles, and points out that this office, which the form of the title shows to have been annual, would indicate that the New Year King was a survival of an age much earlier than dynastic rule. It was a relic of an earlier kingship of prehistoric times and allowed a semblance of the ancient rule to the nobles of the old race, just as the king of the Saturnalia at Rome preserved among the enslaved aborigines a memory of their former liberty.

NEW CORBICULÆ FROM URUGUAY.—The genus *Corbicula* has a special interest for the student of post-Tertiary geology inasmuch as though now a southern form, it originally in both hemispheres ranged farther north, inhabiting Britain and Siberia in one, and attaining to Nebraska in the other. The American forms differ from the European in that the former have a slight palial sinus, which is wanting in the latter, and have been placed in a separate subgenus, *Neocorbicula*, by Fischer. Dall, however, has sought to revive Férussac's name of *Cyanocyclus*, which was only a synonym for *Corbicula*. Mr. W. B. Marshall in this respect has followed Dall when describing an interesting series of *Corbiculæ* from Uruguay (*Proc. U.S. Nat. Mus.*, vol. lxvi. art. 15). Altogether eight new species are described and well illustrated, whilst a most useful list of the seventeen previously described American species, with the original references, is appended.

CINCHONA AND IPECACUANHA IN BURMA.—The Report of the Botanical Survey for India for 1923-24 contains further information as to the progress of the interesting experiment upon the planting of an experimental area (now at Mergui) in Burma with cinchona (see *NATURE*, April 21, 1923, p. 547, and January 5, 1924, p. 25). The conclusion of a brief description of progress is apparently "to confirm the optimism expressed earlier." With the more equable rainfall of Mergui, it appears that the period of nursery culture may be materially shortened, plants set out as quite small seedlings making such vigorous growth after rainfall that they have formed an area of young Cinchona already ahead of the older plants at the former station at Tavoy, now abandoned in favour of Mergui. So far the species to which this report refers is only *C. Ledgeriana*, but *C. succirubra* is also upon trial. Ipecacuanha is also under cultivation at Mergui, "where it is obviously much more at home than it ever can be in the Bengal plantations."

Until now, however, no cropping has been attempted, but the policy of multiplication of stock continued.

BARK SCORCH OF WILLOWS.—A bark scorch of willows, caused by the fungus *Fusicladium saliciperdum* Tub., has been known as a troublesome disease of willow rods for some time on the Continent. The disease was noted on the rods of willows grown for cutting in a market garden in Lanarkshire, and specimens were sent to the Edinburgh Botanic Garden for diagnosis, where they were examined by Mrs. N. L. Alcock (*Transactions of the Royal Scottish Arboricultural Society*, vol. xxxviii. part ii. October 1924, p. 128). The disease first appears as patches on the leaves resembling those of "scab" *Fusicladium dendriticum*, Fuckel., on apple leaves. The disease causes later on striking black patches on the bark giving the rod a piebald appearance, and it may also cause a die-back, and the young rod then turns black from the tip downwards. Little is known as to control, but probably a winter wash of copper sulphate would be useful. Care should be taken when cutting out the rods to cut down to the stock, and not to leave long stubs. Affected rods should be cut out and burnt.

PALÆOZOIC ALGÆ.—Interesting plants from the Old Red Sandstone of Scotland, showing clear indications of algal organisation, are described by the late Dr. R. Kidston and Prof. W. H. Lang in the *Transactions of the Royal Society of Edinburgh*, vol. 53, part iii. (No. 29), pp. 603-614. *Cryptoxylon Forfareense* Kidston, described in 1897, is rediscussed in the light of a wider knowledge of Nematophyton, and as a result it is transferred to the genus as *N. Forfareense* Kidston, the pseudo-cellular structure of this species being no longer a bar to its transference to this genus. Two new species of *Pachytheca* are described, *P. media* and *P. fasciculata*. The genus includes a number of spherical forms about half a centimetre in diameter, which when split across show a central region or medulla surrounded by a radially striated cortex, composed of more or less evident tubes. In the newly described species, algal filaments can be clearly discerned on microscopic examination of favourable specimens; these run irregularly in the medullary region, and in groups of seven or more fine filaments through the cortical tubes, emerging from the ends of the tubes in a pencil-like group, in what is described as a peripheral "narrow clear zone." The authors suggest that where the algal organisation cannot be clearly made out, specific names should not be attached to specimens of this fossil, which are widely distributed and relatively abundant in certain formations in Britain. They conclude that the relatively frequent association of Nematophyton with *Pachytheca* raises interesting problems as to the condition of life of these contemporaneous organisms, and that the mode of occurrence of both of them and the nature of the beds in which they occur will repay further work and co-operation on the part of palæobotanists and geologists.

SUNSPOTS AND TEMPERATURES.—In a recent pamphlet under the title "Sunspots and Temperature, 1916," Mr. A. H. Wallis, of Kimberley, criticises the conclusion of Nordman and Köppen that there is a tendency in the tropics towards low temperatures at times of numerous sunspots, on the ground that the relationship is not invariably valid and is based on the discussion of smoothed means. He suggests for further investigation a law that sudden rises in the daily sunspot number are frequently associated with

risers of maximum temperature. He apparently has not had access to the variation curves for 25 regions of the earth's surface from 1820 to 1910 prepared by J. Mielke, or to the 97 correlation coefficients worked out by G. T. Walker; or he would realise that with a coefficient of only -0.2 or -0.3 in the tropics between the annual temperature and sunspot number, a perfect correspondence cannot be expected. Also a negative coefficient in annual means might be perfectly consistent with a positive coefficient over short periods such as a day. When, therefore, Mr. Wallis claims to find in the course of a single year 199 daily agreements of sign in the departures of spots and maximum temperatures and 155 disagreements, he does not upset existing beliefs; neither does he provide much support for belief in a parallel relationship by an agreement of only 56.2 per cent. of cases—his 79.4 per cent. appears to be in error. Also during the year in question, his tables appear to contain 27 occasions on which there was an increase of 24 or more between the sunspot number of one day and the next, and in only 16 of these was there a contemporary rise of temperature. All attempts to throw light on this interesting subject are welcome, but a further examination must be made before an addition to our knowledge can be claimed.

INVESTIGATIONS OF ATMOSPHERICS.—All the various irregular noises which are heard in radiophones are classed together as "atmospherics." In long-distance working they are specially objectionable. As a large amount of research work, the results of which are not readily obtainable, has been done on the subject, the paper by Dr. R. L. Smith-Rose published in the January number of *World Power* will prove useful to many. The connexion between these noises and neighbouring thunderstorms was discovered at the end of last century by means of a coherer, and use was made of it in France, the owners of vineyards being warned of the approach of thunderstorms. During the War the forecasting of thunderstorms was of great value in aviation. It has been shown recently that all important atmospheric phenomena have their origin in mountainous regions and are due to electrical discharges. The range of a disturbance caused by a lightning flash is usually world wide, and there are always sufficient lightning flashes occurring in some part or other of the world to account for all the noises heard in a radiophone. The energy radiated is only a small fraction of the energy required for the local disturbance, and hence radio experts find it difficult to imagine that anything except a lightning flash could produce the observed effects. They also think that the disturbances travelling through the ether must have a high frequency. The methods used to eliminate these disturbances are to utilise the phenomena of directional reception, the beneficial effects being apparently more pronounced the shorter the wave-lengths used by the station.

THEODOLITE OBSERVATIONS WITHOUT FIELD ILLUMINATION.—Difficulties are often experienced, especially by workers in remote regions, in obtaining suitable illumination of the field when observing stars with the theodolite. An ingenious attachment, which permits of observations being taken without any field illumination, is described by Mr. E. A. Reeves in the *Geographical Journal* for December last. A small semi-reflecting glass disc is placed in the focal plane of the telescope objective, taking the place of the ordinary diaphragm. Another similar reflector, which is capable of horizontal and vertical adjustment, is screwed over the eye-lens of the eyepiece. When an image of the star is formed on the semi-silvered face of the diaphragm, the transmitted light passes through

the eyepiece and emerges as a parallel beam on the eye-lens reflector. Part of this beam is reflected backward on to the diaphragm and again reflected into the eye. Two images of the star are thus visible. These coincide only when the star is in the centre of the field. If the star is in any other position, the images part and move in opposite directions, the distance apart being double the error of pointing. The device can be readily fitted to, and conveniently used with, any theodolite if the object-glass is reasonably large. With a 5-in. theodolite, having a $1\frac{1}{4}$ in. aperture, coincidences can be made with 1st and 2nd magnitude and even smaller stars. The device should be of use also in mines and other underground works where lamps have to be used as marks upon which to sight the theodolite.

PHYSICAL PROPERTIES OF SINGLE METALLIC CRYSTALS.—Dr. P. W. Bridgman describes some physical properties of single crystals of zinc, cadmium, bismuth, antimony, tellurium, tin and tungsten in the Proceedings of the U.S. National Academy of Sciences for October 15, 1924. The properties listed include the elastic constants (which vary greatly with direction), linear compressibilities, linear thermal expansions, and electrical resistance. The compressibility of cadmium could not be obtained, owing to the existence of two new polymorphic forms under pressure, the transitions taking place at about 3000 and 6000 kg./cm.² (20° C.). The electrical resistance also changes slightly at the transition. The properties of the new modifications are very similar to those of the ordinary modification. Tellurium exhibits negative thermal expansion along the crystal axis. The influence of pressure on the electrical resistance of antimony is anomalous; it tends to indicate that resistance is determined by something more specific than the distance apart of the atoms.

HARMONIC TIDAL CONSTANTS.—In a paper entitled "Perturbations of Harmonic Tidal Constants" (Proc. Roy. Soc., A, 106, pp. 513-526), Dr. A. T. Doodson, secretary of the Liverpool Tidal Institute, discusses some unusual features in the results of harmonic analysis of tidal observations at St. John (New Brunswick) and at Bombay. The principal lunar semidiurnal constituent M_2 at both stations shows three definite perturbations; one of these is of 19-year period, and arises from a failure of the ordinary method of allowing for the 19-yearly variation of M_2 (due to the varying longitude of the moon's node). The ordinary method assumes that two terms of closely similar period in the tide-generating potential will produce terms in M_2 of proportionate magnitude, and affected by the same phase lag. In actual fact this proves not to be the case, particularly at St. John, and the author states that, though the magnitude of the effect makes the explanation very difficult to believe, resonance is at present the only assignable cause. St. John is of course one of the stations where such a phenomenon is least improbable, since the very large tides in the Bay of Fundy are certainly due to resonance with a "sea seiche." But in addition there is another 19-year term in M_2 which can only be explained as due to frictional forces of considerable magnitude, depending on some higher power than the first (probably the second power) of the speed. This conclusion depends only on the forms of the expressions for the tidal elevations, and, while it is in general agreement with Dr. H. Jeffreys' calculation of frictional losses in the Bay of Fundy, it involves no numerical assumption as to the friction coefficient. Another perturbation of M_2 at St. John and at Bombay is a secular change of amplitude, ascribed to possible changes in the sand- and mud-banks near the ports.