

Research Items

The Lime, Rice-Straw, and Convolvulus in India.—Magical and other practices in India in which the lime, rice-straw, and the convolvulus play a part are discussed by Mr. R. E. Enthoven in *Folklore*, vol. 43, pt. 1. It is customary for village officials to offer two or three limes to a British official when he visits their district. This is more than a compliment; it is a widespread use in driving away evil influences. A lime stuck on the end of a knife is a well-known spirit-scarrer. Recently its use in connexion with the Bombay rite of *muth mārana* has been noted. The exorcist prepares an image of wheat flour and worships it. A lime pierced by a number of thorns or pins is placed before it, and as water mixed with molasses is poured over the face of the image, the lime gradually fades away. It goes to the man whom it is desired to kill and strikes him in the chest. He falls to the ground vomiting blood. In the Central Provinces, it has been noted of late by police officials investigating cases of suspicious death, that a lime is frequently found by the body, especially where poison is suspected. Rice-straw tied in a bundle to an object, in the Rathnagiri district, prevents interference with it when it is the subject of a legal dispute. From this spell release can be obtained only by an appeal to the deity, who must grant a sign of his decision on the matter. The interest of the convolvulus lies in the fact of its close connexion with certain of the castes of the Deccan and Konkan. Although they differ in occupation and widely in social status, these castes have the convolvulus as their common *devak*, that is, an object of worship, which they must protect. It is a bar to marriage between all members of these castes.

West Indian Prehistoric Pottery.—A study of the prehistoric aboriginal pottery of the Dominican Republic, Haiti (*Bull.* 156, *U.S. National Museum*), by Mr. Herbert W. Krieger, is based largely on examples collected from sites excavated during expeditions to the island in 1928, 1929, and 1930. It was found that variation in decorative design, form, and style was much greater than had been anticipated. Forms and designs, which appeared to be examples of ready-made borrowing, proved to be parts of series linking up with characteristic Tainan designs of the Santo Domingo-Porto Rican pottery area. This, in turn, was found to extend well beyond the limits of the two islands, and to link up on the south with lowland forest areas of South America, and on the north with the margin of the eastern Indian pottery area, including the Iroquois of eastern Canada and the contiguous United States. Other designs occur in representative collections from the Upper Mississippi Valley, from the Gulf States of the south-east, and from the Florida Peninsula. This, however, does not imply cultural diffusion or conscious copying; but rather a marginal position in relation to some eastern pottery-producing centre. The entire Mexican, Middle American, lowland and highland South American pottery-producing areas share a common heritage in a culture complex which centres around the cultivation of maize, cassava, and other roots, with which is associated pottery-making. The development of the elements in pottery-making is determined by local environmental differences, physical and spiritual. Thus, for example, in Santo Domingo, the modelling and application of clay figurines, distinctive of decorative design in Middle American tribes, is further differentiated by the absence or presence in representation of certain reptiles and mammals, absent or present in the fauna of that area.

Individuality of Chromosomes.—During the interphase of nuclear division, the chromosomes usually lose their visible identity, but considerable evidence suggests that they do retain some kind of individuality during this period. It is, however, not clear exactly how we should apply the term individuality. Does it apply only to the chromatic material or should it include the achromatic substratum as well? Bearing on this question, Grégoire (*Bull. Roy. Acad. Sci. Brussels*, 17, 1435-1448) has published an interesting note on some work carried out by one of his students on nuclei of *Impatiens Balsamine*, in which type prochromosomes or euchromocentres are characteristic features of the interphase nuclei. In number, these chromatic bodies are equal to or fewer than the specific chromosome number and occur close to the nuclear membrane, and it is an interesting new point that each one already shows the constriction or point at which the chromosomes will afterwards become attached to the spindle fibres. Another new observation is that during early prophase, bands of achromatic material gradually become evident as prolongations of the euchromocentres. This suggests that not only does the central part of the chromosome persist through interphase as the euchromocentre, but also that this is associated with a definite region of achromatic material which condenses again during prophase into the chromosomes. Though these observations are specific, the uniformity of nuclear behaviour is such that a point definitely shown for types with euchromocentres will in all probability be applicable also in general principle to types with a more uniform nuclear reticulum in the interphase.

Leaf Curl Disease of Cotton.—A recent paper upon "The Leaf Curl Disease of Cotton in the Sudan" (*Empire Cotton Grow. Rev.*, vol. 9, no. 1, Jan. 1932, pp. 32-45), by R. E. Massey and F. W. Andrews, describes a malady of cotton which appears to have general relations with a plant virus disease. The authors correctly use the term 'virus' very infrequently in their paper, as they have no evidence for the ultra-microscopic nature of the causal agent. Their work is nevertheless extensive, and detailed descriptions of symptoms, both external and histological, are given, with descriptions of transmission by insects, grafting, and juice inoculations. It is interesting to note that the lamina of a diseased leaf is more than three times as thick as that of a healthy leaf. The insect vector is apparently an aleurodid, and seems to be an efficient transmitting agent. Grafting is the only other successful method of transfer, for juice inoculations have proved unsuccessful. Chemical examination of healthy and diseased leaves showed no difference in the amounts of starch, pentosans and nitrogen, but revealed a striking increase in diastatic activity in diseased tissue. The curl disease reduces the number of bolls per plant, and so would seem to be of considerable economic importance.

Meteorological Tables.—The Smithsonian Meteorological Tables, that fill an entire volume of the Smithsonian Miscellaneous Collections (vol. 86 in the case of the revised edition under review), are of importance for all serious students and advanced workers in meteorology. These tables were badly in need of revision; the dates of previous editions were 1893, 1896, 1897, 1907, and 1918, and the long interval since 1918 has seen a rapid development of meteorological theory. In an abstract dealing with the new

edition issued by the Smithsonian Institution attention is directed to the more important features that appear for the first time. These include comparisons between sunlight, moonlight, and starlight; standards for the duration of astronomical and civil twilight; comparisons between linear metres and the dynamic metres of V. Bjerknes for variations of gravity with varying latitude and altitude; and tables for the determination of height by observation of the temperature of boiling water. The simpler conversion tables, such as inches to millibars, have not been crowded out. English meteorologists will be grateful for the inclusion of hygrometrical tables appropriate to British wet bulb thermometry. Another particularly useful item, and one not normally included in British publications, is the detailed relationship between the zenith distance of the sun and the mass of air traversed by the sun's rays in reaching the earth's surface. One serious omission may be noted. There are no tables relating to the calculation of the entropy, potential temperature, or pseudo-potential temperature of the air under different conditions of pressure and temperature. The preparation of these tables was done under the direction of C. F. Marvin, chief of the U.S. Weather Bureau, assisted by H. H. Kimball, senior meteorologist of that bureau.

A Simple Thermo-electric Pile.—M. Jean Gabreau has described the method used on the Chemin de Fer du Nord to notify at a distant cabin the failure of the light on a signal-post (*Bull. Soc. d'Encourag. l'Indust. nat.*, January). It is based on the action of a thermopile which is placed in the lantern above the flame in such a way that the hot air from the flame surrounds one set of junctions while the other set is exposed to the air outside the lantern. The current produced operates a relay in the cabin, which shows a red light and rings a bell when the thermocurrent fails. The thermopiles, which have been in use since 1926, are made by winding forty turns of 0.2 mm. constantan wire around a sheet of mica with notched edges. The wire on one side of the sheet is then varnished and the sheet immersed in acid until the wire on the other side is reduced to half its original section. A thin layer of copper and over it a thicker one of silver, which brings up the section to its original value, are deposited electrolytically. After dissolving the varnish, the whole wire receives a thin deposit of platinum. In action the pile gives an electromotive force of about 400 millivolts, and a current of 4 to 5 milliamperes.

Infra-Red Photography of Aurora.—Supplementing his communication to NATURE of March 26 on spectrographic observations of infra-red lines in the auroral spectrum, Prof. L. Vegard informs us that Dr. Bauer, working on cinematographic exposures of northlight at the Auroral Observatory at Tromsø, succeeded in January of this year in obtaining a picture of an aurora with infra-red filter and plates sensitive to infra-red rays.

Cosmic Rays.—Some investigations on the cosmic rays, reported in the first February number of the *Physical Review*, are of particular interest at present in view of the possibility that these may be identical with neutrons. One by H. L. Mott-Smith confirms the failure of other investigators to deflect the rays by magnetic fields; a fine technique has been developed for this piece of work, which includes the preparation of sealed Geiger-Müller counters by good vacuum methods, a refinement which has been repaid by the reliability of the instruments. The main result of the two others, which are by R. A. Millikan,

is that the ionisation of the air by cosmic rays is more intense than had been supposed; the rate of formation of ions at sea-level under standard conditions is now given as almost 2.5 per c.c. per second instead of about three-fifths of this. Prof. Millikan has also found that the sun has no direct influence on cosmic ray intensities, to within about $\frac{1}{3}$ per cent of the total ionisation, and has shown incidentally that there is an interesting source of error in connexion with the use of electroscopes containing gas at high pressure for precision work, arising from the effect of temperature on the rate of recombination of ions.

Elements 85 and 87.—Allison, Bishop, Sommer, and Christiensen (*J. Amer. Chem. Soc.*, Feb.) describe experiments with a magneto-optical method, depending on the time lag differences of the Faraday effect behind the magnetic field, on solutions of minerals. In solutions of pollucite and lepidolite, minima were observed which cannot be due to tin and rhenium compounds, and are attributed to element 87. This is also stated to exist in sea water, Searles Lake brine, Stassfurt kainite, crude caesium chloride, monazite sand, and samarskite. Six minima are considered to indicate the probable existence of six isotopes of element 87. Element 85, present only in very small amounts, was detected in solutions of Brazilian monazite sand, from 100 lb. of which indications of 2.5×10^{-6} gm. of the lithium compound of 85 were obtained. The name alabamine (Am) is proposed for the element, and the solutions are supposed to contain salts of the acids HAMO_4 and HAM . The atomic weight of alabamine is estimated to be 221. The peralabamic acid is more stable than other oxy-acids of the element which are indicated in the solutions after appropriate treatment.

Intermetallic Compounds formed in Mercury.—A. S. Russell, with Cazalet, Irwin, and Lyons (*J. Chem. Soc.*, March) describes the formation in mercury of several stable compounds of the metals copper, tin, zinc, and iron produced by shaking the metals with mercury. These differ from the constituent metals in being insoluble in mercury and generally in reducing power. It was necessary to devise analytical methods for determining their empirical formulae without removing them from the mercury in which they were suspended, and these methods are described. Some of the compounds are ternary, mercury being one constituent, and their formulae are very varied, but the total numbers of valency electrons are 6, 9, or 12, or a simple multiple of these numbers. Iron does not form a compound with mercury, yet its action towards reducing agents in presence of mercury resembles closely that of copper, although the passivity does not depend on metallic compound formation. Many of the binary intermetallic compounds have not previously been reported.

The Glow of Phosphorus.—The *Collection of Czechoslovak Chemical Communications* for March contains an account of the influence of chlorine and bromine on the glow of phosphorus by Krejci and Schacherl. The inhibiting effect of these halogens on the glow had been previously noted, and the case of chlorine studied in detail by Bowen and Cavell in 1929. The present authors took special precautions to ensure the purity of the materials, the chlorine, for example, being obtained by the electrolysis of fused pure silver chloride. The pressure in the apparatus was followed by a Bodenstein quartz manometer, the effect on the glow in air and oxygen at temperatures of 15°, 20°, and 25° C. being investigated. Both halogens show a poisoning effect, which is

stronger in oxygen than in air. They are more effective than ethylene but weaker than propylene, whilst nitrogen dioxide, previously investigated, is about ten times as efficient as either. The results could be represented by the equation already used for nitrogen dioxide, namely, $p = k/(a + x)$, where x is pressure of halogen/pressure of oxygen; p is the maximum pressure of the glow, and a and k are constants. Dry gases were used. The effect can be explained on the assumption that chlorine breaks reaction chains by forming chlorine monoxide with atomic oxygen.

Deterioration of Structures in Sea Water.—The Committee of the Institution of Civil Engineers which is investigating the deterioration of structures of metal, timber, and concrete in sea water, began its work in 1916 and published its first report in 1920. Interim Reports have been issued annually since then, and the twelfth of the series reviews the work done in 1930–31 (London: H.M. Stationery Office, 6d. net). The specimens under observation are exposed in many parts of the world—Nova Scotia, Ceylon, Australia, New Zealand, Kenya Colony, the Gold Coast, etc.—and the materials exposed include many varieties of iron and steel, many kinds of timber, and specimens of ferroconcrete. Of the various irons and steels under observation, those with the highest percentage of nickel and chromium appear to give the best results. The investigations of the Committee on methods of protecting timber against marine borers have been continued with the assistance of Profs. G. Barger and S. M. Dixon, and in his report Prof. Barger gives the results obtained through impregnating timber with creosote, fuel oil, arsenical poisons, naphthalene, or tar acids. Prof. Dixon, in a further report, gives some interesting figures showing the effects of incising timber before impregnation. A block of Oregon pine (Douglas fir), 10 in. × 6 in. × 2 ft., with incisions

spaced $\frac{1}{2}$ in. apart in rows round the periphery absorbed two to three times as much creosote as a similar unincised block.

Breaking Circuits and Clearing Faults on Large Networks.—The modern methods of linking together isolated electric distribution networks has given rise to problems in mathematics and physics, partial solutions of which are now being obtained. All the component networks are linked into a single network, every part of which responds to changes in every other part. The large amount of generating plant working in parallel distributed over a wide area, and its haphazard distribution, have introduced problems which do not occur in small networks. In a paper read to the Institution of Electrical Engineers on March 17, R. O. Kapp and C. G. Carrothers discuss from the mathematical point of view the design of systems to protect the network when a fault occurs. It is suggested that the fluctuations in the currents caused by a fault might be used to work the relays employed for the automatic isolation of a faulty portion of the network. At the same meeting H. Pearce and T. T. Evans read a paper on the design and performance of oil circuit-breakers, that is, switches which break the electric circuit under oil. The irregularity in the performance of these devices is generally considered to be due to the erratic movement of the oil. For the higher voltages, quick-break apparatus is considered advantageous. By suitably designing the two contacts with a shroud, improved and consistent results are obtained. The importance of short circuit testing is emphasised, and a plea is made for facilities for testing on the site. A description is given of the oscillograph equipment necessary for testing on the site, and reports of recent tests carried out on oil circuit-breakers fitted with a new type of shrouded contact are added.

Astronomical Topics

Parallaxes of Faint Stars.—Study of pairs of photographs taken at intervals of several years have revealed many examples of very faint stars with fairly rapid proper motions. *Mount Wilson Contributions*, No. 435, contains a paper by A. Van Maanen on an investigation of the parallaxes of some of these stars from photographs taken with the 100-inch and 60-inch reflectors. The largest parallax on the list is that of B.D.43°4305, for which the value 0.209" was found. That star had, however, already been measured elsewhere. Another large parallax is that of Ross 41, mag. 13.4, parallax 0.110". Altogether there are 15 stars on the published list that have absolute magnitude fainter than 10.0. The faintest is a star lately found by Hubble to have a proper motion of more than 1"; its absolute magnitude is 14.0. The fact that such a large number of extreme dwarfs are found comparatively near the sun shows that this type of star must really be very common in space, but they are too faint for observation unless their distance is small.

Astronomical Notes for May.—Venus continues to be a brilliant object, reaching its greatest brilliance on May 22; the illuminated fraction of the disc diminishes during the month from $\frac{3}{4}$ to $\frac{1}{4}$; it is near the moon at 5 P.M. on May 9.

Jupiter passes quadrature with the sun, and is still observable for half the night. Satellites I and II and their shadows are both on the disc on the evening of May 5; I and IV are simultaneously in eclipse late on the evening of May 20; there is a partial eclipse

of III by the shadow of II on May 4 from 11.16 to 11.38 P.M.

Saturn can be observed late in the night, but its south declination of 19° renders the conditions difficult.

ι Virginis is occulted by the moon at 8.5 P.M. on May 17; it is the only occultation visible in London before midnight.

Two comets may be visible with moderate telescopes; the following ephemeris of Houghton's comet for 0^h is by Drs. Cunningham and Whipple; an ephemeris given earlier proved to be erroneous:

	R.A.	Decl.
May 1 . . .	12 ^h 42 ^m 48 ^s	S. 15° 20'
" 5 . . .	12 42 19	8 3
" 9 . . .	12 42 30	S. 2 2
" 13 . . .	12 43 13	N. 2 51
" 17 . . .	12 44 25	N. 6 47

The following ephemeris of comet Grigg-Skjellerup is from B.A.A. *Circular* 113:

	R.A.	N. Decl.
May 15 . . .	7 ^h 54 ^m 12 ^s	20° 23'
" 20 . . .	8 20 20	26 0
" 25 . . .	8 53 28	32 32
" 30 . . .	9 37 24	39 39

Ephemerides of three other periodic comets, Neujmin (2), Kopff, and Borrelly, are given in the B.A.A. Handbook for 1932; all are likely to be near the tabular positions; the search for them will be most conveniently made by photography.

The times given above are Greenwich Mean Time; 1 hr. should be added to give Summer Time.