

Research Items

Mummers' Plays.—Mr. H. Coote Lake has published a study of English mummers' plays with reference to the *Sacer Ludus*, in *Folklore*, 42, No. 2. The mummers' plays are performed by villagers and others over the whole of England, the south of Scotland, and the north of Ireland; but there is no standard version and all sorts of perversions have crept in. A large number of versions—one collection contains thirty-three—have been printed, and probably many more have not been collected. Although they differ verbally and incidentally, the essential structure is the same, conforming, it is suggested, to the formula of an old European ritual dance or *Sacer Ludus*, a primitive magic rite in which the death and resurrection of summer was acted, in order that, as the actor who took the part of summer was slain and revived, so the summer, which had been slain by winter, might be revived. The comic doctor, who revives the hero, is a characteristic feature of the English play, and also appears in a folk play of Thessaly. He is a survival of the primitive medicine man. The Turkish knight, who in the English play fights with St. George, is represented in the Thessalian version by a character with a black face who molests the bride and slays the bridegroom. He is often thought to be derived from a dark character representing winter. A Thracian play represents a blend of a mummers' play and the Plough Monday celebration. In a considerable proportion of the plays there is a 'recognition' of the dead man, which dramatically is unnecessary. If, however, the mummers' play is to be identified with the mimetic rite, this recognition becomes the very germ of the drama.

Marriage Conditions in Palestine.—Dr. Hilma Granqvist has made a close and detailed study of marriage in the Mohammedan village of Artās over a period of three years between 1925 and 1931; of which the results have been published by the Societas Scientiarum Fennica, Helsingfors (*Commentationes Humanarum Litterarum*, 3, 3). Dr. Granqvist's method has been to work by concrete examples, and she quotes her informants' words in verbatim translation, so that her information and deductions may be checked against one another. The subject is studied under three heads: age of marriage, choice of a bride, and marriage by consideration. The births of a boy and of a girl are greeted with a blessing on the 'bridegroom' or 'bride' as the case may be, and it is a usual practice for the girl thereupon immediately to be bespoken by the father of a boy. Provided the boy, or his parents on his behalf, make the customary gifts at the great feasts in after years, this promise, which has been guaranteed by witnesses and ratified by the gift of a handkerchief or the like and a present of money to the bride's father, is never broken, unless in exceptional circumstances. The marriage takes place at an early age—formerly even before puberty, until government action intervened. One of the reasons for early marriage which carried great weight was the fact that the Arabs have no female servants and it was desirable that the mother of the household should have additional female help. It also afforded the mother-in-law an opportunity to mould her son's wife to the ways of herself and the family. The marriage of the children of two brothers was the type of alliance most favoured, the interests of the family or clan being best served by such a marriage. The fathers arranged the marriages, and individual choice or love played no part.

A Red Indian 'Buffalo Drive.'—In the ages before the domestication of cattle and the cultivation of

crops, an outstanding problem for the ill-armed hunter must have been the provision of the community's food supply. Special interest, therefore, is attached to devices for supplementing the food-supply, particularly where they involve co-operative action or careful planning. Both are commemorated in an ancient Indian 'buffalo drive' on Ox-Bow Ranch on Strickland Creek, not far from the boundary of Yellowstone Park. It was used perhaps only two or three hundred years ago, but the fifteen hundred stone arrow-heads found at the spot indicate a people whose culture was still that of a stone age. The drive was formed by two lines of stone piles approximately a quarter of a mile apart at the open end and converging over a mile of prairie until they ended some fifty feet distant from each other. The bison were herded into the open end and constrained to follow the smooth track between what seemed to them natural barriers, and these instead of terminating in a circular pound as was usually the case, ran sheer to the edge of a precipice in the lava rock, over which the stampeded herd rushed to its doom. The distribution of stone arrow-heads beneath the cliff showed how the Indians finished off the maimed animals. A steatite bowl and the arrows from the excavations made on the spot by Barnum Brown and his party (*Natural History*, vol. 32, 1932, p. 75) indicate that the hunters were the Shoshone Indians and not the Blackfoot tribe which inhabited that territory at the advent of white men.

Salmon of the West Coast of Scotland.—The extensive investigations made by the Fishery Board for Scotland into the life-history of the salmon have been devoted mainly to the rivers of the east coast. Observations made in the Grimersta district in the Isle of Lewis indicated that a significant difference might be found in the biology of the salmon on the west coast. Accordingly, a number of examinations have been made by Mr. P. R. C. Macfarlane of salmon from the River Dee in Kirkcudbrightshire in the years 1928 and 1929 (*Fisheries, Scotland, Salmon Fish.*, 1931, No. 2). The results indicate that there is slightly more growth shown by the west coast fish in their first year in the sea than by the east coast fish. This is taken as a possible indication that salmon from the two coasts of Scotland frequent different feeding grounds in the sea, and do not migrate to a common ground in the ocean. The parr from the river under survey also showed a considerably greater growth than do those of the Spey and Aberdeen-shire Dee.

Chromosomes of Sorghum.—In a study of the somatic chromosomes of the genus *Sorghum*, Prof. C. L. Huskins and Mr. Stanley G. Smith (*J. Genetics*, vol. 25, No. 2) find that the wild species and cultivated varieties examined all have twenty chromosomes, except the Johnson grass, *S. halepense*, which has forty. All, without exception, have a single pair of A chromosomes of peculiar character. The cultivated sorghums came from tropical Africa, while *S. halepense* is Mediterranean. Since it has but one pair of A chromosomes, it is probably an allotetraploid, having arisen from a cross between a diploid *Sorghum* and some other genus without an A chromosome. The evidence indicates that all the diploid wild and cultivated species of *Sorghum* will cross readily, while there is great difficulty in crossing Johnson grass with the diploid forms, and the progeny from such crosses are almost sterile. In the root tips examined, a number of tetraploid segments and one

octoploid segment were found in diploid roots. The general results are in accordance with and confirm the views already held by systematists regarding the relationships of these forms.

Loch Doon 'Granite' of Galloway.—The igneous complex of Loch Doon has been described by C. I. Gardiner and S. H. Reynolds (*Quart. J. Geol. Soc.*, 1932, pp. 1-34). The authors find that the plutonic rocks range from true granites in the central ridge to norite at certain parts of the margin, the major portion of the mass being tonalite. These three types seem to be the result of three successive intrusions in order of decreasing basicity. Numerous minor intrusions penetrate the complex and the sedimentary rocks surrounding it. They include relatively large bodies of hybrid or dioritic character and small dykes of porphyrites and mica-, hornblende-, and augite-bearing lamprophyres. Some of the dykes, however, are metamorphosed and thus appear to be pre-plutonic. Metamorphism of the sediments has resulted in the production of mica-cordierite-hornfels. The spreading out of the metamorphic aureole to include the Burnhead mass indicates an underground extension of the plutonic rocks at no great depth, and suggests that the mode of emplacement of the complex may be laccolithic.

The Humboldt Current.—The generally accepted explanation of the Humboldt Current of the Pacific coast of South America, as being derived mainly from the westerly drift of the Southern Ocean and only partly by upwelling of cold water, is questioned by the researches of the R.R.S. *William Scoresby*. In a note in the *Marine Observer* for June, it is recorded that this ship was engaged in surveying the Humboldt Current during the winter of 1931. The current was not found, at that season, south of Valparaiso, which seems to dispute the view that the surface drift of the Southern Ocean feeds it, and favours the secondary cause, namely, the upwelling of cold water due to prevailing south-east and southerly winds. The current reaches its maximum width and greatest strength, about twenty-five miles a day, off Peru. It finally disappears about five degrees south of the equator, underneath the warmer waters of the El Niño current that sets south. The El Niño waters occasionally pass inside the cold Humboldt waters, with disastrous consequences to the climate of Peru. It must be remembered, however, that the Humboldt Current has always been known to be very variable from year to year, and its seasonal fluctuations take it well south of Valparaiso in summer and even in winter, but at that season at a considerable distance from the coast.

Air Movement and Weather.—Sir Napier Shaw has contributed a paper entitled "St. Martin's Summer in England in 1931" to *Beiträge zur Physik der freien Atmosphäre* (Band 19). It was written in commemoration of the birthday of V. Bjerknes, whose name is familiar to meteorologists mainly on account of his important contributions to dynamical meteorology. The extraordinary spells of unseasonable warmth that occurred during the last two months of 1931 were due largely to the occurrence of long spells of southerly or south-westerly wind of subtropical if not of tropical origin; this paper discusses a part of this period centring around Nov. 3. It is shown that the gales experienced in the south-east of England on that day travelled from west of Portugal in 24 hours, that the motion of the air stream underwent acceleration, and that the adjustment of horizontal pressure gradient to velocity at once took place. This air-stream reached Scandinavia and Finland a day later.

There was nothing very abnormal in the circumstances attending these events, the value of the paper lying chiefly in the discussion of the dynamics of moving air that centres around them. Sir Napier's views on these matters, particularly in regard to the greater importance to be attached to the air movement than to the distribution of areas of high and low pressure to which the movement gives rise, have nowhere been more clearly expressed. It is shown that under the conditions existing in an atmosphere that is almost unconfined, the energy represented by the pressure distribution is of secondary importance in atmospheric circulations.

Demonstration of Wave Groups.—A description of an apparatus for explaining the nature of wave groups has been sent us by Dr. D. B. Macleod of Canterbury College, Christchurch, New Zealand. A circular aluminium disc of about 20 cm. diameter was hollowed out and a sine wave cut on the inner portion so that a given number of waves fitted into the circle. A second disc was left solid, and a wave cut on the outer edge. The discs were then mounted, one in front of the other, and rotated at a speed great enough to eliminate flicker. Arrangements were made so that the speed of each could be varied separately. The discs were illuminated by a beam of parallel light from a lantern, and thus silhouetted on a screen. A wave group then appeared on the screen, and its velocity, forward or backward, could be controlled by adjusting the speeds of rotation. The number of waves on a disc may be so few as one, the curve then being a cardioid, or so many as eight or nine. The apparatus can be used to make clear many properties of wave groups, and, by suitably choosing the number of wave-lengths on each disc, can be made to give general ideas of the application of these properties to the electron and to quantum orbits.

Superconductivity for Alternating Currents.—The work of Prof. J. C. McLennan and his associates on superconductivity at high frequencies (*NATURE*, Dec. 12, 1931, p. 1004) has now been described more fully (*Roy. Soc. Proc.*, May). Measurements were made on lead, tin, and tantalum by the reactions of oscillatory circuits made of these, and immersed in the refrigerant, on a tuned oscillator outside the Dewar flask. The effect of using the high-frequency current instead of direct current is twofold: the abruptness of the transition from ordinary conduction to superconduction as the temperature is progressively lowered is markedly diminished, and the temperatures of both onset and effective completion of superconduction fall. With increase in frequency, the transition temperature becomes lower, and it is calculated by extrapolation of the experimental results for tin that the transition would not occur until the absolute zero was reached for a frequency of about 10^9 cycles per second. The apparent failure of metals to become superconductors at sufficiently high frequencies is supported by the fact that no evidence of an abrupt change corresponding to superconductivity has ever been observed with light waves. A number of additional experiments which had to be performed to verify that the frequency effect was not due to some subsidiary cause are also described.

The Red Nitrogen Band Spectrum.—The partial analysis of the rotational structure of these bands by S. M. Naudé (*Proc. Roy. Soc.*, May) is interesting both for the information which it furnishes about the nitrogen molecule and for the time during which these bands, which are amongst the best-known of spectra, have defied complete analysis. Even now, only a section of the system, in which there is com-

paratively little overlapping, has been analysed, an idea of its complexity being given by the fact that a resolving power of 180,000 was not sufficient to show all the existing fine structure. Each band consists of three groups of nine branches, the electronic transition being of the ${}^3\Pi-{}^3\Sigma$ type, and the usual information has been derived from the data for the size and other properties of the molecule. Consecutive lines of the branches have alternating intensities in the ratio of approximately two to one, thus showing that the nitrogen nucleus is spinning with unit angular momentum, a conclusion which has also been reached from the study of some bands of the ionised nitrogen molecule. In making this analysis, much assistance was obtained from the quantum theory of molecular structure, which, as with atomic spectra, permits of prediction of the types of terms and, for molecules, the details of rotational structure likely to be encountered.

Artificial Production of a Penetrating Nuclear Radiation.—Mr. Webster's observations on the secondary radiation produced in beryllium and other light elements by bombardment with polonium α -particles (*Roy. Soc. Proc.*, May; see also NATURE, March 12, p. 402) are an excellent example of the type of work which is usually required now to obtain new knowledge of atomic nuclei, and has only become possible through recent advances in technique with special precautions to eliminate spurious effects. The low efficiency of production of the secondary radiation, which ranges from 0.5 quanta per million α -particles for magnesium to 30 quanta for beryllium, is here aggravated by the small ionising power of the product; the intensity of the effect ultimately measured when this is cut down by screens to measure its penetrating power is very small indeed. A strong α -particle source is necessary, and the measurements must be made in a place free from serious radioactive

contamination. Two detecting instruments, both highly sensitive, have been used, a Geiger-Müller tube counter and a high pressure ionisation chamber, the latter being usually preferred. The counter does not appear to be fulfilling the high expectations it aroused when it was first devised—at least in the form usually employed—and is usually described as somewhat erratic in action. The full interpretation of Mr. Webster's results must remain uncertain, until it can be decided how much of what he has observed is due to neutrons and how much to γ -rays, but his extensive experiments will certainly serve as a sound basis for future work.

Biological Test for Rhamnose.—Aldo Castellani and F. E. Taylor in 1917 described a 'mycological' method for the identification of various sugars and other carbon compounds, based upon the fermentations exerted on these substances by diverse species of *Monilia*. Castellani now describes a bacillus which ferments rhamnose with gas production, but does not produce gas from twenty-eight other substances tested; these included eight other sugars, six alcohols, two glucosides, inositol, dextrin, inulin, and several starches (*Ann. de l'Institut Pasteur*, T. 47, p. 297; 1931). This bacillus, obtained from human faeces, is a small aerobic, non-spore, non-motile, Gram-negative organism which is named *B. rhamnosifermentans*. If this organism ferments a solution which reduces Fehling's solution, in all probability it contains rhamnose. The method employed is to prepare a sterile one per cent solution of the substance to be tested in peptone water in a Durham's fermentation or other tube, inoculate with the *B. rhamnosifermentans*, and incubate at 37° C. for four days; gas production indicates the presence of rhamnose. Suggestions are given whereby a mixture of sugars, etc., might be identified by the use of this and other fermenting organisms.

Astronomical Topics

Detection of Kopff's Comet.—Another of the numerous periodic comets due this year has been detected. Mr. Bobone found Kopff's comet at Cordoba (Argentina) in the following position:

	R.A. (1932.0).	S. Decl.	Mag.
May 25-0788 U.T.	15 ^h 11 ^m 18.8 ^s	26° 11' 12"	12

It is rather brighter than was expected. The concluded date of perihelion is Aug. 21.40 U.T.; this is 0.24^d later than Mr. Kepinsky's prediction, and 1.08^d later than Mr. Cripps's in the "B.A.A. Handbook". This comet was discovered in 1906, and seen again in 1919 and 1926.

Cometary Observations at Yerkes Observatory.—Prof. G. van Biesbroeck gives much attention to observations of comets, chiefly by photography with the 24-inch reflector. *Harvard Card* 189 contains a series of observations of Nagata's comet made by him during February, more than eight months after perihelion. It was of magnitude 15½ and had a faint coma, 25" in diameter, with a central condensation. The positions indicate that the period of 267 years, found by Crommelin in the autumn, is somewhat too short, but the orbit is definitely elliptical, with a period of a few centuries.

A telegram distributed by the I.A.U. Bureau, Copenhagen, announces that Prof. van Biesbroeck detected Grigg-Skjellerup's comet on March 6 at 1^h 30.3^m U.T. Its position for 1932.0 was R.A. 5^h 31^m 49.3^s, S. Decl. 5° 3.0'. Magnitude 16. This is the fourth observed apparition of the comet, the others being 1902, 1922 (when its periodicity was dis-

covered), 1927. As the period is very close to five years, the circumstances of each return are nearly the same.

Distribution of Stellar Luminosities.—The distribution of absolute magnitudes for stars brighter than magnitude 6.0 has been investigated by Strömberg in a series of papers in the *Astrophysical Journal*. These have dealt separately with groups of stars within narrow limits of spectral type, using a valuable new statistical method which employs peculiar motions, parallactic motions, and radial velocities. He now summarises his previous results (*Astrophys. J.*, 75, 115) and brings together on one diagram the luminosity curves for all the different spectral types. Several very interesting features which had been suggested in the earlier investigations now appear more definitely in the assembled results. The distinction between normal giants and dwarfs (or 'main sequence' stars) is, of course, evident; but the existence of an intermediate group ('faint giants') also appears for the types M_0 to F_0 . At type *A* all these three groups merge together and carry on the main sequence to a maximum luminosity of -2.9 for early *B* stars. On the side of greater luminosity, two other fairly well defined sequences occur, termed respectively 'bright giants' and 'super-giants', which are found throughout nearly the whole spectral range. The latter attain absolute magnitudes as bright as -8 for early *B* stars. The gap between bright giants and normal giants is very definite, and the author suggests that this may represent a region of instability connected with cepheid variation and outbursts of novæ.