Research Items

Jewish Folklore in Palestine.—Miscellaneous notes on the folklore of the Jews in Palestine recorded by the late Mrs. H. Spoer (A. Goodrich-Freer) and published in *Folklore*, vol. 42, pt. 1, include references to beliefs connected with sin, disease, and the powers of evil. Many of the Jews of Jerusalem travel down to Jaffa at the coming of the New Year in order to be able to shake their skirts into the waters of the little stream of el-Auja, praying and confessing their sins. It is necessary that there should be fish in the water, in order that they may devour the sins as they are shaken out. A variant of former days, possibly owing to the fact that there was then no railway, was to plant palm-leaf baskets with beans, one for each adult in the family. On the eve of New Year, each would swing the basket over his head, saying, "This basket instead of me", and then drop it in the water, At the present time, the father of the family has to lay his hand on a white cock, confessing his own sins and those of his family, unless they are old enough to perform the ceremony for themselves. During the cholera scare of 1909–10, recently immigrated Russian Jews, who cared nothing for local tradition, averted the danger in their own way by assembling in their own burial-ground on the Mount of Olives and making merry for a day and a night, even celebrating a mock-marriage, to the consternation of the orthodox. In this they were following Russian custom. Russian peasants distract the attention of the spirits of evil by celebrating the marriage of deformed or orphaned persons over the grave of someone who has died of cholera, thus diverting the danger in a direction in which it can do no harm.

Society Islands' Canoes.—Dr. E. S. Craighill Handy, in the course of a study of houses, canoes, and fishing in the Society Islands (*Bull.* 90, Bernice P. Bishop Museum, Honolulu), distinguishes three types of craft which have been described indiscriminately as canoes —dug-outs, built-up canoes with round bottom, and composite vessels with sharp keel. All these types depended on the outrigger for stability unless they were double. The dug-out, made for fishing in or near the reefs, sometimes had one or more strips fastened to the upper margin of the hull, thus forming a gunwale, which, giving more freeboard, enabled the canoe-polers to stand on the sides as they propelled the craft. The old built-up canoe consisted of a hollow log, or, in the larger vessels, of several logs fastened together. To these were added side-boards and bow and stern pieces. Their depth seldom exceeded 3 ft. and their beam 21 inches. The after-part was generally one-third wider than the fore-part. The bow-piece had fastened to it a board projecting out for four or five feet parallel to the surface of the water. The modern sailing boats of the Leeward Islands are distinctly built-up boats; but they differ from the old model in the shape of the hull, which has a round instead of a V-shaped bottom and perpendicular sides. Both types of craft were made into the great pontoon or double canoes, two being lashed about 4 ft. apart by spars and the interval bridged with poles to form a rough deck, sometimes surmounted by a thatched hut. The builders were a guild with rites and places of worship. Men and work were taboo while the canoe was being made; and on its completion a man was sacrificed and eaten by the priest of the chief's temple.

Twins Reared Apart.—Another pair of identical twins reared apart has been studied by Prof. H. H. Newman (*J. Heredity*, vol. 23, No. 1). These girls, now twenty-nine years of age, were separated at five months, but both were brought up in the State of Ohio, less than 100 miles apart. Mary, however, has resided in a small town from the age of six years, while Mabel has lived on a farm and engaged in farm work. Mary attended high school, then acted as clerk in a store, and afterwards gave pianoforte lessons. This occupational difference has made Mabel 28 pounds heavier, 1½ in. taller, with greater muscular and bone development, although the extreme similarity in finger and sole patterns, eye and hair colour, and features prove them to be identical twins. Several series of psychological and intelligence tests show, however, striking differences in mentality and temperament. Mary ranks much higher in the intelligence tests, which throws some doubt on them as tests of innate ability. This pair of separated identical twins thus differ from each other physically, intellectually, and temperamentally. Of the four similar pairs previously studied, two differed intellectually but not temperamentally, while the other two were intellectually similar but very different temperamentally. In two cases there was also marked physical difference. Averaging these results and comparing them with 50 pairs of identical twins reared together, the difference in intelligence quotient (I.Q.) of separated identical twins is more than three times as great as that of those reared together. Another conclusion reached is that fraternal twins reared together are, on the average, one and a half times more similar in mental rating than are identical twins reared apart. Dr. Newman concludes, nevertheless, that heredity is probably more potent than environment in determining mental status. The study of further pairs of separated twins should throw further light on this problem.

Further Spread of the Land-Snail *Achatina fulica*.—This large East African snail, three inches long, promises to become a menace throughout the tropical and sub-tropical world, half of which it already infests. Y. H. C. Jarrett has prepared an account of its latest naturalisation, in Amoy, a centre from which it may well become a serious pest of Chinese agriculture (*Hong Kong Nat.*, vol. 2, p. 262, 1931). The snail was transported from East Africa to Mauritius nearly a century ago; thirty years later it was carried thence to Calcutta, and in 1910 it had become common in northern Bengal. About 1900 it obtained a footing in Ceylon, and within little more than ten years had become a disgusting pest. From Ceylon or India to Malaya and to Singapore and so to China mark the stages of a progress which is certainly not at an end. The snail is voracious and prolific; it lays about a hundred eggs in its first year, two to three hundred at the end of the second year, and close on a thousand in all. In 1928 it was introduced to Sarawak from Singapore as food for poultry, and by 1930 had become so great a pest that in 1931 a small reward was offered for its destruction—between Oct. 1 and Oct. 15, 1931, approximately half a million snails and twenty million eggs were destroyed. Hand-picking, dumping in the ocean, burying the animals in sacks deep in the ground have all been tried, without much effect, as methods of control. The last hope appears to be that the snail may find a favoured place in the dietary of the Chinese populace.

Spotted Wilt of Tomatoes.—One of the most striking results of the work on spotted wilt in tomatoes by Bald and Geoffrey (*Bull.* 54, Commonwealth of Australia Coun. Sci. Ind. Res., pp. 24, 1931) is the

varied host range of the virus causing the disease. *Nasturtium*, *Zinnia*, and Iceland poppy certainly show wide differences for a disease-producing agent which seems to direct its main activities against tomatoes. The tobacco thrip has been confirmed as an insect vector of the disease. *Frankliniella insularis* is shown to be another transmitting insect and to have an intimate relation to the virus. It is necessary that the larva feed on the diseased plant in order that the mature insect produced from it may be viriferous. The virus has been transmitted by mechanical methods, but an extract from a diseased plant loses its disease-producing capacity after standing a few hours. The extract is also rendered inactive by heating to 42° C. for ten minutes—a low temperature in comparison with other viruses.

Oil Origin and Accumulation.—Data of petroleum origin, migration, and accumulation for the oil-pools of the Nemaha granite ridge of Kansas and Oklahoma have been described by Mr. J. L. Rich (*Bull. Amer. Assoc. Pet. Geol.* for December 1931). These pools are mainly located at a widespread unconformity at the base of the Pennsylvanian shales, where these rest on the edges of Ordovician and Mississippian rocks. The evidence, coupled with that from an analysis of some later structures in the region, indicates that the hitherto assumed contemporaneity of the oil with those shales is suspect; in fact, it was clearly not generated until long after they were laid down, and its source cannot be sought in rocks in the immediate vicinity of the pools as they now occur. It appears possible that much of the oil was generated at a distant source from the present pools as a result of regional metamorphism, during the Appalachian revolution (Pennsylvanian-Permian), of older Palæozoic rocks; any types capable of yielding petroleum by the mechanism of geodynamic and geothermal 'cracking' of organic mother-substances through the normal agencies of metamorphism would serve. The conclusion that the oil has thus migrated from a great distance is inevitable, possibly from the metamorphosed area in south-east Oklahoma; and if the Appalachian revolution was responsible, then we may fix generation, migration, and accumulation at this epoch with reasonable certainty: a sharply contrasted theory with those previously held, and a decided hint in other cases where contemporary deposition of oil from indigenous organic matter subject to biochemical change—a common postulate—is invoked.

Forecasting of Indian Monsoon Rainfall.—In vol. 4, No. 37, of the *Scientific Notes of the India Meteorological Department*, S. R. Savur discusses the various formulæ used in seasonal forecasting in the India Meteorological Department since Sir Gilbert Walker placed the subject on its present mathematical basis in 1924. These formulæ connect future Indian rainfall with various meteorological data relating to different parts of the world that are available at the time that the forecast is made. A good deal of work has been done, especially by Fisher, since these formulæ were worked out, with the object of deciding with what degree of confidence multiple correlation coefficients of the kind used by Walker can be regarded as 'significant'. Use is made of this recent work in deciding which, if any, of Walker's factors are likely in the long run to be found insignificant, and which may therefore be discarded. The 1924 formulæ stand this critical examination on the whole very well, but certain factors have been found to be less important than was formerly supposed to be the case, and it is evidently the intention of the writer of this paper to try to find other factors that could replace those rejected. This, it appears, is likely to be a difficult task; until it has been accomplished, the accuracy of the forecasting will remain at its present level, seeing that a mere reduction in the number of factors used cannot bring about any improvement. Such is the economic importance of the monsoon rains that the moderate measure of success already attained cannot be dismissed as of no practical value.

Vibrations of a Lofty Building.—Mr. T. Fukutomi made some useful observations on April 25–May 25, 1931, on the vibrations of the Takeda Building in Tokyo (*Earthq. Res. Inst. Bull.*, vol. 9, 1931, pp. 485-507). This consists of an underground floor and nine other floors, and its total height is 99 ft. Tromometers of the same type were placed on the underground, fourth, and ninth floors, the intermediate one being removed to the sixth floor on May 16. As a rule, the building vibrated with a period of 0·4 sec., the amplitudes of the vibrations on the ninth, sixth, fourth, and underground floors being in the ratios 1·00 : 0·84 : 0·67 : 0·06. There is a diurnal period in the amplitude with its maximum epoch at 3 or 4 P.M., possibly due to the passage of tram-cars. During the month of observation, four sensible earthquakes were recorded, the mean maximum accelerations on the floors being as 1·00 : 0·42 : 0·26 : 0·24. On the underground floor, the direction of motion was nearly perpendicular to the line joining the origin and the building; on the ninth floor, it coincided very nearly with the direction of free vibration.

Ultra-sonic Waves in Liquid Columns.—Vol. 6 of the *Canadian Journal of Research* contains two papers from the National Research Laboratory, Ottawa, contributed by Drs. R. W. Boyle, G. S. Field, and D. K. Froman, on dispersion and selective absorption in the propagation of ultra-sonic waves in liquids contained in tubes. The liquids were water, naphtha, castor oil, transformer oil, and chloroform, the tubes of glass, celluloid and cellophane of various thicknesses, and the oscillations were produced by the action of a high frequency electric circuit on a quartz or tourmaline piezo-electric oscillator. The frequencies were from 20 to 100 kilocycles per second and were measured by means of a Hertzian wave meter, and the velocity of phase propagation along the column by the distances apart of the nodes, which are indicated by the small bubbles which collect there. The authors find that the velocity varies with the frequency in the same way as the velocity of light varies on the two sides of an absorption band, and that the absorption is due to the conversion of the energy of longitudinal into that of transverse oscillations, the frequency of which is determined by the diameter of the liquid column, and for thin tubes is independent of the material and thickness of the walls of the tube.

***e/m* from the Zeeman Effect.**—The accepted spectroscopic value for the ratio of the charge of an electron to its mass has been substantially confirmed in an investigation of the Zeeman effect of zinc λ6362 and cadmium λ6439 by J. S. Campbell and W. V. Houston (*Phys. Rev.*, Feb. 15). This is of special interest, since recent values for the ratio obtained from cathode rays agree with those found from optical experiments, and the present measurements are made by a method very different from the earlier in detail. The splitting of the lines was produced by the field in an air-core solenoid consuming about 50 kilowatts, and was determined with a Fabry-Perot interferometer, yielding the result that e/m is $1{\cdot}7579 \pm 0{\cdot}0025 \times 10^7$ e.m.u. per gram.

Rates of Solution of Gas in a Liquid.—The commonly accepted theory of the rate of solution of a gas in a

liquid, due to Noyes and Whitney, assumes that a stationary film exists on the surface of the liquid and instantaneous saturation of the upper layer of this by the gas. The rate of solution then depends on the rate of diffusion of dissolved gas. Miyamoto (*Bull. Chem. Soc. Japan*, Jan.) points out that the thickness of the stationary film resulting from this theory, 10^{-3}–10^{-2} cm., is improbable, and he has examined the result of an assumption that among the molecules of colliding gas only those with component velocities normal to the surface greater than a threshold value can enter, and a similar relation holds for molecules escaping from the liquid. No assumption of a stationary film is made, which seems the correct procedure in the case of well-stirred liquids. It is shown that the new theory leads to an equation of the same form as the old one and in addition explains the results of experiments on the rate of oxidation of sodium sulphite solutions, stannous hydroxide, and ferrous hydroxide, previously made by the author, in a more satisfactory manner. The maximum rates of oxidation in all these cases are identical under the same conditions, and are governed by the maximum rate of solution of oxygen in water. The value of the threshold velocity of the entering oxygen molecules is calculated as 3·4 times the root mean square value at 15°-35°.

Facsimile Radio Transmission.—Science advances with the ability to make measurements. During the last few years, mainly owing to the advent of short-wave transmissions with wave-lengths ranging between 14 metres and 50 metres, greatly improved methods of measurement have been introduced, and a new technique of echo and facsimile measurement has been developed. In 'facsimile' measurements, the object is to record at the receiving end a pulse emitted at the transmitting end. In practice, the message is placed on a drum and a spot of light from a rotating optical system is caused to scan the message. The reflected light from the picture is led to a photo-cell. The output of the photo-cell modulates the transmitter. A similar optical system revolving in synchronism at the receiving end records the signals. In a paper on radio transmission, read to the Institution of Electrical Engineers on March 23, T. L. Eckersley utilises some of the phenomena observed in facsimile transmission to obtain information about the Kennelly-Heaviside layer. Facsimile records usually show a series of one, two, three, or more separated marks corresponding to the arrival by different paths of a single transmitted impulse. The differences in the times of arrival can be measured with high accuracy. It is from these measured time differences that the author finds the ray angles, heights of the effective layers, and the maximum electronic density in the Kennelly-Heaviside layer. For high angle transmission, for example, those recorded between Writtle, near Chelmsford, and Somerton, in Somerset, the marks (echoes) are so regular that they can be definitely fitted into a multiple-reflection scheme. For shallow angle transmission the echo times are more irregular, and difficulty is experienced in fitting them into an optical scheme. Mr. Eckersley calls a ray which has been reflected n times from the K.H. layer the nth order ray. A study of facsimile transmissions from South Africa to Montreal shows that the high angle rays have greater attenuation than the lower ones. This suggests that at sufficient distances, only the lowest angle ray will survive, and perfect facsimile reproduction will result.

Astronomical Topics

New Comet.—Mr. Carrasco, of the Madrid Observatory, discovered a comet of the twelfth magnitude on April 22. Several observations have been obtained, from which Miss Vinter Hansen and Mr. Möller, both of the Copenhagen Observatory, have deduced the following elements:

T	1931 Dec. 14·594 U.T.	
ω	117° 25·07′	1932·0
Ω	17 43·53	
i	58 11·09	
log q	0·394164	

Thus the comet passed perihelion 4 months before discovery, and is now 3 units from the sun and 2 units from the earth. Dr. W. H. Steavenson obtained the following observation at Norwood:

May 1^d 0^h 33·0^m, R.A. 12^h 6^m 40·98^s, N. Dec. 22° 1′ 34·8″ (1932·0)

This is very close to the ephemeris from the above orbit, which is continued below (for 0^h):

	R.A.	N. Decl.
May 5	12^h 3·0^m	20° 41′
9	11 59·9	19 21
13	11 57·3	18 1
17	11 55·2	16 42

Dr. Steavenson also obtained an observation of the comet Houghton-Ensor (so named because Mr. G. E. Ensor discovered it independently at Pretoria on April 2):

April 30^d 0^h 17·2^m, R.A. 12^h 42^m 50·38^s, S. Decl 17° 18′ 43″ (1932·0).

Dr. Waterfield observed it at Headley on the same night, and considered that its magnitude was eighth or ninth; it was a fairly large object, with some central condensation. It is keeping very close to the ephemeris of Cunningham and Whipple, which is as follows (for 0^h):

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

U.A.I. Circ. 370 reports another remarkable object discovered by Dr. Reinmuth at Königstuhl:

April 27^d 22^h 13·5^m U.T., R.A. 13^h 42^m 7·8^s, S. Decl. 10° 41′ 52″ (1932·0); mag. 12·5; Daily motion, −4^m 56^s, S. 4′; the retrograde motion in R.A. is greater than that of any of the known asteroids, so either it is a comet or an asteroid with a very abnormal orbit.

Astronomical Photographs at Harvard.—The immense value of the great collection of astronomical photographs taken at Harvard Observatory is known to all astronomers. On many occasions it has enabled the history of novæ or variables to be traced for years before their discovery. Early images of Eros were also found upon them. Science Service announces, in a bulletin dated March 23, that this valuable collection has now been placed in a new fireproof building at Harvard, where the plates are both safer and more easily accessible. It will be news to many that some plates of the collection go back to the year 1850, when the first photograph of a star ever taken was made at Harvard with the 15-inch equatorial. But it is only from the introduction of the dry plate in the early 'eighties that the series becomes continuous. The inauguration of the new building comes at an appropriate time, as Harvard is the appointed meeting place of the International Astronomical Union at the beginning of September.