

Research Items.

Folk-Tales of the Cochita, New Mexico.—A collection of tales told among the Cochita Indians of New Mexico, collected by Ruth Benedict, is published as *Bulletin 98* of the Bureau of American Ethnology. As the tales were recorded in a house open to all, they form a selected group; for there is a taboo against telling certain tales to whites, just as there is a taboo against whites seeing masked dances or dancers. The tales fall into certain classes, such as stories of the katechins, hero tales, true stories, and the like. Some are obviously of European origin; but the great majority are fictional. Under the influence of the study of the European folk-tale, which is obsolete, the significance of the fictional story among primitive peoples is often overlooked. The fictional story, notwithstanding its imaginative character, deals with incidents, situations, and problems which are real in the culture of the people. Among the katechins stories, that of the quarrel between two sisters is the origin story of the Cochita; but owing to the prejudice against telling it to the whites, only the culminating incident is given. In the hero tales, the heroes are insignificant, poverty-stricken, and ridiculed boys who are successful in overcoming their enemies and mockers. The Twin Heroes, the protectors of the helpless and the institutors of custom, are mischievous and irresponsible; the Arrow Boy does not hunt and spends all his time courting girls; the Poker Boy is ugly and untidy, and so forth. Montezuma, though a mythological culture hero, is ridiculed as a half-wit. The novelistic tales are fictional versions of Pueblo life, excepting in two respects, one difference being a contest over food stores, the other, marriage to multiple wives, polygamy being absent both in the old culture of the Cochita and at the present time under Roman Catholic teaching. Throughout the stories, the initiative and independence of the women is strongly marked.

Song of an American Oriole.—From observations made in the neighbourhood of Pinole, California, Alden H. Miller is of opinion that his countrymen have not given proper credit to the song of Bullock's oriole, *Icterus bullocki* (*Wilson Bulletin*, June 1931). At any rate he gives an interesting story of the relationship of the song to territorial claims. In spring the male bird precedes the female by one to two weeks, and establishes a singing post. When the hen arrives she combines in the defence of the territory, but the co-operation is imperfect until the nest is built, in the sense that the hen drives away females only, and the cock, males only. Indeed, the female during this period may actually court strange males in the reserved territory (which scarcely seems to be playing the game), but the attachment of the male is equally diffuse. The song of the hen oriole in defence of the territory and in association with males is in every way comparable to the songs of the cocks, and may be regarded as a true territorial song. The songs of the sexes are similar in rhythm, pitch, and quality, except that the final notes of the female's song are slightly harsher, of somewhat less range, and show modifications of rhythm. Before or during nest-building the songs of females may, on occasion, be even more abundant than the songs of the males.

Musculature of Crustacea.—The main portion of the Report for 1930 on the Lancashire Sea-Fisheries Laboratory at the University of Liverpool edited by Prof. James Johnstone and Dr. R. J. Daniel (Liverpool University Press: 1931), is taken up with a

continuation of Dr. Daniel's researches on muscles of certain Crustacea: "The Abdominal Muscular System of *Homarus vulgaris* (L.) and *Palinurus vulgaris* (Latr.)": "The Abdominal Muscular System of the Shore Crab (*Carcinus maenas*) and of the Zœa I and Magalopa Stages": and "Comparative Study of the Abdominal Musculature in Malacostraca. Part I. The Main Ventral Muscles of the Typical Abdominal Segments." In this last paper the author compares all the types investigated both in the present work and in previous reports. *Paraspidetes lacustris*, *Praunus flexuosus*, *Meganyctiphanes norvegica*, *Crangon vulgaris*, *Homarus vulgaris*, and *Palinurus vulgaris* have all been examined. The main conclusions are that the ventral muscles of the Decapoda chosen may be derived from the Paraspidetes type by the addition of true transverse and dorso-lateral muscles; those of *Praunus flexuosus* and *Meganyctiphanes norvegica* being very much specialised. In the case of *Carcinus maenas* it was found that both in the first zœa and in the megalopa the musculature of the abdomen is very simple and anticipates that of the adult crab, where the abdomen is so much reduced.

Respiration of Wheat at Low Temperature.—The commercial importance of frost resistance in Canadian agricultural practice has led recently to a large number of studies of the physiological mechanism underlying hardiness or resistance to frost injury. Newton and Brown (*Canad. Jour. Research*, 5, 333) have investigated the degree of catalase activity shown by juice pressed from wheat plants of various hardy and non-hardy varieties. Under the conditions employed, the activity is greatest in the juice of hardy plants. On the other hand, a subsequent investigation of the rate of respiration of similar varieties of wheat by Newton and Anderson (*Canad. Jour. Research*, 5, 337) showed that the plants of hardy varieties have a smaller respiration rate at temperatures below the freezing point, which agrees with a previous observation that their reserves of sugar are maintained at a higher level during winter than are those of non-hardy varieties. The difference in respiration rate is not, however, observed at higher temperatures.

A Satellite Missing from Ever-Sporting Stocks.—A cytological study of certain ever-sporting races of garden stocks—singles which throw doubles—by Dr. J. Philp and Prof. C. L. Huskins (*Jour. of Genetics*, vol. 24, No. 3), has revealed a striking explanation. The strains were obtained from Miss E. R. Saunders, who has done much genetical work on the genus. Examination of the somatic chromosomes ($2n = 14$) shows that one pair (*A*) in the pure single and pure double strains has a subterminal fibre-attachment constriction and a trabant or satellite attached to the short arm. In ever-sporting singles one of the *A* chromosomes lacks the trabant. Such plants are heterozygous for the recessive doubleness, these factors being carried in the *A* chromosome but not in its satellite. Pollen grains which contain the chromosome lacking the satellite do not function in fertilisation, while this condition is lethal in only part of the female gametes. On this basis the long-known ever-sporting behaviour is explained in general accord with Frost's earlier hypothesis. The authors also show that in a trisomic mutation called 'Crenate' by Frost, which behaves as a trisomic for singleness-doubleness, three *A* chromosomes are present, two of them having a satellite. Frost's variety 'Snowflake' and its trisomic mutants are found to have long

meiotic chromosomes, a confirmation of observations by Lesley and Frost. It is suggested that this condition has arisen from the normal by a mutation which delays slightly the onset of chromosome contraction in the heterotypic prophase.

Timber of the British Douglas Fir.—*Bulletin* No. 10 (August 1931) from the Forest Products Research Laboratory at Princes Risborough treats of the timber of home-grown Douglas fir, now termed *Pseudotsuga taxifolia*, following the International Rules of Botanical Nomenclature, instead of *P. Douglasii*, the name which has been so long in use in Europe. The bulletin has been written by Mr. B. J. Rendle, and comprises the investigations carried out by him with the view of indicating "to growers and users the possibilities and limitations of the timber". Mr. Rendle's investigations have shown several most interesting and reassuring factors on the subject of the home-grown wood of Douglas. The logs investigated came from Benmore and Kilmun in Argyllshire, Taymount in Perthshire, Longleat in Wiltshire, and Highclere in Hampshire. The age of the trees varied between fifty and sixty years, except in the case of Highclere (thirty-five to forty years). This implies that in no case had the trees reached maturity, and consequently contained a high proportion of the rapid-grown timber of the early years as compared with the slower-grown material of later life. It is believed from the examination of the latter that maturer trees would show a greater percentage of the better-class timber. The wood can be readily seasoned, both in the open and in the kiln. For the private proprietor of woods an important outcome of the tests has been that Douglas pit-props have approximately a strength equal to home-grown Scots pine and to that of imported Baltic and French timber, and this in spite of the rapidity of growth in early years. This rapid growth and the question of slowing it down in order to obtain a larger number of rings to the inch (not less than six or seven and preferably ten) is one of the economic problems which will require settlement according to the objects for which the woods are formed: that is, to give a quick and early return, to provide as large an amount of mature timber as possible, or to achieve a middle course. It is mainly a silvicultural problem. Mr. Rendle's study has been systematic and thorough. The bulletin deals with investigations on structure, seasoning, strength, preservation, working qualities and grade, and uses.

Southern Rhodesian Geology.—The geology of the country around the well-known Shamva Mine, north-east of Salisbury, is described by R. Tyndall-Biscoe in *Bulletin* 18 of the Geological Survey of Southern Rhodesia (pp. 87 and geological map, 1931). The greater part of the area is made up of Archæan rocks, the oldest of which consist of highly metamorphosed basic volcanic rocks (greenstones) with interbedded strips of recrystallised sediments. The "Shamva Grits" follow, including arkoses and greywackes, and conglomerates that carry pebbles of the older series. Both sets of basement rocks are invaded by gneissic granite and associated intrusions. It is fairly well established that the gold-bearing quartz-reefs and other gold deposits of the region are to be correlated with the later stages of this igneous cycle. It is concluded that the gold of the Shamva Mine was originally a constituent of the magma which solidified to form the two granite stocks now exposed to the north-east and south of Shamva. The next recognisable episode was the intrusion of dolerite dykes and sills. In part these belong to the late Karroo, but as dykes of three or four different ages are known it is likely that some were injected during earlier geological

periods. An excellent series of chemical analyses by E. Golding deserves special mention. These continue to confirm a geochemical generalisation that has already been noted in these columns, namely, the unusual abundance of strontium and paucity of barium in the rocks of Southern Rhodesia.

Atmospheric Ionisation.—Prof. J. J. Nolan and Dr. P. J. Nolan have published in the *Proceedings of the Royal Irish Academy* (vol. 40) an account of their observations on the state of ionisation of the air at Glencree, in the Wicklow hills. This station can be regarded as uninfluenced by large towns, except when the wind blows directly from Dublin, and to a less extent from smaller places to the east. The data obtained for different winds thus provide information about both clean and contaminated air, and show clearly the effect of the city in producing condensation nuclei, probably products of combustion, in large numbers. The smaller ions are less affected, and after eliminating, so far as possible, all disturbing influences, it was found that about five hundred were present in a cubic centimetre with a positive charge, and 375 with a negative charge; the disparity of the concentrations was diminished by rain. The ratio of concentrations also shows a diurnal variation corresponding to that of the vertical field in the air, and there is evidence that the rate of formation of ions fluctuates in a similar way. An appendix to this paper contains the results of all the observations made between October 1928 and December 1930, and should prove valuable for comparison with readings taken at other stations.

Distillation of Dry Liquids.—It has been observed by several investigators that dry liquids boil with difficulty. The abnormal behaviour observed with liquids after intensive drying might be due, in part at least, to the slowing down of the rates of evaporation and condensation of liquids after such treatment. In the October issues of the *Journal of the Chemical Society*, J. W. Smith records experiments with intensively dried ethyl bromide. This was contained in a bulb connected with a second empty bulb, a wide tube containing phosphorus pentoxide being sealed to the tube connecting the first two bulbs. In this way no obstruction to the vapour was introduced. All air was removed from the apparatus. It was found that the time of non-ebullition distillation increased markedly with drying, and it was difficult to obtain ebullition with the very dry liquid even with violent shaking in a bath at quite a high temperature. The effect was not removed by a period of heating of the liquid, which is considered to indicate that polymerisation is probably not responsible for the change, since this polymerisation might be expected to be broken down by heating. No change in the vapour pressure of ethyl bromide due to intensive drying could be detected, this result being in contradiction to those of Smits, who found an increase, but after a longer period of drying than that used by Smith. No separation into fractions by distillation could be achieved. The change in rate of distillation is very slight in the first period of the drying, but then increases sharply, afterwards decreasing again. The results are interpreted as showing that intensive drying does not disturb the internal equilibrium of a liquid, but that the effects are due to some form of superheating, probably induced by the removal of nuclei of some type during the treatment with phosphorus pentoxide.

Heat Insulation of Furnaces.—The issue of *Chemical and Metallurgical Engineering* for July contains an account by Messrs. J. B. Barnitt, research engineer

of the Aluminium Company of America, and R. H. Heilman, fellow of the Mellon Institute of Industrial Research, of their search amongst the aluminium compounds for a material which would withstand temperatures of the order of 1000°C . and at such temperatures have a low heat conductivity. They find that aluminium monohydrate, bauxite monohydrate, and a waste product from the extraction of pure aluminium material from bauxite are the most promising materials, and that their heat conductivities, which all increase with rise of temperature, are in the ratios of 15:9:6. The latter is cheap but heavy, the bauxite monohydrate is less expensive than the aluminium monohydrate, but will not stand such high temperatures as the latter. If the heat insulating material is required in brick form and not as a powder, the authors find that bauxite monohydrate, with certain additions to increase its strength at high temperatures and decrease its shrinkage, is best, and blocks of this material

12 in. by 36 in. and of various thicknesses are now on the market.

Distance Thermometers.—In an illustrated pamphlet of 40 pages, Messrs. Negretti and Zambra discuss the relative merits of gas, vapour, and liquid thermometers for use at a distance from the observing station, and come to the conclusion that mercury in steel thermometers with dial scales are the most serviceable. The errors to which such thermometers are subject are considered, and conclusions are drawn as to the best methods of eliminating them. The capillary tube connecting the bulb to the Bourdon tube which carries the pointer has its bore reduced to 0.005 in., so that the error due to it may in most cases be neglected. Fatigue of the Bourdon tube material has been overcome by the use of a special steel and a section which distributes the stress in the material more uniformly.

Astronomical Topics.

The Leonid Meteors.—A Science Service bulletin, dated Nov. 16, reports a fairly active shower of these meteors in the early hours of Nov. 16, observed by seven students of Columbia College, Dubuque, Iowa, under the direction of Rev. J. Theobald, professor of mathematics. In spite of a slight haze, 289 meteors were observed in six hours; the maximum rate of fall was 90 per hour at 4.45 A.M. (that is, 10.45 U.T.). These meteors came about eighteen hours before the slightly less active shower observed in England by Mr. Prentice and Mr. King.

Drs. Johnstone Stoney and Downing, in their work on the return of the meteors in 1899, introduced the terms "ortho-Leonids" and "clino-Leonids"; the former are a comparatively compact clump, which are seen only in the years round about the comet's perihelion-passage. Since the earth takes only five or six hours to traverse the ortho-stream (Olivier, "Meteors", p. 36), one or other, or perhaps both, of the displays described above must have belonged to the clino-Leonids; these are scattered around the whole of the long elliptical orbit, but more thickly in the neighbourhood of the comet. When the ortho-stream is entered, the hourly rate sometimes goes up to thousands. Even in the comparatively poor displays of thirty-three years ago, 800 meteors were recorded in a few hours, both in 1898 and in 1901.

Father O'Connor reports that arrangements were made at the Stonyhurst College Observatory to keep the sky under observation during the nights of Nov. 15-18. Rain or clouds prevailed almost the whole time, but it cleared up somewhat about 4.0 A.M. on the morning of Nov. 17. "Between 4.15 A.M. and 6.0 A.M. I observed 13 Leonids, of which four, observed at 4.32, 5.2, 5.3, and 5.42, were considerably brighter than first magnitude stars. The one at 5.3 in particular was exceedingly bright, and distinctly illuminated the surrounding country."

The Mass of Saturn's Ring.—H. Slouka contributes a paper to *Scientia* for August in which he traces the history of investigations on Saturn's ring, beginning with Galileo's well-known anagram announcing the triple nature of the farthest planet. Next comes Cassini's detection of the great gap in the ring, and Laplace's investigation of its stability. Bessel was the first to make any attempt to determine the mass of the ring, which he did from the observed motion of the apse of Titan's orbit: he gave the two values $1/213$ and $1/118$ of Saturn's mass; both are now

known to be much too large, and his revision made things worse instead of better. Clerk-Maxwell, after proving that the rings must be composed of cosmic dust, made an estimate of the number and size of the particles, from which he deduced the very low value $1/50,000,000$ for its mass. Tisserand, from the motion of the apse of Mimas, found the large value $1/620$; Meyer revised Tisserand's work, using improved values of the constants: he first gave $1/1960$, but reduced this later to $1/26,700$. H. Struve's exhaustive researches on Saturn's system are well known; he found it impossible to assign an accurate value for the ring's mass; he proved that it could not exceed $1/314$, but regarded $1/26,700$ as more probable.

The estimate which H. Slouka considers the most reliable was made by Louis Bell from a study of its albedo, based on the photographs taken by Wood in 1916 in light of different wave-lengths; he deduced that the thickness of the rings does not exceed 15 km., and is still less in the less luminous regions; he gave $1/1,000,000$ as a maximum value of the mass.

The general conclusion is that an exact determination of the mass is impossible, but that most of the gravitational determinations are much too high. The research is made more difficult by the fact that the polar flattening of Saturn acts on the satellites in the same manner as the ring, but with much greater effect.

Theories of the Birth of the Planetary System.—Most upholders of the tidal theory postulate that another sun made a near approach to our own, and that its immense tidal action caused a filament of matter to leave the sun, which afterwards broke up into the different planets. Dr. H. Jeffreys suggested, a year or two ago, that an actual collision of the two suns would give a better explanation of some features of the solar system. A report by Science Service, Washington, D.C., dated Oct. 27, describes a lecture given to the Washington Academy of Sciences and the Society of Sigma Xi, by Prof. Willem de Sitter. He prefers the collision theory to the purely tidal one, on the ground that it gives an easier explanation of the rotations of the sun and planets. He supposes that in addition to the matter of the planets there was a large amount of diffused gas expelled from the sun. Much of this was later reabsorbed by the sun, but it had in the meantime acquired moment of momentum from the other star, which it imparted to the sun in the form of rotation. The gaseous medium also helped to make the planetary orbits more circular.