

Research Items.

The Klamath.—In 1925 and 1926 Mr. Leslie Spier visited the Klamath of southern Oregon to study their religion and social organisation, now a thing of the past, but of which the memory still exists among some of the elder people who still occupy their old home. The results of the investigation are published as vol. 30 of the *University of California Publications in American Archaeology and Ethnology*. The Klamath are the northern of two major dialectic groups of the Lutuami linguistic stock, of which the southern is the Modoc. The Klamath have the richer and more specialised culture. They were first visited by whites in 1825 and 1826, at a time when the Snake Indian raids were at their height. These raids probably account for the fact that country between the Klamath and the Dalles on Columbia river was unoccupied. It is probable that in historic times their highest number was about 1200. Owing to lack of adequate information relating to the tribes of the region, it is difficult to place the Klamath in relation to surrounding cultures. Their food habits and material culture generally follow the plateau peoples. Although their river—the Williamson river—was a minor stream, they are as much a river people as the Thompson, Lilloet, and Sushwap. Their staple food was fish, supplemented by roots and seeds. Deer and other game, though abundant, was not hunted. Their mode of living was arbitrary and not decided by geographical conditions. Klamath and Modoc represent the southern boundary of the plateau culture, but they have a strong leaning toward north-eastern California. The basis of their religious experience is that of the northern interior, the Columbia basin, and the north-west coast. Specifically the resemblance appears in the circumscription of spirit-possession to the mid-winter month. Details of shamanism, on the other hand, link with north-eastern California. Social organisation is simple and like that of the basin and plateau in every particular.

Tuberculosis in Man and Lower Animals.—The material for an important memoir under this title by Dr. H. H. Scott (*Medical Research Council, Spec. Rep. Series*, No. 149: H.M. Stationery Office, 4s. net) is derived from post-mortem examinations made by Dr. Scott of 300 cases of fatal tuberculosis occurring among Chinese of the labouring class in Hong Kong, and from similar examinations of a series of wild animals dying of tuberculosis while in captivity in the Zoological Gardens, London. He also reports upon some cases of mycosis in animals, the lesions of which are not unlike those of tuberculosis. Interesting details are given of the kind of lesions and their distribution and histology in the various animals. Thus in the dog, whitish circumscribed tumours with viscid or mucopurulent centres occur in the lungs, liver, and kidneys, which in their naked-eye appearances simulate cancerous growths. Microscopically, the tubercle of the dog differs from that found in man and most other mammals by the absence of giant-cells. In the parrot, which is susceptible to both the human and the avian types of the bacillus, pulmonary tuberculosis is rare and cutaneous infection is common, taking the form of lupoid or warty affections of the head. Tuberculosis is of exceptional occurrence in cold-blooded animals and the bacilli are of several types. Lesions may be present in the lungs, liver, and intestine, and occasionally as a cutaneous infection. Mycoses are commoner in birds than in mammals and double infection with tuberculosis is not infrequent. Dr. Scott doubts the occurrence of tuberculosis among animals in the wild state.

Musk-Ox in Sub-Arctic Canada.—In continuing the account of his expedition to sub-arctic Canada, to which we have already referred, Capt. J. C. Critchell-Bullock discusses the habits of the musk-ox (*Canadian Field-Naturalist*, Nov. 1930, p. 187). He does not agree with the notion that the musk-ox is a migratory animal. It is gregarious, and the band may indeed make periodical journeys, but these are usually due to lack of food in the northern haunts, where grass and willows do not grow so profusely as towards the southern limit of their range. Apart from such movements, they prefer to associate themselves with a chosen locality, where they remain indefinitely. Nor does the author agree with the report of the Royal Commission of 1922 upon the musk-ox, as regards feeding habits. Instead of showing preference for grass as compared with willows, moss, and lichens, as the report suggests, the musk-oxen of the Thelon district were only once seen to eat grass where young shoots of willow bushes were available. The species has been practically exterminated about the headwaters of the Coppermine and Black's Rivers, and the evidence suggests that the policy of conservation is not resulting in the increased numbers hoped for. In the musk-ox country there were fewer signs of wolves than anywhere else, but it is possible that the grizzly bear may do some damage, though the likelihood is that the inland Eskimo has more to do with the reduction of a species which may still be said to be in no little danger of extermination. A good omen, however, was the observation of Capt. Critchell-Bullock that calves composed almost one-third of the three bands he saw.

Hydatid Disease.—This disease is a condition caused by the developmental stage of a tape-worm which has its natural habitat in the intestine of the dog and occasionally in other carnivora. The cystic or developmental stage is particularly met with in the sheep and in man; it is usually those who come in contact with sheep who develop the disease. The disease is apparently rare in China, and Dr. H. H. Loucks, Department of Surgery, Peiping Union Medical College, in a paper entitled "Hydatid Cyst", reprinted from the *National Medical Journal of China*, vol. 16, pp. 402-496, 1930, has been able to collect only twenty cases recorded in the literature, but during the last ten years he has been able to add twelve more undoubted cases, and five others in which a diagnosis rested upon clinical evidence only. Full details of the cases, with a review of the literature on Chinese cases and a bibliography, are given.

Holacanthus bispinosus in the Philippines.—Mr. Heraclio R. Montalban, of the Division of Fisheries, Bureau of Science, Manila, records this handsome fish for the first time from the Philippines ("A Chaetodont new to the Philippines", *Philippine Journal of Science*, vol. 41, No. 3, March 1930) and re-describes it with a good coloured figure. The description is taken from two specimens, 78.5 mm. and 81 mm. in length, from Lumbian Islands, Sulu Archipelago. Previous records are from Zanzibar, Amboina, New Hebrides, Tahiti, Samoa, and the Hawaiian Islands. The fish bears some resemblance to *Holacanthus multispinis* Playfair, but is distinguished at once from the latter by the absence of a shoulder blotch.

Fauna of Lancashire and Cheshire.—An interleaved check list of the fauna of Lancashire and Cheshire ("A Check List of the Fauna of Lancashire and Cheshire", pt. 1. Arbroath: T Buncle and Co.

5s. net) has been edited with great care by the secretary of the Fauna Committee of these two counties, Mr. A. K. Lawson, and has a preface from the pen of Prof. W. M. Tattersall, of University College, Cardiff. Twenty-two orders, ranging from Mammalia to Oligochæta, are included, and the number of insects, spiders, birds, fishes, mites, mammals, worms, and other creatures amounts to upwards of four thousand. Mr. Coward is responsible for the Mammalia (50 species), Aves (288), Reptilia and Amphibia (both 6 species), and non-marine Pisces (32). Of ants Mr. Donisthorpe records 27 forms; there are 1920 Coleoptera, 414 Hemiptera in two almost equal divisions, and 157 Tenthredinidæ classified by Mr. Britten. Mr. Lucas deals with the Mecoptera (3), Neuroptera (28), Paraneuroptera (23), and Orthoptera (34). There are 22 species of Siphonaptera, and no fewer than 467 Arachnida. The latter, together with the Opiliones (15 species) and Pseudoscorpiones (14), are treated by Mr. Falconer, who, together with the Rev. J. E. Hull, is responsible for the Acari (345 species). Prof. Tattersall and Mr. Britten record a hundred and one Crustacea, Dr. Wilfrid Jackson 143 Mollusca, and the Rev. Hilderic Friend 42 Oligochæta, or land and fresh-water worms, with nine different parasites found in the same. Few counties can show so large a record, which is a testimony to the industry of the members of the county natural history societies and the recorders.

Use of Compost for Turf.—The use of compost in horticulture is nothing novel, but it has been little employed for the improvement of turf. A series of articles in the *Journal of the Board of Greenkeeping Research*, vol. 1, No. 3, shows how it may be applied to golf greenkeeping. The preparation and usage of compost is dealt with by R. B. Dawson. The term is applied to a mixture of soil and organic material piled up in alternate layers and allowed to rot. Heavy clay or pure sand should be avoided and horse stable manure is the most favoured type of organic matter, but peat moss, leaves, grass cuttings, spent hops, and seaweed are also mentioned as satisfactory. The stack must be protected from rain, both to facilitate subsequent sieving and also to prevent putrefaction and loss of valuable fertilising materials. A compost heap is best started in the spring and should be allowed to stand undisturbed for one or preferably two years before use, February and March being the best season for treating the turf. The American system is to apply one ton (1 cub. yd.) of screened compost per month per 5000 sq. ft., usually accompanied with 10-25 lb. sulphate of ammonia. However, considerable benefit is obtained with smaller quantities, and an application of one ton in the spring followed by monthly dressings of 5-10 cwt., to which sulphate of ammonia and sulphate of iron have been added for weed destruction, is suggested. The chief objections against the use of compost are based on the possible introduction of weeds. This difficulty can be entirely overcome by sterilising the compost before use, and practical details of the plant in use at the Malone Golf Club, Belfast, are described by J. Henderson. Baking appears to be the best method of procedure, and the cost of 1s. 6d. per ton is not considered prohibitive. The advantages from the use of compost are various. It tends to level the turf and encourages bottom growth of grass; it acts as a valuable carrier for the distribution of fertilisers, itself supplying humus and small amounts of plant food, and also exerts a protective action under conditions of drought or frost.

Huygens and other Lens Makers of the Seventeenth Century.—The addresses delivered by Dr. P. Zeeman,

Prof. Picard, and others in the hall of the Academy of Sciences at Leyden in celebration of the tercentenary of the birth of Christian Huygens on April 14, 1629, have been issued in pamphlet form by Paris of Amsterdam, along with Dr. C. A. Crommelin's guide to the exhibit of Hugeniana in the Observatory, illustrations of apparatus, three portraits of Huygens, and a view of his home during a considerable part of his life in Holland. In a further pamphlet by the same publisher, Dr. Crommelin gives an account of the lens makers of the seventeenth century, with portraits and figures of their grinding apparatus. Although Descartes invented a grinding machine, he does not appear to have made lenses. Huygens and his brother Constantin began to grind lenses in 1655, and illustrations of their machines are given, as well as those of Hooke, Hevelius, Maignan, and several taken from Zahn's "Oculus artificialis" of 1685. Gutschoven, Calthof, Mocchi, Reeves, Campani, Divini, Hartsoeker, Spinoza, Leeuwenhoeck, and Le Bas are all mentioned as lens makers, but no details of their methods are given. Dr. Crommelin's pamphlet forms a valuable addition to the papers of von Rohr and Baxendall which have appeared recently in the *Transactions of the Optical Society*.

Interaction of α -Particles and Helium Nuclei.—It has recently been shown by Dr. J. Chadwick that the collisions between α -particles of medium speed and helium nuclei do not follow the law of the original theory of scattering, but that they behave instead in a modified way because of interference between the material waves of the two similar particles. Dr. Chadwick's results were taken to as small velocities of the particles as were conveniently studied by the scintillation method. P. M. S. Blackett and F. C. Champion, in an investigation with a Wilson cloud apparatus, described in the January number of the *Proceedings of the Royal Society*, have now carried these further, and again obtained good agreement between their measurements of forks on α -particle trails at the end of the range in helium and the predictions of the wave-mechanics. The statistical element in this work is more important than in Dr. Chadwick's, in spite of the fact that trails of about 50,000 α -particles from polonium were examined, but the agreement remains, on the whole, very satisfactory. A new result of importance which has been obtained incidentally in connexion with the present work is the relation between the speed of very slow α -particles and the residual range in air under standard conditions.

Isotopes of Zinc, Tin, Chromium, and Molybdenum.—A description of the isotopes of these four elements, which have been successfully studied by the introduction of volatile methyl compounds and carbonyls into the apparatus, is given by Dr. F. W. Aston in the January number of the *Proceedings of the Royal Society*. In the case of zinc and tin, the order of intensity of the isotopes has been revised, and with the other metals new isotopes have been discovered. In all cases, very good agreement is found between the chemical atomic weight, as deduced from the masses and relative abundance of the various isotopes, and that obtained by the more usual direct chemical methods. The actual numbers for these constants from mass spectrograph data are: Zn = 65.38₀ ± 0.02, Sn = 118.72 ± 0.03, Cr = 52.001 ± 0.006, and Mo = 95.97 ± 0.06. Dr. Aston has not been able to obtain new results for cadmium and germanium. Cadmium methyl, although chemically similar to zinc methyl, behaved in a totally different way in the discharge, cadmium depositing on the walls and disturbing seriously the normal beam of

rays. Germanium was studied by germanium ethyl, by use of which it had already been shown that there are eight isotopes to this element, but no satisfactory quantitative results were obtained. Dr. Aston proposes to study germanium later with the methyl compound, but it appears that with cadmium it will be necessary to return to the more difficult technique of 'anode rays', by which its isotopes were first discovered.

Beam 'Arrays' in Short-Wave Transmissions.—During the last three years the technique of short-wave transmission of electric waves through space has been rapidly developing. It is interesting to remember that so far back as 1899, S. G. Brown took out a patent for an aerial which utilised the principles of interference now commonly adopted. The first successful high-speed radio telegraph service was inaugurated at Bodmin, Cornwall, in 1927 by Franklin and Marconi. They developed a method of short-wave generation, which enabled engineers to design transmitters able to supply a large output at a steady frequency. The transmitters used in short-wave transmission are 'arrays' of wires scientifically spaced and carrying currents in the correct phases so as to increase greatly the resultant field strength in a definite direction. In a paper read to the Institution of Electrical Engineers on Dec. 3, T. Walmsley described many of the beam 'arrays' which are used in different countries, and in particular his own 'T.W.' aerial array which is used at the Post Office radio station at Rugby. He pointed out that the question of suitable transmission lines to the 'array' is of great importance. The Marconi beam stations, the French and the German stations, all use concentric tube transmission lines. Mr. Walmsley, however, pointed out that the losses in open circuit lines are much less than most engineers think, and so they can in many cases be usefully employed. Provided that the currents in the lines are well balanced, the radiation losses are small. There are losses in open circuit lines due to the 'high frequency' resistance, the proximity of the wires, the dielectric losses in the insulators, and the reflections from points on the circuit where the electrical constants change. He suggested methods for reducing these losses.

Problems in Lighting Systems.—Dr. W. T. Walsh, of the National Physical Laboratory, has contributed an interesting paper on photometric research to *World Power* for January. In considering the merits of any lighting system it is necessary to take 'glare' into account. It is found that the sensitivity of the eye is diminished four-fold if a light source of sixty candles is placed 10 feet from the observer, when the line joining the source to the eye makes an angle of 3° with the line of sight. The rate at which the eye loses sensitivity when a light suddenly appears and the rate at which it recovers when the glare is removed are being investigated. There is at Teddington a model street, 500 feet long and 35 feet broad, which is well adapted for tests of street lighting fittings. In particular, the reflection from the road surface when the light is incident very obliquely and the angle of view is nearly horizontal has to be studied. Every material used as a road surface, no matter how rough it may seem, shows a large amount of specular reflection under these conditions. When the road is slightly worn the degree of polish is very marked. Another problem that has been successfully solved is the most economical size of 'light well' to use for large blocks of buildings. It is now possible from the curves and formulæ that have been published, to compute with sufficient accuracy the amount of

light which will reach any point of a room facing a light well of given dimensions. A problem of practical importance is to design a picture gallery so as to avoid the annoying reflections on the glass with which the pictures are covered. The only satisfactory solution appears to be to arrange the windows so that as little light as possible falls on the spectators, while the full amount reaches the picture wall.

Chlorine Monoxide.—Goodeve, in the December issue of the *Journal of the Chemical Society*, describes experiments on the vapour pressure of chlorine monoxide, Cl_2O , which indicate that the boiling-point at 760 mm. pressure is 2.0° and not 3.8° as found by Goldschmidt. The freezing-point is abnormally low, being -116° . The value -20° reported in tables (without indication of the origin) is, therefore, much too high. The vapour pressure curve of chlorine monoxide lies above that of chlorine dioxide found by Partington and King, and considerably below that of chlorine. The value of the Trouton coefficient indicates that the liquid is probably not associated.

Heats of Dilution.—Some accurate experiments on the heats of dilution of potassium chloride in sugar and urea solutions at 25° , with concentrations below 0.1 molar, are described by Lange and Robinson in the November number of the *Journal of the American Chemical Society*. The object of adding the non-electrolytes was to vary the dielectric constant of water and its rate of change with temperature, the values for pure water being used in the case of solutions in which these substances were absent. A linear relation at low concentrations with \sqrt{c} was found, but the curves for sugar and urea were different. Although agreement with theory was not obtained, it was concluded that the existing data on dielectric constants made exact comparison impossible.

Nitrogen Tri-iodide.—The composition of nitrogen iodide appears to vary according to the method of preparation, the ordinary substance being regarded as $\text{NI}_3 \cdot \text{NH}_3$ or NH_2I . In the December issue of the *Journal of the Chemical Society*, Cremer and Duncan describe some experiments on the action of dry ammonia on iodine bromide or, more conveniently, a polyhalide such as KIBr_2 , which dissociates into potassium bromide and iodine bromide. In these reactions NI_3 is formed. The more stable dibromiodides, such as those of tetramethylammonium and trimethylsulphonium, do not react in this way, but form additive compounds with ammonia. The iodide of nitrogen was obtained by washing with water the product of the action of ammonia gas on the polyhalide, and was a black explosive powder.

Complex Salts of Bivalent Silver.—Although silver is normally univalent, its analogies with copper suggest that it should also function as a bivalent metal. The earliest observations on bivalent silver salts were made by Barbieri in 1912. He obtained a compound of argentic persulphate with pyridine, $[\text{Ag } 4 \text{ py}] \text{S}_2\text{O}_8$, and in 1927 obtained the corresponding nitrate. In the December number of the *Journal of the Chemical Society*, G. T. Morgan and F. H. Burstall describe some further co-ordination compounds of bivalent silver in which both two and three diamine complexes (occupying two co-ordination positions) are present, indicating that the co-ordination numbers 4 (as in Barbieri's compounds) and 6 are possible for bivalent silver. The addendum employed was aa^1 -dipyridyl, and the following compounds were obtained: $[\text{Ag}_2 5 \text{ dipy}] \text{S}_2\text{O}_8$; $[\text{Ag}_2 5 \text{ dipy}] (\text{S}_2\text{O}_8)_2$; $[\text{Ag } 3 \text{ dipy}] (\text{NO}_3)_2$; $[\text{Ag } 3 \text{ dipy}] (\text{ClO}_3)_2$; $[\text{Ag } 3 \text{ dipy}] (\text{ClO}_4)_2$; $[\text{Ag } 2 \text{ dipy}] (\text{HSO}_4)_2$.