

Research Items.

CEREMONIAL EXCHANGE IN EASTERN MELANESIA.—M. Raymond Lenoir, who has made a special study of the institution of north-west America termed, in his opinion improperly, *pottlach*, has published in *L'Anthropologie*, T. xxxiv. No. 5, an examination of the system of ceremonial exchange in the trobriands described by Dr. B. Malinowski in his "Argonauts of the Western Pacific," in the light of conclusions derived from a consideration of the evidence relating to similar customs not only from America, but also from the Asiatic Eskimo, the Chukchees, and the Melanesians of Bismarck Archipelago and the Solomons. Dr. Malinowski found that sea voyages, entailing a long and expensive communal preparation in accordance with a certain ritual, were undertaken with a view to the exchange of certain objects of wealth which were passed on by the recipients from island to island in an endless chain. This ceremonial he regarded as a phase of primitive economics. M. Lenoir, however, regards it as an institution which has grown out of a state of war, of which it is an attenuated form, and intended to preserve the relative status of different social groups. The maritime expedition is a raid in which the booty carried off by the victors or the gift received by them at the making of peace is represented by the ceremonial exchange of these objects. The conception of status applies to both forms of ceremonial exchange described by Dr. Malinowski, and the economic conception is accordingly a secondary or later development.

THE PRE-INCA AND INCA CULTURE OF PERU.—From 1899 until 1901, Dr. Max Uhle was commissioned by Mrs. Phoebe Hearst to conduct archaeological excavations in Peru on behalf of the University of California, but owing to a variety of causes, no report on the excavations has been published. It has now been decided by the University to issue descriptions of the collections made by Dr. Uhle. The first of these has just been published as one of the Publications in American Archaeology and Ethnology of the University. In it Messrs. A. L. Kroeber and W. D. Strong describe the collections from Chincha. The Chincha Valley was a peculiarly favourable site for archaeological study as the Chincha Indians were one of the strongest and most famous tribes of Peru, and before the Incas became supreme, threatened to conquer all the interior of Southern Peru. Excavations were carried out at six main points in the Valley. The most important evidence which they produced, from the point of view of the sequence of culture and chronology, was the pottery; but the conclusions to which this points are supported by the other antiquities. These included shells and beads, textile apparatus and textiles, and objects of metal, as well as human remains. The cultural periods distinguishable are Inca, with which were associated beads of blue glass of European origin, and possibly two pre-Inca periods, Late Chincha I. and Late Chincha II., the latter being perhaps a phase of transition with which the Inca overlaps. There are also some indications of a proto-Chincha period in the form of objects of shell and ivory as well as fragments of pottery which suggest the Nasca or proto-Nasca style. The chronology suggested is for the Inca period c. 1425, for Late Chincha II. about a century earlier, and for Late Chincha I. from about 1000 or 1100.

THE GOAL OF COMMERCE.—Mr. G. G. Chisholm, in the Herbertson memorial lecture, published in the summer issue of the *Geographical Teacher*, says that the goal of commerce "is that stage in the evolution

of commerce when the inhabitants of the earth will be able to enjoy the greatest possible variety of commodities supplied at the least cost and with the greatest attainable stability of prices." This is a definition with which few will wish to quarrel. There may be dissentients, however, when Mr. Chisholm goes on to say that the only condition of reaching that goal on which it is necessary to lay stress is the completion of all the main lines required in the network of communications. In fact, he himself proceeds to point out that there are other important factors besides lack of communications which stand in the way that leads to this goal. He instances the excessive density of population in Far Eastern regions. The low wages arising from over-population in certain lands react, he points out, on industries in other countries by bringing about excessive competition on one hand, as in the case of India and Lancashire in the cotton trade, and on the other, by restricting the purchasing power of the people and therefore the market which those lands might afford. After many references to writings on the subject of over-population, Mr. Chisholm contributes the suggestion that the best solution of the problem of how to reach the goal of commerce is "to raise the standard among the poorer classes of the coloured peoples as quickly as possible to the level of the whites, so far as that can be done." He does not develop his suggestion or touch on the problem as to how the increase of wages of the peoples, who at present have a low standard of living according to Western ideas, can be prevented from leading to a serious rise in the price of raw materials (such as cotton, jute, rubber) and of foodstuffs (such as oil-seeds, coffee, cocoa, tea, and so forth), as to lower appreciably the standard of living of the peoples of the industrial regions of the world. In an article in the *Times* of October 18 attention is directed to the enormous increase of the consumption of wheaten flour in the Far East. Vancouver, which exported only about half a million bushels of wheat in the year ending March 1921, exported forty-one and a half million bushels in the year ending March 1924! This went mainly to Japan and China. At the same time the price of wheat in Great Britain, which rarely before the War exceeded 35s. per quarter, has this month risen to more than 70s.! This article affords a very interesting comment on the problem in question.

TSETSE-FLY INVESTIGATIONS IN NIGERIA.—The *Bulletin of Entomological Research*, vol. xv., August 1924, contains a paper by Drs. L. Lloyd, W. B. Johnston, W. A. Young, and H. Morrison, on tsetse-fly investigations in the northern provinces of Nigeria. This work contains a record of the trypanosome infections, food, and breeding of *Glossina morsitans* and *G. tachinoides*, obtained by examining these flies at various foci over a period of fourteen months. It confirms the fact that the breeding of both species is practically confined to the dry season, and follows a period of increased food supply. The tsetse-fly, *Glossina morsitans*, does not feed on reptilian blood, but in times of hunger draws some of its food from birds: in the locality under consideration it resorts mainly to small antelope, big game being scarce. *G. tachinoides* is less restricted in its diet, and in the wet season one-fifth of its food was drawn from a group of animals which included man, monkey, and dog. The infection of the flies with *Trypanosoma vivax* and *T. congolense* bears a close relation to the amount of blood obtained from antelope, and consequently *G. morsitans* is in general nearly four times as heavily infected as *G. tachinoides*. Infections with

T. brucei and *T. gambiense* are scarce in this locality. Trypanosome infection rises just before the main breeding season in *G. morsitans* in all localities, and in *G. tachinoides* in places where the fly is largely a mammal feeder. The proportional infection in general falls in the season of most rapid breeding, owing to the masking of the actual rise by the number of young flies examined. It rises rapidly when breeding ceases. The total infection is reduced when fly-food is hard to obtain, in the time of long grass and flood, owing to *T. vivax* infections dying out when the flies are starved. There is just an indication that postponement of grass burning may interfere with the free breeding of *G. morsitans*, and in some cases that of *G. tachinoides*. This possibility is to be tested. The experiment of excluding game and pig from one of the dry season foci of the flies by means of fencing will be carried out.

DISTINCTION OF THE TWO DRUGS, *HELLEBORUS NIGER* AND *H. VIRIDIS*.—Mr. T. E. Wallis and Miss Alison M. Saunders have carried out a useful if somewhat negative service to pharmaceutical knowledge by their careful anatomical investigation of the rhizomes and roots of *Helleborus niger* L. and *H. viridis*, upon which they report in *The Pharmaceutical Journal and Pharmacist* for July 26, 1924. These parts of both plants are employed as drugs, and various writers have described anatomical criteria in these organs by which the two species may be distinguished. The result of thorough examination of a wide range of specimens is to negative the validity of all such suggestions, and the authors recall an earlier suggestion of Hartwich that the rhizomes should be collected with the basal leaves attached, as these are trustworthy means of determining the two species.

A MILDEW DISEASE OF THE "WILD HOP."—A brief note by Messrs. E. S. Salmon and W. M. Ware in the *Gardeners' Chronicle* for October 18 records the finding of *Peronospora humuli* on "wild" hops in the hedgerows of Kent and Middlesex. Until now this fungus, first described by Japanese workers as occurring in that country, has been little noticed in Great Britain, since it was found by the writers on cultivated hops in the Experimental Hop Garden at Wye in 1920, when it was assumed to be an introduction from America or Japan, introduced with the hop plants. This is still perhaps the explanation of its occurrence here, as if it had been long at home upon the "wild" hop of the south of England, itself usually an escape from the hop of cultivation, it should surely have more frequently been reported from the cultivated hop-field. Messrs. Salmon and Ware note its striking resemblance to the mildew on nettle, *Peronospora urticae*, and are apparently engaged in further investigation before deciding that these two mildews are not the same species.

A LOWER CRETACEOUS FERN.—Prof. Seward describes an exceptionally well-preserved specimen of the genus *Tempskyia*, a fern characteristic of certain Lower Cretaceous Floras, in the *Annals of Botany*, vol. 38, No. 151, July 1924. He names the specimen provisionally *T. Knowltoni* (anatomical characters of stem, root, and petiole alone scarcely providing the material for a final placing of the plant), after Dr. F. H. Knowlton of the U.S. Geological Survey, from whom he received the specimen and who reports that its probable source is the Kootanie formation of Montana. *Tempskyia* was a fern of somewhat unusual habit, a mass of slender dichotomously branching stems, some of the branches bearing

thickly clustered petioles, and all growing within a thick tangle of interlacing roots, forming together a kind of "false stem," which as a whole in some cases had a definitely dorsi-ventral habit. The stem contains a solenostelic vascular system, and Prof. Seward concludes that the examination of the present specimen supports his previous decision, based on material examined earlier, that this fossil fern has affinities with the modern Schizeaceæ.

JURASSIC AMMONITES OF INDIA.—Dr. L. F. Spath (*Palæont. Indica*, N.S., ix., No. 1, 1924) gives a revision of the ammonites from Kachh based on the collection of J. F. Blake, now in the British Museum, and introduces many new generic names. The species are mainly of Upper Jurassic age, ranging from Callovian to Kimeridgian, but a few are referred to the Aptian. The author considers that the widespread simplification of suture-lines in post-Triassic ammonites has not been fully appreciated, and suggests that the natural order of Jurassic ammonites may well be from complex to simple. The "families" considered are regarded as morphological rather than genetic units, and their relationship to the long-lived and fundamental families Phylloceratidæ and Lytoceratidæ will be considered later.

ROSE QUARTZ.—The cause of the colour in rose quartz has been very thoroughly investigated by E. F. Holden, and his conclusions are published in the *American Mineralogist*, vol. 9, April and May, 1924. Rose quartz is always massive. Occasionally pink crystals occur, but their colour is due to the presence of hæmatite inclusions. The effect of radium radiations on white or rose quartz is invariably to produce a dark smoky colour, and it is interesting to notice that smoky quartz is a constant associate of radioactive minerals in Madagascar and Ontario, whereas rose quartz is not. Careful analyses show that the rose colour cannot be due to titanium or iron, which are in all cases accounted for by the presence of rutile inclusions and limonitic stains respectively. Manganese, however, varies regularly with the depth of the tint; the absorption spectrum agrees with that of trivalent manganese glasses and solutions; and the pleochroism is exactly like that of other minerals which owe their colour to the presence of trivalent manganese compounds. The colour can, moreover, be closely imitated by dissolving less than 0.01 per cent. of manganese in a silica gel, and in this case, as in actual rose quartz, the colour disappears on heating to the transition temperature of 575° C. The convergence of evidence is therefore completely in favour of the conclusion that rose quartz owes its tint to the presence of trivalent manganese. In a former paper (*Am. Min.*, vol. 8, July 1923) the same author showed that the colour of citrine, like that of colloidal solutions of ferric hydrate, is due to sub-microscopic particles of hydrous ferric oxide.

THE VAPOUR PRESSURE OF CARBON AT HIGH TEMPERATURES.—In an investigation of the carbon arc light, Messrs. H. Kohn and M. Guckel have measured photometrically the brightness of the crater surface, using different kinds of nearly pure carbons and graphite, with different currents, and pressures varying from 5 to 0.06 atmospheres, the gases employed being air, argon, nitrogen, and carbon dioxide (*Zeitschrift für Physik*, September 17). Above a certain input the surface brightness, and therefore the temperature of the positive crater, reaches a maximum value, which does not increase with increase of current; this constancy has been observed at atmospheric pressure, from 0.3 to 2.1 amp. per sq. mm.

The maximum temperature was the same at the same pressure for the different carbons, and the different gases in which they were used. The ionisation in the arc, on the other hand, depended on the gas; the difference between the anode fall in air and argon was about 50 per cent. The equilibrium temperature of the crater is thus independent of the chemical and electrical processes in the arc, and probably depends, as Lummer has already indicated, on a thermodynamical equilibrium, the evaporation equilibrium of carbon. The pressure equilibrium-temperature curves are identical over the whole range for all four gases; from 5 to 0.8 atmospheres they can be represented by the Clausius Clapeyron equation, and so can be regarded as the vapour pressure curves of carbon, confirming the preliminary results of Fajans and of Kohn. The probable value of the heat of vaporisation of graphite, at room temperature, is deduced as $\lambda = 139.2$ k. cal.; this value may be 7 per cent. too high or too low. The value deduced from the theoretical chemical constants, assuming the vapour to be monatomic, is 141.4.

THE EFFECT OF OXIDISERS ON SENSITIVENESS AND ON THE DEVELOPABLE IMAGE.—In the October number of the Journal of the Franklin Institute is a communication on this subject by Messrs. S. E. Sheppard, E. P. Wightman, and A. P. H. Trivelli, of the Eastman Kodak Company. After a concise summary of the results of recent work, the authors say that it appears from these and other facts that the development centres are latent image spots "which apparently consist of colloidal silver, and that these in turn proceed from pre-exposure sensitive spots in the grain, which may also consist of silver specks, possibly only a few atoms in magnitude." Previous work has shown that the treatment of an ordinary plate with copper sulphate solution merely lowered the sensitiveness of the plate, shifting the H. and D. curve to the right. But the authors find that if the emulsion is diluted so that there is only one layer of silver-salt grains, the copper sulphate treatment causes a marked increase of the steepness of the H. and D. curve, the maximum density being little if at all affected. This matter is being further investigated. When plates are treated with chromic acid the sensitiveness is rapidly reduced and gradually approaches a constant value. The authors have tried the effect of chromic acid on the developable image, and find that it is very considerably destroyed, the slope of the H. and D. curve is much reduced, but that after even many hours' treatment, the last traces of the developable image are not removed. Permanganate appears to be more active in its destruction of sensitiveness than chromic acid, and the authors are investigating its action on sensitiveness and on the developable image.

RESEARCH ON INDIAN TIMBERS.—An account of the research work being carried out on Indian timbers at the Forest Research Institute, Dehra Dun, India, appears in the *Chemical Age* for October 11, 1924. The most important section of the work deals with timber seasoning, experimental kilns with complete mechanical equipment having recently been erected. Wood preservation is also receiving attention; several of the Indian railway companies are installing plants for treating sleepers. Sleepers treated with the oil Avenarius Carbolinum have been found to show no signs of decay after being in the ground for two years. During the past year, 11,000 timber tests have been carried out. An experimental paper-pulp plant is now working, and an exhaustive inquiry into the tan-

stuffs of the mangrove forests (Lower Burma) has just been completed.

THERMAL ACTIVATION BY COLLISION.—In the Journal of the Chemical Society for September, Hinshelwood and Hughes describe experiments on the thermal decomposition of chlorine monoxide. The reaction appears to be complicated by intermediate products, but an average value of the velocity constant was found. From this the number of molecules reacting per second is calculated. The ratio of this to the number entering into collision per second (in both cases per c.c.) gives the fraction of effective collisions. Pfaundler (whose name does not appear to be mentioned) about forty years ago suggested that only collisions between molecules having a certain excess of energy above the mean value are effective, and if Q is the excess energy, Maxwell's result shows that the ratio mentioned can be equated to $e^{-Q/RT}$. The value of Q is found to be 22,000 cal. By plotting $\log (1/t)$, where t is the time for a given fractional decomposition, against $1/T$, a value of the "heat of activation" is found in the usual way to be 21,000 cal., and the conclusion is reached that the agreement seems "to render it certain that bimolecular reactions can be interpreted in terms of simple thermal activation by collision," without recourse to the radiation theory.

DESTRUCTIVE DISTILLATION OF COAL.—The Journal of the Royal Society of Arts for September 26 and October 3 and 10 contains a report of Cantor Lectures by Mr. E. V. Evans, chief chemist of the South Metropolitan Gas Company, on this subject. A given number of therms available as raw coal can be distributed among gas, tar and coke in a variety of ways, depending on the type of carbonisation process adopted and the conditions of its operation. A diagram is given showing the distributions in high temperature carbonisation and in low temperature carbonisation. The yield of therms as gas in the former is more than double that in the latter, less tar is obtained, and less volatile matter is left in the coke as compared with low temperature carbonisation. There is practically no difference between volatile therms and coke therms in the two processes if the volatile part in the coke is taken into account. The difference is merely one of distribution. The rate of carbonisation is shown by diagrams. A very large volume of gas of high calorific value is evolved in the first ten minutes after closing the door of the retort: in this period 5 per cent. of the total gaseous therms is produced. In the second lecture the very close relationship existing between gas and tar was fully considered. Laboratory experiments show that the total volatile therms (gas and tar) decrease gradually as the rate of carbonisation becomes slower, there being a very marked decrease in the case of exceedingly slow carbonisation, and the ratio of gas to tar therms decreases considerably with reduction in the rate of carbonisation. The results are interpreted by tar cracking. The belief that the rapid heating of coal is very wasteful of thermal energy is mistaken. The physical conditions obtaining in the retort were explained in the third lecture, which concluded with an account of a process for producing briquettes from a mixture of coal and coke. This is considered more promising for the manufacture of smokeless fuel than low temperature carbonisation. By mixing inert material such as coke with the original coal, a rapid rate of heat transmission is attained which results in enhanced yields of volatile therms. Such an innovation in the carbonising process opens up new possibilities in the development of the gas industry.