

Research Items.

AN EARLY ESKIMO CULTURE IN ALASKA.—In a communication issued by the Victoria Memorial Museum, Ottawa, Mr. Diamond Jenness, Chief of the Division of Anthropology, reports on the results of four months' field-work in Alaska, where he excavated ancient ruins and studied local dialects with the object of determining the origin and antiquity of an Eskimo civilisation which has left traces in Canada extending from the Mackenzie River Delta to Hudson Bay. At Wales, the point of Alaska nearest to Asia, ruins were discovered belonging to four distinct periods, all preceding the discovery of Alaska by Europeans. The remains of the second period resembled very closely those of the oldest known ruins of Arctic Canada. Excavations on the Diomedede Islands confirmed those at Wales, and revealed a still earlier culture, of which there is no trace in Canada. The most characteristic feature of this culture was a style of curvilinear engraving unlike anything known of Eskimo art elsewhere, ancient or modern. Its source must be sought either among neighbouring Indian tribes or in north-east Asia. In regard to the former suggestion, it is to be noted that local Eskimo folklore and traditions show strong Indian influence, to be seen also in the masked dances, the use of body armour of bone or ivory, and certain sounds in the language. An antiquity of some 1000 to 1500 years is tentatively assigned to the earliest culture.

DIDINGA WITCHCRAFT.—In *Sudan Notes and Records*, vol. 8, Mr. J. H. Driberg, in the course of notes on Didinga customary law, refers to the penalties imposed on witches and wizards, and gives some indications of the character of the belief among these people. The practice is very prevalent and is usually associated with the use of poison. The influence of the evil eye is greatly feared, but does not belong to witchcraft proper, to which, however, the habit of bestiality, presumably a sexual abnormality, is attributed as a practice intended to injure live-stock. The wizard attains his object by dances. To secure the death of a man, a dance is performed at night at his door; to injure his crops, the dance takes place in the crops, but not necessarily at night. The dead are disinterred by wizards, who are fond of dancing by new graves. A wizard caught performing his dances invariably begs for compassionate treatment and proffers a spear, an axe, or a bracelet, which, if accepted, is carefully hidden away. Notwithstanding promises of amendment, the wizard continues his dances, the evidence in the form of the objects accepted as ransom accumulating until the wizard is seized and arraigned before a council, by which he is sentenced to death and hanged. A goat is sacrificed at his funeral. The wizard's powers are transmitted to another, with or without his knowledge, by a certain drug served in a pot of beer. Involuntary witchcraft so induced is an adequate plea at trial provided the principal wizard who was responsible is denounced. The wizards are all highly strung and hysterical, and are capable of self-delusion to such an extent that they believe themselves invisible when dancing on cultivated ground.

FISH PASSES.—In a very interesting paper (*Fisheries, Scotland, Salmon Fish.*, 1926, II. Edinburgh and London: H.M. Stationery Office, 4s. 6d. net), Mr. W. L. Calderwood gives accounts of different salmon passes that have been constructed from time to time. These descriptions, together with photographic illustrations, show the gradual evolution of the modern type of pool pass from the original

ladder pass, through such forms as the Bracket pass and many others fitted with baffle arrangements. There are many factors to be borne in mind in building a pass, and it is largely from the comparative failure of previous types that the most modern forms have been evolved. Of special importance in the British Isles is the fact that spring-running salmon are not jumpers, and will not face a strong rush of white super-aerated water when that water is cold (below 40° F.). For such fish, then, the gradient of the pass must be easy, with no falls necessitating jumps; the velocity also must be sufficiently slow and regular to allow plenty of black water. Of paramount importance is the position of the outflow of the pass; this should be near to the obstruction to be avoided and close to the usual lie of running fish; it should also discharge a sufficient flow of water to be attractive. The protection of the inflow from flood water and the carrying of stones and gravel into the pass is necessary. The most modern pass consists of a series of pools with only slight drops between, a protected entrance for the water and an arrangement of movable sills, worked by floats, ensuring the passage of the same flow of water through the pass at all levels of the river, whether in flood or drought. Plans of two new passes designed by Mr. Rook for the river Tummel are given.

FUNGAL SYMBIOSIS.—In a communication to the Reale Accademia delle Scienze dell'Istituto di Bologna (*Rendiconti*, Vol. 29), Prof. Fausto Morini describes three examples of the parasitic existence of one fungus on another. In the case of a spermatogonial form of *Phyllosticta parassitica* growing on the perithecia of *Uncinula salicis*, the injurious effect of the parasitic organism on the development of the host is apparent from the diminished number and size of the ascospores. In the second case, the host consists of a species of mucus resembling, in the ramification of the sporangiophore hyphae, a reduced and modified form of *M. racemosus*, although it appears to be allied also to *M. corymbosus*. The parasite, a species of *Piptocephalis*, differing slightly from *P. freseniana*, especially in the characters of the haustorial hyphae, penetrates the mycelial hyphae of the mucus and branches freely therein. The third example is that of *Piptocephalis microcephala* on *Pilobolus crystallinus*. A scheme of classification of the principal fungal symbioses is appended to the paper.

ABNORMAL FERN PROTHALLI.—Miss E. Schindler has found that the spores of *Asplenium septentrionale*, *A. trichomanes*, *Dryopteris filix mas*, and *Polypodium vulgare* will germinate when submerged beneath a liquid nutrient medium. Under these conditions they give rise to long filamentous structures, the cells dividing generally only by walls in one plane. These filamentous prothalli branch fairly freely. Neither the normal meristematic growth of the prothallus nor the formation of archegonia, follows in these prothalli unless they succeed in raising themselves out of the liquid medium into the damp air above it; antheridia occur sometimes on the submerged prothalli when growing in nitrogen-free culture media. This work was carried out by Miss Schindler at Cracow, under the guidance of Prof. Rouppert, and is published in the *Bulletin International de l'Académie polonaise des Sciences et des Lettres*, No. 5-6 B, June 1925.

POTATO MOSAIC AND TEMPERATURE.—The so-called 'virus' diseases are occupying considerable attention at present, and although 'leaf-roll' of potato is the form to which is attributed the greatest

potency in inducing degeneration in English potato crops, those forms of mottled or puckered foliage connected with 'mosaic' are not infrequently reported. Considerable interest therefore attaches to the American experience recorded by C. M. Tompkins (*Phytopathology* 16, 581-610, September 1926) as the result of his work at the Department of Plant Pathology, University of Wisconsin. Tompkins reports that air temperatures of 23° to 24° C., even though only occasionally prevailing, are sufficient to mask completely the existence of mosaic in diseased stock when judged by the ordinary diagnostic symptoms. If the plants are afterwards kept at lower temperatures, characteristic mosaic symptoms are again developed. On the other hand, under histological examination the leaves of the diseased plants in which the disease is masked are said to show marked deviation in structure from healthy leaves, both palisade and spongy parenchyma of the mesophyll being very regularly arranged so that air spaces are almost completely eliminated.

FOSSIL LEAF-BEDS IN VICTORIA.—In Miocene times in Victoria, the country adjacent to the shoreline, then 40 to 70 miles inland from the present coast, was in places marked by a lacustrine phase. It was then that large lake deposits were formed consisting of ferruginous mud or slime, fine pipe-clay or silty material. Into these lakes were swept large quantities of leaves of the Miocene forest and brush. The leaves are well preserved and are now found in the ironstones and pipe-clay deposits in seven localities in Victoria. These fossil leaf-beds have been found at Pitfield, Bacchus Marsh, Berwick, Bogong, Cobungra and Dargo. Through some recent studies of the Tertiary flora of the sandstone and quartzite of Narracan in Gippsland (*Proc. Roy. Soc. Vict.* Vol. 38, 1926, pp. 183-191), Frederick Chapman has added several new forms to the known list of fossil plants from the earlier localities mentioned. The Narracan flora comprises a eucalyptus of a modern coastal type, the myrtle beech (*Nothofagus*), the flame tree (*Sterculia*), the kanooka (*Tristania*), the cinnamon, and other Australian genera. Although of Miocene age, these deposits contain several types of leaves still existing in Victoria, mingled with others now belonging to areas situated in lower latitudes, as New South Wales and Queensland. Another point clearly established in this paper is the relatively older age of the Narracan leaf-beds as compared with the leaf-beds in the brown coal of Morwell and Yallourn.

MESOZOIC GEOLOGY OF ALASKA.—*Bulletin* 776 of the U.S. Geological Survey, by G. C. Martin, 1926, contains a valuable record of the advances made in Alaskan geology during the present century. Mesozoic history provides by far the most important clues to the present structure of the Peninsula, and has a direct bearing on the mineral resources. At the end of the Palæozoic there was a widespread emergence of the land accompanied by intense and long-continued vulcanism. Profound marine submergence followed in Upper Triassic times, but the sea withdrew from the entire area during the late Triassic and early Jurassic, and the rocks already deposited were folded. Marine transgression began afresh in the Lower Jurassic, and widespread vulcanism again broke out, culminating in great granitic intrusions with accompanying formation of ore deposits. The Jurassic was brought to an end with vigorous uplift and erosion. The sea again swept over Alaska in Lower Cretaceous times, receded at the beginning of the Upper Cretaceous, and then advanced again. Finally, the submergence of the Upper Cretaceous slackened, marshes were formed and coal-beds de-

posited. The end of the Mesozoic and the beginning of the Eocene were marked by the complete withdrawal of the sea, a renewal of folding movements and intense vulcanism, intrusion, and mineralisation. A geological map of Alaska is now in preparation and will shortly be available.

ECONOMIC GEOLOGY OF CANADA.—The Geological Survey of Canada has published on this subject an extremely valuable and well-illustrated memoir by G. A. Young (No. 1 of the *Economic Geology Series*). Having regard to its physical features and geological structure, Canada is naturally divisible into six major regions. The Arctic archipelago and the Hudson Bay lowland contain extensive deposits of coal. The Canadian Shield is a U-shaped area bordering Hudson Bay, made up of ancient rocks, in which have been developed the Sudbury nickel-copper mines which are the world's chief source of nickel, the spectacular gold mines of Porcupine and Kirkland Lake, and the rich silver deposits of the Cobalt district. In the Appalachian and Acadian region are the asbestos deposits of south-eastern Quebec and the coal-fields of Nova Scotia. In the St. Lawrence region to the south occur the salt beds and petroleum fields of Ontario. The Interior Plains lie between the Canadian shield and the mountains to the west, and are underlain by vast reserves of coal. The Cordilleran region borders the Pacific, and in addition to extensive coal-fields it is noteworthy for the wealth of its placer gold-fields, copper-gold ores, and silver-lead-zinc ores. It is noteworthy on the negative side that Canada does not rank as a producer of aluminium, tin ores, or of precious stones. An excellent geological map accompanies the memoir, and a mineral map in which every important occurrence is numbered; an annotated list gives details of each.

TWILIGHT PHENOMENA.—In the *Denkschriften der Schweizerischen Naturforschenden Gesellschaft*, 62, 1926, there are two memoirs only, of which the first, of 190 pages, is by P. Gruner. It is the second of a series by this author, under the general title of "Contributions to the knowledge of twilight phenomena and of the Alpine glow"; the former paper (of 154 pages) gave a historical-chronological review of Swiss observations and publications on twilight colours and the Alpine glow. The present paper is a similar review of non-Swiss observations and publications on twilights, atmospheric-optical disturbances, and related phenomena. As the extent of the memoir indicates, the author has cast his net widely and summarises an immense mass of literature, which he also indexes under the names of authors, with references, forming a bibliography. The subject is so large when the term "related phenomena" is interpreted generously, as in this case, that completeness is neither attained nor to be expected. But the memoir should be of real value to investigators whose work bears on these fields.

THE LAW OF SPEED RECORDS.—In 1906, Prof. A. E. Kennelly published a paper on "An Approximate Law of Fatigue in the Speeds of Racing Animals," noticed at length in *NATURE*, vol. 75, p. 463. In this he showed that if L is the length of the race in metres, T the time occupied by the winner in seconds, and V the mean speed in metres per second, we have approximately

$$T = \frac{L}{V} = \frac{c^8}{V^9},$$

whatever the type of race. If $\log L$ is plotted against $\log T$, for example, different types of race give parallel straight lines. Prof. Kennelly has now published a second paper, "Changes during the Last Twenty Years in the World's Speed Records of Racing Animals"

(*Proc. Amer. Acad. Arts. Sci.* vol. 61, No. 11, 1926), in which the records created since the first paper was written have been included. Only two classes of events show an appreciable general increase in speed: men swimming by about 10 per cent., and horses running by about 2 per cent. In all other cases the new records fit reasonably well to the lines previously given. The records for horses, running or pacing, show as before far the best fit to the straight-line law, and bicycling records still form an apparent exception to the rule. The conclusion deduced that speed should be maintained at a uniform level throughout the race is in accord with the work of A. V. Hill.

DIAMAGNETIC GASES.—Recently, E. Zehrer (*Zeit. für Phys.* vol. 37, p. 155, 1926), using an independent method, failed to confirm the experimental results obtained by Glaser, namely, that the specific susceptibilities of the diamagnetic gases hydrogen, nitrogen, and carbon dioxide were dependent on the pressure. It is therefore interesting to note that G. W. Hammar (*Proc. Nat. Acad. Sci.*, Oct. 1926), who employed the same method as Glaser, has found these susceptibilities to be independent of the pressure over a range from zero to one atmosphere. In searching for a possible source of error which might explain Glaser's results, Hammar found that a slight trace of moisture produced the effects described by Glaser, and he suggests that the difference between the two sets of results may be due to an adsorbed layer of water vapour on the surface of the test body. Hammar also directs attention to the need of greater reliability in the determination of the susceptibility of gases, since two of the latest and most careful determinations of the susceptibility of oxygen differ by 4.5 per cent., although each observer claims an accuracy of 0.1 per cent.

HEAT TREATMENT OF GAS CYLINDERS.—The second Report of the Gas Cylinders Research Committee, which has recently been issued, is concerned with the periodical annealing of cylinders. It was a recommendation of the Home Office Committee of 1895 that all cylinders of wrought iron or mild steel should be annealed every four years. On the other hand, the present Committee, in its first Report of 1921, considered that cylinders of 0.45 per cent. carbon steel should not require re-annealing during their life of fifteen to twenty years. The later experiments show that annealing, which is usually conducted at 650° C., and may be continued for many hours, is harmful. If the steel be overstrained and then annealed, the structure is altered, the ferrite and lamellar pearlite being replaced by ferrite with globular cementite, the size of the particles increasing with the time of annealing. This change is accompanied by a fall in the tensile strength and by an increase in brittleness, as shown by the Izod test. On the other hand, normalising, or heating to a temperature 50° above the critical point and then cooling in air without exposing to draughts, has no evil effects, and the injury done by overstraining followed by annealing may be almost completely corrected by such a treatment. The proper temperature is 900° for a 0.25 per cent. carbon steel and 850° when the carbon is 0.45 per cent. With properly made cylinders, a single normalising treatment after manufacture is all that is necessary. As it has been supposed that rough handling, involving jarring, may induce brittleness, experiments on the effect of repeated hammering have been made, with the result that the steel is not found to be rendered brittle by such treatment.

THE SUPPOSED REGENERATION OF ENZYME ACTIVITY.—During the past few years, various investigators have published experimental results which appear

to indicate that certain enzyme solutions are able, after being boiled for some minutes, to recover partially their lost enzymic activity. Experiments made by Prof. Ivo Novi, and described in the *Rendiconti della R. Accademia delle Scienze dell' Istituto di Bologna* (Vol. 29), help to prove, as was shown by Pasteur more than sixty years ago, that such phenomena are not observed when care is taken to prevent access of air-borne micro-organisms to the solutions.

HEATS OF CRYSTALLISATION.—The heats of crystallisation, Q , of seven more members of the homologous series of normal monobasic fatty acids, obtained by W. E. Garner, F. C. Madden, and J. E. Rushbrooke, are to be found in the September issue of the *Journal of the Chemical Society*. With the exception of stearic acid, the data for all the even acids up to C_{20} , and all the odd acids except three, are now available. As the series of acids is ascended, marked alternation in the values of Q is shown, and this is ascribed to an alternation in the arrangement of the terminal groups in passing from one acid to the next. An alternation in the melting-points of both odd and even members exists, and the two melting-point curves converge and approach a maximum at 115°. No evidence of alternation was obtained for the specific heats of the acids in the liquid state.

RADIATION THEORY OF CHEMICAL ACTION.—In a memoir published in the *Rendiconto dell' Accademia delle Scienze Fisiche e Matematiche della Società Reale di Napoli*, Fascicoli 4-8, April-August 1926, Prof. Francesco Giordani proposes a modification of the formula connecting reaction velocity, k , with radiation density, u_ν , proposed by Lewis:

$$k = \frac{\pi c^2}{3mh\nu} u_\nu N.$$

He supposes that it is necessary to take into account the number of vibrations in the molecule ν , which he puts equal to the number of ordinary chemical valencies concerned in the reaction, and instead of u_ν he uses u_ν/ν . When the modified Planck expression for u_ν is substituted in the equation, raised to the power $1/\nu$, it is shown that the results are in fair agreement with experiments on the decomposition by heat of phosphine, nitrogen pentoxide, and ozone (bimolecular). The great deviations between calculation and experiment which have previously appeared are then avoided.

THE DETERMINATION OF γ BY THE METHOD OF CLEMENT AND DESORMES.—The determination of the ratio of the specific heats of a gas by Clement and Desormes' method may be made to depend on measurements of temperature and pressure differences resulting from an adiabatic expansion or contraction (Lummer and Pringsheim, Partington, etc.) The adiabatic change is obtained by momentarily connecting the gas, contained in a vessel under a slightly different pressure, with the atmosphere. It has been known to all previous workers that equilibrium is not established instantaneously, but in a time which depends on the shape and size of the orifice, the volume of the vessel and the pressure difference. In the *Proceedings of the Indian Association for the Cultivation of Science*, for August 15, 1926, G. Subrahmaniam and G. Gunnayia show how to calculate approximately the time necessary for the pressures to equalise, in terms of quantities found in the experiments. Their results indicate that the size of the aperture does not have any great effect when the temperature measurements are employed to calculate γ , but when the pressures are measured, overshooting takes place if the opening is too large. In fixing the lower limit for the size of the aperture the effect of radiation has to be considered.