

Research Items.

Anthropology and Blood-Groups.—In *Man* for November, Dr. H. Woollard and Dr. J. B. Cleland discuss the evidential value of the blood-groups in anthropology as an indication of race. Their view differs fundamentally from that now generally held, and is primarily based upon investigation of the blood-group in the Australian aboriginal. It has been observed that the *A* group is the most frequent in the aborigines who belong to Central and South Australia, and when the results are those of natives whose purity is above suspicion, it is found that the Australian aboriginal contains no *B* factor. On this evidence it has been suggested that the Australian has Nordic affinities, while other investigators, finding the evident discrepancies in the group percentages of closely related peoples, have been tempted to ignore blood-groupings. Obviously percentage grouping is only one racial character which no more suffices to distinguish race than any other single character. Taking the evidence afforded by the blood-grouping of the anthropoids, the American Indian, and the Australian, it is here suggested, contrary to the view hitherto put forward, that the original human family contained all four groups. Instead, then, of this single anthropological character being expected to stamp each variety of man, the problem is rather to explain how the existing varieties of man obtained their present percentage, and indeed how a human type escaped an inheritance of all four groups and comes to possess one only. Thus the high frequency of the *A* factor in the Australian aboriginal implies no close affinity with Nordic man, who also possesses a high percentage of the *A* factor. The constitution of a grouping such as that in the Australian would force the assumption that their ancestors started with this genetic constitution, that they were few in number, and that they have lived for a long period in isolation.

Vaccination against Anthrax.—In the current number (Vol. 62, Parts 6-10) of the *Rendiconti* of the Royal Lombard Institute of Sciences and Letters, Dr. Mario Mazzucchi describes the results of experiments on a new method of vaccination against anthrax. The procedure followed differs fundamentally from that used by Pasteur, as it employs, not attenuated anthrax bacilli, but virulent germs and spores. Only a single injection is made, and twelve days later immunity from the disease is so complete that the treated animal is able to withstand an injection of anthrax organisms sufficient to produce fatal results in control animals within 40-60 hours. The tests were made at both the Istituto Sieroterapico di Milan and the Stazione Sperimentale di Zooprofilassi in Rome, and were carried out on goats, sheep, and cows, always with the same result—that the new vaccine is far more efficacious than the three Pasteur vaccines with which it was compared. The observations made by Dr. Mazzucchi indicate that it is necessary in experimental work of this kind to bear in mind that the resistance of an animal to anthrax may be of any of the following forms: (1) Individual resistance, common to all animals, no matter what the species; (2) regional resistance, which appears to be the greater with animals accustomed to the wild state; (3) resistance from natural acquired immunity, not infrequent in animals which live in infected zones and may have contracted infection and undergone spontaneous cure; (4) a complex immunity consisting of type (3), reinforced by the slight action of an attenuated vaccine.

Tidal Zone Fauna in Sand and Mud.—Mr. A. C. Stephen, in his "Studies on the Scottish Marine Fauna:

the Fauna of the Sandy and Muddy Areas of the Tidal Zone" (*Trans. R. Soc. Edinburgh*, vol. 56, Pt. 2, No. 14, 1929), continues his examination of the fauna of the intertidal bays which was begun in the Island of Cumbrae in 1926 and is now extended to various other areas on the Ayrshire coast, Firth of Clyde, south coast of Moray Firth, Aberdeenshire coast, St. Andrews Bay, and the Firth of Forth. Mollusks and polychaetes are specially dealt with, only a few species being common and widely distributed: such are *Tellina tenuis*, *Nephtys caeca*, *Donax vittatus*, *Cardium edule*, and *Macoma baltica*. The two first are characteristic of clean sand, and, locally, also *Donax vittatus*, the two last living on muddy ground or black and strong smelling sand. In certain areas the two types intermingle, the nature of the soil evidently being an important factor when dealing with distribution. Each species has a region of maximum concentration. *Tellina tenuis* is almost always most abundant at low-water mark, gradually decreasing towards high-water mark, *Macoma baltica* and *Cardium edule* having their maxima between tide-marks. A further research into the food of these invertebrates would be of great value, and it is to be hoped that this will be forthcoming.

Influence of Light on Larval Ascidians.—Experiments with larvæ of *Symplesma viride* were made last year at the Tortugas Laboratory by Mr. Caswell Grave. This year a note by the same author (*Year Book* No. 27 of the Carnegie Institution of Washington, 1928) shows the response to light stimuli by *Polyandrocarpa tinctoria*, a species closely related to *Symplesma*. The small larva is liberated in large numbers and its free-swimming period is relatively long (transforming in the course of a day under laboratory conditions). Experimentally, the majority of the larvæ can be induced to metamorphose and attach themselves in about 70 minutes by subjecting them soon after being set free to alternate periods of light and darkness, a typical instance being 25 or 30 one-minute 'doses' of light, each followed by a one-minute 'dose' of shadow. The light was ordinary diffuse light from the laboratory windows, allowed to come only from the east, other sources of light being blocked, and the experimental vessels were covered by tumblers wrapped in black paper for the period of darkness. Controls exposed to the same light but without periods of darkness took several hours to metamorphose. The rhythmic alternation of the periods of light and darkness is of importance, intensity of light making little or no difference. The natural habit of the free-swimming larva is to swim up and down between the surface when it is light and the bottom when it is dark, until a "final stimulus to attachment and metamorphosis is released".

The Trematode Family Schistosomidae.—This family is the subject of a useful and compact synopsis by E. W. Price (*Proc. U.S. Nat. Mus.*, vol. 75, Art. 18, 39 pp., 1929), who has carefully assembled the descriptions of the known genera and species, has prepared keys for aiding their identification, and clear illustrations to show their diagnostic characters. Three new genera are founded—*Heterobilharzia*, for some male worms from the mesenteric veins of the North American lynx; *Paraschistosomatium*, of which the female only is known from the portal vein of a bird from Texas; and *Microbilharzia*, from the mesenteric veins of North American birds.

Encystment in Rotifers.—David L. Bryce (*Jour. R. Micr. Soc.*, vol. 49, Pt. 3) records observations on

the encystment of three Bdelloid rotifers. He states that no evidence of encystment exists in rotifers other than Bdelloids, but suggests that it is widespread in this order, and is correlated with the habits. A large proportion, probably the great majority, of Bdelloids have alternate periods of activity and of dormant existence according as the moss in which they live is wet or dry. So long as the moss is wet they are active and multiply, but when the moss begins to dry they retract their extremities within the central portion of their bodies, reducing their bulk as much as possible, and pour out a secretion which completely covers them and hardens to an air-proof coating. When the moss is again wetted by dew or rain, the coating is dissolved and the rotifer renews its activity. The author refers to the flimsy character of the envelope, "that it would afford any protection against desiccation is not known". He suggests that the reason why similar examples of encystment have not previously been detected is perhaps that few observers have kept these rotifers alive from day to day in almost minute quantities of water. That the short supply of water was the reason for the encystment in these cases can scarcely be doubted.

Japanese Calcareous Sponges.—Only six species of calcareous sponges had been recorded from Japan until Prof. Sanji Hōsawa took up the study of this special group, and now he has added fifty-one more species from this region, no less than forty-seven of which are new to science. Some of these have already been described by the author (1916, 1918), who in a recent memoir, "Studies of the Calcareous Sponges of Japan" (*Journal of the Faculty of Science, Imperial University of Tokyo, Section 4, Zoology, vol. 1, part 5, January 1929*), revises what has been written by previous authors, and gives detailed descriptions of those forms which he has himself observed. The specimens were furnished by various collections from many localities, in depths ranging from shallow water to 572 metres. Thirty-four new species are described in this paper, and these are for the greater part preserved in the museum of the Zoological Institute of the Science Faculty in Tokyo. There are twelve plates with photographs of the individual sponges, and beautifully executed coloured figures showing sections with details of the skeleton, and there are in addition many text figures of the spicules. The new species include three *Leucosolenia*, one *Dendya*, one *Leucaltis*, one *Syccetta*, seven *Sycon*, one *Grantessa*, three *Vosmeropsis*, two *Grantia*, two *Ute*, and thirteen *Leucandra*.

Origin of Cultivated Dahlias.—In an interesting paper, Mr. W. J. C. Lawrence (*Jour. Genetics, vol. 21, No. 2*) has given an account of genetical and cytological work on dahlias. Mexico and Central America is the home of this genus. Three species are found to be tetraploid ($2n=32$), while *D. Merckii* has 36 chromosomes and *D. variabilis*, the common dahlia, is confirmed as having 64 chromosomes, an octoploid number. It was figured so early as 1615, and was probably grown as a garden plant in Mexico long before its introduction into Europe. Considerable evidence is brought in favour of the view that this octoploid species arose as a cross between two tetraploids, the hybrid being sterile but later producing a fertile form with twice as many chromosomes. It is found, for example, that ten species fall into the ivory-magenta-purple colour series, while four others are ivory-yellow-scarlet, while *D. variabilis* alone has factors belonging to both series. The inheritance of the Y factor for yellow flavone is, moreover, tetrasomic, resulting from random assortment of four homologous chromosomes. In the reduction division, associations composed of two, four, six, and eight

chromosomes can be seen, apparently resulting from the earlier conjugation of homologous chromosomes in synapsis. No more striking case could be found of the way in which correlated cytological and genetical investigations throw light on the origin and history of cultivated forms, and it is to be hoped that these researches will be carried further.

Bibliography of Genetics.—There has recently appeared a work which should prove of considerable value to plant breeders and others interested in the subject. This is the "Bibliographical Monograph on Plant Genetics, 1900-1925", by H. Matsuura, published by the Tokyo Imperial University—a large octavo volume of 500 pages. The greater part of the work gives a résumé of genetical researches under the heading of the various genera arranged in alphabetical order. The geneticist has only to look up the genus, and he will at once find a succinct account of what has been already done, with full references to the original papers in the bibliography which forms the second part of the work. There can be few students of the subject who have not frequently experienced the need of such a work, and they will be grateful to Mr. Matsuura for the immense labour that has gone into its compilation. It can be obtained in London from Messrs. Dulau and Co. of Bond Street, for the moderate price of 10s. 6d.

Non-Marine Mollusca of Oregon and Washington.—Unlike the marine, which have been closely studied, and the literature of which is obtainable in comparatively compact form, the non-marine mollusca of the States of Oregon and Washington have been relatively neglected and their literature dispersed in scattered papers. This has now been remedied by the publication of a monograph by Junius Henderson (*Univ. Colorado Studies, vol. 17, No. 2*). Considerable material for the purpose was obtained on expeditions sent out by the University of Colorado Museum, whilst the author himself visited personally 225 widely distributed localities in the two States. The contents of other collections and past records have also been drawn upon. As a result some 186 species are recorded and figured in text illustrations, every endeavour having been made to render the identifications and synonymy correct and to bring the nomenclature up-to-date. A useful index has been provided.

Bibliography of Seismology.—In the spring of 1926, the Eastern Section of the Seismological Society of America began the publication of a valuable bibliographical bulletin of works relating to earthquakes. The bulletin was issued quarterly under the editorship of Mr. E. A. Hodgson, and was distributed in an immeographed form to the members of the Eastern Section as well as to various scientific journals. It was afterwards reprinted in the *Bulletin* of the Seismological Society. It has now been decided to continue the previous lists in a new series entitled "Bibliography of Seismology", the first part of which (for Jan.-Mar. 1929) appears under the same editorship as before in the *Publications* of the Dominion Observatory, Ottawa. It contains the titles (with an occasional brief abstract) of one hundred papers.

Raman Effect.—The amount of light that is scattered by a fluid without change in wave-length increases enormously when the substance is in the critical state. Raman himself suggested that an analogous increase occurred with the modified secondary radiation from carbon dioxide, but W. H. Martin afterwards obtained negative results with a mixture of phenol and water (see *NATURE*, Oct. 6, p. 506; 1928). The question is important, and has now again been attacked by S. L. Ziemecki and K. Narkiewicz-

Jodko, in Warsaw. Their work, which is outlined in *Die Naturwissenschaften* for Nov. 8, was done with the critical mixture of isobutyric acid and water at 24° C., with a powerful mercury arc of special construction for the primary source. The Raman lines due to the acid were found to be present in the scattered light, but their intensity was certainly not more than some 30 per cent above normal, and even this apparent increase may have been due to a heavy continuous background in the secondary spectrum. They point out that this furnishes an experimental proof that the Raman radiation is not coherent. Two further papers on the Raman effect have also appeared in recent issues of the *Indian Journal of Physics*, the third number of the current volume containing an account of an extended series of observations on modified radiation, by S. Venkateswaran and A. S. Ganesan, and the fourth number a useful summary and bibliography of 150 papers on the subject, by Dr. Ganesan.

International Temperature Scales.—The importance of having an international temperature scale for high temperatures is admitted by every chemist and physicist. The international temperature scale adopted in 1927 by the General Conference of Weights and Measures, representing thirty-one nations, is intended to reproduce, as closely as can be done with our present knowledge, the Centigrade thermodynamic temperature scale—the Kelvin scale. In this scale the temperatures of melting ice and of condensing water vapour, when both are under the pressure of one standard atmosphere, are numbered 0° and 100° respectively. This scale would be exactly realised with an ideal gas in a perfect gas thermometer. In practice it is closely realised by several of the permanent gases. The gas thermometer, however, is inconvenient for ordinary use. In practice, the results of the best gas thermometer determinations have been made permanently available by determining the freezing and boiling points of various pure metals up to the melting point of palladium, which is about 1550° C. These thermometric fixed points can be used in defining practical temperature scales with the help of convenient interpolation instruments. We learn from a paper on temperature scales by W. F. Roeser, published by the U.S. Bureau of Standards (*Research Paper*, No. 99), that the new scale (1927) is the fourth temperature scale used by the Bureau of Standards since 1912. His purpose was to determine how much change it was now necessary to make so that these scales could be compared with one another. The experimental results are highly satisfactory and show that the maximum difference in the temperature determined by the four scales is only a fraction of a degree Centigrade. The difference between the temperature of the freezing point of copper (1083°) and that of gold (1063°) is 20° C., with a maximum inaccuracy of less than the half of one per cent.

The Calculation and Interpretation of Parachors.—Some years ago S. Sugden showed that the product of the molecular volume by the fourth root of the surface tension of a liquid, called the *parachor*, might be expected to give a molecular volume at temperatures at which the liquids have the same surface tension. This was divided among the atoms of the compound, and the parachor of a compound could then be represented as the sum of the parachors of its atoms and certain constants characteristic of the types of linkages in the molecules. This has led to many interesting results from the point of view of the structure of compounds. In the September issue of the *Journal of the Chemical Society*, S. A. Mumford

and J. W. C. Phillips show by an extensive survey of the data that, although the atomic constants of Sugden are probably very nearly correct, the change due to an increment of CH₂, and hence of carbon and hydrogen values, which they propose, leads to greater accuracy in the calculated parachors, especially in the case of compounds of high molecular weight. In their scheme also the parachor loses its strictly additive character and becomes definitely constitutive, stresses due to spatial arrangement of, and electrostatic influences between, atoms and groups in a molecule being accompanied by well-defined parachor variations. If these conclusions are substantiated, the value of the parachor method will be increased rather than diminished, since it will be able to throw still more light on the structure of compounds.

Decomposition in a Crystal.—Some very striking results have been obtained by Dr. J. Colvin and Mr. Hume in a study of the process of dehydration in crystals of potassium hydrogen oxalate hemihydrate, 2KHC₂O₄ · H₂O (*Proceedings of the Royal Society*, November, p. 635). This substance forms transparent plates of somewhat indefinite form, and decomposition, when it occurs, usually starts at an edge, where it is first evidenced by the appearance of a black dot. The dot then increases in size, and grows as a black area bounded by lines which are parallel, in general, to edges of the crystal. The rate of advance of the black edge in any particular direction can be followed with ease by means of a travelling microscope, and is constant, but occasionally an edge will halt for a few minutes, and then start off again with the same speed as before. The steady rate of advance depends upon the direction in which the reaction is proceeding into the crystal, and varies considerably from one batch of plates to another, but has in all cases a large positive temperature coefficient, equivalent to a heat of activation in the neighbourhood of forty kilocalories.

Bearings and Lubrication.—The commonest component of machinery of all kinds is the journal revolving in a bearing, and the design, construction, lubrication, and maintenance of such bearings present many problems to the engineer. While such investigators as Beauchamp Tower, Osborne Reynolds, Sir John Dewrance, Summerfeld, Michell, and Kingsbury have done a great deal to advance the knowledge of the subject, there is much to be learnt regarding the size, lining, and clearances of bearings, and the properties and working conditions of the lubricants, to which attention was directed in an important paper on "Journal Bearing Practice", by Mr. F. Hodgkinson, read to the Institution of Mechanical Engineers on Nov. 15. The paper and a summary of the discussion which followed is given in both *Engineering* and the *Engineer* for Nov. 22. A few years ago, it was held that the relation which should govern the design of a high-speed bearing was that the pressure in pounds per sq. in., P , multiplied by the velocity of the rubbing surfaces in feet per second, V , should be 2500, but in modern practice, pressures run up to 150 pounds with velocities up to 150 feet. These figures are from steam turbines. It was also formerly considered that the bearing should be cool to the touch, but it was mentioned in the discussion that running the bearings of a certain 41,000 k.w. machine at 140° F. instead of 120° F. led to a saving of coal equal to £142 per annum. One interesting reference in this paper was that made to a gyroscopic stabiliser for a ship, the rotor of which weighed 230,000 lb. and ran at 800 r.p.m. The maximum bearing pressure in this case approximated to 900 lb. per sq. in. of projected surface.