Research Items.

Eyebrows and Eyelashes in Man.—A preliminary report on a study of the eyebrows and eyelashes in man, a subject not hitherto treated in anthropological literature, is published by Prof. V. Suk and Dr. F. Rozprým in *Pub.* No. 142 of the Faculty of Science of the Masaryk University, Brno. The study deals specifically with form and colour and the question of heredity. Eyebrows are divided into 11 types according to form, which varies extensively. Of 470 cases the greatest number are classified as 'spreading', those which are evenly formed on each side occurring much more rarely, 96 cases of the latter as against 157 of the former. The 'even' occurs 20 times as frequently in women. 'Peaked', rising in the middle, is rare, occurring 12 times only. 'Narrowing', in which the eyebrows are thick at the medial end and narrow towards the distal side, seems to be a feminine form, occurring three times as often in women. A whorl running outward from the nose is also feminine. There is no correlation between form and colour. In the eyelashes the upper are more characteristic than the lower. The long curved eyelashes occur 150 times in a total of 470, being present twice as often in children under sixteen years of age. It is an infantile form, for this type of eyelash is shed at puberty and often replaced by a different type. It is generally dark brown to black. Short and straight occur equally often in men and women, but never in childhood. Short-curved is least represented, and occurs most frequently in men, never in children. Two apparently abnormal types were observed, one bent inward toward the eye, the other long and straight but hooked at the end. Inheritance of these characters having been neglected, there are no data for comparison, but one family tree shows interesting characters. Form and colour are not inherited together, but the inheritance of form is clearly to be seen.

Black Disease and Sheep.—Pamphlet 19 of the Australian Council for Scientific and Industrial Research contains a concise account by Dr. A. W. Turner of the nature and means of prevention of the much-dreaded black disease of sheep (infectious necrotic hepatitis). As a result of extensive investigations carried out by the Council and partly financed by the graziers themselves, it has been shown that this disease, which is responsible for such heavy losses in Australia, is largely preventible. An effective, but not costly, vaccine has been developed. This alone, however, will not prevent the incidence of the disease, for, as had already been suspected, the attack is dependent on previous injury caused by the liver fluke. The fundamental problem is, therefore, the elimination of this latter pest from Australia, and details of suitable methods for getting rid of fluke, such as drainage, treatment of marshy ground with copper sulphate, and drenching sheep with a mixture of carbon tetrachloride and liquid paraffin are described. Vaccination of sheep with the appropriate anti-black disease vaccine is also advised, and the necessity for burning infected carcasses strongly advocated. The cost of these operations is not prohibitive. Apart from labour, drenching and vaccinating sheep amounts to little over 2½*d.* per sheep per annum, and considering the economic significance of the disease the outlay would seem more than justifiable.

Power of the Adductor Muscle of Bivalves.—The power of the adductor muscle of the larger bivalves has often been remarked: Darwin referred to it in the case of the tropical *Tridacna*, and Vaillant in 1865 found that the absolute power of the adductor of *Tridacna elongata* ranged from 4919 gm. to 7200 gm. per sq. cm. of section area of the muscle. Tadashi Tamura has now tested the power of the adductor muscle of thirty species of tropical marine bivalves, and has found it to range from 1071 gm. in *Coralliophaga* to 11,381 gm. in *Chama* per sq. cm. of section area (*Science Reports, Tôhoku Imp. Univ.*, vol. 4, Sept. 1931). A comparison of the power of the adductor among different species of bivalves shows that the specific difference amongst lamellibranchs is far greater than in any other phylum of animals where such differences have been studied.

Chromosomes of an Unfixable Dwarf Wheat.—In 1902 the late M. Philippe de Vilmorin found two dwarf types in commercial wheats, but was unable to fix them by inbreeding, as the descendants always gave some tall progeny which bred true. Engledow and Wadham studied the problem and suspected chromosome irregularity. The solution has now been reached by Prof. C. L. Huskins (*Jour. Genetics*, vol. 25, No. 1), who investigated plants grown at Merton from seeds of Prof. Engledow. It is shown that the dwarf plants in this unfixable wheat produce three main types of progeny: normals, dwarfs, and pigmies. The first two occur in ratio approaching 1 : 1, while the pigmies are rare. The talls have 42 chromosomes, the dwarfs 43, and the pigmies 44. In the dwarfs the extra chromosome is usually included in a trivalent in the pollen mother cell during meiosis, but is sometimes by itself or may form part of a quadrivalent or quinquevalent combination. Quadrivalents also frequently occur in the tall segregates. The extra chromosome in a dwarf is sometimes a long one and sometimes short, and the redistribution of these chromosomes produces smaller variations (noted by Engledow and Wadham) within the three main types which are due to the chromosome numbers. The main results are therefore similar to those obtained in the analysis of speltoid wheats and fatuoid oats.

Germination of Teak.—Mr. H. R. Blanford, of the Burma Forest Service, has paid a great deal of attention to the questions of germination, sowing, and planting of teak and other species. One of his latest papers on this subject is entitled "Experiments in Connection with Sowing and Planting Teak in Taungya Plantations" (*Burma For. Bull.* No. 24, Silvi. Ser. No. 14; 1931) and is of very considerable interest. The paper deals with nursery experiments with teak seed, under the heads—treatment of seed and preparation of soil—position of nurseries—size of teak seed; direct sowing and transplanting of teak; and transplanting with stumps. Owing to the cheapness of seed in Burma in the past they have been content with a comparatively low germination percentage, but the importance of securing early germination would seem to justify extra treatment. It appears to have been finally established that it is moisture and not heat that is required for teak seeds sown during the hot weather. There does not seem to be much difference in seedlings originating from small and large seed, so that there is no reason for sifting the seed. Some valuable information has been obtained on the question of the comparison of the different methods of direct sowing and transplanting in a taungya plantation. The experiments apparently strongly confirm the very great advantage of planting as against direct sowing. The work carried out with teak stumps has not as yet reached a conclusive stage.

Pliocene and Pleistocene Mollusca of California.—The main part of a "Catalogue of the Marine Pliocene and Pleistocene Mollusca of California and adjacent Regions", by U. S. Grant and H. D. Gale (*Mem. San Diego Soc. Nat. Hist.*, **1**, 1931, pp. 1036, pls. 32), consists of a monograph of the species of Mollusca, but is preceded by a summary of the stratigraphy. It is pointed out that correlation by means of the percentage of extinct species may lead to erroneous conclusions. Thus some of the cold-water horizons seemed to be older than they really are, because of the apparently large proportion of extinct species; but with the fuller knowledge of northern faunas now available this percentage is known to be too high. It follows that faunas which lived under climatic conditions similar to those now existing in the neighbourhood will give the impression of being more like living faunas than those which lived during colder periods. Climatic changes are a fundamental cause of differences in faunas, and it is believed that these changes were widespread, especially in Pleistocene times, and are therefore of value in correlation over wide areas. The number of extinct species in the Californian Pliocene is already known to be much less than half the total number of species, and, when the living faunas of western Mexico and central America are better known, the number is likely to be further reduced. A number of striking similarities between Californian species and corresponding forms in Japan, the eastern United States, Europe, and Africa have been noticed. In California there appears to have been one well-marked sedimentary cycle in the Miocene and another in the Pliocene, and the beginnings and endings of these seem to have coincided with the beginnings and endings of the Miocene and Pliocene periods in Europe. It is believed that California remained relatively stable during the Miocene and Pliocene periods, and that the only widespread deformation that would upset the orderly sequence of sedimentary cycles did not come until the middle of the Pleistocene.

Giant Pleochroic Haloes.—In 1920 Hirschi discovered abnormally large pleochroic haloes in the biotite of an Alpine syenite (radii, 54 μ). Ten years later Wiman recorded the presence of similar haloes (55-60 μ) in the biotite and hornblende of the Pre-Cambrian granites near Uppsala. As such haloes have not been generally observed, Wiman thought it improbable that they could be ascribed to the action of the long-range α-particles from radium-C or thorium-C (see "The Age of the Earth", *National Research Council Bull.*, **80**, p. 187). It now appears from an examination of similar giant haloes in cordierite-gneiss from Madura, South India, that the hypothesis rejected by Wiman may, nevertheless, provide an explanation. At the eighteenth Indian Science Congress (*Proceedings*, p. 309) M. S. Krishnan and C. Mahadeven claimed to have shown conclusively that the dimensions of the giant haloes in cordierite correspond to the ranges 9·3 cm. for radium-C and 11·5 cm. for thorium-C in air. The full development and excellent state of preservation of the structures in these haloes is ascribed to the richness of the cordierite in radioactive nuclei-minerals and the long period of activity of the latter. The gneiss dates from early Pre-Cambrian times. The intensity of pleochroism in the haloes varies with the directions of light absorption in the cordierite.

Auroral Heights in Canada.—The *Canadian Journal of Research*, vol. 5, Sept. 1931, pp. 285-296, contains an important article on auroræ by J. C. McLennan, H. S. Wynne-Edwards, and H. J. C. Ireton. On four dates in January and February 1931, photographs of auroræ (mainly of arc or band type) were taken simultaneously from two stations, 46 km. apart, alongside the Temiskaming and Northern Ontario Railway, the telephone system of which was made available to the observers. The main station (Onakawana) was at lat. 51° N., long. 81° W. A Krogness auroral camera was used. The heights found ranged from 70 km. to 130 km., the height of most frequent occurrence being about 95 km. These are a few kilometres lower than the corresponding heights found by Stormer in Norway. The geographical situation of the auroræ is shown on a map: the arcs and bands lie, as elsewhere, roughly at right angles to the magnetic meridians. The paper is enriched by beautiful reproductions of twelve pairs of auroral photographs.

Correlation of Pressure and Temperature in the Upper Atmosphere.—The exploration of the upper atmosphere by means of sounding balloons equipped with apparatus for measuring pressure, temperature, and sometimes humidity, has been pursued to an increasing extent during the past twenty years, in the hope that this may lead to an understanding of the causes of the cyclones and anticyclones that are of such importance in governing the day to day variations of the weather. In Great Britain W. H. Dines showed that there is high positive correlation between pressure and temperature at any level between about 2 km. and 8 km. W. Van Bemmelen found a somewhat similar relationship for the upper atmosphere over Java, the principal difference being that the largest coefficients found there were not so large as those found for the British Isles, while they occurred higher up, between heights of about 8 km. and 16 km. S. Gopal Rao has now given an analysis of 185 soundings made at Agra in 1925–29, and compared the results with those obtained by Dines and Van Bemmelen (India Meteorological Department, *Scientific Notes*, vol. 3, No. 26, March 1931). He divides the material into two parts—winter and summer monsoon. The correlation coefficients for winter show a variation with height that agrees more nearly with the results of Dines, with the difference that the positive correlation disappears at 13 km. instead of 11 km. The variation of those for the summer monsoon, on the other hand, agrees fairly well with that for Java. It appears that adjustment to conditions normal for a given latitude takes considerable time, considering that when the air supply to India is tropical, as happens at the height of the summer monsoon, conditions are found there such as are normal to a place near the equator. The gradual extension of such statistical inquiries to new regions is obviously desirable, and it is greatly to be hoped that the forthcoming Polar Year of arctic research may result in high latitudes receiving attention.

Fundamental Physical Constants.—In two recent papers in the *Philosophical Magazine*, Dr. W. N. Bond has developed a new way for reducing the experimental data used in connexion with determinations of the electronic charge (e) and Planck's constant (h), based on the observation that each group of experiments connects h and e by an equation of the form $h = Ae^n$, where n is either 1, $1\frac{1}{3}$ or $1\frac{2}{3}$, according to the experiments, and A expresses the results of the measurements made. By taking two types of experiments with different values of n, e and h may be found with previously unattained precision. By this method Dr. Bond showed that Eddington's constant had a value of $137{\cdot}02 \pm 0{\cdot}06$, in excellent agreement with theory. The subject has now been taken up again by R. T. Birge, and in a note appearing in the *Bulletin of the American Physical Society* for Dec. 6 he expresses the opinion that Bond's method

for evaluation of e is far more reliable than any direct determination, but disagrees with the way in which it has been followed up. In Birge's new calculation by Bond's method, the values of e and h are found to depend chiefly upon the value adopted for the specific charge (e/m) of the electron, which he takes to be $1{\cdot}761 \times 10^7$, remarking that this now seems well-established. It leads to a value of $137{\cdot}28 \pm 0{\cdot}07$ for Eddington's constant, whereas if this were 137 exactly, e/m would have a value which he regards as improbably high.

Constant Monochromatic Spark Illumination.—Forbes and Brackett, in the November *Journal of the American Chemical Society*, describe an apparatus by means of which a spark between metal electrodes can be maintained automatically constant over fairly long periods. The spark is struck between adjacent edges of two square bars moving in horizontal planes at right angles to each other, the bars being retracted by threaded rods passing through sleeves rotated by worm gears. In the case of zinc bars 400 mm. long and 25 mm. square, a life of one and a half hours per pair of edges was obtained with a 5 kw. transformer operated on 35 amp. and 110 volts. Measurements showing the constancy of the energy of emission from a monochromator for various metal electrodes are given, and also a simplified method of following the energy of emission through a measurement.

Thermodynamics of Gas Reactions.—H. Scheibel, in the *Sitzungsberichte* of the Vienna Academy of Sciences, Abt. IIb, vol. 140, p. 183, discusses in detail the calculation of gaseous equilibria by means of three types of formula: (1) the classical formula, with observed values of specific heats; (2) the formula making use of Nernst's chemical constants; and (3) the formula using the specific heats calculated by the quantum theory from the results of band spectra. The results show that the first type of formula gives the most reliable values, although it is based on empirical results. The other two formulæ, although they have a theoretical basis, involve so many approximations and (in the third case) uncertainties that it is not surprising that they do not, in general, show very good agreement with experiment. In the case of complicated molecules, for example, there is doubt as to the number of degrees of freedom involved, and the extension of the Planck-Einstein function, deduced for monatomic solids, to gases is not strictly justified by theory. It is to be expected that further experimental investigation will lead to improvement in this respect, when the third formula will probably be the only one in general use.

Freezing Point of Platinum.—*Research Paper* No. 326 of the U.S. Bureau of Standards, by Roeser, Caldwell, and Wensel, deals with the freezing point of platinum on the International Temperature Scale, measurements being made of the ratio of brightness of black bodies maintained at the freezing points of gold and platinum, the black bodies consisting of hollow enclosures of fused thorium oxide immersed in the fused metals. The metals were heated in air in a high frequency induction furnace to secure automatic stirring of the freezing metals and to avoid contamination from furnace windings. The International Temperature Scale adopted in 1927 by the General Conference of Weights and Measures defines temperatures above the freezing point of gold in terms of Wien's law of radiation, and the method adopted was therefore one which permitted direct reference to this scale. The mean value of the freezing point of platinum, obtained with two lots of pure platinum, two optical pyrometers, and observations by three observers, was 1773·5° C. Other recent measurements, when reduced to the International Scale, are 1769·5° by Hoffmann in 1924, and 1762° by Ribaud and Mohr. The paper also contains a list of fourteen previous independent determinations of the melting point of platinum.

Astronomical Topics.

Eclipse of the Moon of Sept. 26, 1931.—*L'Astronomie* for November contains a series of photographs of the partially eclipsed moon, also diagrams by M. Ananoff showing the distribution of colours on the lunar disc during the total phase. The most interesting point is that there was a region described as "Bleu-verdâtre" throughout totality, though it changed its position on the disc. Blue is not very often seen on the moon (witness the phrase 'once in a blue moon'), but the writer of this note recorded that part of the disc was of a decided blue colour in the eclipse of Oct. 17, 1902: dawn ensued shortly after this, and it was of a pure blue colour, without any admixture of red; this probably had some connexion with the blue on the moon. A note, with a diagram, was published in *Observatory* for November 1902.

Astronomical Society of South Africa.—Vol. 3, No. 1, of the *Journal* of this Society begins with a well-deserved eulogy of Rev. Fearon Fallows, the first director of the Cape Observatory, who died in 1831, aged forty-two years. His death was hastened by overwork and anxiety. In spite of grave difficulties, due to inadequate assistance and unsatisfactory instruments, he made a creditable beginning in the work for which the observatory has since become so famous; his wife took observations with the mural circle, since he was deprived of an assistant. This circle had been sent out to him in an unfinished condition, the steel collar not having been properly attached. The article closes with the words: "May a long succession of His Majesty's Astronomers, and the people of South Africa, never forget how much they owe to the patient, self-sacrificing, and arduous labours of Rev. Fearon Fallows". An account follows of a large meteor seen to fall in 1838, the explosion being heard over a radius of 70 miles. A number of fragments were collected, some weighing 3-4 lb. This meteor is omitted from many lists of meteors seen to fall.

Four photographs of the total lunar eclipse of April 2, 1931, are reproduced. The gradation of shading at the edge of the shadow is well brought out. The fourth picture was taken during totality, with exposure only two seconds; the limb is clearly visible, and some trace can be seen of the maria. The report of the comet section notes that this is the first report since 1916 that does not include the discovery of a comet in South Africa. Mr. Blathwayt spent 130 hours in searching for comets, but without success. A very complete series of observations of Encke's comet was made at Johannesburg.

Nova Pictoris is fading very slowly, and is still of magnitude 8·4. The light of the central star is nearly constant, but the components B and C are fading. Dr. Spencer Jones reports that the spectrum is of Wolf-Rayet type, but with a strong emission of unknown origin at 6087 A. His conclusions as to the present condition of the star were communicated to the Royal Astronomical Society, and have already been noted in this column.