Research Items

Racial Affinities in Ontong Java. Ontong Java, which is situated to the north-east of the Solomon Islands, about 150 miles from Ysabel, has usually been regarded as one of the Polynesian outliers in Melanesia, among others being Tikopia, Sikiana and Rennel Island. The significance attached to these outliers is that they are thought to represent colonies dropped by the Polynesians in the course of migration from south-eastern Asia to their final destination in the Pacific. Dr. H. L. Shapiro, having this theory in view, has recently examined a series of measurements of the inhabitants of Ontong Java made by Dr. Ian Hogbin. The results of this examination are published in *Oceania*, 3, No. 4. The first comparison made was with the Polynesian series in the studies published by the Bernice P. Bishop Museum. This showed that on the physical side there is no support for the hypothesis of a Polynesian origin, nor did a comparison with the Fijians and the coastal New Hebrideans from Eromanga and Tanna, who represent Melanesian strains crossed with Polynesian, support the view that the original Polynesian strain of the Ontong Javanese had been blended with Melanesian characteristics. Comparison with other groups in turn led to the conclusion that the affinities of Ontong Java are with Micronesia. The Caroline Islanders in particular revealed considerable evidence of kinship. On the other hand, Dr. Hogbin's examination of social structure has revealed a number of Polynesian forms ; but it has been pointed out that their language is not an archaic form of a Polynesian language, as might have been expected had they been an early colony. It seems rather to be modern Samoan or Maori. The indubitable evidence of physical characters suggests a revaluation of the cultural traits to which a Polynesian character has been attributed.

Embryology of Monkey and Man. Further observations on the early cleavage of the primate ovum appear in the latest number of the Carnegie Institution "Contributions to Embryology", 24, 187 ; 1933. Drs. W. H. Lewis and C. G. Hartman, employing the method first used by Prof. G. W. Corner in 1923, have succeeded in obtaining four living fertilised ova from the colony of monkeys (*Macacus rhesus*) belonging to the Department of Embryology of the Carnegie Institution of Washington. The youngest ovum was in a 2-celled stage ; it was kept alive until it passed into the 8-celled stage. In a second case the ovum had reached the 4-celled stage, the third ovum was in the 8-celled stage while the fourth case, known to be about four days old, was in the 16-celled stage. From the data at their disposal, Drs. Lewis and Hartman infer that in monkeys and probably also in man, the ovum reaches the 2-celled stage in 36 hours after fertilisation, the 4-celled stage in 48 hours, the 8-celled in 72 hours and the 16-celled stage in 96 hours. They also succeeded in photographing the behaviour of the centrosphere during cleavage. At no stage were chromosomes visible. In the same number of this publication appears a paper by Prof. G. W. Bartelmez on the microscopic changes which occur in the mucous membrane of the human uterus during menstruation. Prof. Bartelmez finds that in the human uterus, as in that of the monkey, menstrual changes may not be preceded by the discharge of an ovum.

The Grassholm Gannets. The great increase which has taken place since 1914 in the numbers of gannets (*Sula bassana*) on the little island of Grassholm, off the south coast of Wales, gives special interest to the survey and census made by H. Morrey Salmon and R. M. Lockley (*British Birds*, Nov. 1933, p. 142). Possibly gannets were there in 1820, but the first recorded count, made in 1886, revealed 250 nests. From that date up to 1914, the numbers kept remarkably constant, at no time exceeding 300 pairs. The War intervened, and the next count recorded 800–1,000 nesting pairs, in 1922. That was a considerable increase (16 per cent per annum), but the next two years were remarkable, for the 1,000 pairs of 1922 had multiplied to 2,000 pairs in 1924—42 per cent increase a year. Since then the increase has been steady but slower, the census of 1933 revealing 4,750 breeding pairs, a rate of growth of 10 per cent a year. It has been suggested that the development is due to more than natural increase, and that the Grassholm colony may have been supplemented by waifs driven from the over-populated Irish colony on the Little Skellig.

***Sagitta* of the Madras Coast.** Under this title, Dr. C. C. John gives a description of five species of *Sagitta* occurring in the Madras plankton (*Bull. Madras Gov. Mus.* New Series. Natural History Section, Vol. 3, No. 4). The collection studied contained *Sagitta* labelled *Sagitta bipunctata*, but Dr. John does not find this species at all, and has identified *S. enflata*, *gardineri*, *neglecta*, *tenuis* and *robusta*. In distinguishing the species, he finds that the characters generally used have not all good systematic value, especially the number of prehensile spines, and anterior and posterior teeth, for these are found to increase with age and are not really constant. The best dependable characters are the general appearance of the body, form of anterior and posterior fins, interval between them, position of the seminal vesicles and the percentage distance between the seminal vesicles and the opening of the oviduct. This last, as he shows, is important because sperm transference, which is reciprocal in the Chætognatha, is not possible between individuals of different lengths, but as the increase in length is accompanied by a corresponding increase in the distance between the genital openings, the percentage distance between the genital openings, calculated in relation to the total length of the animal, is always constant. The percentage distance between the genital openings has been determined in eight species and in a number of specimens. In none of the examples has the percentage been found to vary more than 0·9 and in each species the distance is different, from 8 per cent in *S. gardineri* to 20 per cent in *S. tenuis*, the corresponding lengths being 10 13 mm. and 5–5·5 mm.

New Intermediate Host for *Fasciola hepatica*. W. H. Krull (*J. Wash. Acad. Sci.*, 23, No. 8, 1933) states that *Pseudosuccinea columella*, which is widely distributed from Nova Scotia to Minnesota and from Quebec and Manitoba to Texas and Florida in ponds and streams, is a very suitable intermediate host for the liver fluke of the sheep. This and another new intermediate host, *Fossaria modicella*, recently reported by the same author, provide a favourable factor for a wide range of distribution of the fluke

unless control measures are undertaken. *P. columella* may become especially important in some places because of its ability to tolerate acid water (*p*H 6·1–6·8). The American snails previously incriminated as intermediate hosts have been species which prefer alkaline water. *P. columella* has been raised in the laboratory and is prolific, producing a new generation about every two months. Effective destruction by the application of copper sulphate might necessitate repeated applications, whereas in other snails, for example, *Helisoma*, in which egg-laying occurs only once, such repeated applications might not be necessary. Infected examples of *P. columella* in laboratory cultures began to shed cercariæ 47 days after the entry of the miracidia. The largest number of cercariæ shed by a snail in a day was 161. One snail which had been shedding cercariæ for two days was dissected and the liver found to contain 241 rediæ and 356 mature cercariæ.

Blue Egg Colour in Fowls. A breed of fowls from Chile lays blue eggs, and Prof. R. C. Punnett (*J. Genetics*, 27, No. 3) has investigated the inheritance of this character from crosses with a Gold-Pencilled Hamburgh cock. Two F_1 pullets were produced, one of which laid blue and the other white eggs. Further breeding showed that the blue egg character is a simple dominant to non-blue in inheritance. The blue pigment when present permeates the whole shell, but its chemical nature is not yet settled. The Chilean hens were also crossed to a Welsummer cock—a breed in which the eggs are deep brown. The resulting pullets laid eggs which were either brown, tinted, green or olive, the last two types containing the blue factor. Further studies show the presence of a main factor and several minor factors for shades of brown, as well as an inhibitor for brown. Punnett shows that pheasants produce a similar series of egg colour types, the genetic relations of which probably follow similar lines. The blue egg colour in Chilean fowls probably arose there as a dominant mutation, as it is not known elsewhere. A semi-wild breed of fowls in Costa Rica has, however, recently been shown to lay green eggs, probably due to the presence of factors for both blue and brown (see also p. 892 of this issue of NATURE).

A Gene affecting Linkage and Non-Disjunction in *Drosophila*. A gene has been known for some time in *Drosophila melanogaster* which affects the meiotic processes of oogenesis. Dr. John W. Gowen (*J. Expt. Zool.*, vol. 65, No. 1) has made a genetical study of its action. It is called *cIIIG*, is present in the third chromosome, and practically eliminates crossing-over in all the chromosomes. For example, where the standard rate of crossing-over is 56·3 per cent it is reduced to 0·1 per cent in females homozygous for the gene. It is completely recessive to its normal allelomorph, since flies heterozygous for it show the normal rate of crossing-over. The effect is, moreover, confined to oogenesis, but it is well known that crossing-over never takes place in the males of *Drosophila*. The presence of this gene also results in chromosome irregularities, producing eggs which are trisomic or monosomic in one or more chromosomes, or are diploid. This factor thus affects the mechanism for both linkage and non-disjunction in the female. Several genes affecting meiosis in plants are now known. A recessive gene prevents chromosome pairing in *Datura*, and several such factors producing pollen sterility are known in maize and other plants, as well as genes which affect the shape of the meiotic chromosomes. It is thus clear that the mitotic and meiotic mechanisms of the cell are subject to control through mutations, just as are the phenotypic characters of the organism.

A Jurassic Pycnogonid. Interest in these curious sea-creatures, sometimes called Pantopoda, and dubiously placed between Crustacea and Arachnida, was recently revived by Sir Douglas Mawson's discovery of a twelve-legged form, described by Drs. W. T. Calman and Isabella Gordon. Among the forty or so genera of Pycnogonida previously known, three had five pairs of limbs, but all the others had only four pairs. From the Lower Devonian slates of the Rhineland, Broili lately described a couple of genera which he regarded as Pycnogonida, but their reception was somewhat doubtful. Now Oberstleutnant Robert Leon, when turning the ultra-violet rays on a surface of Solnhofn lithographic stone that showed no apparent fossil, has observed and photographed the luminescent image of what undoubtedly appears to be a Pycnogonid, though other interpretations are not altogether excluded. This, which he names *Palæonymphon*, would help to bridge the gulf between the Devonian and Recent genera, and is of further interest as showing five pairs of delicate limbs as well as two pairs of what are thought to be well-developed palps. The description and figures are published in *Natur und Museum* of November 1933.

A Fungal Parasite of Grasses. Grasses are such common plants that one might suppose it would be very difficult for a fungal parasite to work much havoc upon them. This is true in general, but when improved strains of pasture or meadow grasses are being raised, they acquire an enhanced value, and any damage to them is worth combatting. The fungus *Epichloe typhina* causes considerable damage under these conditions, as has recently been shown by Miss K. Sampson (*Trans. Brit. Mycol. Soc.*, 18, pt. I, 30–47, Aug. 1933). The most obvious stage of this fungus is the fructification, which usually appears as a swelling all round the flowering stem. Some species of grass, such as *Festuca rubra*, however, rarely produce fructifications, whilst several other species harbour the fungus for years without making any fruit bodies. The fungus is an intercellular parasite, the small mycelium of which ramifies between the cells of almost all parts of the host. Vegetative propagation of grasses readily spreads the disease, and perennial parts of the host carry it from year to year. In experimental plots, control may be obtained by removing infected plants as soon as they produce fructifications, and plants imported from pastures and meadows require very close watching.

Minor Barometric Oscillations and Rainfall. In a paper entitled "A Note on the Rapid Fluctuations of Atmospheric Pressure and the Atmospheric Instability at Peshawar during 1928 and 1929" by S. Basu and S. K. Pramanik (*Sci. Notes India Meteor. Dept.*, 5, No. 53), an attempt is made to investigate the possibility of using the indications of the micro-barograph for forecasting rain. The grounds for supposing that the minor oscillations of atmospheric pressure may be an indication of the lapse-rate (the vertical gradient of temperature in the free atmosphere) can be found in an earlier paper by D. Brunt (*Quart. J. Roy. Meteor. Soc.*, 53, 30–32; 1927), in which the relation between the period of a simple vertical oscillation in the atmosphere and the lapse rate is

developed mathematically. It is sufficient here to note that, under isothermal conditions (lapse rate = 0), a particle displaced vertically will perform a rapid harmonic motion about its original position, and that as the lapse-rate increases towards the dry adiabatic rate, the period increases greatly, while with super-adiabatic conditions there is instability and therefore no restoring force. The practical investigation at Peshawar covers the two years 1928 and 1929, the indications of a Shaw-Dines microbarograph being examined in the light of the weather recorded at the time. It was found that 82 per cent of the occasions of measurable rainfall were associated with microbaric fluctuations, and that out of a total of 218 occasions on which there were fluctuations with a period greater than ten minutes, 140 were occasions of rain. The connexion would, of course, be of little use if it were one of simultaneous association only, but this was not the case, the average interval between the first commencement of the fluctuations and the subsequent rainfall being about six hours.

Magnetic Test for Welds. The extensive use that is now being made of welding for joining metal plates together has brought to the front the importance of methods of testing welded joints. A usual method is to mill out a portion of the joint under test and examine it, but this weakens the work examined. The X-ray method of investigation is better as the joint is not weakened and also the inner structure of the welded zone is shown. But it is necessary that the operator have considerable skill and experience. The method occupies much time and the expense precludes a continuous routine test. In *A.E.G. Progress*, No. 3, 1933, a magnetic test is described which seems to have many advantages. The welded seam is magnetised by two permanent magnets, magnetically linked by an iron core. If defective spots are present the field is distorted. The course of the magnetic field is explored by a probing device consisting of an amplifier and headphones. A search coil located in the head of the probing device is made to vibrate by means of a magnet energised from the supply voltage. When the device is glided slowly over the welded seam, any alteration in the loudness or tone of the sound produced shows that defects are present. The seam can be explored rapidly and after a little experience the kind of noise produced is sufficient to diagnose the nature of the fault. The great advantage of this continuous test is that it gives a positive assurance as to whether the welded seam is faultless or not. Tests like milling and X-ray exposures which are made at various places chosen at random cannot give such positive results. The outfit made by the A.E.G. for testing welds can also be used for testing iron and nickel for cracks, tempering faults and slag content.

Strength of Concrete. A paper issued by the Department of Scientific and Industrial Research (No. 14. H.M. Stationery Office. 2*s*. net) gives valuable data in connexion with the strength of concrete. It is only within the last few years that it has been realised that the expansion due to heat hydration of the cement followed by the contraction on cooling causes the detrimental cracks frequently observed in large concrete masses. In the United States, the specifications for the Hoover Dam enforced that only cements with a low evolution of heat be selected. In this report it is shown that the latest results of laboratory tests are corroborated by full-scale tests on the evolution of heat in concrete during setting. These experiments are the most complete that have yet been made in any country. They show that in small masses of Portland cement concrete, it is desirable to conserve the heat evolved during the process of hydration in order to accelerate the strength development. In mass concrete work where high internal temperature may later result in contraction tending to the formation of cracks, the results confirm the desirability of only using Portland cements which have a slow rate of heat evolution. With high alumina cement, every effort must be made to dissipate the heat evolved as quickly as possible. The effects of cold weather on the material have also been investigated. If it be 'cured' within the yearly range of temperatures likely to occur in practice, there is no appreciable variation in its strength after 28 days. With high alumina cement, a very appreciable falling off in the strength was observed when it was matured at temperatures above 68° F. If suitable precautions are taken, its initial high strength can be maintained unimpaired. Special precautions have to be taken when it is used in marine work.

Prevention of Coal Dust Explosions. Explosions of coal dust underground are prevented by application of stone dust in the workings of collieries. It has been assumed that the nature of the incombustible dust was immaterial, and that all were equally effective under equal conditions of fineness. In the Safety in Mines Research Board Technical Paper No. 79 (London : H.M. Stationery Office), by T. N. Mason and R. V. Wheeler, on the "Inflammation of Coal Dust", it is shown that, as compared with the shale dust commonly used, limestone and gypsum are more effective in preventing the propagation of flame. It is important to have regard to the ease with which the dust can be dispersed as a cloud, especially after it has been exposed to the atmosphere of the mine. In this respect, gypsum is more liable to cake than either limestone or shale dust.

Rotation Effect in Eclipsing Binaries. The problem of determining the axial rotation of stars is somewhat simplified in the case of eclipsing binaries, since it is possible to approximate to an observation of a limb of the primary star when the other limb is obscured by the eclipsing companion. Radial velocities taken shortly before and after mid-eclipse should therefore deviate from the mean in opposite directions. A redetermination of the orbit of α Coronæ has been made by D. B. McLaughlin (*Pub. Michigan Obs.*, 5, No. 7) with the object of detecting this effect. The radial velocity residuals show the effect very strongly, tending to positive values before mid-eclipse and negative values after. The semi-amplitude of the rotational effect is about 12 km./sec., from which an equatorial velocity of the order of 100 km./sec. is deduced. These results confirm the view that the diffuse character of the spectral lines is due to rapid rotation of the star. The orbit of β Lyræ has been similarly re-investigated by R. A. Rossiter (*ibid.*, No. 6). The rotation effect is strongly in evidence in this star also, and its elimination from the observational material has greatly aided the determination of the true orbit. The author finds that the observations are now satisfactorily represented by undisturbed elliptic motion after such elimination of the rotation effect, and that the results are conclusive in deciding that no third body exists.