

## Research Items

### Clan Reciprocity among the Bororo

IN an account of the social organization of the Bororo Indians of South America, M. Cl. Levi-Strauss refers to certain reciprocal obligations between clans, which he considers worthy of intensive study. He himself was able only to obtain a few discursive notes on the customs this reciprocity entails (*J. Soc. Américanistes de Paris*, N.S., 28, 2). For example, when the young men are about to be initiated, the chief of the village entrusts their instruction to the phratry opposite to their own. On the death of a member of the tribe, it is customary for a collective hunt to be arranged. The organization of the hunt is entrusted by the nearest relative of the deceased to a member of the opposite phratry. The funeral emblems are handed to him, and he acts as organizer and leader. The preparation for the funerary dances is the duty of special clans; but the clan for whom the dance is prepared must take part as partners. This duality is well expressed in certain dances, in which the dancers stand in two lines and exchange places in the course of the dance. Each line or side belongs exclusively to one phratry. After the dance, the dancers are bathed by the members of the opposite phratry. An even closer tie binding the clans is formed by the interchange of food. At a stated time a member of one of the clans will carry a bowl of food from his own house to the men's house, where it is received with a ritual cry of welcome. Six or eight men of another clan are then fetched to the men's house, and partake of the food with their shell spoons. This exchange of food takes place reciprocally between all the clans, though with the exception of this ceremony and the giving of food to dancers after the dance, all meals are taken in the family dwelling. The privileges of the clans include the exclusive possession of names, songs, dances, and emblems and of certain techniques and materials. These rights are strictly respected.

### The Human Sex Chromosomes

FROM a study of spermatogenesis in three individuals, Dr. P. C. Koller (*Proc. Roy. Soc. Edin.*, 57, 194) has deduced some interesting conclusions. The length of the X-chromosome in man is found to be 4-5  $\mu$  and that of the Y 1.5  $\mu$ . These chromosomes frequently lie off the metaphase plate in mitosis, and in anaphase the Y frequently lags. In the leptozygotene stages of meiosis the X and Y are precociously condensed. They are divided into pairing and non-pairing regions. The non-pairing portion of the X is about two thirds of its length, while that of the Y, if present, is very small. The spindle attachment of the X is subterminal and is believed to lie in the pairing segment, so that crossing-over may occur on either side of it. The region between the centromere and the non-pairing (differential) segment is a quarter to a half that of the whole pairing region in which crossing-over will take place. Genes in this part of the X will show incomplete sex linkage, the linkage being lowest in loci farthest from the non-pairing segment. Both symmetrical and asymmetrical sex bivalents were found, and the X and Y sometimes fail to pair. In one individual

chromatid bridges and fragments were observed. He was probably heterozygous for an inversion. Such inversions may yet prove to be of significance in the racial differentiation of man.

### Barbels of Japanese Fish

THE structure and function of the barbels of two Japanese fish have been investigated by Mitus Sato (*Sci. Rep., Tôhoku Imp. Univ.*, Feb. 1937, 3 papers). One, the goatfish, *Upeneoides bensasi*, has two long barbels on the chin, and the other, a sea catfish, *Plotosus anguillaris*, has four pairs of barbels, two pairs above and two below the mouth. The barbels in both fish have a central supporting cartilaginous rod and in the epidermis covering them lie a number of characteristic taste organs which are supplied by branches of the fifth and seventh cranial nerves. In the catfish such organs are also to be found in the lips. These organs are more important than either sight or smell in the selection of food. In the goatfish the removal of the barbels causes a loss of the power to distinguish food. This does not occur in the catfish, since some of the organs are left in and around the lips.

### Chromosomes of Coffee Plants

A STUDY of the chromosomes of *Coffea* has been made by Dr. C. A. Krug (*J. Genetics*, 34, No. 3), who confirms that  $2n = 22$  in *Coffea arabica* and has found the same number in seven other species. Most of the cultivated varieties of *C. arabica*, however, are tetraploids; while the var. *bullata* of Cramer, which has broader and much thicker leaves, is an auto-octoploid ( $2n = 88$ ) or in certain plants hexaploid. The octoploid condition also arises somatically on a branch of a tetraploid, and can revert somatically to the tetraploid. Hexaploids are much less frequent, so it is concluded that the octoploids probably arise through chromosome doubling after fertilization. Their fruits are abnormal, giving a very low percentage of germination. All the offspring were  $4n$  except one  $6n$  and one  $8n$ . The  $4n$  plants may have arisen parthenogenetically. The pollen meiosis in the octoploids is irregular, only about 62 per cent of the tetrads having four microspores. From  $4n \times 8n$  seven plants were obtained, all having  $2n = 44$ . These must have arisen from parthenogenesis or by the fertilization of  $2n$  eggs by  $2n$  pollen. The hexaploids also show high gametic sterility and low seed production. Four seedlings were produced, three of which had 66 chromosomes and one 44. In reciprocal crosses between *C. arabica* ( $2n = 44$ ) and *C. canephora* ( $2n = 22$ ) a triploid hybrid plant produced misshapen seeds with little or no perisperm but with normal embryo. *C. canephora* has several chromosomes longer than the rest, and these are recognizable in the hybrid.

### Petrofabric Study of Moine Schists

AT the meeting of the Geological Society on May 5, F. C. Cole presented an important paper dealing, for the first time, with the application of petrofabric analysis to the problems of the metamorphic rocks

of the Highlands. In all, 85 analyses of quartz and mica fabrics of Moine schists have been made. Specimens collected over a wide area have given in every instance a well-marked girdle-diagram, indicating that the schists are typical *B*-tectonites. In these, the direction normal to a girdle, known as the *b*-axis or tectonic axis, has the same significance as a visible fold-axis. The *b*-axes of the Moines pitch uniformly into the south-east quadrant, suggesting that the present regional metamorphic condition of the Moines is the result of movements along approximately south-west and north-east lines. The effect of the post-Cambrian overthrusting on the fabric of the schists is also examined. Relics of the earlier fabric are traceable in partially mylonized rocks, but the thrust movements have had little or no constructive effect, being in the main cataclastic, and the continuity of the structure is lost. The evidence indicates that the general metamorphism of the Moine schists was effected by movements, earlier than the overthrusting phase of the Caledonian orogeny, acting in a direction almost at right angles to the direction of overthrusting, but parallel to pre-Torridonian directions of movement in Lewisian areas.

#### Drilling of a Deep Pressure Test in India

EXPERIENCE has shown that problems pertaining to the drilling of a well under pressure to great depth are many and formidable. The main difficulties to be overcome are shallow zones of low-pressure sands, which cause loss of fluid and circulation, deeper high-pressure water and gas sands, 'heaving shale' formations and hard formations, which retard drilling and are conducive to crooked holes. Mr. G. F. Wilson, in a paper presented to the Burma Branch of the Institution of Petroleum Technologists on May 4, described measures which have been adopted to overcome these particular difficulties when drilling a deep well in India. The casing was set below the low-pressure zone; heavy mud was used as well as pressure drilling; by continuous maintenance of pressure and the use of treated muds, heaving shale formations were penetrated and the effect of hard formations counteracted so far as possible by provision of a hydraulic table. The history of this test well showed that pressure drilling is quite practicable for prolonged periods, providing the best obtainable equipment is used. Where, however, rock pressures are known and can be dealt with by mud, it is better not to employ pressure drilling, but to keep it as a standby, since the increased cost of fuel and equipment for drilling under pressure is in most cases greater than that of mud-loading materials.

#### Crystalline Structure of Pentaerythritol

THE elucidation of the structure of sugars by X-ray analysis has been hampered by lack of knowledge of various interatomic distances. F. J. Llewellyn, E. G. Cox and T. H. Goodwin (*J. Chem. Soc.*, 883; 1937) have made an analysis of the relatively simple compound pentaerythritol,  $C(CH_2OH)_4$ , which shows that the model consists of a central carbon atom surrounded by four  $CH_2$  groups at the corners of an almost exact tetrahedron; each hydroxyl group is attached to its  $CH_2$  by a bond making nearly a tetrahedral angle with the  $C-CH_2$  link, and is so directed that the four OH groups lie at the corners of a square. The bond lengths and angles were

calculated from the measured atomic co-ordinates and cell dimensions, the distances being  $C-C=1.50$  A. and  $C-O=1.46$  A., the first being slightly less than that found in diamond and usually assumed for aliphatic compounds, and the second almost exactly equal to the calculated sum of the half-bond lengths of carbon and oxygen. The structure of the lattice as a whole is of a very pronounced layer type, the molecules being linked together by hydroxyl bonds in sheets in the (002) planes, and the separation of more than  $3\frac{1}{2}$  A. accounting for the perfect cleavage parallel to {001}. The evidence supports the view that the relatively short distance between hydroxyl groups represents a hydroxyl bond in which a hydrogen atom binds two oxygen atoms closely together while remaining attached essentially to one of them. The arrangement is very similar to that found in resorcinol. All other inter-molecular distances are much greater and correspond with relatively weak van der Waals' forces.

#### Determination of Lactoflavin in Milk

A RAPID method for the determination of lactoflavin (vitamin G) in milk by a fluorimetric method is described by C. H. Whitnah, B. L. Kunerth and M. M. Kramer (*J. Amer. Chem. Soc.*, 59, 1153; 1937). To 10 ml. of milk, 15 ml. of 10 per cent trichloroacetic acid is added, the mixture is allowed to stand for  $\frac{1}{2}$ -1 hour and centrifuged for 5 minutes at 2,000 r.c.f. Ten ml. of the resulting serum is neutralized with methyl orange as indicator and diluted until the sample can be matched in the light of an Eveready Fluoray lamp with standard flavin solutions (Labco *PX* grade) containing 0.12-0.06 gamma of flavin per ml. The consistency of the method was confirmed, and comparisons with the biological assay by the Bourquin-Sherman method were satisfactory. Attempts are being made to apply the method to colostrum, which is higher in lactoflavin content than normal milk.

#### Classification of Stellar Spectra

THE spectral classification of stars of types *A* to *K* has recently been discussed by W. W. Morgan (*Astrophys. J.*, 85, 380), who points out the desirability of a two-dimensional system of classification depending on effective temperature and luminosity. The system should be in empirical units based on the actual observed criteria in the spectra, so that no errors are introduced by assumptions involved in reducing these to values of the corresponding physical parameters. The Henry Draper notation provides a suitable method of classification in the temperature direction which is practically constant for all values of the surface gravity in the stars considered; but the criteria on which it is based should be as far as possible independent of a star's luminosity. Classification in the luminosity direction should similarly be based on lines which are unaffected by temperature over the range in which they are employed. The author suggests, as simple criteria which fulfil these conditions, some single line intensities, intensity ratios and differences. They enable the H.D. type to be determined with high accuracy, and (for types *A7* to *K9*) give an additional numerical classification directly related to luminosity. The criteria for types *A0* to *A6* are not sufficiently accurate to give more than a 'group' classification (for luminosity) into super-giants, main sequence stars and white dwarfs.