

## Research Items

### Social Symbiosis in Nigeria

AN attempt to adapt the well-established biological concept of symbiosis in social anthropology is made by Mr. S. F. Nadel (*Man*, June 1938) to define a new, that is, not yet formulated, and specific category of social organization. It applies to 'development', not in any abstract theoretical sense, but as relating to concrete observable social processes, namely, the reorientation of a social system under certain conditions of external change and pressure. The facts examined concern the Nupe town of Kutigi in Northern Nigeria, in which, in a population of approximately 3,000, the development studied reaches back to events of some two hundred years ago. The population embraces four different tribal sections, originally distinct separate cultural groups, which have migrated into their present domicile in different periods. The way in which these groups reacted and adjusted themselves to each other, and eventually evolved a *modus vivendi*, represents the phenomenon it is proposed to call social symbiosis. Of the four groups two are of Nupe origin, one came from Bornu as wealthy traders and attained political and economic ascendancy, and the fourth consists of freed slaves, Yorubas imported to instruct the Nupe in weaving and dyeing. In the arrangement of the town, which is typically Nupe, locality and tribal section, living-place and migrational stratum, coincide. But between the separate localities and migration strata there exists to-day the closest co-operation, which is the fruit of a far-reaching adjustment. The bonds of contact and common interest gain the significance of a specific and new social factor in the sphere of religion and kinship organization. The three activities of the sections—economic, religious, and social—can be shown to represent a reciprocity and interdependence linking section with section in the framework of a larger embracing social group-unit, that is, a symbiosis, which represents the possible origin of clanship, and is one of the three possible developments in attaining a social equilibrium between diverse cultural groups—co-operation, symbiosis, and complete fusion.

### Man of the Old Stone Age in America

PROF. E. B. RENAUD, of Denver University, whose explorations in search of archaeological sites in Colorado and the neighbouring States have contributed largely to knowledge of the stone age cultures of the south-western United States, devotes his tenth report of "The Archaeological Survey of the High Western Plains", sponsored by his University, to a study of the "Black's Fork Culture" of south-west Wyoming. This culture, which consists of series of stone implements of palaeolithic type, or rather types, was first recorded so long ago as 1931. The difference in form, patination and appearance of age of these implements from the more usual type of stone implement of the area naturally attracted considerable attention, and its comparison with European palaeolithic implements of a similar character provoked no little criticism. Further explorations in 1935 and 1936 increased the number of sites on which these implements occur to sixty-nine, situated in an area extending from Utah on

the west to long. 109° on the east and lat. 43° on the north to the Utah line on the south. This area is drained by the Green River and its tributaries, of which Black's Fork is the most important, and apparently the focal centre of the culture. Hence the name. In all, some four thousand specimens have been collected, besides collections in other hands. The 'camp' sites, on which the implements are found, bear a general resemblance to one another. As a rule two cultures are present, an older and a recent; but the two are quite distinct, the older being associated with an older flue of occupation. The materials used are chert, moss agate and quartzite, the specimens falling into six classes, of which three belong to the chert group. Classified on broad lines, the implements are bifaces and unifaces—coup-de-poing, choppers, end scrapers, side scrapers, pointes, and blades. They belong to the early and middle palaeolithic—pre-Chellean, Chellean, Acheulean, and Mousterian as well as Clactonian flakes. There is also a pebble industry, which is comparable with the rough quartzite pebble industry of the Upper Garonne. This terminology is used by Prof. Renaud descriptively only, and carries no implication as to age, though his own comparisons and the verdict of a number of distinguished European archaeologists concur in seeing in these implements a close resemblance to the African races.

### Measurement of Temperamental and Personality Qualities

REPORT No. 83 of the Industrial Health Research Board, by P. E. Vernon, is an account of the various tests that have been used to measure temperamental and personality qualities by means of rating scales and questionnaires, oral and written, but excluding the ordinary interview and clinical techniques. There is a short description of practically every published test within these limits, with an account of the method adopted, the statistical or other techniques used to evaluate the results, and a critical survey of the results and criteria. That a survey is necessary is implied by the surprisingly large number of the questionnaires in use, and by the fact that both in the medical and industrial field temperamental or emotional problems are proving to be urgent. Efficiency and even happiness in many walks of life are partly bound up with the temperamental make-up of the individual, and some objective measure by which this could be assessed would be of great value. The conclusion of this painstaking study, however, does not permit of any belief that this, at least by the means studied, is an immediate possibility. The author suggests that more care should be taken in compiling the tests and that investigators should not neglect the work of their predecessors. He gives a very clear discussion of the possibilities and drawbacks of this very popular verbal test.

### Serological Reactions in Cancer Diagnosis

THE polarographic method developed by Prof. Heyrovský depends on the potential set up in a cell between a polarizable dropping mercury electrode and a non-polarizable reference electrode. The literature of the method and of its numerous applications is detailed in a comprehensive bibliography (Bibliography

of Publications dealing with the Polarographic Method" by J. Heyrovský and J. Klumpar. *Coll. Czechoslovak Chem. Comm.*, 10, No. 2-3, pp. 23; 1938), which covers the period 1922-37. Dr. Brdička has applied this method to serological reactions, with special reference to cancer diagnosis ("Serologische Untersuchungen mit Hilfe der Polarographischen Methode, und ihre Bedeutung für die Krebsdiagnostik" by R. Brdička, *Acta Internat. Verein. für Krebsbekämpfung*, 3, 13-30; 1938). Purr and Russel, and Waldschmidt-Leitz, have produced evidence tending to show that in the blood of cancer patients there are relatively less sulphhydryl groups than in normal blood. The potential set up at the dropping mercury cathode, being a function of the reducing systems present, may be used to detect the amount of these groups in very small quantities of serum. With this method, the author has investigated sera from 187 normal and pathological subjects, including cancer patients. The cancer sera gave a diminished polarographic reaction, but this was also found in numerous inflammatory conditions, and is therefore not specific for cancer.

#### Localized Nature of Photoperiodic Response

DR. W. F. LOEWING has recently published (*Proc. Soc. Exp. Biol. and Med.*, 37, 631; 1938), the results of experiments in which the bases and tops of soybean plants were submitted to different photoperiods by training them to grow through a slit in a vertical opaque panel. The plants were divided into three groups: (1) controls with leaves and flowers intact, in one set of which tops were given long day and bases short day; in the opposite set tops were given short day and bases long day; (2) tops defoliated and bases exflorated, criss-crossed as in controls; (3) tops exflorated and bases defoliated, criss-crossed as in controls. The responses to differential lighting are clear cut. Dr. Loehwing concludes that the data indicate that the flowering stimulus is a foliar influence entirely distinct from carbohydrate synthesis. The formative floral organization apparently depends upon one or more specific inductors the production of which in the soybean results from short-day illumination. Both the flowering stimulus of short-day and its inhibition in long-day exhibited a direct quantitative relationship to the amount of foliage. The largest number of flowers on defoliated parts appeared on those plants with the greatest number of leaves under short-day illumination.

#### Protein Synthesis in Detached Leaves

IN an extensive series of experiments on detached leaves of daffodils, *Pelargonium zonale*, *Iris Pseudacorus*, *Tropaeolum majus*, *Ligustrum vulgare*, *Helianthus perennis* and *Vicia Faba*, W. H. Pearsall and M. C. Billimoria have shown, by floating the leaves on nutrient solution which allowed of rapid protein synthesis, that the capacity of leaves for protein synthesis under experimental conditions may depend upon their age, protein content and certain factors associated with the physiological condition of the whole plant (*Ann. Bot.*, New Series, 2, No. 6, 317; April 1938). It is also suggested that the permeability of the dissolved solutes in the experimental medium may be an important factor. The main significance in the results obtained is that it is probably undesirable to attempt to apply to other genera conclusions based on any one type of plant.

#### Control of Michaelmas Daisy Wilt

MR. N. C. PRESTON has recently tested a method of control, originally suggested by W. J. Dowson, for the Verticillium wilt of the Michaelmas daisy (*Gard. Chron.*, May 14, 1938). The disease is caused by the fungus *Verticillium Vilmorinii*, which apparently does not extend into the smaller top shoots of an infected plant. These can be struck as cuttings, and usually grow into disease-free plants. The malady appears to be rather widely distributed, and it is not always possible to obtain clean stocks for nursery propagation; hence the value of top cuttings as a practical means of multiplication of valuable strains, even though they be infected with the wilt fungus.

#### Nature of Ultra-virus and Bacteriophage

A USEFUL review of present-day hypotheses about the nature of bacteriophage and ultra-viruses is contained in a recent paper by Prof. C. Levaditi ("Les Ultravirus", *Bull. Soc. d'Encour. pour l'Indus. nationale*, 27-42, Janv.-Févr. 1938). Prof. Levaditi is scientific director of the Alfred Fournier Institute, and is in a good position to review the subject widely. After considering the physiological similarity between bacteriophage and virus, he sifts the evidence for various theories as to their nature. Are they inorganic, or unorganized organic matter comparable to enzymes: are they organized living cells in the full sense of the term, or do they represent life laid down with illiberal autonomy? Prof. Levaditi inclines to the last-mentioned view. . . . "les ultravirus et les bactériophages paraissent appartenir à un monde vivant ignoré jusqu'à ce jour". The considerations are mainly illustrated by animal viruses, though plant viruses are also mentioned. A good deal of modern knowledge is collected in the paper, and many interesting questions for future research arise from its perusal.

#### Segregation in a Species-Hybrid

BY pollinating *Tragopogon pratensis minor* with pollen from *T. porrifolius*, a hybrid was obtained by Dr. O. Winge (*C.R. Lab. Carlsberg, Sér. Physiol.*, 22, No. 9) between two well-known Linnæan species, one of which has yellow and the other violet flowers. This cross was originally made by Linnæus himself and grown in 1759. The species also differ markedly in size of flower heads, foliage characters, size of plant, achenes and pappus. Both are found to have six pairs of chromosomes, but *T. pratensis* has one pair of satellites while *T. porrifolius* has two. There are also differences in the size and constrictions of certain chromosomes. The  $F_1$  shows hybrid vigour but is highly sterile, producing only 8 per cent of good achenes in comparison with the parents. Yet meiosis is regular. Later generations were grown to  $F_7$ , and were much more fertile. The  $F_1$  were nearly uniform and intermediate between the parents. Five independent pairs of segregating genes for flower-colour were identified, but the ratios were frequently modified. By selection in later generations, both parental species were obtained, with the corresponding chromosome morphology. It is concluded that all the specific differences arose as genic differences in the chromosomes, and that there is therefore no absolute boundary between species-factors and variety-factors. Two fine coloured plates illustrate the colours and other characters of the heads in the parent species and the various segregates.

### Tilting of the Ground at Wellington

IN September 1930, an Ishimoto tiltmeter was installed at the Dominion Observatory, Wellington, in the hope that its records might lead to the prediction of local earthquakes. The instrument continued in action until March 5, 1934, when it was broken by the severe earthquake of that day. An account of the results obtained with its aid has now been published by Mr. R. C. Hayes (*Dom. Obs. Bull.*, No. 133, 625-628; 1938). The records showed marked diurnal and seasonal variations. The diurnal tilt, sometimes exceeding 2 seconds, follows the temperature variation, the curves of mean hourly tilt and earth-temperature at a depth of one foot corresponding very closely. The most interesting movement is a persistent westerly tilt of at least 10 seconds in less than  $3\frac{1}{2}$  years, perhaps connected with crust displacements preceding the earthquake of 1934. With this possible exception, no connexion has been traced between the tilting of the ground and the occurrence of local earthquakes.

### Ultrasonic Dispersion

THE technique used by Mr. B. V. Raghavendra Rao, of Bangalore, in obtaining the preliminary results described in *NATURE*, (139, 885; 1937) is given in full in a recent paper (*Proc. Indian Acad. Sci.*, 7, Pt. 3). The source of light was a cathode cooled, low density, mercury lamp, wave-lengths 4046, 4078 and 4358 being used, 4078 in general proving most suited in spite of its low intensity. The dust-free liquids investigated were contained in a Wood tube and the fine structure of the radiation scattered backwards was examined by means of a Fabry-Perot étalon, the distance piece of which was chosen to suit each liquid. For carbon tetrachloride using a 5 mm. gap étalon, the author finds that while the velocity of ultrasonic waves of 1-1,000 megacycles per second is 920 m. per sec., that of hypersonic waves of more than 1,000 megacycles is 1,070 m. per sec. For acetone on the other hand, using a 4.5 mm. gap étalon, the ultrasonic velocity is 1,205 and the hypersonic 978 m. per sec. For benzene and toluene, measurements of hypersonic velocities have not proved accurate enough to warrant publication.

### Elements 43 and 61

A DISCUSSION of the possibility of the existence of stable nuclei of atomic numbers 43 and 61 is given by H. Jensen (*Naturwiss.*, 26, 381; 1938). The importance of Mattauch's rule which states that if two isobares differ in nuclear charge by unity one of them must be unstable is emphasized, and it is pointed out that the elements adjacent to element 61,  $^{90}\text{Nd}$  and  $^{92}\text{Sm}$ , have many isotopes. This points to the fact that a nucleus with atomic number 61 would be unstable, and the same applies to element 43. The possibility that  $\beta$ -active isotopes with these atomic numbers might exist and have very long lives, cannot be entirely ruled out, but is unlikely. The existence of anomalies in the structure of certain nuclei is also mentioned. Considering nuclei with odd mass numbers and only one isobare, the passage from one of these to the next is always accomplished (with four exceptions) by the taking up of either one neutron and one proton, or two neutrons, so that the atomic number only increases by 1 at the most. Hence every chemical element must have at least one odd isotope. The exceptions are the mass numbers 37 ( $Z = 17$ ), 97 ( $Z = 42$ ), 139 ( $Z = 57$ ) and

145 ( $Z = 60$ ). In these cases transition to the next nucleus of odd mass number is accomplished by taking up two protons, so that the nuclei of atomic numbers 18, 43, 58 and 61 are passed over. Nuclei with atomic numbers 18 and 58 do, however, exist with even mass numbers. On the other hand, the remaining two, having odd atomic numbers (43 and 61) can have no isotope with an even mass number (owing to the rule that heavier nuclei with even mass numbers have always an even atomic number), and so should not exist at all.

### Polyphenol Oxidase

Keilin and Mann have recently described the preparation from *Psalliotia campestris* of a highly purified polyphenol oxidase (*Proc. Roy. Soc.*, B, 125, 187; 1938). The enzyme contains copper as an essential constituent of its active group. The less pure preparations contain large amounts of copper, which, however, does not belong to the enzyme, and no proportionality is found between copper content and activity until the copper is between 3.2  $\gamma$  and 3.5  $\gamma$  per enzyme unit. At this level, the copper content and the enzymatic activity are strictly proportional. The enzyme in its pure form has a high specificity. Even when crude, it oxidizes ortho-dihydroxyphenols with great rapidity, but affects only a few monophenols, such as *p*-cresol. As it is purified, the enzyme gradually loses its power of catalysing the oxidation of monophenols.

### Constant of Nutation

DR. H. SPENCER JONES has recently published a paper (*Mon. Not. Roy. Astro. Soc.*, 98, 6; April 1938) on "The Determination of the Constant of Nutation from the Greenwich Latitude Variation Observations", in which he deals with the material available for the period 1911-36 from observations with the Cookson floating zenith telescope at the Royal Observatory, Greenwich. Dr. J. Jackson had previously utilized the observations from 1911 until 1929 to determine the constant of nutation from the latitude variations and, while his method was closely followed, certain minor alterations were introduced. Amongst these may be mentioned the revision of the star-places and proper motions, the application of corrections for wind and diurnal latitude variations, and the reduction of morning and evening observations to identical epochs. The value of the constant of nutation derived by Jackson was  $9.2066'' \pm 0.0055''$ , and that found by utilizing the results up to 1936 is  $9.2173'' \pm 0.0040''$ . The latter approaches much more closely the theoretical value than the former which presented a difficulty to Jackson; he described the discrepancy as "one of the outstanding discordances of the constants of the solar system". By using Newcomb's formula, which connects the luni-solar precession, the constant of nutation, the mass of the moon, and the mechanical ellipticity of the earth, the inferred value for the reciprocal of the mass of the moon is 81.53. This is based upon a luni-solar precession for 1900.0 of  $50.3899''$  found by Newcomb, but according to Oort, who took into consideration the rotation of the galaxy, the value is  $50.4012''$ , from which the inferred value for the reciprocal of the mass of the moon is 81.59. It is hoped that the observations of Eros at the 1931 opposition will provide a more accurate determination of the mass of the moon than that derived by Hinks from the 1901 opposition. As a result, the nutation constant should be found with greater accuracy.