

## Research Items

**Totemism among the Karadjeri.**—The totemic system and social organisation of the Karadjeri tribe, which inhabits territory around Lagrange Bay, north-western Australia, is described by Mr. Ralph Piddington in *Oceania*, vol. 2, pt. 4. Although the tribe has long been under the influence of the white man, certain elements of the totemic system, such as the increase ceremonies and their associated mythology, retain the more important features of their original elements. Increase ceremonies are associated primarily with the districts in which the ceremonies are held rather than with the individual members of the totems. Not all species have their increase centres located in Karadjeri territory, but all important natural species have increase centres somewhere. There are certain prescribed forms for the ritual, though these are not so circumscribed as among the Aranda. The ceremonies are usually performed once a year only, and, if the species appears at one season only, generally just before it becomes plentiful. If the ceremony is associated with perennial foods, it may be performed at any time. Instructions to the species to become plentiful are uttered by the performers as they carry out the ritual, the districts in which it should become plentiful being named in succession. The places named are those in which the species are actually found. At many of the increase ceremonies decorations are worn, such as powdered charcoal, red ochre, white mud, white down, and blood from a human being, taken from the fore-arm by a pointed bone from a wallaby's leg, at a ceremony of which no woman should be a witness.

**Ancient Hindu Temples in Burma.**—The history and cult of the only Hindu temple in Burma now extant, the Nat-Hlaung temple, Pagan, is discussed by Nihar Ranjar Ray in a communication to the *Indian Antiquary* for September. It would appear that the temple was built not for housing figures of the Buddha, but for statues of deities inferior to him—Hindu figures of the different incarnations of Viṣṇu. According to tradition the temple was founded by king Taung Thugyi (A.D. 931–964); but more probably, and in accordance with another tradition, it was founded by Anaorahtha, who flourished in the last half of the eleventh century, even though he was an ardent adherent of the southern Sinhalese school of Buddhism, under the influence of the Brahmanas, who were prominent at the Pagan court. The figure of the main deity of the temple once stood in a niche in a square obelisk in the centre of the interior; but after lying on the floor for long it was removed, and is now in Berlin. It was a seated image of Viṣṇu, of which the lotus throne rests on the bird Garuda posed ready to fly. The god is elaborately ornamented from head to ankles. The bird differs from other representations in Burma. It shows a short stunted human bust resting on two heavy rounded feet. A peculiar feature of the figures of the ten niches on the outer walls of the temple, is that of the seven which still remain, only four are avatars of Viṣṇu, while of the other three, one is identified as the image of Sūrya. It is of the south Indian variety. In the Vedas Sūrya is identified with the sun and is intimately related with Viṣṇu. The idea that Viṣṇu is the sun appears in the worship of the sun as Sūrya-Nārāyaṇa.

**The Inheritance of Goitre.**—Various hypotheses have been put forward to explain the inheritance of goitre, which is well known to be endemic in regions where the soil waters have a low iodine content but to occur sporadically elsewhere. Dr. C. B. Davenport (Carnegie Inst. Publ. No. 428) has recently made an investigation of goitrous families in a mountain valley in western Maryland. The difficulty of drawing a line, particularly in women, between functional and pathological enlargement of the thyroid, introduces some uncertainty into the results. Since many individuals in goitrous regions escape the disease while some in other areas develop it, the threshold for iodine intake and the efficiency of the thyroid must vary in different families. Dr. Davenport has compiled a number of pedigrees, and from their analysis reaches the conclusion that for the appearance of goitre two genetic factors are necessary, one dominant and sex-linked, the other dominant but not sex-linked. This hypothesis accounts for the well-known excess of females with goitre, and also for various relationships found among the offspring when one or both parents are goitrous. How widely this hypothesis is applicable can be determined by testing it with other pedigrees.

**X-Ray Analysis of Teeth.**—The hardness of teeth, like that of bone, is due to the deposition, in the enamel and dentine, of a salt (or salts) of calcium and phosphorus. Previous X-ray investigations have indicated the probability that these elements are deposited in the form of apatite. J. Thewlis (*Brit. J. Radiology*, 5, 353; 1932) has recently confirmed this conclusion, in an X-ray analysis of the enamel and dentine of both human and canine teeth. The rays are more heavily absorbed by the enamel than by the dentine, due to the greater proportion of organic matter in the latter. From density determinations it appears that there is about five per cent of organic matter in the enamel but forty per cent in the dentine. The human tooth contains slightly less than the canine. It was also found that the crystallites of the dentine, in both types of teeth, are randomly oriented: the enamel crystallites, however, have one direction in common but are otherwise randomly oriented. This direction makes an angle of 20° with the normal to the tooth surface in human teeth and is coincident with the normal in canine teeth. There is a possibility that the immunity of dogs' teeth to caries may be related to the arrangement of the crystals of apatite in the enamel. Thewlis's experiments failed to disclose the presence of any other crystalline constituent.

**Cytology of Spinning Glands.**—St. Wajda (*Bull. Internat. Acad. Polon. Sci. et Lettres*, No. 2, Bd. II., 1931) has investigated the cytology of the spinning gland of the larvæ of the trichopteran insect *Anabolia*, and has shown that, as in the spinning glands of other insects, the nucleolar substance plays an important part in the formation of the secretion which, he states, may be produced in four different ways. (1) The nucleolar material may be extruded from the nucleus into the basal part of the cell; there it stains with acid dyes more weakly than the nucleoli, and forms a sort of pro-secretion which later

breaks up into spherules, and these lie for a long time in the cell plasma, but later increase in size at the expense of the cytoplasm and are finally passed into the lumen of the gland. (2) The nucleolar substance may be expelled from the nucleus into the cytoplasm, where it lies in large vacuoles, and from this eosinophilous material small secretion particles pass from the cytoplasm into the lumen of the gland—in this case the secretion arises directly from the nucleolus. (3) Fragmentation of the nucleolus occurs, and the pieces lie each in a vacuole and become changed by swelling and pyrenolysis into the spinning substance. (4) Pieces of chromatin change from basophile to eosinophile and become transformed into the spinning material. The nucleolar substance therefore plays the most important part in the production of the spinning secretion, as is the case in other insect larvæ previously investigated, but there is no production of the secretion in the cell plasma such as takes place in the larvæ of Myrmeleionidae and Hymenoptera. This may be correlated with the different chemical constitution of the secretion in the Trichoptera, which 'sets' under water.

**Metabolism of Potatoes affected with Leaf-Roll.**—Leaf-roll of potatoes is perhaps the most serious of the so-called degeneration diseases. It has been recognised for many years that the causal virus produces an accumulation of starch in the leaves and hinders its translocation to the tuber. The cause of this hindrance forms the subject of a very extensive study by E. Barton-Wright and A. M'Bain ("Studies in the Physiology of the Virus Diseases of the Potato: A Comparison of the Carbohydrate Metabolism of Normal with that of Leaf-Roll Potatoes". *Trans. Roy. Soc. Edin.*, vol. 57, Pt. II, No. 11, 1931-32). It was found that sucrose is the sugar of translocation in healthy plants, whilst carbohydrates are removed as hexose in leaf-roll potatoes. The seasonal variation of starch content in leaf-roll tubers has also been studied, and the bearing of these factors on tuber formation is discussed. Two varieties of potato have been used for the experiments—'Arran Victory', which is not much affected by leaf-roll, and 'President', which is attacked very severely by the disease.

**'Tea Yellows' in Nyasaland.**—A communication from the Department of Agriculture of the Nyasaland Protectorate (Bulletin No. 3, new series) records a successful piece of work on the etiology and control of the 'yellows' disease of the tea bush, which has troubled planters in Nyasaland for many years. This work, done by Dr. H. H. Storey, of the Agricultural Research Station Amani, Tanganyika, and Mr. H. Leach, mycologist to the Nyasaland Department of Agriculture, leaves little doubt that 'tea yellows' is a deficiency disease due to lack of sulphur in the soil and in the plant. An experiment, started in 1927, showed that the application of ammonium sulphate was very effective in restoring the health of severely diseased bushes, and this was followed up by a series of field tests with fertilisers containing sulphur and not containing sulphur, which showed that both prevention and cure are effected by the sulphate part of the fertilisers. Treatment with ground sulphur was also found beneficial. These results were corroborated by growing tea seedlings with their roots immersed in distilled water containing all the essential plant foods, and in solutions from which one of these plant foods was absent. The seedlings grown in the solution without sulphur

developed the exact symptoms of 'yellows' disease even down to the scorching of the young leaves. Chemical analysis of leaves from diseased bushes showed a deficiency in sulphur, and mycological investigation indicated that the fungus *Rhizoctonia bataticola*, which is found on the roots of diseased plants, is not the causative agent, but invades the plant after its health has been sapped by the disease. The control measure now recommended is to apply ammonium sulphate or potassium sulphate in a minimum dressing of 1 oz. per old plant or  $\frac{1}{2}$  oz. per new plant, or sulphur at the rate of  $\frac{1}{2}$  oz. or  $\frac{1}{4}$  oz., respectively. The use of kraal manure, which is rich in combined sulphur, is also advocated.

**Swedish Topography.**—A detailed study of the recent geology of the Stockholm region in its relation to the existing topography is contained in a paper by Prof. G. de Geer entitled "Stockholmstraktens Kvartärgeologi" (*Sveriges Geologiska Undersökning*, Sev. Ba. 12). It is accompanied by a large-scale coloured geological map of the area showing the surface geology, and much of the paper consists of a discussion of the relations to one another and the sequence of the moraine strata. The morphology of the region is shown to be partly determined by shatter belts and this feature is particularly noticeable in the area lying to the south of the inlet joining Lake Mälaren to the Baltic. This inlet, some forty metres deep, is bordered on its southern side by a horst rising comparatively steeply to sixty or even seventy metres. This horst, like the rest of the area, was once covered by Cambro-Silurian deposits. It was then faulted downwards and so its covering rocks were better preserved than in surrounding regions. Subsequent elevation then occurred and gave the present position. The paper is provided with summaries in English of several of its sections.

**Scattering of X-Rays by Amorphous Media.**—The *Physikalische Zeitschrift* for Aug. 15 contains two papers dealing with the scattering of X-rays by 'amorphous' media. In the first, by Mencke, the scattering is studied in the 'atomic' liquids mercury and gallium, and in carbon tetrachloride. A filtered beam of X-rays falls at a small angle on the liquid surface, and the scattered intensity shows periodic variations with angle. From these one may deduce the structure of the liquid as expressed by a curve showing the relative probability of various interatomic separations. The distribution is similar to that obtained by shaking up two marked balls in a lot of similar balls. The case of carbon tetrachloride is more complicated, and it appears that the scattering cannot be explained by assuming molecules oriented at random. In the other paper, by Ehrhardt, the shapes of the molecules (1,1) and (1,2)  $C_2H_4Cl_2$  and (1,2)  $C_2H_2Cl_2$  are studied by X-ray interference patterns obtained from the vapours. The results show the distortion of the 'tetrahedral' linkages when chlorine molecules are linked to carbon atoms, the atomic separations in the *cis* and *trans* forms of (1,2)  $C_2H_2Cl_2$  and the structure of (1,2)  $C_2H_4Cl_2$  as a rotational oscillation around a stable *trans* form. The paper is an interesting example of the application of X-rays to the structure of simple organic molecules.

**Scattering of Light by Argon and Methane.**—Rayleigh and others have found that the light scattered transversely when a beam of unpolarised light passes through argon is incompletely polarised.

The incompleteness is usually explained by assuming that the molecules behave as anisotropic electric dipole radiators, but it is also possible to explain it on the assumption of electric quadrupole radiators or of magnetic dipoles. S. Parthasarathy has described (*Indian J. Phys.*, July) an experiment designed to test this point. The anisotropic dipole view alone requires that the light scattered in the plane of the electric vector from a beam of plane polarised light be unpolarised. The gases were illuminated with a plane polarised beam and the track was photographed through a double image prism by a lens of aperture  $F:1$ . A 48-hour exposure was required. The images showed that the light was unpolarised as required by the anisotropic dipole theory. A similar result was found for methane.

**Free Organic Radicals.**—Rice, Johnston and Evering (*J. Amer. Chem. Soc.*, Sept.) have presented experimental evidence for the decomposition of organic compounds into free radicals by heat. Paneth had previously shown that the vapour of lead tetraethyl,  $Pb(C_2H_5)_4$ , when mixed with an indif-

ferent gas and passed through a heated tube, decomposed with the formation of free ethyl radicals, since the decomposed gas would remove lead mirrors from a colder part of the tube to form tetraethyl lead once more. The present authors show that a condensable gas such as steam or carbon dioxide may be substituted for the permanent gas, and that a great variety of organic compounds when heated in the range  $800^\circ$ – $1000^\circ$  decompose into free radicals, so that by removing the products rapidly from the furnace, the free radicals formed can be combined with many different metals. Acetone gives only methyl groups; propane gives 80 per cent methyl and 20 per cent ethyl; and butane gives 70 per cent methyl and 30 per cent ethyl. The half-life of the radicals so obtained is  $1 \times 10^{-3}$ – $2 \times 10^{-3}$  sec., as compared with  $6 \times 10^{-3}$  sec. obtained by Paneth and his co-workers. The rate of disappearance does not follow either a first order or a second order equation very well. The temperature coefficient of the decomposition into free radicals, in the case of acetone, was approximately the same as the temperature coefficient of the ordinary thermal decomposition.

### Astronomical Topics

**Astronomical Notes for November.**—Venus and Jupiter are conspicuous morning stars. Venus is now more than a unit from the earth, but three quarters of the disc is illuminated. Mars is also a morning star, near Regulus on November 10; but it is still too distant for useful observation. Uranus is well placed for observation in Pisces, and is observable nearly all night.

Several occultations of stars by the moon are observable in London. A sixth magnitude star disappears at  $9^h39^m$  P.M. on November 8. The Pleiades are occulted at the end of November 13 and beginning of November 14, but the moon is only 18 hours past full. Disappearances occur at  $10^h30^m$ ,  $10^h53^m$  and  $11^h4^m$  P.M. Re-appearances (at the dark limb) at  $11^h22^m$  (angle  $197^\circ$ ),  $0^h6^m$  (angle  $274^\circ$ ), and  $0^h26^m$  (angle  $241^\circ$ ). Regulus is occulted on the morning of November 21; disappearance  $7^h51^m$  A.M.; re-appearance  $8^h51^m$  (angle  $274^\circ$ ). The angles are measured from north point through east.

A good display of the Leonid meteors is likely to occur this year, but it is impossible to predict what longitudes on earth will be most favoured; the most likely time of maximum is in daylight on November 16, but watch should be kept for two or three nights preceding and following this. The Astronomer Royal has requested the Directors of Kodaikanal and Helwan Observatories to telegraph to the B.B.C. if they see a rich shower. The B.B.C. will broadcast the telegrams if they arrive before the stations close down. The radiant (near Gamma Leonis) does not rise until nearly 11 P.M., so watch need not begin until then. Tempel's comet, associated with these meteors, may also be detected in November; search ephemerides are given in the B.A.A. Handbook for 1932 and (with shorter time intervals) in B.A.A. *Journal*, vol. 42, No. 10. The earth on November 16 is only half a million miles from the comet's orbit.

The minor planet Vesta is in opposition on November 22, and is visible in a binocular, being brighter than mag. 7. An accurate ephemeris is given in

the B.A.A. Handbook for November; the following will probably suffice to find it:—

Nov.	5 <sup>d</sup> 0 <sup>h</sup>	R.A.	N. Decl.
	13	4 14.8 <sup>m</sup>	12° 42'
	21	3 58.8	12 15
	29	3 502.	12 8

Vesta is  $5'$  south of  $\lambda$  Tauri on the evening of November 22. Conveniently observable minima of Algol occur on November 3, 9<sup>h</sup> P.M., November 6, 6<sup>h</sup> P.M., November 23, 11<sup>h</sup> P.M., November 26, 8<sup>h</sup> P.M.

**Radial Velocities of Stars, Nebulae and Clusters.**—Vol. 18 of the Lick Observatory Publications consists of a useful catalogue of radial velocities compiled by Joseph Haines Moore. All the results obtained at the Lick Observatory and at its southern station in Chile are included, also those at eighteen other observatories, systematic corrections being applied to all classes of observations for which their determination is possible. The results of the separate observatories are given for each star, also an adopted value with its estimated probable error. The stellar portion of the catalogue occupies 199 pages with an average of about thirty stars on each. Then follows a short catalogue of velocities of 133 gaseous nebulae; these are all galactic objects except 18 in the Magellanic Clouds. Another list includes the results for 18 globular clusters, mainly obtained by V. M. Slipher at the Lowell Observatory. Finally there are radial velocities for ninety extra-galactic nebulae, mainly obtained at the Lowell Observatory and at Mount Wilson. The spectral shift is expressed as radial velocity, but with a note that this is only done for uniformity with the rest of the catalogue, not asserting that this is its true interpretation. The velocities are nearly all positive; there are the well known exceptions of the Andromeda nebula and its two companions, also M. 33 and N.G.C. 6822. The largest recessional velocity is 19,700 km./sec. for a nebula in Leo, R.A. (1900)  $10^h22.0^m$  N.Decl.  $10^\circ 56'$ .