

Research Items.

RELIGION IN SZECHUAN, CHINA.—No. 1 of vol. 80 of the *Smithsonian Miscellaneous Collections* is a study of Chinese religion in Szechuan Province by Mr. David C. Graham, who points out that this area provides an excellent ground for the study not only of the religious beliefs of the Chinese themselves, but also of those of the aborigines. In the family, which is the social unit, and not the individual, the ancestors are a part, and the most honoured part. The ceremonies of their cult can only be performed by the eldest son. Hence, not only are sons desired, but also every means taken to protect them from harm. The conception of a multiple soul makes it possible to commemorate the dead person at the tablet and the grave, while the soul, or one part of it, may also reside in the underworld. At death every effort is made to entice the soul to return and take up its abode in the ancestral tablet. In the popular religion the conception of *mana* is the primary key to understanding. Demons, the spirits of the dead who for some reason are not at peace, play a large part in the lives of the people and are the cause of all diseases and other calamities. Both gods and charms protect from their influence. The element of luck creates and maintains a belief in a mysterious potency, producing belief in lucky and unlucky days and being responsible for a number of superstitious practices. The organised religion is so arranged as to arouse the feeling of awe and loyalty by its large temples situated on hills, and the imposing character of the great deities with their robes and their retinues of priests and their festivals. This feeling reflects the attitude towards and the practices connected with their one-time temporal rulers. Notwithstanding the spread of democratic ideas, to which anything connected with royalty is abhorrent, this aspect of religion remains unchanged.

THE HAVASUPAI.—In a detailed study of the Havasupai, a small and obscure group of Yuman-speaking Indians living near the Grand Canyon in north central Arizona (*Anthrop. Papers, American Museum Nat. Hist.*, vol. 24, pt. 3), Mr. Leslie Spier points out that much of their old life is still open to observation, social life, religion, art, and—only to a less extent—material culture being practically intact. Yet they have been little studied. They are closely related in speech to the neighbouring Walapai, with whom they intermarry. Members of each tribe commonly live with the other. In 1919 they numbered 177; the limitations of the cultivable area make it improbable that at any time did they number more than three hundred. They are seasonal migrants. In the spring and summer they live in villages along the canyon, cultivating the fields; in winter they live on the plateau in the cedar thickets, existing on the corn saved from the harvest, and seeds and nuts, as well as by hunting. An abundant harvest is marked by wide-spread invitations to Walapai, Hopi, and Navajo to the harvest feast and dance. Marriage is normally monogamous and forbidden between blood-kin. This tie, however, is not recognised beyond the grandparents. The basis of their life is the family; there are no indications of the existence of clans or gentes at any time. The unit family lies within a larger group of family relations—those of the husband's or wife's parents; a grouping based upon the inheritance of land and a temporary matrilineal residence. The larger groupings have been intensified by a shortage of competent marriageable women. Hence men and children have often been compelled to rely upon the services of a female relative. There are six chiefs, of whom one is recognised as head. Men may become chiefs through

inheritance, prestige, or ability. The chieftainship, however, is emphatically not a position, but the embodiment of certain functions. A woman may not become a chief.

THE POISON OF THE STONE FISH.—Various opinions have been expressed as to the situation of the poison glands of the spines of the stone fish (*Synanceja horrida*). Dr. J. V. Duhig and Gwen Jones have summarised the literature, investigated the problem, and carried out experiments on the effects of the poison (*Mem. Queensland Mus.*, vol. 9, part 2, 1928). The poison is secreted in sacs upon the dorsal spine. Venom from a single fish was emulsified in normal saline solution so as to give a dilution of 1 in 10. Of this emulsion 0.1 c.c. injected beneath the skin of a guinea-pig, produced a toxic action on the voluntary and involuntary muscles, so that in the course of an hour respirations became slow and shallow, and all the limbs became paralysed. After 8½ hours the most marked of the symptoms had passed off. As well as producing these, probably neurotoxic reactions, the poison has a lytic action on the red blood cells. Recovery from the gross effects of the venom conveyed some degree of active immunity. The authors give full clinical notes on a case where a man trod on a stone fish, the spine of which penetrated the sole of his foot. They are inclined to attribute a marked respiratory failure of the patient a fortnight later to the effects of the venom.

THE FLOCK PIGEON OF AUSTRALIA.—Australian ornithologists are exercised by the rapid disappearance of the flock pigeon (*Histriophaps histrionica*), the history of which threatens to repeat that of the American passenger pigeon. During the nineteenth century many observers recorded enormous flocks of these birds even up to two miles in length, and so late as 1901 they were seen in Western Australia in "countless myriads." Since then their numbers have unaccountably dwindled. They are unknown throughout the country where the two miles flock was seen in the 'sixties of last century, and extensive inquiries made by F. L. Berney (*Mem. Queensland Mus.*, vol. 9, part 2; 1928) show that in most places where they were once common they are either absent or are represented by but a few individuals. From Queensland only comes a recent record (February 1928) of considerable numbers, a flock of four or five hundred having appeared in the Flinders River basin. There has undoubtedly been an extraordinary decrease during the past twenty-five years, and this cannot be attributed to the spread of farming or to actual destruction by man. But the flock pigeon, unlike the passenger pigeon, is a ground nesting and ground feeding bird, and we suggest that the cause of the decrease may be looked for in the increase of ground vermin, particularly the small carnivores which have been introduced by earlier settlers. In other lands, and especially in islands, ground nesters have been the first to disappear under the pressure of animals thus introduced.

AMERICAN ROTIFERS.—In continuing their work on American rotifers, H. K. Harring and F. J. Myers ("The Rotifer Fauna of Wisconsin. IV. The Diceranophorinæ." *Transactions of the Wisconsin Academy of Sciences, Arts and Letters*, vol. 23, January 1928) occupy themselves with the large family Notommatidæ. The family is divided into two sub-families, the Notommatinæ, which are plant and detritus feeders, and the Diceranophorinæ, which are carnivorous. So large is the group that the authors state

that they can visit old favourite collecting grounds regularly and still bring back new species. The distribution apparently depends to a large extent on the hydrogen ion concentration of the water, some species living under very acid conditions, others preferring alkaline surroundings; the range of hydrogen ion concentration for individual species, however, appears to be quite narrow. Among the Notommatinae are some green forms belonging to the new genus *Itura*, which shelter symbiotic zoochlorellae and have no gastric glands. The Dieranophorinae have the mastax or pharyngeal mill specialised into forceps for capturing their prey, and the rest of the apparatus is very slender, the various differences being important in classification. Careful figures are given of the whole animal and mastax of more than seventy species, most of which belong to the genus *Dicranophorus*.

SAGITTA FROM THE NORTH SEA AND BALTIC.—A recent issue of "Die Tierwelt der Nord- und Ostsee" (Lieferung XI, Teil VIIIb; Akademische Verlagsgesellschaft m.b.H., Leipzig) contains amongst other groups the Chatognatha by W. Kuhl. There has been much controversy as to the distribution of *Sagitta bipunctata*, which, although still recorded for the North Sea by many workers, is not admitted by the author into the area covered. The policy of Ritter Zahony in restricting the species is strictly followed, and those forms hitherto regarded as *S. bipunctata* are put down to either *S. setosa* or *S. elegans*. Only three species of *Sagitta* are allowed in this work from the North Sea and Baltic, *S. setosa*, *S. elegans* (with the tree forms *elegans*, *arctica*, and *baltica*), and *S. maxima*, together with one species of *Eukrohnia*, *E. hamata*. Thus *Spadella* (*S. cephaloptera*), which is common in the neighbourhood of Plymouth, and probably is to be found in other parts of the Channel near the coast, is not recorded. The Chatognatha occur in enormous numbers in the plankton, and are interesting in their habits, being extraordinarily voracious and feeding on almost any planktonic animals available. As their food includes young fishes, especially the newly hatched herring, *Sagitta* is of practical economic importance as an enemy besides being useful as valuable food for the larger animals. The plankton-eating fishes and many coelenterates, including medusae and ctenophores, devour huge quantities of *Sagitta*, which, as is to be expected, act as intermediate hosts for a variety of parasites duly noted in the present work, the adult hosts usually being fishes which have eaten the *Sagitta*.

METAXENIA IN THE DATE PALM.—The problem of metaxenia (*i.e.* the direct effects of pollen on the parts of the seed and fruit lying outside the embryo and endosperm) has been investigated in the case of the date palm *Phoenix dactylifera* by W. T. Swingle of the U.S. Dept. of Agriculture (*Journal of Heredity*, vol. 19, No. 6). In this particular case, the pollen has been found to exert a direct influence on the size, shape, and colour of the seed, on the size of the fruit, on the speed of development of the fruit, and on the time of ripening of the fruits of the vegetatively propagated female varieties. This direct influence of the male parent is precise and definite, and varies with the particular males used to fertilise the female flowers, each male exerting the same effects on fruits of all varieties and producing the same result in different years. Metaxenia, unlike xenia, cannot be explained by hereditary elements or chromosomes brought in by the pollen, as no such chromosomes occur in the tissues that show the direct effect of the pollen parent. Swingle thinks that the simplest and most probable theory is that the

embryo or endosperm or both secrete "hormones or soluble substances analogous to them," which diffuse out into the tissues of the mother plant that constitute part of the seed and fruit, and exert on these tissues a specific effect varying according to the particular male parent used. Evidence is adduced to show that the embryo and endosperm of the date show remarkable chemical activities during their development, and interact to some extent on each other, and probably on the near-by tissues of the seed and the surrounding ovary walls that constitute the fruit. In support of his theory Swingle mentions the 'growth stuff' found at the very tip of the coleoptile in germinating grasses according to Boysen-Jensen and Paál, and also describes some recent work on similar lines by F. W. Went.

Fossil Mollusca from the Galapagos Islands.—Some of the scientific results obtained by the expedition from the California Academy of Sciences to the Galapagos Islands in 1905-6 are now, after much delay, seeing light. One of the most important was the discovery by Mr. Ochsner of fossiliferous strata where hitherto only volcanic rocks were supposed to exist. A brief preliminary note on these by Dr. W. H. Dall was published in 1924 (*Geol. Mag.*, Oct. 1924), and now, both Dr. Dall and Mr. Ochsner having died early in 1927, the final preparation of their manuscript has been undertaken by Dr. G. Dallas Hanna (*Proc. Calif. Acad. Sci.*, Ser. IV, vol. 17). The deposits contain marine shells, and occur on three of the islands. That on Albemarle Island is believed to be of Pleistocene age; those on Indefatigable and Seymour Islands are thought to be of Pliocene age. From Albemarle 48 species were collected, of which 32 are still living in the Panamic fauna. On Indefatigable Island 68 species were found, of which 27 are still living and 23 apparently new, while Seymour Island yielded 9 species, of which two are living and 5 appear to be new. The characteristics of these fossils are typically American, but while most of the species belong to groups now represented in the Panamic fauna, there are a few which recall forms existing only on the Antillean side, and quite a number which belong rather to the subdivision of the Panamic fauna present in the Gulf of California, than to the warmer waters of the Gulf of Panama. The possible inference is that the Galapagos fossils were living in seas somewhat cooler than those at present surrounding the islands. Sketch maps of the islands, showing the localities of the deposits, with check lists of the fossils and full descriptions of the new species drawn up by Dr. Dall are given. Five plates from photographs taken by Dr. Hanna illustrate the paper, while portraits of the two authors are appended.

STRUCTURE CONTOUR MAPS OF OILPOOLS.—Those whose technical interests compel constant reference to such bulletins of the United States Geological Survey as are devoted to oilfield development can never fail to be impressed with the clarity and excellence of the structure contour maps provided, and with their real value in aiding visualisation of the attitude of underground oilpools. In Great Britain, the structure contour map is by no means as prominent in geological publications as it might be, though there are notable exceptions, especially in the coalfield regions. The usual criticisms levelled at American structure maps are that they tend to be geometrical and rather artificial, being, in fact, generalisations of supposed structures based on restricted well-data, hence often only true at certain precise points. This element of uncertainty is not in itself a vitiation of the data portrayed, nor reason for

passing over with scanty glance these interesting supplements to the literature. American oil geology, especially where it concerns the mid-continent and Rocky Mountain regions, lends itself directly to representation by means of structure contour maps, largely owing to the comparatively simple nature of the structures involved. One has only to mention such examples as the Cushing Oilfield, Oklahoma (*Bulletin* 658) and the Midway-Sunset field, California (*Prof. Paper* No. 116), to give point to these remarks, while the small publication on the oil and gas prospects of North Eastern Colorado (*Bulletin* 796-B), recently issued, contains one such map (plate 17), which, however artificial it may or may not be, serves to illustrate structural types and renders detailed perusal of the text unnecessary: this in itself may often be sufficient reason for blessing an organisation which possesses both knowledgeable enterprise and financial backing to publish periodically such useful contributions to science.

FIRE-DAMP EXPLOSIONS.—Safety in Mines Research Board Paper No. 42 (H.M.S.O. 6d. net) entitled "Firedamp Explosions. The Projection of Flame," by M. J. Burgess, is a continuation of a previous paper (No. 27). This recorded laboratory experiments, the conclusions of which have now been confirmed by tests on the experimental gallery 7½ ft. in diameter, installed at the Board's research station at Buxton. It was shown that even with a weak mixture containing 6.3 per cent only of methane, the flame produced on its explosion was projected 60 ft. into the pure air of the gallery, or more than twice the length of the column of gas mixture exploded. With richer mixtures the flame was projected further, the maximum being 4.5 times the length of the column of mixture containing 10.5 per cent of methane. When constrictions were left between the gas mixture and the air, the effects were more destructive. The results show that the flame of a firedamp explosion may be projected a considerable distance beyond the confines of the original mixture.

THE STRUCTURE OF FORMALDEHYDE.—A very complete description of the formaldehyde molecule is given by Prof. V. Henri and S. A. Schou in the issue of the *Zeitschrift für Physik* for July 26 (pp. 774-826), the data being obtained by applying the usual methods of analysis of molecular spectra to the absorption bands of the vapour in the ultra-violet. The molecule is Y-shaped, with the carbon atom at its centre, and the two hydrogen atoms placed symmetrically on opposite sides of the produced oxygen-carbon axis, its principal dimensions being H-H, 1.4 Å.; C-O, 1.1 Å.; and C-H, 1.3 Å. It has two sets of vibration frequencies, corresponding to the natural frequencies of carbon monoxide and hydrogen, whilst since the observed electronic transitions are triple, there are probably four molecular valence electrons present, and the fundamental term is 3^3P . Numerous other relations have also been found amongst the energy levels of formaldehyde itself, and between these and the levels of other atoms and molecules, but probably the most important consequence of the discussion of these is the prediction and discovery of a new absorption band of carbon monoxide near 2060 Å. which is related to the Cameron emission bands. An incidental point of some interest which has emerged in connexion with the properties of formaldehyde in solution is that its absorption spectrum in hexane is similar to that of the vapour, whilst that in water is of a totally different character.

SOLUTIONS IN PURE ACETIC ACID.—Some preliminary experiments on the solubilities and chemical reactions of salts in pure acetic acid are described by A. W. Davidson in the *Journal of the American Chemical Society* for July. The results so far obtained show that many salts, such as calcium chloride or barium iodide, are readily soluble in acetic acid, and that double decomposition reactions take place as readily in this solvent as in water. Thus, silver chloride is precipitated from a solution of silver nitrate in acetic acid by the addition of sodium chloride. In some cases, however, the course of the reaction was found to be less familiar; for example, the addition of a drop of anhydrous sulphuric acid to the solution of any inorganic salt in acetic acid causes the precipitation of the corresponding sulphate. Even the sulphates of the alkali metals behave in this way, and sulphates, such as cupric sulphate, which normally form hydrates, separate in the anhydrous form even when some water is present. It is interesting to note that sulphates are also insoluble in liquid ammonia. The behaviour of many acetates in acetic acid closely resembles that of the corresponding hydroxides in water.

STRUCTURE OF MERCERISED CELLULOSE.—Mercerised cellulose gives a diffraction pattern with X-rays which is somewhat different from that of untreated cellulose, and from an examination of X-ray data obtained from mercerised ramie fibres, O. L. Sponsler and W. H. Dore have developed a space lattice for this material. Their paper, which appeared in the *Journal of the American Chemical Society* for July, also contains suggestions as to the probable mechanism of mercerisation. Untreated ramie cellulose appears to be built up of parallel chains of glucose units running lengthwise in the fibre, and the action of sodium hydroxide seems to cause a lateral shift of these chains in the wall of the fibre together with a partial rotation of the alternate glucose units in each chain. The hydroxyl group attached to each sixth carbon atom also appears to change its position. Sponsler and Dore conclude that mercerisation is not a progressive change dependent upon the concentration of the alkali solution as suggested by Herzog, but they consider that there is a critical concentration (about 13 per cent for sodium hydroxide) below which a permanent change does not occur. Their results also tend to support the view that the units of cellulose are connected in chains by primary rather than by secondary valence linkages.

PURE PHOSPHORUS TRIOXIDE.—The *Journal of the Chemical Society* for July contains an account by Christina C. Miller on the preparation and properties of pure phosphorus trioxide. Many attempts have been made to connect the glow of ordinary phosphorus trioxide with that of phosphorus, but it now appears that the luminescence of the oxide is due to the presence of dissolved phosphorus. The latter may be removed by low temperature recrystallisations followed by exposure to light and subsequent separation from the red product by volatilisation. The pure trioxide is a transparent, crystalline solid free from the waxy, opaque appearance of the impure substance, and melting at 23.8°, whereas the oxide prepared in the usual way melts at 22.4°. The pure substance neither glows nor oxidises in moist or dry oxygen, but when heated to 200° in a sealed tube with dry oxygen at 300 mm. pressure, a faint glow was observed. It dissolves phosphorus in small quantities and then regains all the properties generally ascribed to it.