

## Research Items.

RELIGIOUS BELIEFS IN THE SIMLA HILLS.—Mr. H. A. Rose has communicated to the June and July issues of the *Indian Antiquary* a number of legends of the *deotas* or godlings of the Simla Hills, collected mostly from the district of Khumharsain by Pandit Sukh Chain. The legends cover seven families or groups, and in most cases give an account of the origin of the godling and its cult. In a number the serpent appears. Kot Ishwar, for example, who originated in the temple of Durga at Hat Koti and had been imprisoned by the magic of the Brahmans on account of his oppression of the people, in order that he might be thrown into the river, escaped and troubled the people in the form of a serpent, sucking milk from the cows. The same story of taking the milk from the cows in the form of a serpent is told of the *deota* Marech of Malindi. Kalú, the eldest of five brothers and a hermit, when he died became a snake living on Tikkar Hill who devoured men. He could draw people into his mouth from afar by his breath. Others of the godlings had a fondness for human flesh, and demanded human sacrifice. Dithú's favourite meal was a woman's breast, of which he ate one every day. He was arrested on the order of Kot Ishwar, and not released until he had sworn not to touch human flesh again.

SCULPTURED STONES FROM GORGONA, SOUTH AMERICA.—In *Man* for July, Mr. Hornell continues his account of the archaic sculptured rocks found on the island of Gorgona by the *St. George* Expedition. On a second group of rocks the incised figures were very numerous, but greatly worn. The central boulder of the group is thickly set with small cups from an inch to an inch and a half in diameter, and half an inch in depth. At the ends are the figures of a frog and a bird, and on one side is a triangular axe lashed to a haft. On a ridged stone near by is a rude human face and a complicated, but symmetric, design of superimposed groovings. These designs appear to have been cut with stone implements, and a number of such implements have been found together with fragments of pottery. Embedded in the beach were numerous fragments of large stone troughs. One of four boulders with relatively modern engravings showed a head with a peculiar form of tailed cap which points to an Indian, possibly Inca, origin. Later investigations, on a second visit, suggest that the stones described in the previous communication were the sacred place of the island, while the second is probably secular. Two settlement sites were dug and showed that the inhabitants probably lived in pile-dwellings.

GEOLOGY OF THE TAUNGS STRATA.—It will be remembered that the limestone block from which Prof. R. Dart chiselled out the fossil skull of *Australopithecus africanus* was brought to him by his colleague, Dr. R. B. Young, professor of geology in the University of the Witwatersrand, Johannesburg. On April 20 last Dr. Young read a paper to the Geological Society of South Africa on the cliff-limestone at Buxton, seven miles to the south-west of Taungs, from which the famous fossil was quarried in November 1924. From this paper (*Trans. Geol. Soc. S. Africa*, 1925, vol. 28, pp. 55-67) we learn that the cliff-limestone at Buxton was deposited at the eastern edge of the Kaap plateau by streams and springs issuing from the dolomitic limestone of that plateau. Dr. Young found that calcareous deposits were still being formed at various points along the eastern escarpment, and although he refuses to hazard an opinion as to the geological age of the cliff-limestone

exposed in the quarry at Buxton, it is clear that he does not think it can be older than the Pliocene and may be later. In this recent limestone deposit numerous and extensive caves and passages formed, many of them communicating by fissures with the surface of the plateau. The caves, when exposed on the face of the quarry at Buxton, were found to be filled by bedded sands, similar in texture to those of the Kalahari. Dr. Young sums up his opinion regarding the antiquity of *Australopithecus* in a concluding paragraph thus: "This conclusion applies to the skull of *Australopithecus*. The position in the quarry face from which it came . . . was a few feet to the left of the body of loose sand already described in detail. The limestone in which it was embedded was full of reddish sand and, as previously shown, probably formed part of the filling of an underground passage in the limestone. The loose sand had all the appearance of being water deposited, and possibly the skull was washed in from the surface. I may mention that the latter event seemed to me the more probable when, above the limestone cliff at Thoming, I came on an isolated, complete, and partly cleaned skull of a baboon which had obviously been removed along by surface water and might easily be washed into any opening in the rock." Dr. Young also found that baboons still frequent caves along the eastern escarpment of the Kaap plateau.

THE LAVALA WEED IN INDIA.—The Lavalá weed, *Cyperus rotundus*, probably reduces the crop yield in many fertile districts in India by 25 to 30 per cent., and in view of the great loss thus incurred S. B. Ranade (*Mem. Dept. Agric., India*, 13, No. 5) has fully investigated the life history of the plant with the view of ascertaining its most vulnerable points and the best means of effective eradication. Enormous quantities of "seeds" (calculated at fifty-four million per acre) are produced throughout the year, particularly in July and October, and prevention of flowering is therefore of paramount importance. Lavalá is of geophilous habit, and establishes a subterranean tuber system as soon as the first aerial shoots have appeared, but not before. Consequently, if germinating seeds or tubers can be prevented from putting up aerial shoots, by means of judicious cultivation and weeding, it is possible to prevent fresh colonies from being formed. Established colonies in badly infested land penetrate three feet deep in the soil, and though repeated removal of the aerial parts at short intervals will eventually exhaust the tubers, the process is very slow. Experiments indicate the value of bringing the tubers to the surface by deep ploughing, as tubers exposed on the surface of the soil in hot weather, or not deeper than three inches deep in dry soil, are killed in eight days. The use of certain smother crops is also successful, sann hemp distinctly reducing the numbers of tubers in the soil, though other methods of covering were less useful. The best practical method of treatment seems to be continuous hot weather cultivation, in order to expose as many tubers as possible to the air, followed by a thick green manure crop ploughed in early, and again succeeded by a second dry season's continuous cultivation. Once clear, no difficulty should be experienced in keeping the land clean from further infection. The article includes details of many laboratory experiments yielding much information with regard to the propagation of *Cyperus* by tubers and on the effect of spraying with various chemicals.

HYDROGEN-ION CONCENTRATION AND CELL DIFFERENTIATION IN PLANTS.—Dr. H. Pfeiffer of Bremen pub-

lishes a long and very interesting paper (in German) in vol. 24, No. 2, of the *New Phytologist*, in which he records his observations upon the relation between the  $P_n$  of the developing tissue and the process of differentiation; his data being obtained from studies of the secondary phloem of the dicotyledon. He has studied the crystallisation of calcium oxalate from solutions of different  $P_n$  and points out that the monoclinic crystals (raphides) are deposited at low (acid)  $P_n$  values, whilst the tetragonal (sphaeraphides) or amorphous forms are deposited from neutral or alkaline solutions. Pfeiffer then employs indicators upon plant sections, and concludes that this factor of  $P_n$  is probably of importance in determining the form of the crystalline deposit laid down in the living cells of the secondary phloem and cortex. Dr. Pfeiffer further shows that thin-walled cells appear to be associated with a low  $P_n$  of the tissue during development, whilst in tissues that are more alkaline during development thick cellulose deposits are the rule.

INDIAN AMPULLARIIDÆ.—In 1920 the Zoological Survey of India, then under the Directorship of the late Dr. T. N. Annandale, began a series of small monographs on the genera of the freshwater gastropod Mollusca of the Indian Empire as a basis for the accurate determination of those species, if any, that acted as the intermediate hosts of internal parasites inimical to man. The latest, and in some respects best, of these is a "Revision of the Indian Ampullariidæ," by Dr. B. Prasad (Mem. Indian Mus., 8, No. 2). The author, who accepts Dall's classification for the family published in 1904, recognises two genera as being present in India—*Pila* of Bolten, to which belong the common forms found in the plains, and *Turbinicola* of Annandale and Prasad, embracing the hill-stream species. Nine species of the former, including *P. robsoni*, n.sp., and two of the latter are carefully and adequately described almost entirely from the conchological aspect, and for the first time in the series a properly worked out synonymy is prefixed to each, thus greatly enhancing the value of the work. The three plates of shells prepared from untouched photographs by the artists of the Survey well deserve the commendation bestowed upon them by the author.

GEOCHEMICAL DATA.—Those interested in the study of rocks and minerals, more especially in relation to geochemical processes, will welcome the recently published fifth edition of Dr. F. W. Clarke's "Data of Geochemistry" (Bull. 770, U.S. Geol. Surv., 1924). The first edition of this very useful bulletin was published in 1908, being followed by later editions in 1911, 1916, and 1920. The work has been revised for the present edition, which, with its 841 pages, has ten more than the previous one. The author does not pretend that the book is an exhaustive monograph on geochemistry. He modestly claims that it presents to the reader a critical summary of what is now known about this subject, and serves as a guide to the more important literature. He gives little attention to merely speculative matters, preferring, in accordance with the title of the book, to set out the available data. These relate not only to rocks and rock-minerals, but also to coal, petroleum, and metallic ores. Chapters are given to the chemical elements, the atmosphere, lake and river waters, ocean waters, well and spring waters, saline residues, volcanic gases and magmas. The book is a model of accuracy and terseness. Probably none of the other publications of the United States Geological Survey has attained such a wide and well-deserved popularity among students of chemical

mineralogy and geology. It is already so well known that it seems almost superfluous to recommend it to any one interested in the data of geochemistry.

THE ORIGIN OF THE RYDBERG SERIES.—In *Die Naturwissenschaften* of July 3, Prof. A. Landé of Tübingen raises the question, "Why do the chemical elements fall into periods of 2, 8, 8, 18, 18, 32?" A novel answer is given to this question, since by taking into account the four series of quantum numbers ( $n, K, J, m$ ) indicated by the analysis of spectra, it appears that the total number of options is 2, 8, 18 and 32 for the cases in which  $n=1, 2, 3$  and 4. There is therefore only one electron for each option, and no two electrons need be assigned the same series of four quantum-numbers, even in the case of the more complex atoms. This classification of orbits is, however, different from that which was in vogue a year or two earlier, and depends on assigning to  $K$  the quantum numbers  $\frac{1}{2}, \frac{3}{2}, \frac{5}{2}$ , etc., instead of the integers which were used at an earlier stage.

MONOMOLECULAR FILMS ON WATER.—A paper on this subject, by W. D. Harkins and E. H. Grafton, appears in the May issue of the *Journal of the American Chemical Society*. The areas occupied in films by the molecules of various hydroxy-derivatives of benzene were determined by surface tension measurements of their solutions. The results indicate that while phenol, pyrocatechol, resorcinol and pyrogallol give "condensed" films (*i.e.* films of low compressibility), these films are nevertheless not "closely packed." All the substances investigated give expanded or "gaseous" films at lower concentrations of the solutions. It is probable that the hydroxyl group turns towards the water, while the phenyl group is on edge or on end above it. With *o*-hydroquinol, however, both hydroxyl groups are immersed in the water, while the phenylene group remains on the surface.

TESTING RADIO-TRANSMITTING ANTENNÆ.—A serious difficulty in connexion with experimental research on the best shape of the antennæ used in radio communication is that in practice the radiating systems used are very elaborate and costly. Once these systems are erected their heavy initial cost makes it imperative that they be operated commercially as soon as possible, and very little time is available for scientific investigations. The research bulletin issued last May by the University of Illinois dealing with the question as to whether the action of antennæ can be investigated by means of models is therefore a timely one. The author, Mr. J. Tykociner, adopts two theorems proved by Max Abraham about thirty years ago. They are that if we have two geometrically similar oscillators, their natural periods are proportional to the lengths of their respective segments, and they also have equal logarithmic decrements. The assumption is made that the ohmic resistance of the conductors is zero; the decrement is supposed to be due, therefore, to the radiation resistance. A proof is given that the radiation resistance of a model antenna is approximately equal to that of the original antenna. The smaller the model, therefore, the higher becomes its fundamental frequency as compared with that of the real antenna. Full instructions are given for making model antennæ. It is shown that the working characteristics of full-sized antennæ can be predicted with a maximum inaccuracy of about one per cent. by this method. Exceedingly short waves are used in the experiments, their wavelengths being less than 10 metres. They do not disturb, therefore, commercial radio traffic, and the errors due to the interference of commercial radio stations are negligibly small.