

Research Items.

FESTIVALS OF THE HOS OF KOLHAN.—Mr. D. N. Majumdar describes in the *Journal and Proceedings of the Asiatic Society of Bengal*, N.S., vol. 23, No. 3, the seven important worship festivals of the Hos which take place at different seasons of the year. It is noteworthy that in certain feudatory states in Orissa, where the Hos live in close association with the Oriya-speaking peoples, while the latter take part in the festivals of the Hos, they are not allowed to take part in their dances, when men and women mingle freely, as intermarriage is not allowed. The festivals are not held at fixed dates, but depend upon economic conditions. When the granaries are full and the Hos are free from other engagements, the priest fixes a day for a festival, each village deciding for itself, so that any given celebration may extend over as much as two months, when the whole area of Kolhan is taken into account. The principal festival is the Maghe, which is held in January and February. Its meaning is obscure, but it seems to be connected with fertility. All villagers, even if working in remote districts, must return to take part. It entails five days of ritual observances, with *pujas* and sacrifices to the village deity. On the first day the sacrifice is connected with the cattle, on the second rice-beer is offered by the priest and his wife. The third day is purificatory, in preparation for the marriage festival of the fourth day, which is the main function of the celebration. On this day the priest is escorted to take a ceremonial bath. He then sacrifices a cock and hen. A second hen, which is offered to the god, is not sacrificed by the priest, but is stoned to death by the villagers. In the dance which follows obscene songs are sung and obscene practices observed for the purpose of increasing the procreative power of the tribe. On the fifth day the expulsion of spirits takes place, when the villagers arm themselves with sticks, four or five feet long, and hunt the spirits throughout the village with invocations which are unintelligible even to themselves.

EARLY PERSIAN ZOOLOGY.—The earliest exposition of Persian zoology is contained in a compendium of science, the "Nuzhatu-i-Qulub," written by Mustaufi about A.D. 1340. One of the few extant zoological treatises of the Islamic East, apparently the only one the primary object of which was scientific rather than literary or philological, its chapters are of much interest as illustrating the level of zoological knowledge at the time, and indicating the sources from which that knowledge sprung. In a learned treatise upon the subject (*Isis*, vol. 11, December 1928), Dr. John Stephenson traces the influences which are apparent in Mustaufi's zoology, gives examples of the treatment of real and fabulous zoology, of the bearing of the work upon medicine, and of the surgical uses of animals and their several parts. In an interesting comparison with European zoological works of the same period, he points out striking resemblances with the zoological text-book of Christianity in medieval times, the "Physiologus," and, since direct borrowing may be ruled out of the question, he regards these similarities as due to the descent of tradition from a common source. The general level of knowledge is much the same as that displayed by the thirteenth-century English Franciscan, Bartholomew de Glanvilla, who borrowed from the "Physiologus," and, like the Persian author, had his mythical creations, mermaids, fauns, and satyrs, as well as more realistic monsters, such as the omocentaur, offspring of the bull and the ass.

EVOLUTION OF HUMAN TOOLS.—An unusual study in human evolution has been made by Mildred Fairchild and Dr. Hornell Hart (*Scientific Monthly*, January 1929), in which they trace in a general way the development of cutting tools from the earliest chipped flints to the machines of the present day. The existence of such tools from the early stages of man's development affords the longest and most complete series of data available for the estimation of man's cultural progress. The tools present five variables upon which efficiency depends: (1) keenness and durability of the cutting edge, (2) differentiation and specialisation, (3) effectiveness of mechanisms employed to apply the blade to the materials to be cut, (4) utilisation of auxiliary power, and (5) mastery displayed in the technique of manufacture. Reducing these elements of efficiency to a numerical basis, and combining all in a graph of progress, the authors produce a curve which, showing little rise over a long period, makes a sudden and rapidly increasing ascent during the past 8000 years. Whereas in earliest times thousands of years indicated the unit of progress, now each decade or each year shows swift advancement. The more and more rapid acquisition of new elements is not due to our lack of knowledge of early portions of the series; the increasing speed of invention is an unmistakable feature of the series itself.

BIRDS OF INNER LONDON.—Much has been written about the birds of London, and the lists published by the committee in charge of the bird sanctuaries in the Royal Parks furnish useful notes on fluctuations of species from year to year. But no attempt has hitherto been made to compile a complete list of the birds which have been seen in Inner London as a whole. The area selected by A. Holte Macpherson for his interesting article on the subject (*British Birds*, March 1929) extends 2½ miles due north and south of Charing Cross and 4 miles due east and west of that point. Within this district the author is able to record a list of 126 species, of which 21 breed regularly, 8 others have been known to breed during the present century, and the remainder are visitors, 20 of which may be regarded as regular and 77 as putting in only an occasional appearance. Perhaps the most striking feature of the list is the variety of ducks and waders recorded. The occurrence of such as whimbrel, common and jack snipe, and woodcock, and of gadwall, scaup, and scoter, suggests that the mud-banks of the Thames at low water may yet reveal further additions to the list, now that so satisfactory a basis has been laid for future observations.

NEW AQUATIC RODENT FROM AFRICA.—Until the expedition organised by the Field Museum and the *Chicago Daily News* returned from its explorations in Abyssinia, only one aquatic rodent was known from Africa, namely, *Dasymys*. Now a second murine rodent, with rather pronounced aquatic modifications, has been found in a small mountain stream near the source of the Blue Nile. Its adaptations more closely resemble those of aquatic rodents in other parts of the world than of *Dasymys*, and since it shows no special affinities to the latter, the two African 'water-rats' probably had independent origins. For this outstanding form Wilfred H. Osgood has created a new genus and species, *Nilopegamys plumbeus* (*Field Mus. Nat. Hist.*, Publication 250, November 1928). Its particular adaptations for aquatic life are mainly in the character of the fur, the reduction of the external ears and the enlargement of the hind feet;

and in these respects it is reminiscent of the South American *Ichthyomys*, to which also it bears some resemblance in its skull. But the skull is not greatly modified and the suggestion made is that the new 'water-rat' may have been derived at no very remote period from one of the common types widely distributed in central Africa.

GRAFTING EXPERIMENTS IN TWO-DAY CHICKS.—P. D. F. Murray (*Aust. Jour. Exp. Biol.*, vol. 5, part 4, Dec. 1928) has made chorio-allantoic grafts of lateral pieces of two-day chicks, taken from the region forming the posterior limb by making an anterior transverse cut posterior to the hindmost somite then formed, a posterior cut in front of the anterior end of the primitive streak, a longitudinal median cut lateral to the vertebral plate. The grafts show cartilaginous structures interpreted as attempts at limb-formation, and it is concluded that no essential influence is exerted by the somites on the development of limbs, and the author adduces reasons for the view that if the limb rudiment at two days could be completely isolated self-differentiation would occur, that is, the rudiment of the hind limb is already determined at this stage. The nervous system exerts no essential influence on the development of the limbs of the chick. In three cases the endodermal and splanchnopleural components of the grafts have given rise to short pieces of intestine with epithelium, corium, circular and longitudinal muscle layers, hence small pieces of the region of the alimentary tract are able to develop in the absence of the other regions of the tract.

INTESTINAL MUSCLE OF THE CRANE FLY.—S. Maziarski (*Bull. Int. Acad. Polonaise Sc. Lettres*, 7 B; 1928) has investigated the histology of the muscle of the alimentary tract of several species of *Tipula* (crane fly). Opinions as to the nature of the muscular elements—whether they are smooth or striated—have been contradictory, but the author states that undoubtedly all the muscular elements of the intestine are in the category of striped muscle. All the contractile elements and their ramifications by which they anastomose exhibit a characteristic longitudinal and transverse striation, the longitudinal due to the myofibrillæ in the sarcoplasm. The elongate muscular elements, each with a single nucleus and a sarcolemma sheath, exhibit numerous ramifications either terminal or lateral, some short and others apparently composed of a single myofibril, which anastomose directly with neighbouring fibres to form a network. The anastomosis always takes place at the level of the membrane of Krause, which confirms the view already expressed by many other histologists that this is distinct from the contractile substance and represents a more plastic and more resistant supporting material. The intimate relations between the fibres (cells) suggest that the contractile elements have lost their individuality and form a muscular syncytium.

COTTON.—The reports received from experiment stations during 1927–28 have been issued by the Empire Cotton Growing Corporation in a bulky volume of some 270 pages, plus photographs, diagrams, etc. This lengthy document is preceded by a very valuable, concise summary of its contents by Dr. J. C. Willis. Dr. Willis points out the inevitable difficulty of the field experimenter in that his rainfall practically always departs from the average (and the same may be said of every measurable climatic factor), and thus in the twenty climatic records from ten cotton experiment stations in the last two seasons, five may be classed as good years, ten medium, and five bad. Some experiment stations are probably situated in climates which are not well suited for existing varieties

of cotton, and here, as at Fiji, where the weather is probably unusually wet for cotton, something may be done by hybridisation and selection to produce a new variety more suitable to the climate. In South Africa, the immediate problem has been the production of a variety showing resistance to the jassid pest, and remarkable progress appears to have been made with the selection and multiplication of suitably resistant strains. These strains, developed at the Barberton Station, seem likely also to be successful in Rhodesia. In Queensland good progress seems to have been made in dealing with the pink boll-worm, whilst in Fiji it is very interesting to learn that the boll-worm pest is apparently kept in check by its parasitic enemies. Boll-shedding before the crop is mature is often a great source of trouble with cotton, and in Uganda definite progress seems to have been made with the breeding of varieties with lower rates of boll shedding. All who are interested in any phase of the field study of the cotton plant, its growth, the control of its parasitic enemies, the breeding of new strains, etc., will find the Report of interest and value. It is published by the Empire Cotton Growing Corporation, Millbank House, Millbank, London, S.W.1.

GLADIOLUS.—The wide range of species of *Gladiolus* in South Africa is illustrated to some extent in the beautiful coloured plates accompanying the article by Mrs. Bolus on this genus in the *Journal of the Botanical Society of South Africa*, part 14, 1928. In the notes on p. 3 of the same journal, attention is directed to the horticultural possibilities that are suggested by experiments in hybridisation with some of this species. Thus at present there are no scented and no blue forms among the *Gladiolus* hybrids under cultivation, whilst amongst the South African species blue-flowered ones occur and some of the wild species have a powerful and delicious fragrance. Such hybridisation experiments would seem very suitable work to be carried out at the National Botanic Gardens, Kirstenbosch, but unfortunately the income of the Gardens does not permit the possession of any scientific or technical staff whatever, so that such experiments in the Gardens could only be carried out to the detriment of other work. In the same number of the journal, Mr. J. W. Mathews, curator of the Gardens, contributes some notes on the cultivation of the native South African gladioli.

NEW PROJECTION FOR WORLD MAPS.—In the *Geographical Journal* for March, Mr. S. W. Baggs describes a new equal-area projection that should be useful in statistical maps. It is an equal-area projection which is an arithmetical mean between the sinusoidal equal-area projection of Sanson and the elliptical equal-area projection of Mollweide. Inequality in linear scales near the equator is scarcely noticeable, and the same is true between latitudes of, say, 60° and 75°. This feature is an improvement on Mollweide. Angular distortion is less than in Sanson in latitudes below 62°; above 68° or thereabout the angular distortion is less than in Mollweide. The author describes it as a 'eumorphic equal area projection.' He points out that this projection, like those of Sanson and Mollweide, having straight parallels and converging meridians, lends itself to 'interrupted' construction in gores or lobes which much enhances its value for distributional maps.

EARTH MOVEMENTS IN CALIFORNIA.—The United States Coast and Geodetic Survey is continuing its researches into earth movements in the western United States by comparing the position of stations as determined by old and new triangulation. In *Special Publication* No. 151, Dr. W. Bowie discusses the results

of recent work in California. The comparison is generally between determinations made prior to 1900 and those made between 1922 and 1925. Many stations show no movement. The greatest movements have occurred close to the fault line of the earthquake of 1906. Stations more than twenty miles from the fault were affected but only slightly. The differences are small and seldom exceed one metre. The trend of the changes is to the south-eastward, on the east of the fault where they are most noticeable. Dr. Bowie suggests that investigations of this nature should in the future be done by means of short arcs of triangulation extending across the fault line or zone to a distance of about twenty-five miles on both sides. The accuracy can be made great enough to detect movements of about one-tenth of a foot in a mile. He prefers this method to that of measurements between monuments placed across the fault zone in a straight line. This plan involves the difficulty of measuring with tapes over broken ground.

INDIAN JURASSIC AMMONITES.—The third part of Dr. L. F. Spath's "Revision of the Jurassic Cephalopod Fauna of Kachh (Cutch)" (*Palæont. Indica*, N.S., vol. 9, mem. 2, pp. 163-278, plates 20-47, 1928) deals with the super-family Stephanoceratidæ, represented by about 500 specimens. This is divided into five families: the Macrocephalidæ with 7 genera; the Eucycloceratidæ with 4 genera; the Pachyceratidæ with 2 genera; the Mayaitidæ with 5 genera; and the Reineckeidæ with 6 genera.

JAPANESE PALÆONTOLOGY.—The rich fauna of the Lower Tertiary of the island of Kyûshû, Japan, has been described by T. Nagao (*Sci. Rep. Tôhoku Imp. Univ. Sendai*, ser. 2, Geol. 12, 1, 1928, pp. 11-140, plates i-xvii). It consists mainly of lamellibranchs and gasteropods, but some foraminifera, echinoids, nautiloids, crabs, and fishes are also found. Three horizons are recognised. The lowest is regarded as Ypresian or Lutetian in age; the middle as Upper Eocene; the upper as Oligocene. In the same publication (pp. 141-152, plates xviii-xxiii) H. Yabe and S. Toyama give an account of the rock-forming algæ from the Jurassic and Cretaceous deposits of Japan. Some of the species are referred to genera found in England (*Girvanella*, *Solenopora*): others belong to new genera.

VACUUM TECHNIQUE.—Several attempts have been made to find a substitute for mercury for use in high-vacuum pumps, but they have not hitherto met with any conspicuous success; metals other than mercury have undesirable properties, and it had been thought that organic substances were too liable to decomposition to be of use. C. R. Burch, of the Metropolitan-Vickers Company, states, however, in the issue of the *Proceedings of the Royal Society* for Mar. 6, that it is possible to run a condensation pump satisfactorily with some of the fractions obtained in the vacuum distillation of petroleum jelly, when both the speed of pumping and the degree of vacuum reached compare favourably with those obtained when mercury is employed. The petroleum products have the additional advantage that their vapour pressures are decidedly less than that of mercury at room temperatures. The author has also isolated a number of greases, the vapour pressure of which is less than a microbar at 300° C., which should be extremely valuable for the lubrication of ground joints in vacuum apparatus which does not require to be heated.

STARK EFFECT.—Prof. Stark's discovery of an electrical analogue of the Zeeman magnetic effect for spectral lines, although less widely applied in spec-

trum analysis, has recently become of importance in connexion with the wave-mechanics. The distribution of intensities in the Stark patterns for the Balmer series of atomic hydrogen has been predicted by Schrödinger, and experiments to test his theory have now been made by J. S. Foster and L. Chalk (*Proceedings of the Royal Society*, Mar. 6), and by H. Mark and R. Wierl (*Zeitschrift für Physik*, Feb. 25). Dr. Foster has made use of the natural electric fields in the cathode dark space of a discharge tube, and finds distributions of intensities which agree with those predicted by theory. The other investigation was made upon the light emitted from a beam of positive rays passing through an auxiliary electric field, and the agreement between theory and experiment is less good. The origin of these discrepancies is not clear, but it may be, as H. Mark and R. Wierl suggest, that the experimental conditions employed do not conform completely with those contemplated in the theoretical analysis. Dr. Foster has contributed a second paper, on the Stark effect in neon, to the same issue of the *Proceedings*, which also contains a paper by J. K. L. MacDonald on the Stark effect for some lines in the violet part of the secondary spectrum of hydrogen.

COMBUSTION OF CARBON MONOXIDE.—Prof. W. A. Bone's experiments on the combustion of dry mixtures of carbon monoxide and oxygen have been subjected to a certain amount of criticism on the grounds that inadequate precautions had been taken to remove occluded hydrogen from the platinum electrodes between which the igniting spark was passed. These objections appear to have been met satisfactorily in the reply which he has published in the issue of the *Proceedings of the Royal Society* for Mar. 6, and some new experiments which are described there, in which the drying was, if possible, even more drastic than before, confirm his earlier result that the intensively dried mixture can be induced to react if only sufficient energy is supplied to initiate the explosion wave. Prof. Bone and his collaborators consider that the limit of intensive drying by phosphorus pentoxide is reached in about six months in small glass vessels such as those they have employed. The energy required to start the explosion seems to depend both upon the nature of the electrodes used and upon the composition of the detonating mixture, but the numbers which are mentioned in this paper are all in the neighbourhood of one joule.

ACTION OF ACETYLENE ON SELENIUM.—Only very few accounts of experiments on the direct action of non-metallic elements on organic compounds have as yet appeared in chemical literature. The formation of thiophthen, $C_6H_4S_2$, by the interaction of acetylene and molten sulphur was observed by Capelle and confirmed by Oechsner de Coninck (1908), whereas, according to Meyer and Jacobson's "Lehrbuch," Sandmeyer established the formation of thiophen under such conditions. In the *Rendiconti* of the Naples Academy of Physical and Mathematical Sciences for September-December 1927 (just received), Mazza and Solazzo give the results of an investigation on the action of acetylene on selenium. Passage of the pure, dry gas over selenium heated to 250°-300° C. yields an oily product, which may be resolved by fractional distillation into two compounds: (1) Selenophen, C_6H_4Se , b.pt. 113°-114°, which is identical with the product obtained by Foà in 1909 by the action of phosphorus selenide on sodium succinate; (2) a new compound, selenonaphthen, C_8H_6Se , m.pt. 53°-54°, b.pt. 207°-209°, which is the selenium analogue of thionaphthen and has an intensely nauseous odour. This compound crystallises well and forms a golden-yellow, crystalline, slightly soluble picrate.