

## Research Items.

**AFRICAN HOE CULTURE.**—Dr. Hermann Baumann publishes in *Africa* for July a contribution to the study of primitive economics in the form of an analysis of the division of work according to sex in the use of the hoe in African methods of cultivation. It was for long held that the exclusive use of hoe culture by women was proof that agriculture and the settled life were the invention of the woman, who thereby acquired legal and social ascendancy, while man only took part in the tilling of the soil with the introduction of the plough. Now, however, a higher form of hoe culture is recognised in which the man takes a part. It is still associated with matriarchy, but operates in the larger family. In Africa there are two large groups of hoe cultivators. One in the Sudan, Central East Africa, and the highlands of Angola, shows men's work to a greater or less extent, with intensive cultivation; the other, mainly on the west coast, with branches extending to the east coast, in which, except for clearing the ground, the work is left exclusively to the women, and the cultivation is non-intensive. In nearly all cases where cultivation is by men and intensive, it is associated with the older form of patriarchy, the older kinds of African grains are used, government is associated with the ownership of farms, and inheritance is the right of the elder brothers. Cultivation by both sexes, with a preponderance of male labour, is characterised by the fact that the men who mainly grow grain still retain in their processes of hoe culture much of the older root cultivation methods of the women. The rough work, digging, making beds and mounds, is the work of the men; weeding is done by the men when the hoe is exclusively the man's tool. In sowing, the man makes the hole for the seed, the woman puts it in, while at harvest the men dig up the roots, and the women carry or cart the corn. Each sex has its special crop. The evidence from Africa thus tends to confirm the theory that the culture of root crops associated with female labour is the most ancient, and that female labour is associated with matriarchy.

**SLAB-BUILT GRAVES IN THE MALAY PENINSULA.**—A grave built of granite slabs, with which three carnelian beads were associated, was found in Perak in 1895. A subsequent examination by Mr. H. C. Robinson produced a cross-hatched stone bark-cloth beater, some fragments of bronze, pottery, and an iron tool. Three additional graves of this type discovered at Sungkai in 1927 have been excavated by Mr. I. H. N. Evans, who publishes a report on them in vol. 12, pt. 5, of the *Journal of the Federated Malay States Museums*. In their essentials the graves are comparable to the dolmen, though outside these cists the only megalithic monuments discovered in the Peninsula are those at Pengkalan Kempas, Negri Sembilan. No human remains have been found, and it is not, therefore, possible to arrive at any conclusions as to the race by whom they were constructed, except that they are the work of a race, possibly of tinworkers, who occupied at least part of the peninsula. The graves are of considerable size, three metres in length or just under, and as no granite occurs nearby, their use must have involved considerable labour. The iron tools which were in use were of a peculiar type, some having very small sockets for the insertion of a handle in the same plane as the blade. Stone quoits, though not found in the graves, were probably contemporaneous with the cross-hatched cloth-beaters. A number of bronze implements were also found. Pottery was rough in type and handmade. Patterns were not common; but both inside

and out, the pottery was covered with some glaze-producing material. On the authority of Dr. P. V. van Stein Callenfels, it is stated that cists and graves of the dolmen type are not uncommon in Java, extending from the neolithic to the iron age.

**TOBACCO SMOKING IN GREAT BRITAIN.**—The smoking habits of the people of Great Britain have undergone considerable changes during the past two decades, according to a report of the Imperial Economic Committee (Ninth Report, Tobacco, Cmd. 3168. London: H.M. Stationery Office). There has been a considerable increase in the consumption of tobacco, which has risen from 2.4 lb. *per caput* in 1914 to 3.4 lb. in 1927. The increased consumption would appear to be due "to the extension of the cigarette habit and to smoking on the part of women." Only in a few countries is the average consumption greater than in Great Britain (Belgium 6.6 lb. a head, U.S.A. 6.02 lb., and Germany 4 lb.). Another interesting feature has been the change over from pipes to cigarettes. In 1907 only 24 per cent of the tobacco consumed in Britain was smoked in the form of cigarettes, but by 1924 the percentage had risen to 58. There has been a marked increase in the demand for Empire tobacco, and considerable improvements in its quality have been effected. In 1924 the Empire supplied only 3.3 per cent of the leaf tobacco imported into Britain, but by 1927 the figure had risen to 18.4 per cent. It is estimated that 37 per cent of the pipe tobacco consumed in the United Kingdom consisted of Empire leaf, but that only 1 per cent of cigarette tobacco was Empire grown. The greatest field for expansion in Empire tobacco marketing is therefore in cigarette tobaccos. It is essential, however, that attention should be paid to type and quality. Distinctive types of tobacco tend to retain their aroma even under marked changes of environment, and to that extent flavour may be regarded as heritable. Nevertheless, the soil and climatic peculiarities have a great influence. Efforts should be made to adapt the flavour of Empire tobaccos to the established taste of the public, and for this purpose the Committee recommends research into the nature of aroma.

**EFFECT OF DROUGHT UPON BIRD LIFE.**—The long-continued and disastrous drought experienced by central-western Queensland during the past few years has had notable repercussions upon bird-life. During the past three years the total rainfall has been 17½ inches, whereas a forty years' average would indicate 4 feet. Consequently insects, seeds, and berries have been scarce, and birds have suffered from lack of food. Some of the results described by F. L. Berney (*Mem. Queensland Mus.*, vol. 9, pt. 2, 1928) are unexpected. For example, it was discovered that all birds ceased to nest: "from the middle of February 1925 to the latter part of June 1926, a matter of nearly seventeen months, I saw absolutely no evidence of any bird nesting. Even the Corvidæ, birds that one would think would rather revel in hard times with so many dead animals about, were not nesting, but that is perhaps to their credit, indicating that they require not carrion but a variety of insects on which to rear their nestlings," a suggestion which indicates either remarkable instinct or foresight on the part of the crows. Following upon two inches of rain in May 1926, the author noted about a dozen nests belonging to seven species of birds. The high fencing of the country added to the distress, for it prevented the possibility of the migration of emus to more favourable

localities, so that on many holdings these fine birds have been exterminated. The bird population has thus been seriously affected not only by actual deaths, but also by the absence of potential broods.

**A NEW AQUARIUM MICROSCOPE.**—With the view of observing aquatic microscopic organisms under conditions approaching as nearly as possible to their natural surroundings, Mr. D. J. Scourfield has devised a new type of aquarium microscope (*Jour. R. Micr. Soc.*, June 1928). At the lower end of the body tube of this instrument is a water-tight casing, containing a right-angled prism, to which is attached another casing also containing a right-angled prism, and this second casing serves as the carrier of the low- and medium-power water immersion objectives employed. The combinations of movements possible with the two casings, together with the raising and lowering of the tube and the traverses in two directions in a horizontal plane, enable the objectives to be turned in any direction in the aquarium. Mr. Scourfield points out the probable interest of observations from below or from the side on organisms which make use of the surface film.

**SUBTERRANEAN CRUSTACEA.**—This formed the subject of the presidential address to the Quekett Microscopical Club (*Jour. Q.M.C.*, vol. 16, 1928) by Dr. W. T. Calman. He urged the amateur microscopist to be on the watch for well-shrimps and other subterranean crustacea, for the amateur who is content to wait but is able to take advantage of the opportunity when it arrives, may obtain results which the professional worker sighs for in vain. The well-shrimps, *Niphargus*, seem to be confined to the southern counties of England, but the common species, *Niphargus aquilex*, occurs as far north as Norfolk. It is not clear how many species of *Niphargus* occur in England, nor has their distribution been exactly ascertained. No subterranean isopod has hitherto been recorded in England, but about two years ago Miss Lucas found in a well at Ringwood, in the New Forest, a blind isopod, *Asellus cavaticus*, which is known from several localities on the Continent.

**DIPTERA FROM THE MALAY PENINSULA.**—Flies of the sub-order Nematocera other than mosquitoes have hitherto been almost entirely neglected by collectors in the Malay Peninsula. In the *Journal of the Federated Malay States Museums*, vol. 14, part 1, 1928, Mr. F. W. Edwards contributes a lengthy paper on the Malayan Nematocera, which serves to give an idea of some of the genera and species that occur in that region. The material which he studied had recently been acquired by the Malay States Museums and was submitted by the late Director of that institution. At least half the species of all the families, other than mosquitoes, appear to be new to science, and were almost all collected by Mr. H. M. Pendlebury, entomologist on the staff of the museum. Among the fungus gnats, or Mycetophilidæ, only a single species was previously recorded from this region, and in the present paper 59 are recorded, 45 of which belong to the subfamily Sciarinæ, which is evidently strongly represented. The mosquitoes are tolerably well known and number 198 species, which is almost the same total as that recorded from the Indian Empire with Ceylon. There are, however, very evident differences in the Malayan and Indian mosquitoes, and less than seventy of the Malayan forms have been found in the Indian region, whereas nearly all the known Bornean mosquitoes also occur in Malaya. The Crane flies, or Tipulidæ, are also abundantly represented, and the 160 species in the present collection bring the total known forms to 175. As with the mosquitoes, the crane flies exhibit a much stronger

facies with those of Borneo, Java, and Sumatra, than with the Indian forms. The Chironomidæ or midges are not included in this paper, while certain of the gall-midges or Cecidomyidæ have already been described by Mr. H. F. Barnes (*Jour. F.M.S. Mus.*, vol. 13; 1927).

**EFFECT OF SULPHURIC ACID ON COTTON SEEDS.**—The process of treating cotton seeds with sulphuric acid for the purpose of delinting has involved a number of questions, including the effect of the treatment on germination and the sterilising effects on the seeds. Prof. V. H. Blackman undertook to investigate the treatment for the Cotton Growing Corporation, and his report is published in a recent issue of the *Empire Cotton Growing Review* (vol. 5, No. 3). The germinating power of seeds soaked in concentrated sulphuric acid and in dilute acid has been compared with that of controls soaked in water only, and the results are based on the examination of 11,000 seeds. After treatment for 20 to 30 minutes in strong acid, there was no clear evidence of definite increase or decrease in germinating capacity and no evidence of any injurious action. In the case of both the acid-treated seeds and the controls, germination was as complete after four days as after six. With acid treatment there was, however, earlier germination, the second-day results being higher after acid treatment. An exposure to strong acid for so long a period as six hours had no injurious effect on the sample tested, and complete delinting was attained in four hours. The method of wetting the seeds thoroughly with weak acid and then allowing them to dry, thus concentrating the acid remaining on the seeds, was found to be unsatisfactory. The seeds were not delinted, besides suffering a serious reduction in their germinating capacity. It seemed possible that if treatment with strong acid had any detrimental effect on the viability of seeds, it might be due to rise in temperature associated with the treatment. The rise in temperature when the acid comes in contact with the small quantity of water in the seed coat was, however, found to be slight. It is suggested that during the process of washing, local heating of individual seeds may occur as the result of combination of water with acid absorbed by the seeds.

**LAND SHELLS OF THE GALAPAGOS ISLANDS.**—Numerous collections have from time to time been made of the land shells of the Galapagos Islands, and a record of these was given by Dr. Dall in his admirable paper on "Insular Landshell Faunas" (*Proc. Acad. Nat. Sci. Philad.*, 1896), but the most extensive collection yet appears to have been that made during the expedition sent out by the California Academy of Sciences in 1905-6. Owing to delay in publication some preliminary descriptions of the new species were issued by Dr. Dall in 1917 (*Proc. Calif. Acad. Sci.*, Ser. IV, vol. 2). The complete report, however, by Dr. Dall and W. H. Ochsner (both, alas, no longer with us) has now appeared and forms a most valuable communication (*Proc. Calif. Acad. Sci.*, Ser. IV, vol. 17). The authors give a summary of the environmental conditions and the habits of the land shells, followed by a scheme of the groups or sections, some of them new, of the Bulimuli, as well as a check list and insular distribution of all the known Galapagos land shells, totalling 78, in alphabetical order. The remainder of the paper is devoted to the descriptions of 59 of these, mostly belonging to the genus *Bulimulus* and none of them new, whilst the more important are figured on two good photo plates. The whole is a noteworthy contribution to the fauna in question and likely long to remain a standard work of reference.

**ORGANIC CONSTITUENTS OF OIL SHALES AND RELATED ROCKS.**—The latest contribution to this theme comes from Miss Jennie Livingstone of the University of Colorado, published in vol. 16, No. 2, of the *Studies* of that institution. Her work covers microscopical investigations and chemical experiments, reinforced with the usual sketch of shale industrial history and a résumé of the researches of different international workers. The photomicrographs are, however, very good, and the drawings of Green River shale and Kentucky cannel, especially the sporangium covering in the former, are reproduced in colour and are accordingly most instructive. The results of the work support the general theory of organic origin of oil shales, differing specifically in the nature of the original vegetable matter entombed in the sediments, and in the subsequent modifications which such matter has undergone. The environment of accumulation is pictured as swamp, marsh, or lagoon, and bacterial action is indicated by the predominance of humic material in most of the thin sections examined. Further, specific types of organic constituents probably control the nature of the distillates furnished by various types of oil shale, hence recognition and differentiation of such constituents might be expected to form the best basis of philosophical classification of these pyrobituminous rocks. This is, as a matter of fact, so far as most current researches get, but it is the next step which is the most difficult of all. It is not enough to arrive at a classification which, after all, is merely an aid to description; what we would like to know is the mechanism of the complex change whereby the organic matter is converted into 'kerogen,' exactly what principal factors control the destiny of that 'kerogen' when subjected to destructive distillation, and precisely why it is that different ranges of products are produced not only according to the varied shales used but also in response to different conditions of distillation.

**THE DAILY VARIATION OF TERRESTRIAL MAGNETISM.**—The July issue of the *Physical Review* contains a paper by Mr. Ross Gunn, of the Naval Research Laboratory of the United States, in which it is pointed out that the properties of the conducting layer of the atmosphere are not such as to lead to the large electric currents originally suggested by Balfour Stewart and utilised by Schuster and by Chapman in their examinations of the origin of the daily variation of terrestrial magnetism. Mr. Gunn shows that at the altitude of this conducting layer, where the free paths of the ions and electrons are long, the conductivity is anisotropic and is zero in the direction of the impressed electric field, and the resulting currents in the direction of the field are small. The ions and electrons move spirally about the lines of the magnetic field and produce a diamagnetic region in the higher atmosphere facing the sun, the effect of which is shown to be of the order of the observed diurnal variation. The semi-diurnal and lunar variations and the existence of disturbed days are also explained in a general way by the new theory.

**HISTORY OF THE DYNAMO.**—In connexion with the fiftieth anniversary of the "world's first tests of the dynamo," interesting reminiscences are given in the *Journal of the Franklin Institute* for July by C. F. Brush, the inventor of the arc light dynamo, and Elihu Thomson. Brush relates how he first tested his dynamo in a sawmill, using a team of horses to get the required power. He excited his dynamo with a single battery, and he relates his joy when the machine suddenly began to develop electric power and the horses were nearly brought to a stop. It is interesting to remember that even in those days Deschanel's "Natural Philosophy" was regarded as a standard

authority on electricity. In 1880 the Brush system of electric lighting was exploited in Great Britain and throughout Europe, a factory being equipped in London. The unit of electric current was then called the 'weber.' It was not until the International Conference in Paris in 1881 that the 'ampere' was officially adopted. In the early days, Brush made all the requisite working drawings himself, and also all his special testing appliances. It was a 'one man' laboratory. He wrote all his own patent specifications and tested and personally adjusted all his lamps and dynamos. Elihu Thomson carried out the tests on dynamo machines for the Franklin Institute in 1878. The lack of instruments made it necessary to improvise all kinds of methods of making measurements. He relates that the Committee of the Senate in 1900 which advised the establishment of the Bureau of Standards at Washington, took into consideration papers by Lord Kelvin and Prof. Snyder in arriving at their decision. So far back as 1881, Elihu Thomson had observed curious high frequency phenomena, and in 1889 he constructed a high frequency alternator.

**THE PHOSPHORESCENT COMBUSTION OF SULPHUR.**—At a temperature just below the ignition point, which varies with conditions from 285° to 325°, the oxidation of sulphur is accompanied by a bluish-white luminescence so long as heat is supplied. The reaction taking place at this point has been investigated by H. J. Emeléus with a view to search for any oxide of sulphur more volatile than sulphur dioxide, and his results are given in the *Journal of the Chemical Society* for July. The reaction products were condensed by cooling with liquid air and then carefully fractionated. No evidence of the formation of sulphur monoxide was obtained, and it was concluded that the reaction during the phosphorescent combustion of sulphur is the same as that in the normal flame. The formation of ozone in the glow, reported by Bloch, could not be detected. The slow luminous oxidation of sulphur appears to be a gas reaction and is sensitive to the presence of sulphur dioxide and various organic vapours. It is suggested that inhibition of the phosphorescence is the cause of the rise in the ignition point of sulphur produced by the presence of these substances.

**CATALYSIS BY WATER.**—During the course of an investigation of the fluorescence of mercury vapour, which is described in the issue of the *Philosophical Magazine* for August (p. 271), Prof. R. W. Wood and Dr. Gaviola have been able to show the precise part played by water in a chemical reaction catalysed by it. The reaction in question was the photochemical formation of mercury oxide from its elements at low pressure, under the influence of the ultra-violet light from a mercury arc. In the presence of a trace of water vapour, this proceeded with such rapidity that it could probably have been used to measure the rate of evaporation of mercury from a liquid surface, but when water was absent the oxidation did not occur. Nitrogen acted in the same way as water, but was less efficient. Simultaneously, water or nitrogen was found to change a large number of the optically excited mercury atoms from the  $2^3P_1$  state into the metastable  $2^3P_0$  state, in which they would accumulate. The conclusion reached was that for oxidation to take place, the mercury had to be excited to this particular metastable level, and that the energy of the metastable atoms was probably the real catalyser of the reaction. The method used by the authors to detect the presence of mercury atoms in their various states was characteristically neat, consisting in an interferometric examination of the appropriate lines from a mercury arc for reversal of their cores after passage through the reaction vessel.