

Research Items

Military Organization in Swaziland

In a study of the military organization of the Swazi (*Africa*, 10, 1, 2), Hilda Beemer points out that the one service which the military organization is no longer allowed to perform is the key to its former importance and present impotence. Inter-tribal warfare has been suppressed, and for the purpose of war against the European its weapons are out of date. Wars were waged to extend the boundaries, to retain tribal independence, and to secure internal solidarity. At times it was a competition instituted by the warriors to show their courage, loyalty and strength. The prize was glory and booty, more especially cattle. The young bloods would boast to the king, asking to be allowed to show that they were better than such and such a regiment, who would then ask permission of the king to be allowed to show their prowess against an outside enemy. An enemy rich in cattle would be chosen, and the tribal war-doctor would doctor the regiments to bring them home alive and 'wipe out' the terror of taking life. This was a national and not a personal rite; and the individual soldier would often arm himself with powerful medicine purchased from private doctors. The king himself never went to war but while the regiments were away he, with the national war doctor, worked out destructive magic against the enemy, and in this way also fortified his own subjects. The old war magic was in the hands of a special clan who were forbidden to use it for private individuals or for civil strife between two sections of the Swazi. The tribal ancestors were always considered to be present in spirit, giving courage to the men and ennobling their aim. Spoil brought back was distributed by the king according to group and individual achievement. A certain number of cattle was always set aside for national use in the cattle posts of the king, while every man who killed an enemy was entitled to a decoration for bravery.

Clowns in Hopi Ceremonial Dances

DR. ELSIE CLEWS PARSON has edited the voluminous journals kept by Alexander M. Stephen, who from 1881 until the early 'nineties, when he died, was in touch with the Hopi of Arizona, and assisted J. W. Fewkes by his intimate knowledge of Hopi ceremonial and custom in the studies which the latter published with the Bureau of Ethnology (*Columbia Univ. Contrib. Anthropol.*, 23, Pts. 1-2). Stephen was admitted to three societies, the Flute, the Lalakon and the Snake, and he lived in several households, both Hopi and Tewa, on the Mesa top. His journals contain much detail unpublished even in the parts incorporated by Fewkes. Little attention is given to material culture (though an exception is his account of pigments, and their relation to sexual attribution and the cardinal points), and his observations deal mainly with the seasonal festivals, of which he took detailed notes while they were being performed. Owing to the changes which have since taken place and the reticence of the Hopi, which even Stephen found a hindrance, the material is especially valuable. One of the remarkable features which Stephen observed is the puzzling ceremonial of the clowns. Of this he gives a graphic description. On First Mesa

there are four clown types, of which the Ta'chukti, like the Koye'mshi, wear masks with knobs and carry a fawn skin bag. They wear the black dress of a woman as breech-clout, and mask and body are painted with pinkish clay. They sing Zuñi songs, pretend to talk Zuñi and even make Zuñi prayer sticks. Their origin myth is a Koye'mshi brother-sister incest story, their play obscene or phallic, and their games are those of the Koye'mshi. They are sprinkled with meal as sacred figures and rain-making is an attribute of their eponymous spirit. They have no fixed chieftainship or organization. The Chürkü'-wimkya wear a wig and are painted yellow with red stripes across their faces. They initiate in an ash house, an outline in ash made in the dance court. The initiation is for temporary membership only, and seems to be part of their play. The ash house appears in the clown ritual elsewhere.

Nemertea and Crinoidea of the John Murray Expedition

NUMBERS 3 and 4 of the "Scientific Reports of the John Murray Expedition 1933-34" (British Museum (Natural History), 4; 1936) contain the Nemertea by J. F. C. Wheeler and the Crinoidea by Austin H. Clark. Only two specimens of nemerteans were collected by the Expedition, a littoral form taken with the dredge in shallow water off the Arabian coast which proved to be *Amphiporus reticulatus* Bürger, previously only known from the Bay of Naples; and a pelagic form sorted from the plankton taken in the Indian Ocean, representing a new genus and species which is described in the report under the name of *Nannonemertes indica*. This new nemertean is referred to the family Pelagonemertidae, Mosley. The crinoids form an important addition to our knowledge of the fauna of the Indian Ocean, as they were very imperfectly known in this region, the sixteen species recorded enabling the author to supplement the information already available and to describe one new genus and five new species. An annotated list of all crinoids at present known from the seas west of Ceylon and the west coast of India is given and the crinoid fauna of the Indian Ocean and the Red and Arabian Seas is discussed. Many interesting points arise and for the first time it has been possible to describe, "with the probability of a reasonable degree of accuracy", the faunal relationships of the different portions of the Indian Ocean.

The Asteroid Nervous System

To Johannes Müller (1850) we owe the first recognition of the asteroid nervous system. As a result of subsequent work, it is widely taught that it is composed of three parts, a sensory ectoneural system, a hyponeural system (Lange's nerve) and an apical system, the two latter being motor in function and of mesodermal origin. The whole problem of this system has been re-investigated by J. E. Smith (*Phil. Trans. Roy. Soc.*, B, 227, 1937). The work was mainly based on *Marthasterias glacialis*, but six other species were also studied. It is suggested that a more useful division would be into sensory and motor systems. There is a general ectodermal sensory system with concentrations in the radial nerves and the circumoral ring found in all classes. The ring,

however, is absent in Crinoids, which have a well-developed apical sensory system not homologous with the apical nerve of Asteroids, which is motor. The ectodermal system communicates with the motor system through the interspaces of the boundary zone of connective tissue. The hyponeural (motor) system is also a constant feature but the extent and position of its development are related to the type of motor activity of the animal. Thus in Echinoids, where a test prevents movement of the body wall, the radial hyponeural nerve is absent.

Fowl-Pox and its Transmission

FOWL-POX is a virus disease which attacks chicken, pigeons, geese, turkeys and other birds, and causes considerable loss to the poultry farmer. It appears as cheesy diphtheritic membranes in the mouth, and as warty growths on the comb, wattles and mucous membrane of the mouth and eyelid. In the past, it was supposed that these various lesions were caused by different agents, but R. L. Kaura and S. G. Iyer confirm the present view that all are due to a single filter-passing virus (*Indian J. Vet. Sci. and Animal Husbandry*, 6, Pt. iv, 313; 1936). They find that diphtheritic lesions from the mouth produce the fowl-pox lesions on the skin, and that the Indian strain of virus is immunologically indistinguishable from the English Weybridge strain. A. L. Brody has studied the transmission of the disease (Cornell Univ. Agric. Expt. Station, Memoir 195. Ithaca, N.Y., 1936). Direct contact is one certain method by which fowl-pox is spread within a flock, and contaminated inanimate objects may possibly do so as the virus on them remains alive for at least six weeks. Mosquitoes, such as *Aedes aegypti*, may also transmit the contagion by intermittent feeding. Inoculation of the bodies of mites (*L. sylviarum*) four days after their last association with diseased birds produced pox, but mites after feeding on diseased, and then on healthy, birds did not cause pox.

Pruning the Tea Plant

J. R. TUBBS (*J. Pom. and Hort. Sci.*, 14 (4), 317; 1937) has estimated that the young shoots of the tea plant (*Camellia Thea*), of which the majority of leaves are normally harvested almost as fast as they grow, have produced at the time of harvesting only half the amount of carbohydrate used up in their development. The consequent continual depletion of the reserves of the bush frequently causes die-back of branches, followed by fungal attack and the death of the whole bush. An investigation on plantations at 200 ft., 1,500 ft. and 4,600 ft. above sea-level showed that die-back was more common at the lower elevations, and smaller amounts of reserve carbohydrate were found in the roots. Several methods of pruning were tried, and it was found that by allowing a number of branches to retain their foliage, a method designated 'lung-pruning', the drain on carbohydrate was checked and the incidence of die-back reduced.

Euchromocentre Type of Nucleus and Feulgen's Stain

It is now commonly recognized that plant nuclei are usually either of the large chromosome type giving a chromatin 'reticulum' in the resting stage or of the small chromosome type in which, in the resting stage, the small amount of chromatin is present in the form of euchromocentres lying peripherally to a

large central region containing the single large nucleolus. G. Yamaha and S. Suematsu (*Sci. Rep. Tokyo Bunrika Daigaku*, 3, Section B; 1936) have examined many species of Cucurbitaceous plants, which with *Impatiens* and *Ricinus* have the latter type of nucleus, and have followed the behaviour of the constituent parts of the nucleus to Feulgen's stain through the nuclear cycle. During prophase, in addition to the euchromocentres, the nucleolus and nuclear sap also stain faintly with Feulgen. At metaphase-anaphase the chromosomes are fully chromatic, but the nucleolus, which persists to this time, and the nuclear sap no longer stain. After the formation of the nuclear membrane at the completion of telophase, a clump of irregular granules, often in connexion with the disappearing chromosomes, appears and afterwards this clump rounds off to form the typical nucleolus of the resting stage. There seems strong evidence in this case that material responsible for the Feulgen reaction is, at least in part, transferred from nucleolus and sap to chromosomes during prophase and from chromosomes to the sap and a new nucleolus at telophase.

Air-Mass Analysis

At a meeting of the Royal Meteorological Society held on April 21 a paper was read by E. W. Hewson on the application of wet-bulb potential temperature to air-mass analysis, particularly in regard to the rainfall that is to be expected to result ultimately from the ascent of air in the warm sectors of depressions with various vertical distributions of wet-bulb potential temperature. Wet-bulb potential temperature was introduced sixteen years ago by Normand as a simple function of the temperature and humidity that will remain constant during any adiabatic or pseudo-adiabatic process, the name being derived by analogy with ordinary potential temperature—the temperature that any sample of air will take up when its pressure is brought adiabatically at a standard pressure. It was shown that the potential instability in a column of air is determined by the vertical distribution of potential wet-bulb temperature, and that a mass of damp air may become unstable merely by being lifted to a greater height above the ground, the condition for this being that the wet-bulb potential temperature shall decrease with height. Evidence in support of the ideas put forward is furnished by a table of data referring to a number of depressions with warm-sectors for which aerological soundings are available, and by a diagram in which the maximum rainfall in 12 hours is plotted in each case against the sum of all the decreases of wet-bulb potential temperature in the different layers through which this quantity showed a steady decrease with height. The two quantities were seen to be highly correlated, but the author emphasized that the diagram is not suitable for forecasting rainfall for the whole of a depression, but only for regions bordering the trajectory followed by the air during the 24 hours immediately after the aerological sounding which furnished the computed rainfall.

Radio Fading and Solar Eruptions

THE relation observed between the fading of high-frequency radio signals and solar eruptions is the subject of a News Service Bulletin by Dr. R. S. Richardson issued by the Carnegie Institution of Washington. The work is connected with the observations of Dr. J. H. Dellinger of the National Bureau

of Standards that, between July 1934 and June 1936, thirty-nine fade-outs of radio transmissions have coincided so closely with observations of bright solar eruptions as to suggest the probability of a relationship between the two phenomena. Fifteen eruptions were photographed at the Mount Wilson Observatory of the Carnegie Institution and are described in the bulletin, which is illustrated by reproductions of spectroheliograms of the sun. From his earlier observations, Dr. Dellinger noted that the complete fading of the high-frequency radio signals occurred at intervals of 54 days, but this simple law does not appear to have been maintained since about July 1936. In co-operation with Dr. Dellinger, special hydrogen spectroheliograms have been taken at Mount Wilson with automatic apparatus, and these have been studied in conjunction with the radio records. In five cases, the time when the eruption was first seen agrees to a minute or less with the time at which the fade-out began. In six cases, the eruption preceded the fade-out by from two to twelve minutes; while in no case is a fade-out known definitely to have preceded an eruption. If continued observation confirms the relationship between eruptions and fade-outs, it would appear that the cause of the fading travels from the sun to the earth with the velocity of light; but further investigation is required to explain why some eruptions produce fading while others do not.

Deterioration of Paper

Technical Bulletin No. 541, November 1936, of the United States Department of Agriculture, Washington, D.C., deals with the "Deterioration of Book and Record Papers" and is written by T. O. Jarrell, J. M. Hawkins and F. P. Veitch. It appears to be the general opinion of librarians that much of the paper of books and records on their shelves, especially that made since about 1860, is not sufficiently durable. This conclusion applies especially in the case of books and papers subject to frequent handling. Thirty-eight samples of paper taken from old books, magazines and court records, ranging in age from 19 to 169 years, were examined. The results seem to indicate that paper actually absorbs from the air harmful quantities of acidic sulphur compounds with which the air is generally polluted. The absorption is greater in the portions of the leaves more fully exposed to the atmosphere, and this is one reason why the leaves of old books become more brittle near the outside edges. Seven samples of commercial bond and ledger papers, made in 1914 and 1915, were tested after storing under normal conditions for eighteen years. They were examined after five years and again after eighteen years storage. After eighteen years, the folding endurance of these papers had decreased 23-93 per cent and the bursting strength 0-18 per cent. In general, papers with the higher acidity, as indicated by the pH of their water extract, suffered the greatest deterioration. The results are indicative that a water extract with a pH of less than 5 is a major factor in the deterioration of even the best classes of paper.

Integrating Electricity Meters

THERE is now a great demand for prepayment meters for use among consumers who do not wish to pay a quarterly account. In a progress report on integrating electricity meters by Mr. G. F. Shotter, which is published in the February number of the

Journal of the Institution of Electrical Engineers, various novel types of prepayment meters are described. One of these makes provision for arrears of payment which mount up owing to the consumer not inserting sufficient coins to cover the continuous collection of a fixed charge. The meter has a dial which when the consumer has inserted sufficient coins indicates by black figures the amount the consumer has overpaid, the word 'credit' in black appearing on the dial. When he has underpaid, 'credit' in black changes to 'arrears' in red, the figures automatically changing to their opposite sequence and appearing in red. Another possible difficulty due to his supply being cut off owing to arrears mounting up in his absence or for other reasons is overcome by a special device giving a limited supply for a short time upon the insertion of a coin. The current must be used immediately, as the mechanism allocates a larger proportion of the value of the coin inserted to the repayment of arrears. If the current is not so used, the balance of the value of the coin is transferred by the operation of a small motor to the paying off of further arrears. Manufacturers are also supplying prepayment meters which may be changed from D.C. meters to A.C. meters by merely changing the meter element. This type of meter would be useful and advantageous to undertakings which are supplying at present on D.C. but look forward later on to supplying some or all of their consumers with A.C. from the Grid.

Theory of Age-Hardening

RESEARCHES on the copper-aluminium alloys have resulted in the view being put forward that two kinds of hardening occur during their ageing, one of which relates to those changes which take place prior to precipitation, whilst the other is connected with the precipitation of the CuAl_2 itself. It has also been suggested that a concentration of copper atoms occurs at certain definite positions in the aluminium lattice prior to a copper-rich phase being thrown out of solution. It is not easy, however, to explain all the facts on the basis of existing theories, and Dr. M. L. V. Gaylor (Institute of Metals, March 1937) now proposes a modification which is believed to cover the known facts more adequately. Briefly, the new hypothesis suggests that age-hardening takes place in two stages, of which the second overlaps the first. In the initial stage, ageing is considered to be due to the diffusion of the solute atoms to the planes about which precipitation will ultimately take place. This view is in agreement with that of Desch. The next stage, which follows the first directly and takes place nearly simultaneously with it, results in some of the atoms forming molecules with neighbouring atoms of the solvent metal. As these molecular groups increase in size, local stress is set up. When the solid solution can no longer withstand these stresses their release is effected by the rejection of the compound from solid solution, and precipitation proper has taken place. It is believed that precipitation of molecular groupings intermediate between that of the solute and the solvent metal may conceivably take place, and in support of this view intermediate structures between that of CuAl_2 and the aluminium or solid solution have been observed. It follows that age-hardening is now considered as being due not so much to the precipitation itself but rather to the mechanism by which the alloy passes through the metastable to the stable state.