Research Items

Antiquities of the Jumna Valley

AN investigation by Prof. B. Sahni of mounds on the outskirts of the city of Khokra Kot, where their structure has been revealed by ravines cut through by rains, has produced a large number of relics, old bricks, pottery, etc. (*Current Science*, May 1936). A well-defined dark layer exposed in the side of a cliff at three feet below the surface, yielded hundreds of black terra-cotta disks, afterwards identified as moulds for coins. These, as is shown by a Brahmi inscription, must be assigned to the Yaudhiyas and dated at about 100 B.C. Some were found afterwards still to contain coins. The coins are of bronze. On the obverse is a humped bull, looking to the right, with head obliquely pointing to the observer. In front of it is the conventional sign for a tree enclosed within a railing. On the reverse is an elephant, also pointing to the right, in various postures of walking or running, with trunk upraised. In some, the tail is bifurcated. Above is the Brahmi letter *ga* and the *triratna* or *nandipada* symbol. The matrices were either baked over a slow fire of paddy or wheat and barley, or they were packed in them, when the molten metal was poured in. They show impressions of the paddy straw, and charred grains adhere to them in the form of a carbonized crust. A terra-cotta model of a humped bull probably came from the same level. Other relics belong to a distinctly lower, and probably earlier, level. A glazed pot of white paste bears on its inside a clear impression of a finely woven cloth. In this was an ink-like substance, which analysis has shown to consist of carbon (lamp-black) with mineral substances. A shell bead is carved out of the columella of a large gastropod. It is suggested on the ground of the resemblances of these objects in style to antiquities from Mohenjo-daro and Harappa, that there may be in the Jumna valley a tradition of a connexion with the Indus valley civilization, which systematic investigation on this site might confirm.

Antithyrotropic Activity

THE injection of extracts of anterior pituitary causes hyperplasia of the epithelium of the thyroid gland and general symptoms of hyperthyroidism. The effect on the thyroid is not maintained for long, and the symptoms of hyperthyroidism disappear, in spite of the continuance of the injections. Collip and Anderson showed that this disappearance of the effects is due to the appearance of inhibitory antithyrotropic substances in the blood. Rowlands and Parkes (*Proc. Roy. Soc.*, B, **120**, 114; 1936) have studied the properties of this antihormone. Inhibition of the effect of thyrotropic extract on the weight of the thyroid of the immature guinea pig was used as a test of antithyrotropic activity, and a method of assay is described. Normal blood has no action. If thyrotropic extract is injected daily into rabbits, antithyrotropic activity begins to appear after four weeks and reaches a maximum in ten weeks. The results described are in complete agreement with the antihormone theory of Collip and his co-workers. It would be difficult to over-estimate the biological importance of this theory.

Northern Phytoplankton and its Production

DR. E. STUMANN NIELSEN has investigated the general plankton production conditions in the Faroe, Icelandic and East Greenlandic waters proper as well as dealing, although in less detail, with the whole of the northern region of the Gulf Stream and the bordering colder regions (*Meddelelser fra Kommissionen for Danmarks Fiskeri og Havundersøgelser*. Serie: Plankton. **3**, No. 1; 1935). He gives the results during 1932–34, made chiefly with the Danish research ship *Dana*. All the plankton work was done in close co-operation with the hydrographic observations, and in 1934 the transparency of the water was also registered. The phytoplankton production is one of the most important links in the chain of factors leading to the production of great fish populations. On it depend the fisheries of all our seas either directly or indirectly. The conditions of production are of a very diverse character in the different seas around Iceland and the Faroe Islands, the factors that are of importance do not act in the same way everywhere, and it is only when they act together as a harmonious whole that the possibilities of production are optimal. Light and the quantity of nutritive salts are of supreme importance in restricting the plankton production in northern waters, but there depend many other factors which partly work into one another, such as stabilisation of the surface layers and the transparency of the water (including amount of detritus present); temperature and salinity having as a rule only a regulating effect. More exact studies into vertical movements of the volumes of water in the sea are advocated and also systematic investigation regarding the transparency of the sea throughout the year, together with detailed inquiries into the relation between the areas with large production of phytoplankton and those with great fish populations.

Researches on the Sucking Lice

THERE has recently come to hand Part 8 of "Contributions towards a Monograph of the Sucking Lice" by Dr. G. F. Ferris, and published by the Stanford University Press, California. This fascicle forms No. 8 of vol. 2, Stanford University Publications, Biological Series, 1935, and completes the monograph concerned. It deals especially with the lice of man and certain other primates. The author arrives at the conclusion that the genus *Pediculus* contains but three species. The question, so often debated, as to what constitutes a species is of particular interest in connexion with this genus, and the author defines his attitude as regards the problem as definitely as possible. Of the three species recognized, *P. humanus* L. is adopted as the name for the whole assemblage of Pediculi found on the races of man. It seems clear that it can also establish itself upon other primates which have been in contact with man. The validity of the author's conclusions remains to be tested by experimental work upon the various forms that are known to occur. The second species, *P. mjöbergi* Ferris, infests monkeys of the family Cebidæ, and *P. schäffi* Fahrenholz occurs on the chimpanzee. Of the genus *Phthirus*, in addition to *P. pubis* (L.), the existence of a second species, *P. gorillæ* Ewing,

is doubtful, and adults are, as yet, undescribed. The fascicle concludes with an appendix relating to Anoplura dealt with in the earlier parts of the monograph, and an index.

Inhibitors of Tobacco Mosaic Virus

SEVERAL viruses produce local lesions upon the inoculated leaves of certain host plants, and this capacity has been used to test the effects of various inhibiting substances. It has not, however, always been possible to determine whether the inhibitor was acting upon the virus or the host, but Dr. J. Caldwell has evolved an interesting technique to separate these effects ("Factors affecting the Formation of Local Lesions by Tobacco Mosaic Virus", *Proc. Roy. Soc.*, B, **119**, 493–507, March 1936). The earlier part of the paper shows that if the inhibitor acts upon the virus, its effect should increase with decreasing virus concentration, and the reverse effect would indicate inhibitory action upon the host. Experiments with normal sera of horse and rabbit, with trypsin, and with silver nitrate, indicate that all these inhibitors act upon the virus. The mode of action is not yet quite clear, but should form a fascinating subject for future study.

Unity of Force and Matter

THE Masaryk Academy of Work has just published a thesis by Dr. J. Bašta entitled, "L'unité de la force et l'unité de la matière dans la conception physique uniforme du monde", in which the author sets out to show that, mathematically and physically, all matter is composed of what he terms 'proto-atoms'. Experiments are cited to indicate the possibility of reducing the various causes of pressure and acceleration, for example, cohesion, adhesion, chemical affinity, adsorption, vapour pressure, osmotic pressure, gravity, magnetic and electrical attraction and repulsion, etc., to a single force. This force is the cause of strain in static states and of acceleration under dynamic conditions. It is supposed that this simple force is the attraction of the smallest elementary particles of matter (proto-atoms). The range of action of these bodies is limited by the amplitude of their vibrations. The attraction is transmitted only by contact of one particle with its neighbour. All action at a distance is excluded. The primary sources of this elementary attraction are the proto-atoms. Atoms of the chemical elements and also the ultimate particles of cosmic ether represent different complexes of these ultimately simple proto-atoms which, it is postulated, are only able to exercise an influence on primary matter in their own material system or on other systems by their residual lines of force.

Oceanography and Meteorology of China Seas

Koninklijk Nederlandsch Meteorologisch Institut publication No. 115, entitled "Oceanographic and Meteorological Observations in the China Seas and in the Western part of the North Pacific Ocean", is a large atlas in which are set out cartographically the extensive observations collected during many years by Dutch and other ships in East Asiatic waters in a similar form to that of the atlases of the Indian Ocean (Publication No. 104) and of the Atlantic Ocean (No. 110). The text is in Dutch, with an English translation, but the names on the maps are in English only. The work is in accordance with the recommendations of the Fourth Pacific Science Congress of 1929 at Batavia for active international co-operation to develop the practical and scientific aspects of oceanography and meteorology, and for this reason more observations from ships of other nationalities—especially those of Great Britain, the United States, France and Germany—have been used than in the case of the similar earlier Dutch publications. The result is an impressive mass of marine statistics set out in great detail and with admirable clearness, on charts roughly 18 in. × 18 in. It is a bulky publication, which when open occupies a space of 3 feet 6 inches by nearly 2 feet, but by adopting a large size for the charts excessively small lettering has been avoided. For the General Current Circulation 'one degree squares' are used. Each of these contains an arrow showing the average observed resultant current, and figures alongside giving the average speed in nautical miles per day and the number of observations, while the stability of the circulation is shown by the length and thickness of the arrow. Each month is dealt with separately; the information just described is shown on the left hand page at an opening, while on the right hand page the current roses for the same month are given on 'squares' of rather larger size—generally 5° of longitude by 3° of latitude. These roses follow a well-known standard form, the percentage frequency of a given direction of current being shown by a suitable length of line on the scale 1 mm. = 2 per cent, and various ranges of speed are represented by various thicknesses and shadings of line. On the same system of 'squares' the monthly data for the ordinary meteorological elements, wind, fog, precipitation, pressure, air and sea surface temperature are set out, and also the tracks of the more important temperate depressions (here designated continental depressions) and typhoons.

Iron Wire and Nerves

IN the study of complex problems, the construction of a simplified model may serve as an aid to comprehension. It is now eighteen years since R. S. Lillie first directed attention to the similarity between the properties of iron wire immersed in nitric acid and those of living nerves. During these years the phenomenon has been more closely studied, and many more points of similarity have been discovered. A review of the present situation has recently been published (*Biol. Rev.*, **11**, 181; 1936). When the iron wire is placed in nitric acid it is quickly covered with a film of oxide which protects it and makes it 'passive'. If this film is broken, the damaged area becomes anodal and local currents flow which break down a new area of the film, and this in turn 'stimulates' another area and an 'impulse' passes along the wire. When the impulse has passed, the damage is quickly repaired. The model resembles nerve in the fact that it can be stimulated by electric currents, and the laws governing the conditions necessary for excitation are similar. The 'chronaxie' of a certain model was about the same as that of heart muscle. After stimulation, the model shows an absolute refractory period followed by a relative refractory period. The temperature coefficients of the two processes are about the same. If the wire is enclosed in a tube the velocity of transmission is diminished. This is compared with the slow transmission in small nerve fibres. If a wire is enclosed in a series of short tubes, the impulse can jump straight from one node to the next and the impulse passes quicker than normally. This is compared with the nodes on the myelin sheath of certain quickly-conducting nerves. Under certain conditions, models may show rhythmical activity.