

Research Items.

The Earliest Civilisation of Egypt.—In *Antiquity* for December, Mr. Guy Brunton gives a brief account of the progress of excavation at Badari since it was initiated in 1922. He sketches in outline the civilisation of the Badarians so far as it can be reconstructed from the evidence, dating it approximately at 5000 B.C., going on to describe the differing and, it is suggested, earlier culture of the Tasians, discovered in the expeditions of the last two years. Certain points differentiate them sharply from the Badarians. The typical form of pottery is a jar having a small flat base, wide mouth, and a rather sharp angle at the bulge. The ware is greyish with black patches, and shows a vague coarse rippling which is vertical. There is sometimes a definite irregular black band around the rim. Associated with these people are beaker pots with broad flaring mouths and incised designs filled with white. Two more or less whole and many fragments come from the village sites, none so far from graves. In five places they have been found with polished celts, either of hard limestone or greyish green igneous rock. The Tasians are definitely connected with the celts by an undisturbed grave at Deir Tasa, in which was typical Tasian pottery. A poor example of the beaker was found in a Badarian grave at Qau in 1923, and may indicate an overlap of the two cultures. The Tasian culture is more primitive than the Badarian, and everything points to its being earlier. A few skulls have been found in good condition. They are rounder than the predynastic or the Badarian, and have broad faces and square jaws quite unlike the Badarian. The graves are wider and deeper than the Badarian, with a niche in the side to take the pot.

Change in an African Society.—In the *Sudan Notes and Records*, vol. 12, Part I, Mr. G. O. Whitehead publishes a study of the social organisation of the Bari, with special reference to the changes which have taken place comparatively recently in the status of the various social groups. The Bari were formerly composed of freemen, *Lui*, and servile groups, collectively called *Dupi*. The *Dupi* proper were serfs who cooked, and were of a physique markedly distinct from their masters. They did not own cattle, but are supposed to have lost them to the freemen. Yet they had to pay cattle on marriage, these being obtained from their masters. For this the masters had a claim on their services. Probably they were racially distinct from the freemen who had conquered them when they invaded the land. Other classes were the hunters, neither owning cattle nor cultivating land. They paid tribute to their chief. Two other classes were the Artisans of the Forge and the Artisans of the River, each living in separate villages. They were not so servile as the *Dupi*. They had few or no cattle, yet married independently of their chief's assistance owing to the value of the goods they produced. The introduction of money, the increase in agriculture, and disturbance due to unrest in the Sudan have brought about a redistribution in the ownership of cattle, which no longer belong exclusively to the *Lui*, and a dislocation of the pastoral life. This has blurred the hard-and-fast lines between the classes. The *Dupi* no longer depend on the *Lui* for their marriage arrangements, while under European control the position of the chief is changed and depends upon the relation with the Government rather than his own intrinsic position. The advice of the fathers of the soil is no longer listened to as it once was.

Yellow Fever Vaccine.—Stokes, Bauer, and Hudson in 1927 made the important discovery that Asiatic monkeys, particularly *Macacus rhesus*, can be readily infected with yellow fever, and that the disease may be maintained in these animals either by direct inoculation of infected blood or tissues, or by mosquito transmission. By this means, Hindle has been able to maintain and propagate the virus in London for more than a year, and through a large series of animals (*Trans. Roy. Soc. Trop. Med. and Hyg.*, 22, p. 405; 1929). Hindle finds that a suspension of the ground and cytolised liver and spleen taken from an animal *in extremis* will produce infection in a dilution of 1:10,000, but if to the suspension two parts of formaldehyde per thousand are added and the mixture is kept in the ice-chest for twenty-four hours, virulence is lost and the material may be used as a preventive vaccine. A monkey inoculated about ten days previously with this vaccine resists a dose of 1000-10,000 minimal lethal doses of active virus, and the immunity produced lasts for more than six months, the longest period so far tested.

Snakes of Ceylon.—A useful paper, by L. Nicholls, deals with the simpler recognition marks of the land snakes of Ceylon (*Ceylon Jour. Sci.*, Sect. D, vol. 2, Pt. 3, 1929, p. 91). Since every year deaths in Ceylon are attributed to non-poisonous snakes, the diagnoses have been arranged so that medical men may have at hand a ready means of determining any species and its possible harmfulness to man. In all, 61 species are described, 14 of which are earth snakes, 1 a constrictor, 42 colubrids, and 4 vipers. So far as possible, technically difficult descriptions have been avoided and identification rests for the most part on the external characters of coloration, markings, and general appearance, and simple scale characters.

Teleostean Fishes of Tortugas.—Mr. E. W. Gudger ("On the Morphology, Coloration, and Behaviour of Seventy Teleostean Fishes of Tortugas, Florida"). Papers of the Tortugas Laboratory of the Carnegie Institution of Washington, vol. 26, No. 5) gives an account of his observations on various fishes. The work is specially valuable as it has to do mainly with living material, giving details of the colouring, variation, and habits both in natural surroundings and in the aquarium. Special stress is laid on the importance of the variability in colouring. The fishes also vary much in number of fin rays, scales, and relative proportions of the body. The small clupeoid *Jenkinsia stolifera* is present in schools of many thousands; often swarming round a large grey snapper, leaving a space round it and moving when it moves, only to rearrange themselves in the same way when it comes to rest. The account of the feeding habits of the grey snapper itself is interesting. *Apogonichthys punctulatus* was found swimming inside the mouth of the shell of a large conch (*Strombus bituberculatus*), and probably lives symbiotically with this mollusk, in the same way in which *Apogonichthys strombi* lives in *Strombus gigas* as described by Plate from the Bahamas. Anatomical details of many of the fishes are given, including many notes on the internal organs besides the external features.

Gonophores of *Myriothela*.—E. A. Briggs (*Records Austr. Mus.*, vol. 18, 1929) describes the gonophores of *Myriothela australis*. All the gonophores on one individual are of the same sex; they are spherical when mature, supported on narrow cylindrical peduncles

arising from the sides of the blastostyles. The male cells are derived from cells on the floor of the subumbrellar cavity, and the first stage in spermatogenesis begins in the mass of cells covering the spadix. The secondary spermatocytes derived therefrom fill the subumbrellar cavity. At the distal pole of the gonophore, the ectoderm becomes invaginated to form the velar aperture, which breaks through into the subumbrellar cavity, and permits the escape of the sperms. In the female gonophore the cells of the germinal mass are arranged in several layers, the outer of which forms the external epithelium of the future spadix, and the others are the reproductive cells and form the oogonia. These multiply and finally fill the space between the manubrium and the subumbrellar epithelium. The oogonia give rise to primary oocytes, and here and there two of these come into contact and their cytoplasm fuses. The fusion products increase by accretion of other similar ones or of primary oocytes. The end result is that in the gonophore are five or six plasmodial masses separated by non-cellular partitions. The large definitive egg is produced by the withdrawal of these partitions and the fusion of the plasmodia, and becomes charged with yolk. At the distal pole of the gonophore is the velar aperture through which probably the sperm enters.

Cardita beaumonti Beds of Sind.—The *Cardita* [or *Venericardia*] *beaumonti* beds as they occur in Baluchistan were treated of by M. Henri Douvillé in a previous paper (see NATURE, Oct. 6, 1928, p. 552), and he now deals with them as developed in Sind (*Pal. Ind.*, New Series, vol. 10, mem. 3, fasc. 2). The fauna of these beds in Sind is definitely marine, as evinced by the abundance of Nautili and Fusidæ, whereas in Baluchistan more brackish water forms, and particularly Melaniidæ, prevail. Stratigraphical evidence shows that in Baluchistan the beds represent the lower Danian, whilst in Sind they are at the top and underlie the basaltic trap of the Lakhi hills. Many of the Sind species differ solely in specific characters from Eocene forms. Just fifty species of mollusca are described, half of which are held to be new and illustrated on eleven photolitho plates, which, considering the nature of the objects depicted, are remarkably good.

Petrographic Nomenclature.—In the *Travaux du Musée Minéralogique près l'Académie des Sciences de l'U.R.S.S.*, vol. 3, 1929, Dr. Beliankin gives an interesting discussion (in English) of the meaning of the term 'rock'. He arrives at the definition: "Rock is a mineral body, homogeneous in matter and structure", where 'mineral body' includes aggregates of one or more minerals, mineral mixtures or glasses. From this it is deduced that the classification and nomenclature of rocks should be primarily mineralogical. Beliankin points out that geographical names are not suitable, and that "a text-book of petrography turns out to be a certain kind of universal manual of geography". As a concrete suggestion for a practicable alternative, he proposes to name rocks from the first syllables of the names of their dominant minerals. For felspathoidal rocks he thus arrives at the following names, based on the abbreviations italicised in *ægrine*; *pyroxene*; *diopside*; *titan-pyroxene*; *amphibole*; *barkevite*; *biotite*; *nepheline*; *sodalite*; *nosean*; *analcite*; *melilite*:

Geographical Names.	Rational Names.
Urtite	Leuco-ægrineite
Ijolite	Ægrineite
Melteigite	Melano-ægrineite
Monmouthite	Amnite
Congressite	Bineite

Geographical Names.	Rational Names.
Tawite	Ægisodite
Naujaite	Anam-ægisodite
Bekinkinite	Barneite
Fasinite	Tipyneite
Riedenite	Pynosite
Turjaite	Binemelite
Uncompahgrite	Dimelite.

The suggestion is an excellent one; it deserves serious discussion at the next International Congress of Geology.

Wave-Mechanics of α -Ray Tracks.—In a note in the December number of the *Proceedings of the Royal Society*, Mr. N. F. Mott discusses the apparent contradiction between the wave-mechanical theory of radioactive disintegration, according to which an α -particle leaks out from its parent nucleus as a spherical wave, and its particle-like attribute of leaving an almost linear trail in a Wilson cloud chamber. The discrepancy is, of course, only apparent. The wave of the α -particle must not be considered by itself, but as contributing to a wave-function in a space of many dimensions formed by the co-ordinates both of the α -particle and of every atom in the expansion chamber. Mr. Mott develops the appropriate theory for the case when there are two atoms of hydrogen present, and finds that both must lie within a cone of small angle having its apex at the radioactive nucleus, if they are both to be ionised. In other words, the α -particle should, apart from collisions with atomic nuclei, leave an almost straight trail. Mr. Mott's paper is an elaboration of one of the points raised by Prof. C. G. Darwin in his paper on collision problems in wave mechanics in the June issue of the *Proceedings*.

Measurement of Refractive Indices.—A rapid method for investigating the dispersion of liquids is described by Prof. T. M. Lowry and Mr. C. B. Allsopp in the December number of the *Proceedings of the Royal Society*. A small quantity of the substance is enclosed in a quartz etalon, and the interference fringes formed in the film in parallel light are focused on to the slit of a spectrometer, when the variation in fringe-width in passing along the spectrum—photographed in the usual way—leads readily to a knowledge of the dispersion in the liquid. The accuracy obtainable is not so high as in some methods, being largely limited by the number of fringes which can be thrown on to the slit, but the device of working with thin films in quartz makes it possible to follow the dispersion curve of even poorly transmitting substances well into the ultra-violet, and the information so obtained is very complete. A curve for nicotene, which was obtained without very elaborate precautions in the control of temperature, is reproduced in the paper, and extends to 2900 Å.: hollow prism methods could only be used down to about 4300 Å., below which it was impracticable to proceed, because of absorption in the liquid.

Photoelasticity.—In the first part of volume 12 of the *Scientific Papers* of the Institute of Physical and Chemical Research, Tokyo, Mr. Z. Tuzi describes a new method of studying the elastic stresses in structures by means of the kinematograph. A model in phenolite is placed between crossed nicol prisms through which monochromatic green light is sent. The light and dark bands produced by the stressed specimen are photographed either in the usual way with a steady load or on a kinematograph film during the application of the load. Photographs of the bands produced when the steel side of a railway carriage with its doors and windows is loaded at nine points on its top edge, are reproduced for a steady load and

for its gradual application, and are remarkably clear. The stresses are calculated from the photographs and are compared with the values calculated by the approximate methods used in designing the carriage. The agreement is not satisfactory, and the author gives more accurate methods of calculation which agree better with the experimental results.

Shearing and Punching Metals.—More than 110 pages of the *Bulletin* of the Société d'Encouragement pour l'Industrie Nationale for July-August-September are devoted to M. Charles Fremont's account of his researches on the shearing and punching of metals, which have been carried out with the support of the Society. He has investigated the influence of the form of the shears or punch on the work which has to be done in the shearing or punching process, and by means of photomicrographs determined the distortion the material undergoes. The 268 figures add greatly to the interest of the memoir.

Precipitated Selenium Dioxide.—In the November issue of the *Journal of the Americal Chemical Society*, Hoffmann and Lenher show that the precipitate formed by the action of ozonised oxygen on a solution of selenium in selenium oxychloride is selenium dioxide. The density of the precipitated dioxide is appreciably lower than that of the sublimed substance, although the molecular weights of the two were found to be identical. The precipitated dioxide absorbs dry hydrogen chloride to form a fuming, straw-coloured liquid similar in composition and density to selenium hydroxychloride. No evidence of the existence of selenium trioxide or chloroselenic acid was found.

Union of Hydrogen and Chlorine.—When a mixture of equal volumes of hydrogen and chlorine is exposed to white light of constant intensity, combination occurs more slowly in narrow capillary tubes than in wider. D. L. Chapman and Grigg, who discovered this effect, explained it by assuming that the combination is due to an unstable catalyst which is destroyed in contact with glass or a film of water. In the November number of the *Journal of the Chemical Society*, they describe further experiments which show that the mean life of the catalyst is of the order of magnitude of the time taken by the catalyst molecules to reach the surface, although there are some points in which the theory proposed is not closely followed. The mean life always increases with decreasing pressure, which seems to show that one or both of the reacting gases have an inhibitive effect, a conclusion which is supported by an observation of M. C. C. Chapman that hydrogen can act as a weak inhibitor. The results are consistent with those of Weigert and Kellermann, published in 1923, these authors being the first to attempt to estimate the life of the catalyst which is formed when the gas is exposed to light. The experiments give no indication as to whether this catalyst is a chain of alternately formed chlorine and hydrogen atoms, as postulated by Nernst and Bodenstein, or unstable nuclei of unknown structure.

Glycogen.—Glycogen is a peculiar material very similar to starch which is found in the livers of mammalia. It is coloured wine-red by iodine. In the November number of the *Journal of the Chemical Society*, Haworth, Hirst, and Webb describe some preliminary experiments with glycogen which indicate that the hypothesis supported by Karrer, that starch and glycogen are similarly constituted, both structurally and configurationally, is correct. The difference in the colour reaction with iodine may be distinctive, but it is possible to prepare a starch fraction which gives the same colour as glycogen. In accordance

with modern views, glycogen is assumed to be constituted on the basis of continuous maltose units, that is, of a conjugated chain of α -glucose units. The difference in properties of the two substances is supposed to be due to a difference in size of their respective micelles. The experiments involved acetylation of glycogen with acetic anhydride, in presence of either chlorine or sulphur chloride as catalysts or of pyridine, when the triacetate was obtained in almost quantitative yield as a white powder. Although this was denser than starch triacetate, the two products showed nearly the same optical rotation in chloroform solution. Deacetylation gave a regenerated glycogen having all the characteristic properties of the original polysaccharide. Similar results were obtained by methylation following simultaneous deacetylation of the two triacetates.

Experimental Cold-rolling Mill.—The invention of rolls for metal working dates back at least so far as the twelfth century, probably being used then for producing gold strip. Leonardo da Vinci was the first to suggest their use for heavier work, but the rolling of iron did not come in until the eighteenth century. The Swedish man of science and engineer Triewald had a rolling mill with 10-inch rolls, but it was in England that the mill was fully developed and rolling both hot and cold is widespread. To further the study of the cold-rolling of steel and other metals, a cold-rolling mill has been placed in a new laboratory attached to the metallurgical and engineering departments of the University of Sheffield, see NATURE, July 13, p. 66). The machine, constructed by Messrs. W. H. A. Robertson and Co., Ltd., of Bedford, is described in *Engineering* for Dec. 6. The rolls, of Hadura alloy steel, made and presented by Messrs. Hadfields, Ltd., are 10 in. diameter by 10 in. face and are suitable for the cold-rolling of strip up to 6 or 7 inches wide. Special attention has been given to the cooling of the rolls and the lubrication of the bearings, and the rolls are driven by an electric motor of 50-120 h.p., giving a speed of anything from 59.3 ft. to 300 ft. per minute. A good deal of the work done will naturally be in the direction of metallurgical research, but it is hoped that opportunity will be taken to obtain reliable data on the effect of rolling speed on power consumption, accuracy, etc., matters of the greatest value to the industry.

Fuel Tests.—Canada's resources in fuel are abundant, but the distribution is unfortunate. Ontario and Quebec rely largely on anthracite from the United States. This dependence has been inconvenient in recent years owing to recurrent shortages, and many substitutes have been tried. In order to determine the relative value of these, the Dominion Department of Mines has instituted a series of "Comparative tests of various fuels when burned in a domestic hot water boiler", reported by E. S. Malloch and C. E. Baltzer (*Report* No. 705. Ottawa: F. A. Acland, 1929, 20 cents). These tests were carried out with great elaboration and on thirty fuels of the most varied type, ranging from anthracite to peat, consumed in a typical domestic appliance and for house-heating. The most efficient fuel tested was Welsh anthracite, 8.4 tons of which was equal to 10 tons of American anthracite, taken as standard. Scotch semi-anthracite was nearly as good. The tests showed that more than 70 per cent of the heat of anthracites and coals could be transferred to the water. With semi-bituminous coals 65 per cent, and with low-grade fuel less than 55 per cent, of the heating value of the fuel could be utilised. The results should be very encouraging to those interested in the export of British coals.