Research Items.

BABYLONIA AND EARLY INDIA.—In further reference to the discovery of an early Indian civilisation at Mohenjo-Daro and Harappa (see NATURE, October 18, p. 584), it may be of interest to note that the chief points of resemblance between the objects from these sites and Babylonian antiquities to which Messrs. Gadd and Smith direct attention in the *Illustrated London News* of October 4, are as follows:—The seals are similar in shape to square stamp seals from Susa and Babylonia (3500–2500 B.C.), while the engraved bulls on them are distinctly Sumerian both in general appearance and in detail. They stand before a cult object in a position familiar in Babylonian art of all periods, and if the object were a sheaf, this would closely resemble the Sumerian picture sign *Zag*. Of the signs on the seals, obviously some form of writing, nine very closely, and seven partially, resemble Sumerian writing. The numeration system appears to be the same. A cylindrical piece of hæmatite with flattened ends from Mohenjo-Daro recalls a common type of weight from Babylonia. The curious stone rings may be compared to Babylonian mace heads, and, like them, may be votive offerings. Shell inlay, of which pieces have been found, is one of the most characteristic features of early Sumerian culture. The figurine of a cock from Mohenjo-Daro finds a parallel in a clay figurine of a hen from Ur. The style of brick building, with its drainage system and ornamentation of glazed bricks, closely resembles the style of buildings brought to light by the recent excavations at Ur. The miniature funerary pottery from Mohenjo-Daro is similar to miniature pottery from Ur which belongs to the second millennium. Painted pottery from both Susa and Babylonia antedates 3000 B.C. It belongs, however, to a period when metal was only just coming into use, as appears to be the case on the Indian sites.

ANCIENT CLEPSYDRÆ.—In most early civilisations means were devised for measuring time, and in ancient Egypt, while sun-dials or shadow-clocks of various types were used to indicate the passage of time during the day, water-clocks were employed at night. In an article in *Ancient Egypt* for June, Mr. R. W. Sloley describes two of these water-clocks. The older of them dates from about 1400 B.C. and was found at Karnak in 1904; it is now in the Museum at Cairo. In this type the surface of the water in a vase of the shape of the frustum of a cone fell through approximately equal intervals in equal periods of time as the water flowed out through a small orifice at the base. Among the Græco-Roman papyri found by Grenfell and Hunt at Oxyrhynchus is a fragment dating from the third century B.C. in which are given instructions for constructing the scales for one of these "outflow" water-clocks. The second one is probably an "inflow" clock, of which an example dating from Ptolemaic times was found at Edfu. In this type the water chamber is cylindrical, and it would appear that water flowed into it at a constant rate, causing a float to rise, though the lines which are scribed on the inside of the vessel scarcely support this view; on the other hand, they are difficult to see and could not have furnished a convenient means of reading the time directly. Casts of both of these water-clocks and one of a shadow-clock—which was used during the day in ancient Egypt—may be seen in the Science Museum at South Kensington. Thus in ancient Egypt the priests, by observing the culmination of different stars with the aid of a plumb-line and sight-vane, could determine sufficiently for their purposes different hours of the night; and with the water-clocks they could measure the passing of the hours. The shadow-clocks, which showed approximately the number of hours which had elapsed since sunrise, or which remained before sunset, were probably in more general use among the people; the distribution of water by a water-wheel or the working-periods of different pairs of oxen are still checked by little shadow-clocks made of a few pieces of millet (durra) stalk by the cultivator for his guidance.

CHILDBIRTH CUSTOMS AMONG THE INDIANS OF NEW MEXICO.—In *Man* for October, Dr. Elsie Clews Parsons describes a number of interesting customs relating to mothers and children among the Tewa Indians. An eclipse of the moon occurring during pregnancy is believed to cause deformities of mouth, foot, or hand. Therefore an expectant mother carries a key, stone, or something hard in her belt so that "the moon won't eat the baby." At an eclipse "when the moon dies," a woman is told not to go out of doors. The mother lies in for three days; on the fourth day the child is named, the attendant aunts, paternal and maternal, giving the names. In the course of the ceremony one of the aunts, called the navel mother, takes a mouthful of water from an abalone shell which has been used for bathing the child, and in which has been placed a fetish stone. With this water in her mouth she breathes along an ear of corn. The ear is waved in six directions, and the water ejected into the mouth of the infant. This rite is repeated for a second ear. The two ears are left on either side of the child for ten or twelve days. They are planted in the following year. The object of using these sacrosanct ears is that the baby may grow up perfect like the corn ear.

IMPLANTATIONS OF TESTIS AND OVARY.—Knud Sand in *Endocrinology* (vol. 7, pp. 273-301, 1923) gives a summary of his experimental results published in 1918 in a Danish monograph. He confirms Lipschutz's observations of hypertrophy of the clitoris following iso-transplantation and gives a preliminary account of two cases of testis-implantation in castrated homosexual human males and of the successful regeneration of a 12½-year old dog by means of resection of the left epididymis and right-sided vasectomy. He is of the opinion that Leydig's cells are substantially the most important tissue in the production of the male sex-hormones. In the matter of ovarian grafts, he finds that the place of implantation and the relatedness of donor and host are factors of slight importance. One point of considerable interest emerges from his observations on the artificial hermaphrodite. Apparently mammary activity with milk secretion can be produced in a male organism in the entire absence of corpora lutea, uterus, and pregnancy.

VASECTOMY AND SIMILAR OPERATIONS.—In *Acta Chirurgica Skand.* (vol. 64, pp. 387-426, 1922) Sand gives an English edition of his paper in Danish (Ugeskrift for Laeger., 1922) dealing with the operation of vasectomy for regeneration. He prefers to free the epididymis and resect a portion under local anæsthesia. An account is given of thirteen patients treated for senium præcox and of five younger men treated for impotency, who have been under observation for 3-21 months. In the first group nine, in the second four, benefited by the operation. The rest were unsuitable cases. Sand adopts a very cautious attitude. In *Skand. Archiv f. Physiologie* (vol. 44, pp. 59-75, 1923) the same author describes the case of

a 10-year old individual, brought up as a boy, with imperfect external genitalia. An explorative operation was performed and a uterus and two Fallopian tubes were found. On the right side there was an infantile testis, on the left what appeared to be an embryonic ovary. The author discusses the question as to what gonadial tissue should be implanted and suggests that when puberty is reached indications will be forthcoming. In *Abhandlungen aus Handwörterbuch der Sexualwissenschaft* (Marcuss and Weber, Bonn, 1923) Sand deals with certain aspects of sexual physiology (such as sex-reversal, hermaphroditism, gonad transplantation, regeneration, cryptorchism, vaso-ligation) in which he is an authority, in a concise yet encyclopædic manner.

MOLLUSCA OF COLORADO.—Mr. J. Henderson's previous catalogue of the Mollusca of Colorado, published in 1907, being out-of-date and out of print, the author has compiled a fresh one (Univ. Colorado Studies, vol. xiii. No 2), extending the area treated so as to include the States of Utah, Montana, Idaho, and Wyoming, which appear to constitute a rather distinct molluscan province, characterised (except at its northern border) by the absence of Polygyra and by the presence of Oreohelix. The amount of work which a valuable compilation of this sort entails is well gauged by the bibliography and synonymies, whilst its utility is enhanced by the numerous illustrations in the text and on photographic plates. By the time a further edition is required, and we trust it may be soon, it is to be hoped Mr. Henderson will have seen his way to a more modern system of classification, for it has long ago been shown that Vallonia and Cochlicopa belong to the Pupillidæ, being Orthurethra and not Sigmurethra, whilst Succinea represents the Heterurethra; further, Dr. Sterki, whom he has followed for Pisidium, will have realised that two years before he announced the discovery in America of the *Pisidium parvulum* of Clessin, it had been shown to have no existence, being a composite of other and well-known species, whilst the form to which Dr. Sterki attaches that name is probably the *P. moitessierianum* of Pallary.

THE MECHANISM OF ADAPTATION.—Professor L. Diels of Berlin, writing in *Naturen* for July on how the shapes of plants are affected by climate, puts the difficulty of explaining the mechanism of adaptation very clearly. While adopting a cautious attitude, he concludes that "in one way or another there may be some truth in the ideas of Lamarck, though experiment has not yet enabled us to decide wherein that truth consists. Without the Lamarckian theory geographic adaptations in the organic world would be nothing but a puzzle." Prof. Diels recognises, no doubt, that a whole-hearted acceptance of the Lamarckian theory still leaves us to find the mechanism by which new somatic characters are transmitted to the germ.

PARAMO PLANTS OF THE COLOMBIAN ANDES.—The Philadelphia Academy of Natural Sciences has turned its Annual Report into a Year Book, but the change seems to be confined to the title. Both in the first of the new series and the last of the old a large part is taken up by attractively written and well-illustrated accounts of explorations and collecting trips conducted on behalf of the Academy. As an example may be chosen Dr. F. W. Pennell's narrative of a botanical expedition through the Andes of Western Colombia in 1922. The features of chief interest were the lofty wind-swept moors known as Paramos, where the plants protect themselves from the bitter blasts either by donning a woolly coat, by spreading prostrate along the ground, or by forming dense cushions of almost rock-like hardness. The most characteristic of the woolly plants are the "frailejones," usually species of Epeletia, one of which reaches a height of 10 ft. Each isolated region of paramo appears to have developed its peculiar "frailejones," and Dr. Pennell suggests that a knowledge of the relations of these species would greatly assist a reconstruction of recent geological history in the northern Andes.

SKULL OF DINOTHERIUM.—In the Memoirs of the Geological Survey of India (vol. vii. No. 4, 1924) has appeared an account, by the late Captain R. W. Palmer, of an incomplete skull of Dinotherium. Remains of this genus are usually so fragmentary that every account of new material is of value even if it does no more, as in the present instance, than confirm previous accounts. There is no editorial note to show when the manuscript was completed, but it is likely that the author's health, before his much to be lamented death in October 1922, prevented his seeing a paper by Andrews published in 1921 and one by Forster Cooper in 1922 on the subject of Dinotherium, both in the Proceedings of the Zoological Society. The specimen described is an incomplete fragment of a skull showing the basal surface from the condyles to the pterygoid region. The anatomical features shown do not differ markedly from those described by the late Dr. Andrews for the celebrated skull of *Dinotherium giganteum* in the British Museum, but the new specimen being in better condition, certain points are more clearly established. With regard to the question of the validity of the Indian species *D. indicum* and *D. pentapotamiæ*, the author concludes that they cannot be upheld and that they are both to be referred to the European form *D. giganteum*. This agrees with the views already published by Forster Cooper which were the outcome of a study of material from Baluchistan.

THE STRUCTURE OF LIGHT.—In the October issue of the *Philosophical Magazine*, Sir J. J. Thomson gives an account of a mental picture based on the idea of tubes of force which he has used for some time to reconcile the optical properties of light, which point to a wave theory, with the electrical properties, which demand some form of corpuscular theory. When an atomic electron falls towards its positive nucleus, the tube of force connecting them is not shortened, but forms a loop which may detach itself from the rest of the tube and move off as a free ring. Its emission is radiation, and the energy radiated is concentrated in the ring. Such a free ring may strike another tube and, in coalescing with the tube, lengthen it either temporarily or permanently. If the association is temporary only and the ring is thrown off, there is no absorption; if permanent, the electron has moved out from the nucleus and absorption has taken place. This picture is shown to be in keeping with the quantum theory and the principal facts of absorption and resonance.

THE HARDNESS OF SCATTERED X-RAYS.—An apparatus for measuring the hardness of X-rays, scattered through different angles, is described by Messrs. F. Dessauer and R. Herz in the *Zeitschrift für Physik* of August 28. Preliminary measurements have been made, in which the X-rays were filtered through 4 mm. of aluminium, so that they belonged to a narrow spectral region; they were sent in a narrow beam through holes, 5 mm. in diameter, in a series of concentric cylindrical lead screens, on to a sphere of paraffin placed at the axis of the cylinders. A series of holes in the lead cylinders allowed scattered beams, about 8 mm. in diameter, to pass outward at

angles 30°, 60° . . . 150°, and fall upon a photographic film, which was bent into a cylinder coaxial with the lead screens; the lower half of each beam passed through an aluminium filter. A movable lead screen, with rectangular openings, made it possible to expose narrow vertical strips of the small circular patches formed on the photographic plate, for regularly increasing periods, 100, 200, 300 . . . minutes, up to a total exposure of ten hours; thus the calibration of the photographic blackening, as a measure of the intensity of the radiation, can be made separately for each angle of scattering, *i.e.* for each wave-length. Since the whole series of observations is made simultaneously on the same photographic plate, some of the possible errors are eliminated and others greatly reduced. It is possible to deduce, from the photometric measurements of the blackening, the wave-lengths of the rays scattered at different angles. The results obtained agree fairly well with those calculated by means of Debye's theory, thus confirming Compton's results. Measurements in which monochromatic radiations are employed are in progress.

THE GEIGER α- AND β-PARTICLE COUNTER.—Dr. H. Geiger discusses the working of the pointed electrode counter in the *Zeitschrift für Physik* of August 28. If the counter is 2 cm. in diameter, a β-particle produces primarily some 50 ions, or 2×10^{-8} electrostatic units; while, according to the voltage employed, the rush of electricity will be from 0·1 to 1 unit. It seems clear then that an α- or β-particle causes a momentary discharge; but it is difficult to explain why this discharge breaks off so suddenly. Dr. Geiger has connected the point electrode to a string electrometer, earthing them through a high resistance such that the time the charging rush lasts is small compared with that which it takes to leak away; if a capacity several times as large as that of the electrometer is then connected in parallel, the deflexions are reduced, and are roughly inversely proportional to the capacity, so that in each discharge the same quantity of electricity flows. It is not the rise of voltage caused by the current rush which stops the discharge, for if this were the case the deflexion would be independent of the capacity. The point electrode in general requires a certain preparation before it will work properly; the form of the point and the degree of polish have little influence, but heating to incandescence will generally make the point active. Apparently the point becomes covered with a surface layer having a high electrical resistance; since platinum is a suitable material, this layer can scarcely consist of an oxide; the alteration seems rather to depend on the gas which covers the metal. Janitzky has shown that in an X-ray tube no discharge takes place from an electrode which has been perfectly freed from gas. On Geiger's theory, when a rush takes place, the outside layer of this surface film becomes charged, and the potential difference between this surface and the surrounding walls falls rapidly, so that the current stops soon after it commences.

A NEW BLEACHING REAGENT.—A new bleaching reagent for use in laundries is described by Dr. R. Feibelmann in the *Chemiker Zeitung* (1924, vol. 48, p. 685) under the name of *activin*. This compound is the sodium derivative of *p*-toluene sulphochloramide, $CH_3 . C_6H_4 . SO_2 . NClNa + 3H_2O$, and belongs to the class of chloramines. Although the oxidising power of activin is due to "available" chlorine, it is much milder in its action than the hypochlorites though more effective than sodium perborate. Moreover, it possesses several advantages over the latter. Thus it is not easily decomposed by heat and it is not sensitive to the catalytic action of traces of copper and other metals, a property which is apt to render sodium perborate destructive to fabrics. It acts as a powerful germicide, being indeed comparable with corrosive sublimate in this respect.

EFFECT OF MOTION ON CHEMICAL CHANGE.—The April-July volume of the *Compte rendu des Séances de la Société de Physique*, of Geneva, contains a paper by Duparc and Molly on the above subject. The authors examined the reaction between marble and a solution of ammonium chloride, both when the mixture was agitated, so that the pieces of solid rubbed against one another, and again when the liquid was merely circulated around the pieces of solid. It is claimed that the results were different in the two cases. In the first experiment the quantity of calcium carbonate dissolved increased to a maximum and then decreased, whilst in the second experiment a state of equilibrium was reached. It was shown that in the first case the solution contained free ammonia, and the reaction was assumed to occur according to the equation: $2CaCO_3 + 2NH_4Cl = CaCl_2 + Ca(HCO_3)_2 + 2NH_3$, whilst in the second case the reaction $CaCO_3 + 2NH_4Cl = CaCl_2 + (NH_4)_2CO_3$ attained a state of equilibrium.

THE DELAWARE RIVER BRIDGE.—This suspension bridge is in course of erection over the Delaware River between Philadelphia and Camden. The estimated amount of load which the cables will ever have to carry is nearly 60,000 tons, and requires two 30-in. diameter steel cables, each weighing nearly a ton per foot of length and each subjected to a maximum pull of 20,000 tons; there will be 18,000 wires in each cable. The design and construction of the anchorage for resisting these enormous forces is of particular interest, and an extremely lucid account will be found in the Journal of the Franklin Institute for September, where the design is treated by Mr. Allston Dana, of the Delaware River Bridge Joint Commission, and the construction by Mr. Montgomery B. Case, who is the senior resident engineer on the bridge. The anchorages are separated by a distance of about 0·6 mile, and will be concrete structures faced with granite, 218 ft. long, 190 ft. wide, 175 ft. above ground, and with foundations extending down to rock 65 ft. below ground in Philadelphia and 105 ft. below ground in Camden. Each anchorage will weigh 5 or 6 times as much as the pull exerted on it by the cables. The cables will enter the anchorage at points 130 ft. above ground and at an inclination of 8° with the horizontal; they will then bend over the top of an inclined steel tower and will pass down into the anchorage at an inclination of about 45°. Forty feet down each cable will be incased in a cast steel band the lower part of which is bell shaped, and the cable will then flare out in all directions, and will be looped round a group of 61 cast steel shoes connected to eyebars, which in turn will be connected to anchor girders placed as far down in the corner of the anchorage as practicable. The design of the anchorage structures introduces some very interesting calculations which are explained clearly by Mr. Dana. The caissons were sunk by dredging and their behaviour varied widely with the class of material under penetration. In sand and gravel the caissons followed the dredging gradually, whilst in clay or disintegrated rock they frequently held up until the excavation was 10 ft. or more below the cutting edge, when a sudden drop would occur and the cutting edge forced the material to the centre of the dredging. The paper is profusely illustrated with drawings and photographs, and we can recommend its perusal to all students of civil engineering.