

Research Items.

Hippopotamus Figures from Ancient Egypt.—Mr. W. M. Crompton describes two hitherto unpublished hippopotamus glazed figures in *Ancient Egypt*, 1931, pt. I. The first was found by the expedition of the School of Archaeology in Egypt to the Fayum in 1913–14, in a shaft-grave of the twelfth dynasty near Haregeh. The figure lies with the head turned to the right in a natural pose. It was originally covered with blue glaze, and decorated with designs in black outline, representing the fauna and flora of the marshes frequented by the animal, which was seldom seen except in glimpses through such a foreground. Recently Dr. L. Keimer has published a study of thirty-six decorated hippopotami. On twenty-six examples, including that from Haregeh, decorative motives appear as follows: the flowers of *Nymphaea sp.* appear in all but one, which is entirely decorated with pondweed. The leaves and buds almost invariably appear. Shining pondweed (*Potamogeton lucens* Linn.) appears on five. The papyrus is shown three times only. Rosettes are usual, but not invariable. Birds appear six times; butterflies three, or possibly four times; and a bee once. In one instance there is a frog half emerging from a lotus flower. Decorative bands are found four times and a network once. The representation on an animal figure of objects with which it was supposed to be surrounded was not, until recently, known to occur before the Middle Kingdom. It has now been carried back to the Middle Predynastic period; for Mr. Brunton has found at Badari a fragment of a pottery hippopotamus on which is the design of a ship and men with harpoons, evidently meant as surrounding the animal with intent to destroy it.

Evolution in the Chelonia.—P. E. P. Deraniyagala, in the *Proceedings of the Zoological Society*, Part 4, 1930, gives a reasoned account of his views on testudinate evolution and upholds the thesis that the Athecæ, the leathery turtles, are the more primitive type in the structure of the carapace, as well as in many other features. He points out that the current view that the Athecæ have lost the endoskeletal expansion of the ribs, and consequently the carapace plates, is not necessarily correct, being due to a wrong bias from palaeontology. The rarity of Athecæ in any except recent deposits is not due to their recent evolution, but can be explained by the fact that on death their skeletons fall apart and are not preserved as are the well-knit bodies of the Thecophora. As a matter of fact, the earliest known of Chelonian remains, *Psephoderma alpina*, from the Triassic, is claimed as Athecan. The author considers that the original Chelonia were marsh dwellers and at first had a dermal covering with an external layer of ossified scales and a non-retractile neck. It was at this stage that the Athecæ took permanently to marine life, retained the primitive scaling, and never acquired the retractile neck.

Sex-change in the Oyster.—Prof. J. H. Orton and C. Amirthalingam (*Jour. Mar. Biol. Assoc.*, 17, No. 2, 1931) record observations on sex-change in the European oyster (*Ostrea edulis*). Oysters in which a batch of eggs has been passed into the mantle cavity normally immediately begin to develop spermatozoa, and this process is so rapid that in a few hours after extrusion of the eggs small clumps of spermatocytes can be recognised in the gonad. Within about fourteen hours from the extrusion of ova, relatively large clumps of spermatocytes are recognisable in the gonad, and within about forty-five hours the gonadal tubes become filled with maturing sperm. About

eight and a half days after the extrusion of ova, when the larvae which the oyster is carrying have become fully developed veligers ready to be liberated, sperm development may have proceeded so far that the gonadal ducts become filled with ripe sperm-morulae. After the larvae have been liberated, sperm production continues, but about a month after extrusion of the ova begins to wane and in another month has usually ceased if the egg-spawning has occurred in early or mid-summer. The gonad passes into a quiescent condition, and a period of fattening, that is, the accumulation of reserves, usually follows. If egg-spawning occurs in late summer, the sperm afterwards developed may be retained over the winter period. Instructions are given for making the microscopic preparations of the gonad, and illustrations are added to represent the condition as seen in fresh preparations and in sections.

Anterior Abdominal Vein in the Toad.—We have received a communication from Prof. Ekendranath Ghosh and Birendrakumar Mitra, of the Medical College, Calcutta, stating that, while examining about fifty dissected toads (*Bufo melanostictus* Schneider) in a medical examination conducted by Prof. Ghosh, they found a normal-sized anterior abdominal vein, arising in the usual way and ending in the left subclavian vein. The vein had no connexion whatever with the liver or hepatic portal vein. The animal was an adult male. This is the second abnormality of its kind to be recorded for this species. The previous example, where the anterior abdominal vein opened on the right anteriorly, was reported by Bhaduri (*Jour. Dep. Sci. Calcutta*, p. 1, 1929).

A Hypothesis of 'Sub-genes'.—Numerous papers have been published on the inheritance of bristles in *Drosophila*. A group of gene mutations which reduce the bristles in different parts of the body has been studied. These genes are shown by their linkage relations to lie at the scute locus of the X-chromosome. To account for these phenomena, Serebrovsky and others have elaborated a hypothesis of 'sub-genes' arranged in linear order, each concerned with the development of one or a few bristles on the fly. The various mutations which scute undergoes are then each supposed to represent a change in a different block of sub-genes. Sturtevant and Schultz (*Proc. Nat. Acad. Sci.*, vol. 17, No. 5) have constructed a similar series of bristle-effects from their experiments, but they interpret it in a different way. Hairless is another gene (in chromosome III.) which removes the bristles in a different pattern from that of the scute series, and achete also inhibits bristle development. By experiments involving these series of forms, it is shown that scute 1 and achete act on bristles throughout the length of the series and not on particular bristles alone. Thus since each 'sub-gene' is affecting many or all the bristles of the fly, though in different degrees in different parts of the body, the basis of the sub-gene hypothesis is undermined and the usual conception of the interaction of genes in controlling development is adhered to instead. The pattern of bristle-effects is explained rather as due to the paths and rates of diffusion of certain substances during development.

Pivots and Jewels.—H.M. Stationery Office has issued at the price of 4s. a well illustrated 4to pamphlet of 55 pages describing the work done at the National Physical Laboratory, by Mr. V. Stott, on the conditions favouring smooth running and

long life of the pivots and jewels which play so important a part in watches and scientific instruments of all kinds. Mr. Stott has investigated the most suitable shape and hardness of a pivot to carry a given load, and has measured the friction between the pivot and jewel and the torque due to it. He finds that during the rotation of the pivot rust is formed, and that this rust is the main cause of the increase of friction during wear. Lubrication does not diminish the friction between the pivot and jewel, but its presence considerably increases the life of the bearing. The relation between the direction of the hole in the sapphire or diamond and its crystalline axis has an influence on the wear of the bearing.

Flame Propagation in an Electric Field.—Prof. W. A. Bone, R. P. Frazer, and W. H. Wheeler have contributed a paper to the July number of the *Proceedings of the Royal Society* on the effects of an electric field upon the propagation of flame through a dry mixture of carbonic oxide and oxygen. The gas was dried by prolonged contact with phosphoric anhydride, the combustion started by a spark, and the progress of the flame recorded photographically. An electric field was applied between electrodes in the gas, and control experiments made in the absence of a field in otherwise similar apparatus. Their results show a definite effect of the sign of the pole on the flame; near the negative pole conditions are much more favourable to the continuance and propagation of the flame, and near the positive pole rather less favourable than in the field-free control experiments. There appear to be two distinct conditions in which the field has an effect: first, when the flame is being propagated through a dry medium in which the field is maintained, and secondly, when the flame fronts have nearly reached the poles and the field breaks down. In the first instance, there is a general drift of the

medium towards the negative pole and also a sort of initial wave of positive ions in the same direction; and in the second, combustion is accelerated by the highly ionised condition of the medium. The paper is illustrated by some beautiful photographs of the moving flames.

Structure of XO_3 Groups in Crystals.—A paper by W. H. Zachariasen in the June number of the *Journal of the American Chemical Society* gives the general results concerning the structure of groups XO_3 in crystals, as determined by X-ray analysis. The groups are found to be of two kinds: (1) co-planar groups; BO_3''' , CO_3'' , and NO_3' ; (2) pyramidal groups; SO_3 , ClO_3' , AsO_3''' , BrO_3 , SbO_3''' . In the following table a denotes the oxygen to oxygen distance, r the cation to oxygen distance, and h the displacement of the cation from the plane of the oxygens, all in angstroms.

	BO_3	CO_3	NO_3	SO_3	ClO_3	AsO_3	BrO_3	SbO_3
a	2.35	2.13	2.14	2.24	2.38	3.28	2.76	3.62
r	1.35	1.23	1.23	1.39	1.48	2.01	1.68	2.22
h	0.51	0.49	0.67	0.56	0.75

The groups XO_3 are co-planar if the number of valency electrons in the group is 3×8 , whilst a pyramidal arrangement seems to be connected with $3 \times 8 + 2$ valency electrons. An explanation of the formation of the asymmetrical groups in terms of ions and their polarisability is given in the paper, and the values of a and h are shown to be related by the expression $12h = a\sqrt{6}$, which suggests a simple picture of the pyramidal groups as tetrahedral groups with three corners occupied by oxygen ions, the centre by the cation core, and the fourth corner by two displaced electrons or an equivalent concentration of electron density.

Astronomical Topics.

Nagata's Comet.—*Science News Letter*, dated Aug. 1 (Science Service, Washington, D.C.), gives information about the discovery of this comet: Mr. Masani Nagata is a native of Japan engaged on fruit-growing near Brawley, California; he possesses a 3-inch telescope, and in the course of observing Neptune on the evening of July 15 (July 16.2 U.T.) he swept up a nebulous object near it; the next night it had moved a degree to the north-east; he sent the news to Mt. Wilson, where Mr. Moore confirmed the discovery. There was a tail 4° long on July 18; the magnitude of the comet was given as 7 on July 23 and 9 on July 25, but it was probably really brighter, as twilight and atmospheric absorption would weaken its light more than that of the stars.

The following positions (for 1931.0) are from Harvard Cards 161-164:

Date.	R.A.	N. Decl.	Place.
July 18, 1792 U.T.	10 ^h 40 ^m 44.7 ^s	9° 50' 57"	Mt. Wilson
19, 1861	10 45	6.0	9 54 46
20, 1795	10 49	22.3	9 58 12
22, 2004	10 57	56.3	10 4 27
23, 1157	11 1	46.1	10 6 50
25, 1933	11 10	20.8	Yerkes
		10 11 22	Lick

The following ephemeris for 0^h U.T. is from *U.A.I. Circ. 329*:

	R.A.	N. Decl.
Aug. 19	12 ^h 42.5 ^m	9° 52'
23	12 55.5	9 39
27	13 8.1	9 25
31	13 20.4	9 10
Sept. 4	13 32.4	8 54
8	13 44.1	8 37