

Research Items

Asianic Deities in the Paganism of Ancient Georgia

A RE-EXAMINATION of the evidence relating to Paganism in early Georgia by Prof. M. Tsereteli (*Georgica*, 1, 1) indicates the need for revision of hitherto accepted views, and the recognition of a considerable Asianic element in the ancient cults of the Caucasian area. The deities enumerated in the sources are Armaz Zaden, Ga or Gafm and the Chaldean goddess It'rujan, or It'rushana. The resemblance of Armaz to Ahura-Mazda, together with the fact that Mazdaism was introduced into Georgia long before Christianity, suggests an obvious identification. There is no doubt that Armaz is a Georgian national deity. The account of the copper idol and the religious festival of Armaz given by St. Nina point to identification with Teshub, the god of the Mitanni and Urartaeans, the pre-Indo-European people of Armenia, who is represented with thunderbolt and axe, and may be related to Zeus Labraunda and Jupiter Maximus Dolichenus, *natus ubi ferrum exoritur*, whose worship was said to have been brought to Kommagene by Khalybean smiths. The god Zaden with Armaz gives rain and fertility to the Georgian soil. He is, in fact, the Asianic god of fertility, Sandar or Marduk, the Babylonian Tamus. The custom of offering first fruits and the first born of man and beast to Zadin is probably Semitic. Human sacrifice was also offered to Ga and Gatsi. It is argued that Gatsi and Ga are the 'father' and 'mother' of the widespread fertility cult. A deity not mentioned in the texts, the goddess Ašhara, is still worshipped among the Abkhazians. She may be the goddess Išhara, mentioned in the Boghazhöi texts, who was also worshipped in Babylon, Assyria and Elam. She is the tutelary goddess of the homestead, and the mountaineers still worship "the angel of the house". Finally, there is the Chaldean goddess It'rujan who is opposed to Armaz. It'ru is rightly identified with Ishtar; 'jan' is probably Samain, the goddess of heaven, who as a Chaldean deity destroyed the idol of Armaz and was resisted by the natives. There is also evidence of a tree and pillar cult.

Antiquities in Shetland

A TOUR of archaeological investigation in Shetland made by Mr. Ludovic Man in July last, following up a similar investigation in Orkney last year, has produced some interesting results. An examination of the glacial clays and derived gravels produced a number of rolled stone implements of types similar to those of the palæolithic cultures of England and France. At Bressay an old land surface about three feet below the existing surface yielded more than a hundred tools, mostly of quartz and quartzite and of small dimensions, unrolled with sharp edges, which Mr. Man classifies as mesolithic. On Ward Hill at Sumburgh, a settlement of considerable size has been exposed by wind erosion. Stone foundations of a large number of buildings have been bared. The walls appear to have been three feet thick at the base, and the oval internal chamber some fifteen feet by ten feet in dimensions. No traces of super-structure survive; but stone implements, the half

of a large saddle quern, and a massive hammer-stone, weighing thirty pounds, point to a considerable antiquity. Possible evidence of cultivation is found in small cleared plots, thirty feet in diameter, with the stones from the clearing lying without system on the periphery—it may be a prehistoric anticipation of the present method of cultivation in walled enclosures. The most interesting find, however, was at Braewick, where storm water had breached an 'ayr', or storm beach, and drained a small lock, exposing ancient timbers, in which the distinctive character of the nails, and the wooden pegs with hexagonal shafts, point to a Viking origin. If further examination of the material, which is now in Glasgow, confirms Mr. Man's conclusion that this is part of a Norse boat, it is the first find of that kind to be recorded in Scotland.

Fossil Horse Remains from Idaho

NORTH AMERICA has supplied in its remains of fossil horses one of the most complete of evolutionary series. The collection of bones described by C. Lewis Gazin, from the Hagerman lake beds of Idaho, belonging to the Upper Pliocene, contains an abundant assortment of remains of *Plesippus shoshonensis*, an advanced member of its genus bordering on the horse types of the Pleistocene age (*Proc. U.S. Nat. Mus.*, 83, No. 2985, 281, Washington 1936). The material included 130 skulls of the species named above, and a large quantity of other skeletal material, some of which was found still in a position of articulation. The appearances are that the remains accumulated naturally round a water-hole, for amongst the many other vertebrates which are represented in the Hagerman beds there is a noticeably large number of aquatic forms. The paper contains descriptions, measurements, and comparative comments upon the horse remains.

Urethral Sinus in Rodents and Insectivores

THE male of certain rodents and insectivores possesses a sac-like diverticulum of the urethra, the urethral sinus. The development of this structure in the white mouse and its occurrence in other forms have been dealt with by Hall (*J. Anat.*, 70, Pt. 3, 1936). The sinus makes its appearance about the sixteenth or seventeenth day. At this time, the fusion of the genital folds gives rise to the penile or secondary urethra, and the sinus arises as a dorso-lateral bulge at their point of junction, but is derived from the primary urethra. A pair of solid club-shaped structures then arise as buds from the urethral epithelium just at a point where the sinus bulge occurs; these are the rudiments of Cowper's glands, which in the adult open into the base of the urinary sinus. The walls of the sinus are similar in nature to those of the urethra, and contain glands, whereas the epithelium of the penile urethra is non-glandular. The presence of this urino-genital sinus is reported in *Evotomys glareolus*, *Microtus hirtus*, *Apodemus sylvaticus*, *Mus rattus*, *Cricketus auratus* and *Fiber* (that is, *Ondatra*) *zibethicus*. It is apparently not present in *Cavia cobaya*.

Loose Smut of Oats

THE fungus *Ustilago Avenae*, causing loose smut of oats, is capable of infecting its host through the stigma of the flower, and the disease may also appear from later infection. A paper by Mr. Robert McKay ("Methods of Infection of Oat Grain with *Ustilago Avenae* and the Influence of External Factors on the Incidence of the Disease", *Sci. Proc. Roy. Dub. Soc.*, 21, No. 33, July 1936) shows that under the conditions of the crop in Ireland, the fungus produces a resting mycelium within the glumes, and further spores may also lodge there. These remain ungerminated until the following spring. Experiments on washing flower-infected grain in water, and on removing the glumes (de-hulling), both gave a substantial reduction of infection in the subsequent crop. A combination of these two methods of treatment resulted in almost complete control of the disease, and suggests that most of the infection is brought about by the ungerminated spores lodging within the glumes.

Immunity of Apples to Woolly Aphis

IN certain countries the use of immune stocks and stems on which desirable varieties are grafted has met with considerable success as a means of combating attacks of woolly aphis (*Eriosoma lanigerum*). An attempt to elucidate the underlying causes of resistance and immunity to this pest is described by M. B. Crane *et al.* (*J. Pom. and Hort. Sci.*, 14, 2, 137; 1936). Its life-cycle is outlined, and preliminary experiments on the physiological aspect of immunity described. These suggest that the mechanical structure of the stem and the presence of certain insoluble substances may possibly be related to resistance, though they do not explain complete immunity. A genetical analysis was made by crossing a large number of common apple varieties with a number of well-known susceptible and immune root-stock varieties and testing the resultant seedlings for resistance or immunity. The results of this analysis indicate that "the hereditary behaviour of immunity is determined by and dependent upon a certain balance of genetic factors and is governed by a number of genes, the action of which is in part complementary and in part cumulative". Several immune seedlings raised in this way are being tested for their suitability for general use in respect to vigour, ease of propagation and productivity.

Diorites of the Cascade Range, Oregon

A SERIES of dioritic intrusions penetrate Tertiary volcanic rocks in a narrow belt which extends longitudinally through the Cascade Range of Oregon. An interesting regional study of these rocks and the associated metasomatism and metamorphism has been made by A. F. Buddington and E. Callaghan (*Amer. J. Sci.*, 421-449; 1936). The intrusions are mostly dyke-like, but there are numerous plugs and a few small stocks. The rock-types represented range from augite-diorite to granodiorite and porphyritic dacite. Replacement of plagioclase by orthoclase is a common feature throughout. Similar orthoclase-zonation, described by Gillson, transformed a gabbro into quartz-monzonite (Pioche, Nevada) and was ascribed by him to the action of potash-bearing emanations from below during the magmatic stage and also, locally, after solidification. The Cascade rocks are shown to be closely related chemically to those of the Mesozoic intrusives of the Sierra Nevada.

Volcanic rocks surrounding the intrusions have been modified through zones varying in width from a few inches to nearly half a mile. In places the original rocks (basalt-andesite-rhyolite series) have been wholly reconstituted and changed to tourmaline-hornfels.

The Patwar Meteorite, 1935

IT has been estimated that the number of meteorites recovered, after their fall to the earth's surface has been actually seen, averages about four per year since the year 1850. A large proportion of these meteorites are stones or masses of crystalline rock, a much smaller proportion being composed of metallic iron alloyed with nickel and cobalt. An account of the "Patwar Meteoric Shower of 29th July, 1935", by Dr. A. L. Coulson (*Rec. Geol. Surv. India*, 69, 439), illustrates the considerable amount of careful work required to ascertain the circumstances of the fall of a meteorite, the recovery of its various parts, and the subsequent mineralogical and chemical analyses. Reports collected from the Tippera district of Bengal indicate that the Patwar meteorite fell on July 29, 1935, at 14^h 20^m Indian Standard Time. Its fall was accompanied by the usual phenomena of light and sound. Five portions of the meteorite were recovered over an area of about 4½ square miles. The largest portion, weighing 23 kgm., which came from Patwar, had penetrated the ground, presumably soft owing to monsoon conditions, to a depth of 34 inches. This portion, which is completely illustrated in the report by a number of photographs, has a greatest circumference of 2 ft. 9½ in.; its greatest length is 1 ft.; its breadth 10 in. and its thickness 8½ in. The specific gravity of the meteorite is 4.21. Analysis shows that the meteorite, which is intermediate in composition between a stone and an iron, is composed chiefly of nickel-iron, with olivine, enstatite and bytownite, together with smaller amounts of other compounds including hydrocarbons.

Absorption of Short X-rays

T. R. Cuykendall and M. T. Jones have recently described (*Phys. Rev.*, 50, 105) absorption experiments on X-rays from a 600 k.v. tube. A double crystal spectrometer was used to isolate X-ray beams of wave-length down to 40 X.U. The absorption of very short X-rays by carbon was in excellent agreement with the Klein-Nishina scattering formula. The absorption coefficients for a number of elements, heavy and light, were determined, and the photoelectric part of the absorption fitted to an empirical formula. The photo-electric absorption observed in lead in this frequency region is about 10 per cent higher than that calculated theoretically by Hulme and others.

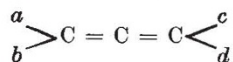
Mass-spectrographs

IN an article on "Second Order Focusing for Mass Spectrographs" (*Proc. Camb. Phil. Soc.*, 32, pt. 3) Mr. W. W. Sawyer considers the conditions under which focusing may be improved when, instead of the electrostatic deviation being produced by the field between parallel plates, the field between co-axial cylindrical plates with the axis perpendicular to the plane traversed by the charged particles is substituted. The mean path of the particles in this field is nearly a concentric circle, and on emergence they enter a magnetic field the lines of which are parallel to the axis of the cylinders and the section

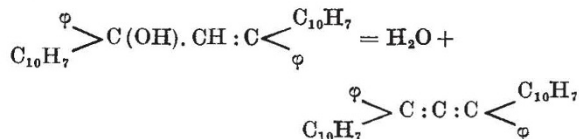
of which is a circle. The advantages of this arrangement were mentioned by Dr. F. W. Aston in a recent note in *NATURE* (137, 357; 1936). Mr. Sawyer gives the dimensions of the spectrograph constructed on these lines as follows: mean radius of cylinders 40 cm.; angle subtended at the axis $\frac{1}{4}$ radian; distance from farther edge of electrostatic to near edge of magnetic field 15 cm.; diameter of magnetic field 15 cm.; the near edge of the photographic plate is 11.3 cm. beyond the farther edge of the magnetic field and 16.2 cm. from the axis of the beam between the two fields; and the plate itself is inclined at 24° to this axis.

Resolution of an Allene Compound

THE prediction that optical activity could be exhibited by allenes of the general type



was made by van't Hoff in 1875 ("La Chimie dans l'Espace", p. 29) and many unsuccessful attempts were made to verify it. The linking of the central carbon atom in the triad differs considerably from those types for which the tetrahedral theory has been shown to hold. The groups a and c and b and d may be identical. P. M. Raitland and W. H. Mills (*J. Chem. Soc.*, 987; 1936) have now shown that the compound in which $a = d = C_6H_5 = \varphi$ (phenyl) and $b = c = C_{10}H_7$ (naphthyl), when produced by the catalytic dehydration of the alcohol:



by means of optically active catalysts, can be obtained in two enantiomorphous forms. As catalysts, d - and l -camphor sulphonic acids were used in benzene solution. The specific rotation $[\alpha]_{5461}$ of the active allene has the large value of 437° – 438° . The two forms (m.p. 158° – 159°) combined in solution in ether to a racemic compound (m.p. 242° – 244°). Van't Hoff's prediction of the enantiomorphism of unsymmetrically substituted allenes is thus verified. It depends on the assumptions of the linear arrangement of the three carbon atoms and the disposition of the external valencies of the terminal carbon atoms in planes at right angles to one another.

The Marconi-E.M.I. Television System

ON the occasion of the recent demonstrations of television provided in connexion with the Radio Exhibition at Olympia, the programmes were transmitted on alternate days by the Baird system and by the Marconi-E.M.I. system. Some details of the latter system are given in an illustrated pamphlet just issued by the Marconi-E.M.I. Television Co., Ltd. The system employs one or more 'Emitron' scanning cameras, having no moving parts, by means of which the scenes to be transmitted are directly and continuously transformed into electrical impulses without the intermediary of a film device. These cameras can be used under normal conditions of daylight on exterior locations or in studios. Film scanning cameras are also included in the normal equipment. In either case, the resulting electrical impulses are fed to a specially developed modulator unit, whence the oscillations of the main transmitter

are controlled. A suitable synchronizing signal is included in the transmissions by means of which complete steadiness of the received picture is ensured. The pictures are transmitted at a frequency of 25 per second with a scanning detail of 405, 240 or 120 lines, and provision is made in the equipment for either straight or interlaced scanning. The latter system is recommended since flicker of the received picture is entirely eliminated. The radio transmitter consists essentially of a master oscillator, frequency doubler and amplifying and modulating equipment. With the carrier frequency in the region of 40 megacycles per second, it is claimed that the frequency can be maintained constant to an accuracy of ± 1 part in 20,000. The modulating stages are designed to have linear response from zero frequency up to 3 megacycles per second. The aerial system comprises a number of aerial and reflector units suspended round the periphery of an octagon; the whole system is designed to give maximum radiation in the horizontal plane, uniform in all directions. In the arrangement of the aerial system at the B.B.C. station at Alexandra Palace, the aerials for the sound and vision transmissions are erected one above the other on the same tower.

Accuracy of Meteor Observations

WITHIN recent months, three independent articles have appeared in different journals dealing with this subject. Mr. B. S. Whitney has published (*Mon. Not. R.A.S.*, 96, 5, March 1936) an interesting paper, "New Methods for Computing Meteor Heights", in which it is admitted that meteor heights deduced from ordinary visual observations are subject to large errors because of the difficulty in observing and plotting the paths accurately. He proceeds to develop a method for adjusting the beginning and ending as seen at different stations, the adjustments being the smallest possible which will refer the recorded directions to a common point. In the case of multiply observed meteors or fireballs a least square solution is developed, and three cases have been already computed by the method by the staff of Flower Observatory of the University of Pennsylvania, where the author is engaged in research. Unfortunately, the numerical results are not given, so it is impossible to judge the extent of the observational errors. In *Popular Astronomy* of May 1936 there is an article by Messrs. F. Watson, jun., and E. M. Cook, entitled "The Accuracy of Observations by Inexperienced Meteor Observers", in which some rather startling conclusions are drawn from the results of observational tests. It appears that in the case of inexperienced observers, the probable error in the direction of a meteor lies between $\pm 10.8^\circ$ and $\pm 18.8^\circ$. Experienced observers, however, concentrating on bright meteors, have reported observational errors as low as $\pm 4^\circ$. The Rev. Dr. M. Davidson (*J. Brit. Ast. Assoc.*, 46, 8, June 1936) has given very comprehensive analysis of the method which he proposes for computing real paths, assuming the *direction* of flight to be accurately recorded, but allowing for the beginning or ending of the apparent path to be missed. In this article, "The Computation of the Real Paths of Meteors", two numerical examples are fully worked out, and it is shown that in both cases a considerable portion of the flight was missed by one or other observer. These papers suggest that the whole subject of meteor observation may require reconsideration in order that more accurate results may be obtained.