Research Items.

Unknown Tribes in Arabia.—An account of a journey undertaken in 1928 in a part of S.E. Arabia previously untrodden by Europeans, is given by Mr. Bertram Thomas in the *Journal of the Royal Anthropological Institute*, vol. 59, part 1. The journey of 650 miles from Suwaih to Dhufar occupied 48 days. From Wadi Sarab (lat. 20.10 : long. 57.45 E.) to Salala, capital of Dhufar (lat. 17.20 : long. 54.6 E.) is the habitat of a group of five tribes which are racially distinct from the Semitic Arabs, speaking four dialects not understood by Arabs, and having closer affinities with Ethiopia than Arabia. There are Harasīs, Bautāhara, Mahra, Qara, and Shahara. They are clearly a block of non-Arab tribes of great local antiquity, and as regards the last four, at least, of Hamitic origin. They have an ancient tradition of a North African origin. They have many interesting and perhaps unique customs. The women are not veiled and tattoo the chin with a short vertical line with a dot on each side. Some have a bracelet-like design round the wrist. In Dhufar they paint the face red, black, and green for religious festivals, marriages, circumcisions, etc.—generally a line along the edge of the cheek under the cheekbone and one bridging the nose across the eyebrows. The men are not tattooed. The women shave a half-inch parting along the centre of the top of the head and around the forehead to show a large expanse of brow. The boys' hair is cut short except for an inch wide strip. The men shave clean except for the chin tuft by which they swear. Circumcision is universal, the boys at adolescence, the girls on the day of birth or the second day, the reverse of the custom in Oman, where the ages are 6 for boys and 10 years for girls. In Dhufar elaborate rites are performed in which, after the operation, the boy, carrying a sword, is chased three times round the assembly by an unveiled virgin, also holding a sword. A wife must not show grief at the death of her husband. With the Qara death is a time of wholesale sacrifice of cattle, camels, and sheep. Special reverence is shown for the cow, especially at milking, which is a male prerogative. It is shameful for a woman to touch the udders. This reverence for the cow is completely reversed in Oman, where milking is only fit for women, and the cow is almost an unclean animal. The Harasīs will neither milk nor slaughter their sheep in sunlight, and two breeds of sheep no tribesman whatsoever will slaughter until after dark.

Variations in the Composition of Milk.—It is well known that the composition of milk is somewhat variable, and a committee of the Ministry of Agriculture and Board of Agriculture for Scotland has issued a summary of the circumstances known to be associated with such variations (Min. Agric. and Fish., *Miscellaneous Publications*, No. 65, London : H.M. Stationery Office, price 4*d*.). The mean percentages of fat and of solids-not-fat have been found to be respectively 3·70-3·95 and 8·746-8·78 (Tocher, Crowther, Cranfield). The fat content is likely to be low when a long interval elapses since the previous milking, and when the milker is inexperienced and fails to draw the 'strippings'. As the cow ages, the average percentage of fat falls, and during lactation there is a gradual fall until the 14-16th week, followed by a gradual increase. Different breeds yield different fat contents, the Jersey being richest (5 per cent or more) and the British Friesian lowest (3·7 per cent). Underfeeding, while reducing the *yield*, affects the *quality* of the milk only shghtly. Day-to-day variations in composition occur and are difficult to explain. From figures derived from two dairy companies, 7-8 per cent of churn samples are likely to be deficient in fat, and 5 per cent in non-fatty solids. Cranfield and Ling have recorded the composition of the milk of an abnormal cow during three lactations. Fat percentages were very variable, but solids-not-fat were consistently low, only 2 per cent of the samples exceeding 8·5 per cent. During the first two lactations no abnormality of the animal could be detected, but during the third tuberculosis of the udder and lungs developed, and it is suggested that an abnormally low solids-not-fat content may be a sign of incipient disease (*Jour. Agric. Sci.*, vol. 19, p. 491).

Birds of North-Eastern Brazil.—The bird fauna of north-eastern Brazil is rich in species, for a comprehensive list, based upon collections made by Heinrich E. Snethlage between 1923 and 1926, but including every species recorded in literature from the three States concerned, comprises 524 forms (Charles E. Hellmayr in *Field Mus. Nat. Hist. Zool. Series*, vol. 12, No. 18, 1929). Within the boundaries of the region discussed, little differentiation seems to have taken place, and, contrary to the conditions in the Amazonian region, the rivers in this part of Brazil have little zoogeographical significance. But it is clear that the bird fauna contains several distinct elements. A group of forest birds of Amazonian parentage appears to have penetrated eastward by following the gallery forest which extends along the banks of many rivers far into the open country. Many of these are unknown in eastern Brazil. Beyond the forested belt, in a southerly direction, occurs a second, very different fauna, which presents a great resemblance to the bird life of Bahia. Other elements are less evidently associated with the neighbouring geographical areas, some having been found so far in a restricted portion of the area investigated, while others find a limit set by the Rio São Francisco, east and south of which they are either absent or are represented by allied forms.

Histology of the Mid-Gut of *Vanessa*.—H. Henson has examined the histology of the mid-gut in the five larval stages of *Vanessa urticæ* (*Quart. Jour. Micr. Sci.*, vol. 73, part 1, 1929). The mid-gut has three categories of cells—interstitial, goblet, and columnar. The interstitial cells renovate the epithelium by the addition of new cells at each larval ecdysis. There is a period at the beginning of each instar during which occurs cell differentiation from interstitial nests, but this process soon ceases. Cell division, by mitosis, of the interstitial cells occurs throughout the instar. The goblet cell cannot become a columnar cell, neither can the former be derived from a senescent columnar cell, for goblet cells are present at the time of hatching. Both are derived by independent modification of interstitial cells. The contents of the goblet have the same affinity for counter-stain as the striated border and appear to consist of a closely packed mass of fibrils not optically distinguishable from the striated border. The author favours the view that the secretion vesicles seen on the ends of many of the columnar cells are not the result of a secretion process but of a process of cell disintegration due to wear and tear or to the incidence of metamorphosis.

Internal Secretion in Invertebrates.—G. Koller (*Biological Reviews*, vol. 4, No. 3, 1929) reviews our present knowledge of internal secretion in invertebrates. The presence of active sexual hormones can be assumed with reasonable certainty in cases where

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parasitic or experimental castration brings about specific changes in secondary sexual characters, for example, the parasitic castration of *Carcinus*, *Inachus*, and *Pagurus* by Rhizocephala, the result of which in male crabs is a definite approach to the female facies. It has been shown by the castration, by radium, of *Asellus aquaticus* that the development of the brood pouch in this animal is dependent upon the presence of functional ovaries, but experiments on caterpillars by several investigators do not permit the assumption that sex hormones exist in these animals. In the Sipunculid *Physcosoma*, Harms has demonstrated histologically and physiologically the existence of an endocrine gland (internephridial organ) the secretion of which is essential to the life of the animal. The characters of the branchial and pericardial glands of Cephalopods suggest endocrine action. The œnocytes of larval and adult insects are unicellular endocrine glands. Koller has shown by blood transfusion that internal secretions are probably concerned in the ecdysis and pupation of caterpillars, but the site of formation of the hormones is unknown. Koller and Perkins have shown experimentally that the expansion and contraction of the chromatophores of shrimps and prawns is due to substances secreted into the blood in response to light stimuli. The two secretions concerned are formed respectively in the eyes and in the rostral region.

Pug-headed Trout.—The occurrence of the abnormality known as pug-head or bulldog-head amongst fishes has often been recorded, and E. W. Gudger has summarised the cases found in Salmonoids, and describes new examples which have come to his notice (*Bull. Amer. Mus. Nat. Hist.*, vol. 58, Sept. 1929, p. 531). The deformity would appear to be due to a failure of the base of the skull to elongate, the check to the growth of the parasphenoid tying down the surrounding bones, so that the upper part of the head remains in an essentially embryonic condition, while the lower jaw attains almost normal size. Feeding is not prevented by either of the two forms which the deformity assumes amongst salmonoids, but there is a suggestion, founded on a limited number of breeding observations, that the malformation is inheritable and transmissible. The author makes a geographical error which we cannot pass: "Next for England", he says, and proceeds to discuss more Scottish examples. Indeed, in a wonderfully complete catalogue, he omits one of the few examples which England has supplied, that of the bulldog-headed trout from a beck on Pennyghent, described by Clarke and Roebuck in "The Vertebrate Fauna of Yorkshire".

Origin of Cultivated Wheats.—Further attempts are being made to throw light on the origin of cultivated wheats by a study of the chromosomes. The hexaploid wheats might be autopolyploid, with six similar sets of chromosomes, or allopolyploid with unlike sets derived through crossing of different species. Mr. Fuyuwo Kagawa (*Jour. Coll. Agric. Tokyo*, vol. 10, No. 3) has made measurements of the chromosome sets in various species of *Triticum* and *Ægilops* in order to obtain evidence on this point. The chromosome sets of *T. monococcum*, *T. dicoccum*, *T. polonicum*, and *T. vulgare*, *Ægilops speltoides* ($2n = 14$) and *Æ. cylindrica* ($2n = 28$) were compared as regards the length and the number and position of constrictions in the chromosomes. In *T. polonicum*, for example, the 28 chromosomes are of at least eight types, differing in length and the position of constrictions. Six of these types do not correspond to chromosomes in the set of *T. monococcum*. The 28 chromosomes of *T. dicoccum* are classified into ten types, seven of which are different from those of *T. monococcum*. The 42 chromosomes of *T. vulgare* belong to at least nine types, eight of which appear to differ from those of *T. monococcum*. It is concluded that the polyploid wheats possess only one pair of most of the chromosome types and that they did not originate through duplication of a basic set, but probably from crossing among ancestors having different sets. Similarly it is concluded that the tetraploid *Ægilops cylindrica* did not arise through duplication of the chromosome set of a diploid species such as *Æ. speltoides*.

The Great Barrier Reef.—The nature and origin of the Great Barrier Reef and the Queensland coast are discussed in great detail in a paper by Mr. J. A. Steers in the *Geographical Journal* for September and October. Previous writers on the origin of the reef fall into two classes, those who regard the reef as a thin veneer on a platform, and those who see in it evidence of the submergence that Darwin suggested. Mr. Steers, who was attached to the Great Barrier Reef Expedition, believes that faulting or flexing of the peneplain of north-eastern Australia has been more important in the formation of the reef than the subsidence of the continent. Evidence of faulting was found in practically all parts of the reef region visited. Similar evidence is known from other parts. Faulting has obviously played an important part in the formation of the coast-line. Mr. Steers goes on to show that the trend lines of the continental shelf are similar to those of the mainland, and he concludes that the Barrier has grown up concurrently with the subsidence of a series of fault blocks. At the same time he shows that faulting has been most intense in northern and north-central parts of the Barrier area. It is of interest also to note that borings on the Michaelmas cay show that a coral reef can grow up on unconsolidated material.

Miocene Mollusca from Jamaica.—The first part of an important work by W. P. Woodring on the Miocene mollusca from Bowden, Jamaica, appeared in 1925 and was noticed in these pages at the time (NATURE, Dec. 12, 1925, p. 881). We have now the pleasure to record the publication of Part 2 dealing with the gastropods and giving a discussion of the results (Carnegie Inst., Washington, *Pubn.* No. 385). This ponderous volume of 564 pages and 40 plates in every respect resembles its predecessor in the scrupulous care with which it has been compiled and produced and it fully merits similar praise. It seems that the total number of molluscan species present is 610, all marine, for though some land snails have been recorded, the author considers them to have been accidental introductions of living animals that fell into openings in the ground and so got collected with the fossil material. No other American Tertiary locality has yielded so abundant a molluscan fauna. The origin, ecology, and age of the Bowden fauna are fully discussed. The author summarises the published information on the Miocene mollusca from other localities in the American tropical region to which naturally they are most akin, whilst directing attention to their similarity to those of southern France and the Mediterranean region. The Bowden horizon would appear to fall at the top of the Middle or at the base of the Upper Miocene.

Italian Earthquake of Mar. 27, 1928.—Two useful studies of this earthquake in the Carnic Alps have been published, one by Prof. A. Cavasino (*Ital. Soc. Sism. Boll.*, vol. 28, pp. 77-100; 1929), the other by Prof. M. Gortani (*L' Universo*, Dec. 1928). Though the intensity was high (9 or 10, Mercalli scale), the epicentral area contained only 30 square miles, its centre

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being in lat. 46° 21′ N., long. 12° 59′ E. The intensity decreased rapidly outwards, implying a small depth of focus, 4 or 5 miles according to Gortani, and 11 miles according to Cavasino (using Seebach's method). The epicentral area was elongated north and south, transversely to the tectonic lines of the Carnic Alps. Cavasino, from a large number of observations, estimates the mean velocity of the primary waves as 7·3 km. per sec. and of the secondary waves as 4·0 km. per sec.

Variations of Mean Sea-level.—It is often supposed that once the variations of sea-level due to astronomical (tidal) and meteorological causes have been eliminated, carefully made tidal observations afford a secure basis for establishing the datum plane required in geodetic levelling, and for detecting possible changes in the level of the land. In "Studies of Mean Sea-level" (*Bull. Nat. Res. Council*, No. 70, Washington, 1929), Douglas Johnson, in a report written for a Committee appointed by the Council to make shore-line investigations of sea-level, indicates various causes why this supposition is untrustworthy. Chief stress is laid on variations of level due to changes in inlets and bars at the mouth of estuaries or nearly enclosed bays into which rivers flow; the changes in tidal currents due to such and other causes can alter the mean sea-level in an estuary or bay by amounts which depend on the form of the shore-line, the direction of prevailing winds, and other factors, and which may in favourable circumstances be so great as a number of inches. Observations of mean sea-level in Jamaica Bay near New York have disclosed local inequalities, while the level inside differs from that outside by from three-quarters of an inch to two inches—in close agreement with the predictions made in a theoretical study of the local conditions.

Heat Insulators.—Special Report No. 35 of the Food Investigation Board deals with heat insulators, contains nearly 100 pages, and is issued at 2*s*. 6*d*. (London: H.M. Stationery Office). It covers the whole of the work done on the subject by Dr. E. Griffiths at the National Physical Laboratory, for the heat insulation sub-committee of the Board since its formation in 1918. Almost every known type of cork, wood, powder, rubber, and fibre has been investigated, and the general conclusion is that for refrigeration purposes there are several materials which possess the necessary mechanical strength, do not too readily absorb moisture, and the heat conductivity of which does not exceed 0·00010 in c.g.s. units.

Amorphous Carbon.—A preliminary investigation of the anomalous diamagnetism of graphite, described by S. Paramasivan in the August number of the *Indian Journal of Physics*, is of interest in its bearing on the problem of the nature of amorphous carbon. Specimens of the latter which had been prepared from very different sources—naphthalene, anthracene, sugar, coal gas, wood charcoal, and two kinds of coal—all had a specific diamagnetic susceptibility close to that of diamond ($0{\cdot}5 \times 10^{-6}$), whilst only one body examined, graphitic anthracite, had an appreciably higher susceptibility ($0{\cdot}97 \times 10^{-6}$), and even that was well below the number for pure graphite ($4{\cdot}2 \times 10^{-6}$). There is some evidence that the susceptibility of graphite is less when it is finely divided than when it is in a massive state, and the X-ray investigations that have been made of similar bodies tend to show that a graphitic structure develops in course of time if rearrangement of the atoms is facilitated by heat, but the immediate conclusion to be drawn from the present experiments is that, so far as its magnetic properties are concerned, freshly prepared amorphous carbon is practically indistinguishable from diamond.

Quadrivalent Tellurium Derivatives.—In 1920, Vernon obtained two different forms of dimethyl telluronium iodide, Me_2TeI_2, and explained these as space isomers in which the valencies of the tellurium were in one plane:

In the March number of the *Journal of the Chemical Society*, however, H. K. K. Drew showed that the first compound is normal, and in it the valencies are probably directed towards the vertices of a regular tetrahedron, as in methane, whilst the second compound was not a true isomer but a complex substance, of salt-like character, having the same empirical formula. This was extended to similar compounds. In the September number of the same journal, Prof. Lowry and F. L. Gilbert review the properties of quadrivalent derivatives of tellurium in the light of Drew's formulæ, which they accept in their main features, although they consider that the properties of the two types of compounds are not so sharply separated as Drew suggested. They consider, from other evidence, that the complex form may have either the formula proposed by Drew, namely, $[TeMe_3]^+[TeMeI_4]^-$, in which all the halogens and methyl groups are covalently linked to tellurium, or $TeMe_3I$, $TeMeI_3$, corresponding with a mere aggregate or double salt of the two components. This explains the colours of some of the compounds. The authors give the results of experiments on the absorption of light by the compounds as well as the conductivities, which support their assumptions.

Pulverised Fuel in Electric Power Stations.—The paper on the modern use of pulverised fuel in electric power stations, by R. A. Chattock, the electrical engineer to the Birmingham Corporation, which is published in the *Journal of the Institution of Electrical Engineers* for October, is a very timely one. Mr. Chattock gives the results of experiments carried out in Birmingham which demonstrate that the use of pulverised fuel gives a higher combustion heat efficiency in the boilers than that obtained by mechanical stokers. With pulverised fuel firing a much larger proportion of the ash appears in the form of fine dust, the bulk of which is carried away by the waste furnace gases. The ash consequently is now becoming more apparent and is objectionable. With stoke fired boilers a coarse grit is carried out of the chimneys and is deposited in the immediate neighbourhood. After trying various experiments the 'cyclone' catcher was adopted, and it is found that this catches 90 per cent of the dust that formerly escaped up the chimney. With pulverised fuel boilers, however, the same type of cyclones only stopped about 35 per cent of the dust. What escaped was so fine that it was carried away to great distances and deposited over a very large area. At present two cyclones in series are being used which catch 75 per cent of the dust. It is hoped by washers and electrostatic catchers to increase this percentage very appreciably. The elimination of the sulphur products in the furnace gases is a new problem. Mr. Chattock thinks that it would be impossible to use only coals which contain very little sulphur, as he had to purchase coal from thirty or forty different pits and the proportion of sulphur in the coal varies considerably. Washing the gases is probably the simplest and best way of preventing both the emission of these products into the atmosphere and catching the dust.

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