

Research Items.

THE HUMAN FACTOR IN ACCIDENTS.—The importance to industry of a study of accidents, major and minor, cannot be exaggerated, but when definite causative relations are sought the difficulties and complexities seem to render scientific treatment almost impossible. The immediate relation is between machinery and an accident, and quite rightly have efforts been made to diminish the risk due to machinery. More detailed study reveals, however, a number of determinants which point to less obvious factors. Report No. 34 of the Industrial Fatigue Research Board (H.M.S.O., price 5s.) is a contribution by Miss Newbold to the study of the human factor in the causation of accidents. It is a statistical analysis of minor accidents reported from many firms and covering a considerable period of time. It is found (1) that in nearly all the groups the average number of accidents is much influenced by a comparatively small number of workers, and that the distributions among the workers are far from chance; (2) that there are many indications that some part is due to personal tendency; (3) that the people who have the most accidents are, on the whole, those who pay most visits to the ambulance room for minor sicknesses. The study is very important not only for what it brings forward in the way of positive evidence, but as an example of scientific method applied to a very difficult problem where vague speculation and prejudice frequently masquerade as fact. The writer suggests that further detailed investigation should be undertaken along the lines of individual study and experimental psychology.

MAN IN THE GLACIAL PERIOD IN GREAT BRITAIN.—In *Man* for April, Mr. J. Reid Moir discusses the inferences to be drawn from the discovery of a palæolithic implement on the foreshore at Eccles-on-Sea, Norfolk, by Mr. W. W. R. Spelman. The implement is an oval core-implement, unpatinated and unrolled. Its form and flaking assign it to the class of specimens concerning which, in the present state of our knowledge, it can only be stated that they belong either to Late Chelles or Early Acheulean. The unabraded condition of the implement suggests that it must have been uncovered just prior to discovery from a bed underlying the beach, as the sandy beach and low cliff reveal no humanly flaked flints. Such a bed must have been the stratum designated as 'First Till.' In all probability the First Till represents one of the deposits laid down during the second Glacial Period of East Anglia, and was separated from the Upper Chalky Boulder Clay (of the third Glacial Period of East Anglia) by the inter-glacial phase represented at Hoxne, Foxhall Road, Ipswich, and elsewhere. As St. Acheul implements occur in this phase, it becomes of importance to ascertain whether the present implement is of Chellean or Acheulean date. The main fact, however, is that a definite flint implement of Lower Palæolithic Age has been found under conditions making it probable that the specimen was derived from a glacial boulder clay and thus affords additional evidence of the existence of man in England during the glacial period.

RESEARCH IN THE FAYUM.—In *Ancient Egypt* for March, extracts are given from correspondence from Miss Gertrude Caton-Thompson, and Miss Elinor W. Gardiner, who are working in the Fayum on behalf of the British School of Archaeology in Egypt with the view of linking the archaeology to the close of geological changes. Writing from Dimeh, a little south of the lake, Miss Caton-Thompson says that it is plain that there was more than one simple rise and fall of

the lake in Pleistocene times. A shore line 189-190 feet above the present lake (46 ft. over sea) yields much evidence of the prehistoric people. On a slope down to the Birket Qarun, flint was obtained at 176 feet on a ridge on which it was unlikely to have been washed (*i.e.* 32 feet over sea, submerged since 9000 B.C.). Pigmy cores came down to 138 feet (6 feet below sea, submerged since 17,000 B.C.). Investigations at Kom have settled the question of the contemporaneity of the polished flints, the pottery, and the bone arrows, but only one culture is represented. Miss Gardiner writes that the most important fact in the geology of the area is that the Fayum people were living on an old lake surface and not tertiary rock as supposed. There is distinct evidence of two lakes. The older dried up and the deposits denuded very considerably before the waters of the second lake gained access to the Fayum. A section in a wady shows gravels full of flints, mostly wind worn, at 185 feet above lake level, probably belonging to the older lake beds. The surface of the gravel is 185 feet above lake level (submerged since 8000 B.C.). A considerable number of Fayum implements were found upon it. (The statements in brackets are from explanatory notes by the editor of *Ancient Egypt*.)

A DIET CHART.—We have received a copy of the "Grassendale" Diet Chart prepared by S. G. Willimott and Frank Wokes, Grassendale, Liverpool (price 6d.), which appears to have been designed for the benefit of the general practitioner of medicine who wishes to place his patient on a known diet before sending samples of blood, urine, etc., to a biochemical laboratory for chemical examination. At the same time, it should be of use to all who wish to treat their patients by means of strict dieting. The information given on the chart is comprehensive: 'for a large variety of natural, and a few patent, foods the following data are set forth in a series of columns; the percentage composition (carbohydrate, protein, and fat), the energy value, the digestibility coefficient of the carbohydrate present, and the most important of the inorganic elements contained in the food, and whether it leads to the formation of acid or base in the body, its relative power in this respect being indicated by a numerical figure. At the same time, the relative content of the material in the three vitamins, A, B, and C, and the presence of purines, are also indicated. Blank columns are given for entering the amounts of each food eaten in the twenty-four hours and for the results of the calculations of the quantities of protein, fat, or carbohydrate assimilated. Explanatory notes of the chart are given on the back: those on vitamins might perhaps have been a little clearer; dry seeds contain vitamin B, but on germination it is vitamin C which appears in large quantities. The information given in the chart should be of use in dieting cases of diabetes mellitus, gout, and nephritis, being available in a compact and handy form; whilst sent to the laboratory with the specimen it will enable a more correct interpretation to be placed on the results of the chemical examination.

THE SWIM BLADDER OF SOME INDIAN FISHES.—In his thesis recently presented to the Faculty of Sciences in Paris, D. R. Bhattacharya has given an account of the structure and relations of the swim bladder of Indian fishes belonging to the families Sciaenidæ and Ophiocephalidæ. In the former the swim bladder is oval and extends the whole length of the abdomen. Issuing from it is a complex system of branches passing to the head and to the tail—those in the head region have an arborescent form, and some of

them enter into relation with the auditory capsule, being separated from the perilymph only by thin fibrous tissue. Some of the blind branches also penetrate the operculum and the pectoral fin and their ends come to lie just under the skin. In *Scienoides pama*, two lateral lobes arise from the swim bladder and extend between the peritoneal epithelium and the body-wall and form a complete sac around the body-cavity. A dorsal sac is formed in a similar manner and completely envelops the swim bladder dorsally. The two sacs meet laterally, and thus in a dissection one comes upon this large sac enveloping the swim bladder. In the Ophiocephalidæ the swim bladder is an elongate sac extending from the anterior part of the abdomen to the tail, and does not give off diverticula. Details are given of the glands of the swim bladder in each family.

EFFECT OF LIGHT ON THE MOVEMENT OF EARTH-WORMS.—E. Nomura has made (*Science Reports Tohoku Imp. Univ.*, Japan, fourth series, vol. 1, pp. 293-409, 1926) careful investigations on the effect of light on the movement of *Allolobophora fetida* to test the differential effect of light on fresh and on fatigued worms, to ascertain the average limit of the free or random movements, the influence of light—horizontal, and from above, and in flashes—on worms with the cerebral ganglia removed and on worms in the course of regeneration. His general conclusions may be summarised as follows: The orientation of the worm is determined by the antagonistic functioning of the cerebral ganglia and of the ventral nerve cord. The brain causes negative orientation and forward crawling, while the nerve cord causes positive orientation and crawling either backwards or forwards. By the predominant influence of the brain the longer exposure to light of stronger intensity causes the stronger negative phototaxis. With light of a given intensity the strongest negative phototaxis is produced when the light rays fall at an angle of about 25° to the horizontal. The most anterior part of the ventral nerve cord causes the strongest positive orientation, the more posterior parts cause a progressively less pronounced reaction—that is, the worms exhibit axial gradient in these reactions.

SOME NON-MARINE MOLLUSCA OF THE WESTERN HEMISPHERE.—A fifth part of Dr. H. A. Pilsbry's notes and descriptions of South American land and fresh-water molluscs, that were begun in 1924, has appeared detailing various new species, including one of that remarkable land snail *Megaspira* (*Proc. Acad. Nat. Sci. Philad.* 77). The same author on later pages in the same publication, deals with other new non-marine mollusca. The most remarkable of these is a very small *Physa* from Zion Canyon, Utah. No snail can be found in the swift-running stream at the bottom of the canyon, but where the water trickles out of the rock joints of the almost vertical walls of the canyon, the wet rock faces become coated with green algæ, and it is on these isolated patches of algæ the little *Physa zionis* lives. This account is followed by descriptions of new non-marine shells from Querétaro, Mexico.

MODIFICATIONS IN THE CALYX OF PRIMULA.—Since recording in NATURE of April 10, p. 518, the occurrence in phylloidy of the calyx *Primula vulgaris* (Huds.), Mr. F. R. Browning writes that he has seen hybrids of *P. vulgaris* with *P. veris*, sometimes termed *P. variabilis*, Goup., showing a completely petaloid calyx. The three flowers examined were 'pin-eyed,' two of them having five petals and five petaloid sepals, which alternate with them normally. The third flower has six petals and five petaloid sepals; the sixth is

diminutive though decidedly petaloid. It also differs from the others in that it has not the well-marked ridge at the midrib, which characterises the other sepals. The size attained by this unusual calyx is in all cases the same as that attained by its enclosed corolla.

DOMESTICATED PLANTS IN SPANISH AMERICA.—An interesting field of research is opened up in a paper on the plant content of adobe bricks by George W. Hendry and Margaret P. Kelly which has been published by the California Historical Society. Missionaries and travellers who visited California in the Spanish period are known to have introduced a number of cultivated plants into the country, but precise information, especially as to varieties, is lacking. An examination of bricks from a number of buildings, ranging in date from 1771 to 1845, although representing a small sample only, has furnished a considerable amount of exact information on the point. The adobe bricks were made of a variety of soils, ranging from sandy loam to heavy loam, some natural, others the result of artificial mixing, and contained organic matter chopped into two-inch lengths, usually wheat or barley straw, but also weeds and grasses of various kinds. Of the twenty-two weeds, eleven are introduced European species. Six varieties of wheat were identified. This establishes a new date for the introduction of Big Club wheat (*T. Compactum Humboldtii*) not previously known as a mission crop. One wheat, California Club wheat (*T. Compactum Crinaceum*), is not grown in California to-day, but disappeared prior to the Mexican period (1822-45), and another, a beardless wheat (*T. Vulgare Albidum*), is unknown. Propo wheat (*T. Vulgare Graecum*), supposed to have been introduced from a Chilean strain about 1875, was also found, and may have persisted from the original Spanish stock. Only one variety of barley (*H. Vulgare Pallidum typica*) was found. One wild oat kernel is of doubtful authenticity. Of two cultivated oats, *Avena sativa*, which belongs to a group not adapted to central California, may represent an unsuccessful experiment.

CHROMOSOMES OF ROSES.—In a reprint from his *Experiments in Genetics*, Dr. C. C. Hurst discusses the origin of species in Rosa. Starting with a hypothetical decaploid rose (which would have ten times seven chromosomes), he supposes that the various septets of chromosomes became differentiated under sub-polar conditions, so that each set was pre-adapted to a different climate. This all happened within a single (hypothetical) decaploid species of rose. The hexaploid, pentaploid and diploid existing species were afterwards formed by the throwing off of different septets of chromosomes successively until the present diploid species were arrived at, each adapted to different conditions. This highly hypothetical speculation is contrary to all that is known concerning polyploidy in other plants. It also implies a sort of evolution *in vacuo* of the chromatin, which is contrary to every experimental evolutionary view of the relation between the organism and its environment. The evidence from other plant genera is that polyploid species are derived from diploid ancestors, and not the reverse.

MEAN SEA-LEVEL IN THE OCEANS.—The relation between wind or current and mean sea-level in the Indian and Atlantic Oceans and adjacent seas is discussed by P. H. Gallé in a short paper in the Proceedings of the Koninklijke Akademie van Wetenschappen te Amsterdam, vol. 27, No. 10. Mr. Gallé concludes that the range in mean sea-level is mainly due to

fluctuations of wind and current, either near at hand or far distant. He believes that while the north-east trades and the equatorial current are causes of fluctuations in mean sea-level on the European coast, the main cause must be looked for in fluctuations of the north Atlantic high- and low- pressure systems. The correlation factor between monthly departures of the velocity of the current and strength of the wind and departures from mean sea-level is given as varying between 0.829 and 0.957. The time relation between changes of velocity in the equatorial current and mean sea-level on Atlantic coasts varies from one month in the Azores to three months in the English Channel and four months on the north coast of Norway.

ATLANTIC DOLDRUMS.—The Meteorological Office, Air Ministry, in "Geophysical Memoirs," No. 28 (London: H.M. Stationery Office, 1926. Price 1s. 6d. net), has issued a discussion of "The Doldrums of the Atlantic" by Mr. C. S. Durst. The author rightly gives considerable credit to Captain Toynbee, the first Marine Superintendent of the Meteorological Office, for his study of this district and the publication of the observations for the Nine Ten-Degree Squares comprising the area of the Atlantic Doldrums. A previous discussion was undertaken of Square 3. The copious letterpress accompanying these charts by Captain Toynbee is full of valuable information, especially on the direction of upper clouds with the different surface winds. The author notes that the minimum of pressure in the Doldrum belt follows the position of greatest humidity rather than the position of maximum temperature, and he is of opinion that over the ocean it would seem that convection must be started dynamically rather than thermally. If obtainable, synchronous weather charts over the Doldrum area would add much to our present knowledge of this interesting region.

THE COLOUR OF RED FORMATIONS.—In the *Journal of Geology*, No. 2, 1926, a valuable discussion of the origin of the colour of red beds is presented by G. E. Dorsey. It is shown that the non-red rocks often contain more iron and even more ferric oxide than do the red beds. The red colour is due not merely to oxidation—which is widespread—but to dehydration. Favourable conditions for the production of the red hydroxide, turgite, and the red oxide, hæmatite, are found in warm moist climates, and not, as has previously been asserted, in deserts or semi-arid regions. Ferric hydrate turns red spontaneously by dehydration, even under water, if given time enough. In the tropical belts heat favours dehydration, and the heavy cover of vegetation keeps the soil from being rapidly removed, so that time is available for the reaction to proceed. Most sediments are carried to the seas and there, exposed to the reducing action of the decay of marine organisms, they lose any red colour they originally possessed. But red detritus is able to retain its colour if it comes to rest upon the continents where no widespread reduction is in progress. Thus for the most part the red formations of the geological column represent continental deposits; though it is recognised that occasional wedges may be found in marine series, like that now forming off the mouth of the Amazon, where fresh water and red detritus are sufficiently abundant to force the true marine conditions farther off-shore.

INVESTIGATIONS ON THE EARTH'S CRUST.—The *Year Book*, No. 24, for 1925 of the Carnegie Institution of Washington includes, *inter alia*, reports on the work of (i.) the Geophysical Laboratory directed by Arthur L. Day, (ii.) the Advisory Committee on

Seismology, and (iii.) of certain physicists associated with the Institution. The latter include S. J. Barnett, formerly attached to the Department of Terrestrial Magnetism, who is continuing his valuable researches on rotation by magnetisation, and vice versa, at the California Institute of Technology, Pasadena. Much of the work done under R. A. Millikan in the Norman Bridge Laboratory at Pasadena is also subsidised by the Institution. In the Geophysical Laboratory at Washington a large part of the work has consisted of experiments involving very high pressures; the attainment of a pressure of 15,000 atmospheres (225,000 lb. per sq. in.) on a small sample of material has now become "a matter of simple routine": this corresponds to the pressure at a depth of 30 miles below the surface of the earth. Still higher pressures are readily obtained, but beyond the limit stated the work is liable to be interrupted by expensive and annoying explosions. The compressibilities of the more important rocks and minerals have been investigated under these high pressures: the results are of special interest in determining the speed of earthquake waves through the earth. Less directly, the work bears on the temperature within the earth, and has led to an estimate of 850° C. at 30 miles depth, and 1700° at 100 miles, values which are much lower than has generally been supposed. Laboratory studies and 'field' observations (at Vesuvius and elsewhere) on volcanic problems have also been considerably advanced. The Committee on Seismology plans to establish a central seismological laboratory at Pasadena, and has completed the development of new instrumental installations for the accurate measurement of the horizontal and vertical components of local as distinct from widespread earth movements (such as ordinary seismographs record). It is hoped to furnish a considerable number of seismological stations with such installations. In co-operation with the Coast and Geodetic Survey, triangulations are in progress for the determination of relative surface displacements in a large region around California. The measurements already made indicate that the stations on the west side of the fault between Monterey and the Santa Barbara Channel have all been moving northward, the maximum movement recorded, whatever its source, being about 24 feet, at a station situated a few miles west of the city of Santa Barbara.

A MICROLUMINOMETER LIGHT SOURCE.—At the meeting of the Physical Society on May 14, Dr. Fournier d'Albe demonstrated an apparatus for producing very minute measurable fluxes of light and illumination. The original source of light was a small glow lamp of $\frac{1}{8}$ c.p. candle power, which illuminated a ground-glass disc with an aperture of $\frac{1}{2}$ in. This disc acted as a secondary source of $\frac{2}{3}$ c.p. in the direction of propagation. A number of lengths of tubing, 2 in. long, were telescoped together, each length ending in a $\frac{1}{16}$ in. diaphragm covered with ground glass. The amount of light emerging from each successive diaphragm was $\frac{1}{27}$ th part of the light emerging from its predecessor. The candle power thus obtained was 1.6×10^{-4} c.p. at the first stop, 6.4×10^{-7} c.p. at the second stop, 25.6×10^{-10} c.p. at the third stop, and 10^{-11} at the fourth stop. The light emerging from the fourth stop is quite invisible, even after prolonged accommodation, and represents, indeed, a star of about the seventh magnitude. The microluminometer source is intended for a comparison of the efficiencies of photoelectric cells and selenium respectively in detecting faint light. It is claimed that the faintest source is measurable within 2 per cent.