

Research Items.

SEX RATIOS IN AFRICA.—Capt. L. W. G. Malcolm has brought together in the *American Anthropologist*, vol. 26, No. 4, data from various sources, in addition to his own observations, bearing upon the question of sex ratios among the tribes of West Africa and other parts of that continent, with the view of ascertaining what relationship these ratios bear to racial decline or otherwise. In the case of the adult sex ratio there is, in the majority of cases, a low degree of masculinity. The preponderance of females over males, however, in many cases is due purely to artificial causes, such as intertribal warfare and slavery or forced labour, which have depopulated large tracts, especially in West Africa. The ratio is 89:80. For the sex ratio at birth the information is very scanty; but it appears to be somewhat lower than that of European countries. The suggestion that a surplusage of adult men over adult women of reproductive age is consistent with a corresponding decline in the crude population, and that an increasing population produces a surplusage of women, does not appear to be in accord with the observed facts. The evidence for Africa is too scanty to indicate whether there is a higher proportion of male to female births in polygamous or monogamous marriages. An appended note by Dr. A. S. Parkes suggests that the great excess of females among adults is produced by a high masculinity in the mortality, possibly due to an inherent frailty of males which is also apparent in European figures.

PLANKTON at CULLERCOATS.—Plankton investigations occupy a large part of the report for 1923-24 of the Dove Marine Laboratory, Cullercoats, Northumberland, each group being dealt with both in the form of lists and tables. With such an amount of information available, the plankton of the Cullercoats area should soon be thoroughly known. Miss Jorgensen states in her report on the Crustacea that, whereas there are many more decapod larvæ taken from the inshore stations, the copepods were in much larger numbers farther out. In her table, however, showing total copepods, she gives the largest average but one from Station I., which is one of those closest inshore. On carefully examining the detailed copepod tables, we find that this inshore maximum is chiefly due to Temora, a neritic copepod capable of living under very variable conditions. The bulk of Miss Meek's important work on pollution of the River Tyne is reserved for a separate memoir, only a short résumé appearing here in which she states that last autumn there was a good ascent of salmon, and the smolts passing to the sea in the spring were numerous, few having died in passing through the polluted area.

CHENOPODIUM OIL IN THE TREATMENT OF HOOKWORM.—In the *Journal of Pharmacology and Experimental Therapeutics* for December 1924, Drs. W. G. Millie and S. B. Pessoa give an account of the anthelmintic properties of the various components of chenopodium oil, one of the drugs authorised by the International Health Board for use in campaigns against hookworm disease. The constituents of the oil were isolated for these experiments at the Wellcome Chemical Research Laboratories in London, and the authors show that the only vermifugal agent in the oil is ascaridole, which proved to be remarkably efficient against the two common forms of hookworm, *Ankylostoma duodenale* and *Necator americanus*, though the latter was more susceptible to its action than the former. Victims of hookworm disease in the tropics almost invariably harbour other helminths,

notably *Ascaris*, in addition to hookworm, and ascaridole has the advantage over other hookworm remedies, such as thymol and carbon tetrachloride, of also eliminating *Ascaris* from the intestinal canal. In view of these results, the authors point out that if ascaridole itself proves too expensive for use in extensive campaigns against hookworm and it is necessary to resort to chenopodium oil, it is desirable that the dosage of the oil should be based on the amount of ascaridole in it. If this precaution were taken, much of the risk attending the use of chenopodium oil, which like all effective anthelmintics is toxic to the host as well as the parasite, will be avoided. The authors naturally do not refer to other remedies for hookworm, but there is now a considerable amount of evidence that a solution of ascaridole in pure carbon tetrachloride is probably the most effective remedy against joint infection by hookworm and *Ascaris*. It has the great advantage of being cheap, a point of first-rate importance in such campaigns where the cases to be treated are numbered by hundreds of thousands.

THE LEPIDOPTERA OF NEW YORK.—Memoir 68 of the Cornell University Agricultural Experiment Station (June 1923) has recently come to hand, and is devoted to an account of the "Lepidoptera of New York and Neighboring States." The author, Mr. W. T. M. Forbes, is to be congratulated upon this very careful and detailed piece of monographic work. It extends to more than 700 pages, and deals with all the so-called Microlepidoptera and such families as the Saturniidae, Bombycidae, and Lasiocampidae, etc., among the higher groups. It is, furthermore, prefaced by a good illustrated general account of the external morphology of the order. The wealth of information relating to family, generic and specific characters and the metamorphoses should prove of great value to the systematist, while at the end of the memoir there is a good index to the food-plants of all the larvæ referred to. We shall welcome the appearance of the remaining portion of this work, which, when completed, will serve as a general book for reference.

SEX-TRANSITION IN PLANTS.—*Arisaema japonica* is an Aroid which has usually been regarded as strictly dioecious, although American species may be monoecious. Tokujiro Maekawa (Journ. Coll. Agric., Imp. Univ. Sapporo, Japan, vol. 13, Part 3), in an interesting account of experiments with this plant, shows that the same corm is at first asexual, after one or more years develops a male inflorescence, and one or two years later becomes (and normally continues) female. The author collected 231 corms from which he demonstrated these phenomena of sex-transition. Occasionally retro-transition from female to male took place, but monoecious inflorescences were rare and intersex conditions apparently did not occur. Sex is here a progressive phenomenon in the individual correlated with the weight of the bulb, and believed to be dependent on the amount of formative assimilation products (*i.e.* size of leaves) rather than the amount of reserve material in the corm. It was possible to reverse the sex of a female corm by growing it in poor, sandy soil or by cutting off portions of the corm or leaves. In this way a corm which had been producing female inflorescences could be made to produce a male. The relation of these results to other studies of sex-determination in plants is discussed at some length. Schaffner (*Amer. Journ. Bot.*, vol. 9, p. 72) has obtained similar results with American species of *Arisemas*.

BROWN HEART IN AUSTRALIAN APPLES.—Reports 21 and 22 of the Food Investigation Board of the Department of Scientific and Industrial Research seem to show conclusively that this diseased condition of imported Australian apples results from the accumulation of carbon dioxide in the ship's hold during the voyage (see *NATURE*, vol. 112, pp. 636-7, October 27, 1923). Report 21 gives the results of the study of the atmosphere in ships' holds during the voyage by Messrs. A. J. Smith, Ezer Griffiths, and E. A. Griffiths. In Report 22, Mr. A. J. Smith, the physiologist sent out by the Food Investigation Board to Australia, presents the results of his investigations of conditions in the orchard and during the handling of the apples up to the time of shipment. No signs of brown heart were discovered in the fruit prior to shipment, nor was the treatment of the fruit likely to produce the disease. On the other hand, the concentration of carbon dioxide in unventilated ships' holds often rose above the safety limit of 10 per cent. during the voyage, and shipments examined on arrival showed marked correlation between occurrence of brown heart and high carbon dioxide contents recorded on the voyage.

A NEW DEVONIAN ECHINOID.—A new genus of echinoid (*Nortonechinus*) from the Upper Devonian of Iowa is described by A. O. Thomas (*Iowa Geol. Survey*, 19, p. 481). The genus shows several features of interest, and the great rarity of echinoids in the Devonian system gives importance to this discovery. *Nortonechinus* appears to be allied to *Archæocidaris*, but differs from it in having 11, or possibly 14, columns of plates in each interambulacral area instead of 4; and the imbrication of the plates is more considerable, so that the test must have been very flexible. The spines are remarkable for the great expansion of their distal ends, so that they became polygonal by mutual contact, and must have formed a coat of mail over the test similar to that seen in the living species *Colobocentrotus atratus*; this feature has been hitherto unknown in Palæozoic echinoids except to a limited extent in *Xenocidaris*. Parts of the lantern have been found and seem to be similar to those of modern cidarids.

THE GEOLOGY OF SOUTHERN RHODESIA.—A very valuable summary by H. B. Maufe of the physical features and geological formations of Southern Rhodesia appears in the first "Official Year-book" of the Colony, and is conveniently reprinted as a Short Report (No. 17) of the Geological Survey. The report is accompanied by an excellent colour-printed geological map, and the history of the region is well set forth in a provisional table of formations which also gives the associated igneous intrusions, earth-movements, and economic minerals. Unfortunately no fossils have been found in any beds older than those of the Karoo system. Even where fossils do occur, they are wholly terrestrial, the sea never having invaded the Colony since at least Carboniferous times. The *Glossopteris* flora is represented in the Wankie coalfield, while the Upper Karoo has yielded remains of dinosaurs and of petrified wood. The younger Kalahari contains freshwater shells and the plant *Chara*. The older rocks can be correlated lithologically with corresponding systems in South Africa, but in neither area has it yet proved possible to correlate with standard equivalents elsewhere. The discovery of uranium minerals would probably help in determining the position of one or two of the unfossiliferous formations. Already, indeed, the uraninites of Morogoro and Katanga may be used in this way. They are clearly of Upper pre-Cambrian age, and if the lithological correlations can be trusted, the Transvaal

System (sometimes thought to be Ordovician from the occurrence of a doubtful fossil in Angola) should be, as Prof. J. W. Gregory thinks, nearly equivalent to the Torridonian or Longmyndian in Britain.

PRECAUTIONS AGAINST TROPICAL CYCLONES.—The recent quarterly number of *Matériaux pour l'Étude des Calamités* contains an important article by Mr. Stephen S. Visher on tropical cyclones as calamities (No. 3, 1924, pp. 195-217). Most of it is devoted to a description of typhoons, their principal centres of origin, their seasonal distribution and frequency, and the courses followed by typhoons. In the concluding pages, he suggests several methods of reducing the damage done by them. Houses should be built of reinforced concrete and about twenty feet above the sea-level or the bottom of a valley. Coastal cities should be protected from hurricane waves by sea walls like that at Galveston, U.S., where six thousand lives were lost during a typhoon in 1900. Crops should be diversified, so that all is not necessarily lost at one blow. The taller growing varieties of bananas should be replaced by the dwarfed Chinese kind, and indiarubber plantations should be grown in sheltered valleys. Weather offices should be established in the stormier regions, so that sufficient notice of an approaching typhoon may be given by radio or telegraph to allow the strengthening of buildings or the removal of livestock and boats from the lowlands.

TEMPERATURE RECORDS AT WILLIS ISLAND.—We have received from Capt. E. Kidson, of the Meteorological Bureau of the Commonwealth of Australia, a note on a paper on "Observations from the Willis Island Meteorological Station" which was read at the meeting of the Australasian Association for the Advancement of Science in Adelaide in August 1924, together with copies of two weekly thermograph charts. The island offers useful opportunities for research into the meteorology of the trade winds, being in lat. 16° 18' S. and long. 149° 58' E., 250 miles from the mainland of Australia. The island is only about 600 yards by 250 yards at low water, and is less than 30 feet above low-water mark. It might thus be expected that the diurnal range should be one or two degrees only as over the ocean, instead of which the thermographs show frequently ranges of so much as 8° F. The thermograph is fitted in a Stevenson screen, which is fixed on a base of concrete. Dr. Kidson throws doubt on the efficiency of the Stevenson screen, but it is certain that the effect of the base of concrete must be very considerable. The cooling effect of showers of rain would appear to confirm this. In view of the ideal location of the island, it is highly desirable that observations should be taken there by means of properly ventilated instruments.

SOUND AND WIRELESS IN HYDROGRAPHY.—As a result of the extensive series of measurements of the speed of sound in sea water undertaken by the United States Coast and Geodetic Survey, the steamer *Guide* has been equipped with a special sound and wireless method of determining its position at sea during a hydrographical survey it is making of the coast of California. The equipment is described by Commander N. H. Heck and Messrs. E. A. Eckhardt and M. Keiser, of the Bureau of Standards, in Special Publication No. 107 of the Survey. A bomb of T.N.T. is fired under-water by the ship and the sound wave is picked up by three shore stations provided with hydrophones. Each hydrophone by means of a relay sends out a wireless signal which is received by the ship. The interval between the firing of the

bomb and the reception of the wireless signal is recorded automatically on a chronograph, and from the records for the three stations the position of the ship is determined. Full particulars of the apparatus are given in the paper, and it has been found to give results as accurate as visual methods, and to be applicable during fog and rough weather when these methods are no longer of use.

ATOMIC COMBINATION AND THE QUANTUM THEORY.—Messrs. M. Born and J. Franck, in the *Zeitschrift für Physik* of February 19, show that according to the quantum theory a stable molecule cannot be formed by the simple collision of two atoms, but that a triple collision is necessary, the third particle serving to carry off the excess of energy. In spite of this it is shown that molecules which are not fully quantified (quasi-molecules) may be formed, and that they may exist long enough to emit or absorb characteristic radiations which can be recognised in the spectrum of a gas. When two atoms collide they move round their common centre of gravity in cometary orbits, and during a certain period their trajectories are not very different from those of the atoms of a stable molecule. During this period it is possible for the quasi-molecule to be excited, an electron jumping into a higher quantum orbit; if this then falls back into the lower orbit, the quasi-molecule will emit a characteristic radiation. In a similar manner characteristic absorption phenomena will be produced, absorption bands being formed without any structure due to rotational quantification and others where the signs of vibrational quantification (band groups) are weak. A number of spectra can be explained in this way, particularly certain appearances in the spectra of metallic vapours.

EÖTVÖS TORSION BALANCE.—An improved model of the Eötvös torsion balance has recently been put on the market by Messrs. L. Oertling, Ltd. Hitherto visual observations in this type of instrument have necessitated the provision of long brackets to carry the observing telescopes, so that a large and heavy tent has been necessary for the protection of the balance. In the new Oertling model, telescope arms are completely eliminated so that the effective width of the instrument is reduced considerably. This balance can be used either for visual reading or photographic self-recording, the change from one system to the other being possible by simply replacing a ground glass screen by a photographic dark slide. The rotation of the upper part of the instrument into various azimuth positions is effected by a clockwork mechanism controlled by an electric time clock, which also controls the illumination of the scales at the proper intervals, and moves the photographic plate. A special optical system enables a magnified image of the actual scale to be observed or photographed, while the sensitivity is also increased and is variable at will. The spaces between the three metallic walls of the balance are packed with special insulating materials, while additional protection is provided by a three-walled cylindrical tent, the inter-wall spaces of which are also packed. Arrangements are provided by means of which it is possible to read the instrument from outside the tent, through specially placed windows, so that it is unnecessary to open the tent door after the instrument has once been set up. In this way it is claimed that temperature and radiation effects are reduced to an absolute minimum consistent with economical transport, while it is confidently anticipated that readings can be taken both by day and by night, and at least three stations occupied every twenty-four hours. Other modifica-

tions are introduced, among which may be mentioned the clamping of the balance to the tent after observations have been completed, enabling the instrument and tent to be moved together as a whole to the next station, after which the instrument is unclamped and relevelled, when it is immediately ready for use again.

THE LIMITING POSSIBILITIES IN STEAM PLANTS.—An examination of the available evidence and the fundamental facts in searching for the real upper limits to the sequence of operations in steam plants provided the subject matter for an interesting paper read by Profs. A. L. Mellanby and William Kerr before the North-east Coast Institution of Engineers and Shipbuilders on February 27. The paper opens with a discussion of the temperature limits, obviously a question of the properties of the materials employed. The results of direct stress and fluctuating stress researches, together with creep-limit considerations, demonstrate an upper limit of 750° F. to 800° F. for the ordinary steels and the best non-ferrous metals. With special steels, and allowing the possibility of fair advance to the metallurgist, the authors consider that 900° F. represents the steam-plant limit. The consideration of pressure limits is one of thermal efficiencies, and a critical survey of the factors involved indicates 1250 lb. per square inch as the limiting pressure above which no gain need be expected, although it appears that there is too little prospective gain to justify actual advance beyond 1000 lb. per sq. inch. Discussing reheating, the authors consider that two stages of reheating requiring a total heat supply of between 40 and 50 per cent. of the Rankine heat drop provide the true limit to the reheating process. This condition is closely met by reheating pressures of 500 and 180 lb. per sq. inch. The best feed-heating limits are obtained by choosing eight heaters operating on the range up to the saturation temperature corresponding to 1000 lb. per sq. inch. The limiting cycle thus starts from initial conditions of 900° F. and 1250 lb. per sq. inch, involves re-superheating at intermediate pressures of 500 and 180 lb. per sq. inch, and includes the employment of about eight extraction feed heaters, equally stepped, on a range of liquid heats up to that corresponding to 1000 lb. per sq. inch pressure.

SULPHIDE FOG PRODUCED BY BACTERIA.—The Eastman Kodak Company of Rochester, N.Y., found that 65 gallons of metal-hydroquinone developer, used in a tank for developing motion picture negative film, suddenly began to give excessive fog. Similar cases were observed when developer in a deep tank after a certain amount of use was at rest, unused, for at least two or three days, or when a smaller quantity was kept in a closed bottle. Messrs. M. L. Dundon and J. I. Crabtree (*British Journal of Photography*, p. 172) investigated the trouble, and found sulphides in such developers either in solution or in the sediment. It has been shown that some bacteria are able to reduce thiosulphates, sulphites, and even sulphates to sulphides, and the authors confirmed the action with ordinary yeast. Bacteria were found in the faulty developers, "bacilli predominating although cocci were present." Such developers may be restored to good condition by adding about 0.5 gm. of lead acetate per litre to precipitate the sulphide. When a developer is used continuously, the dissolved silver salt precipitates the sulphide as it is formed, and the authors found that silver bromide was sufficiently soluble in the developer for this purpose. No substance has yet been found that can be recommended as a preservative against bacterial growth in a developer.