

Research Items.

Wastage in Imported Fruit.—Two special Reports of the Food Investigation Board, No. 38, by Dr. J. Barker, and No. 39, also by Dr. J. Barker and dealing with New Zealand apples (London: H.M. Stationery Office, 1s. 6d. and 6d. respectively), together with *Bulletin* No. 23 from the New Zealand Department of Scientific and Industrial Research, in which Mr. L. W. Tillar deals with the relation of storage temperature to the overseas carriage of apples, show that investigation is now actively proceeding into the many important scientific problems associated with the marketing of overseas fruit. Since 1926, with the co-operation of the Food Investigation Board, a small laboratory has been maintained near Covent Garden Market, and most of the data utilised by Dr. Barker in his more general report have been obtained through the opportunities thus provided for studying wastage, through the cordial co-operation of the Covent Garden salesmen. The problems are now seen to be many and various, but in many cases there seems to be clear indication as to the lines to follow for practical success. Thus, the condition of the fruit when gathered is seen to be of prime importance; 'bitterpit' in apples, for example—on which subject a valuable paper by W. H. Carne, H. A. Pittman, and H. G. Elliot was presented at the Imperial Horticultural Conference—can be practically avoided if the apple is picked at the rightly mature stage. New Zealand shipping experience shows the importance of prompt reduction of the temperature in the ship's hold; whilst South African experience has shown how wastage can be reduced by care and inspection during picking, the use of refrigerated trucks for long-distance rail transport, and improvement of the refrigeration systems on board ship. We are still ignorant often of the best temperature at which to maintain the fruit during transit and before sale. Also, in many cases, simple precautions such as tight packing, to avoid bruising in transit, are essential preliminaries to refinements as to temperature, ventilation, and humidity controls. The reports referred to, however, are ample evidence of the progress that has been made and of the necessity for further experimental investigation in a co-operation which extends from the orchard overseas to the retail counter at home.

Food of the Terns of the Dry Tortugas.—Mr. W. H. Longley (Year Book No. 28, Carnegie Institution of Washington, p. 288) gives some interesting observations on the food of the terns, especially the Noddy and the Sooty tern of the Bird Key Rookery, the material studied being the more or less digested fishes and squids dropped and lost by the parents when feeding their young. It is clear from these investigations that the pelagic fishes of the several hundred square miles of deep water over which the birds feed outside the Tortugas atoll provide the greater part of their food—the shallow water inshore relatively little. The chief food consists of the flying fishes *Parexocoetus mesogaster* and *Cypselurus fuscatus*, Carangids, especially *Caranx ruber* and *C. crysos*, and a variety of species belonging to various groups. Many rare forms occur in the list, some of which are new to the Tortugas. One adult *Amia* occurred and the deep water fishes *Bolmania* and *Lonchopisthus*. The little cephalopod *Spirula* is also eaten. *Coryphæna*, the 'dolphin' of these waters, also preys to a large extent on the flying fishes, but those up to six inches in length are themselves eaten by the terns, forming an important part of their food.

Mitogenetic Radiation.—Dr. Nine Choucrour (*Jour. Mar. Biol. Ass.*, vol. 17, No. 1, pp. 65-74, 1930) gives

an account of experiments designed to test the validity of the hypothesis of mitogenetic radiation, formulated to account for the influence, at a distance, of dividing cells on other living tissues. Gurwitsch first observed the mitogenetic influence of embryonic tissues on the root of the onion and on yeast cells. According to him, this action, exerted only through quartz and not through glass, was due to an ultra-violet radiation, of wave-length of 2000 Å., produced by the active embryonic tissues and capable of regular reflection. Dr. Choucrour exposed the developing eggs of *Echinus miliaris* to the influence of *Bacterium tumefaciens*, using as controls eggs not so exposed. He found that the observed mitogenetic influence undoubtedly exists, but, as a result of carefully designed precautions, he found that the influence could not reach Echinoderm eggs contained in flasks the stoppers of which were surrounded by a water seal. He concludes that the action of the bacterial culture on the Echinoderm eggs could not be ascribed to a radiation or to any influence acting through the walls of the receptacles containing the eggs. He believes that the observed action is the result of something material, given off by the bacterial culture and reaching the medium in which the eggs are developing, possibly as a monomolecular film which travels round the walls of the receptacles, penetrating any ordinary stopper or seal, but effectively stopped by a water seal such as he used in his experiments. He finds further evidence in support of his belief that the influence is the result of something material, in the fact that seawater exposed first to the influence of a bacterial culture and afterwards used for Echinoderm eggs causes abnormal development of the eggs. The author, therefore, rejects the hypothesis of a mitogenetic radiation acting through the walls, whether of glass or quartz, of the receptacles in which the eggs were developing.

Northern Rotifers.—A recent part of "Die Tierwelt der Nord- und Ostsee" (Lief. 16, Teil 7.e: Rotatoria, von A. Remane. Pp. 156. Leipzig: Akademische Verlagsgesellschaft, m.b.H. 1929) contains a very complete and up-to-date account of the Rotifers of the North Sea and Baltic. This is a specially useful section and enables one to identify the species with ease besides learning much about the group as a whole. These tiny animals, scarcely reaching more than 2 mm. in length and usually much smaller, have always been favourites of the microscopist and one is not surprised at the large number of brackish water and marine forms recorded from these districts. They are predominantly freshwater organisms but may occur largely in water of various salinities, many being found in the sea. It is interesting to note that the order Seisonidea, containing the genus *Seison* living on *Nebalia*, possesses the most primitive characters and is purely marine, showing no trace of a freshwater ancestry. The remaining orders and sub-orders may occur in fresh, brackish, or sea water and it seems probable that they have mostly migrated seawards from fresh water. Here only one genus (*Zelinkiella*) is purely marine. There is a good general account of the group embracing the anatomy, reproduction, biology, and ecology, occupying about half the memoir, the remainder being devoted to the systematic part. Good keys are given, the illustrations are excellent, and the whole is recommended thoroughly to all workers in the group.

Fishes of Porto Rico and the Virgin Islands.—Mr. J. T. Nichols ("Scientific Survey of Porto Rico and the Virgin Islands." Vol. 10, parts 2 and 3. New

York Academy of Sciences, 1929) has provided a survey of the fishes of Porto Rico and the Virgin Islands, Part 2, the families Branchiostomidae to Sciaenidae, Part 3, Pomacentridae to Ogecephalidae. This is a very useful work with a description of each species and in nearly every case a small and simple figure. Shore fishes are much the best known of the Porto Rico fauna, consisting of pelagic off-shore fishes which are for the most part cosmopolitan, and of West Indian species of the coasts, islands, and reefs from the Capes of the Carolinas to Brazil. The tropical pelagic species are usually wide-ranging surface fishes which approach tropical island shores rather freely and evidently had their origin from tropical shore forms. Of these, certain Scombriformes including *Coryphaena*, *Gymnosarda pelamys*, and various flying fishes (Exocoetidae) are the most important. The fish fauna of these regions is very rich and all species should be easily identifiable from the present work, which not only describes and figures the species but also adds notes on distribution and in many cases on colour, feeding, and habits.

Transplant Experiments of the British Ecological Society.—A detailed account of preliminary results arising out of transplant work carried out at Potterne, Wilts, is given by Marsden-Jones and Turrill in *Journal of Ecology*, vol. 18, No. 2; August 1930. From stock plants of known homozygosity, large numbers of individuals have been obtained by cloning and selfing, and the resulting plants have been grown under carefully standardised conditions, in beds of sand, calcareous sand, clay, and chalky clay. Modifications resulting from growth under different soil conditions have been periodically recorded for *Centaurea nemoralis*, *Silene vulgaris*, *Silene maritima*, *Anthyllis vulneraria* and *Plantago major*. Of these, the first is least plastic and capable of surviving under a wide range of edaphic conditions, whilst *Anthyllis* is also non-plastic but is limited in its edaphic requirements. *Silene maritima* is more plastic than *Silene vulgaris*, which changes slowly under certain edaphic conditions. *Plantago major* is exceedingly plastic and varies between wide limits for the characters examined, namely, number of infructescences, maximum and minimum length of spike and of spike plus peduncle, on the different soils. The changes in this species, moreover, become apparent within the space of five months.

Swedish Cretaceous Mollusca and Brachiopoda.—The mollusca and Brachiopoda from the Cretaceous formation at Eriksdal, Sweden, have been investigated by R. Hägg (Sver. Geol. Undersök., *Arsbok* 23, No. 8); 130 species, including forms to which names have not as yet been given, are described and many figured. Of these, 16 gastropods, 18 pelecypods, and 1 cephalopod are new to Sweden. The geological and palaeontological aspects of the containing beds are discussed, and it would appear that the Eriksdal fossils are referable to the Danian and Senonian horizons.

Neogene Shells from Japan.—Prof. Matajiro Yokoyama, to whose researches into the Tertiary molluscan fauna of Japan we have previously had occasion to refer (Cf. *inter alia*, NATURE, Aug. 24, 1929, p. 319), has now published further papers in this connexion (*Jour. Fac. Sci.*, Imp. Univ. Tokyo, sect. 2, vol. 2). From around Okuyamada, Tsuzuki county, Yamashiro province—not far from Kioto—he chronicles 37 species of Neogene mollusca, including a new species of *Umbonium*. Occasion is then taken to correct an error of determination and transfer his *Cochlioconus* from the Conidae to the Fusidae, as they used to be called, and place the shell in the genus *Thatcheria*. A further collection of Neogene mollusca from the

southern half of the island of Karafto, or Sakhalin (Cf. NATURE, Mar. 8, 1930, p. 392), has yielded 45 species, including 5 new and some as yet indeterminate; descriptions and figures of the more important of these are given.

Length of the English Mile.—In a paper in the *Geographical Journal* for October, Sir Charles Close records some conclusions he has reached regarding the length of the old English mile as ascertained by measurements on old maps. The Bodleian map of about 1300 A.D. is the earliest detailed map of Great Britain. By comparing distances on that map, where distances between towns are marked in miles, and modern measurements, it would appear that the mile then in use was about ten furlongs. This, as Sir Flinders Petrie pointed out from a study of the same map some years ago, was about equal to the old French mile. In Lily's map of 1546 the mile was 7.4 furlongs, which was apparently the Italian mile. Mercator's map of 1564 had a mile of 9.47 furlongs. In Saxton's county maps of 1574–79 the length varied from 10.4 to 10.75 furlongs. In Speed's county maps of 1608–12 it was 10.3–10.4 furlongs on the average. In short, Sir Charles Close found out that from 1574 to 1695 the customary mile was about 10 furlongs, in spite of the statute of 1593 defining it as eight furlongs or 1760 yards.

Distribution of Earthquakes in Northern Europe.—Mr. K. E. Sahlström has recently published a valuable earthquake-map of Sweden, Norway, Finland, and Denmark (Sveriges Geologiska Undersökning, *Arsbok*, 1930). He uses a method previously applied by H. Renqvist to the earthquakes of Finland. On the map of the country, a network of points 30 km. apart is plotted. The disturbed areas of all known earthquakes from 1600 to 1925 are drawn on special maps and it is noted how many times each of these points falls within a disturbed area. Curves are then drawn through points of equal earthquake-frequency. The method thus depends on the mapping of disturbed areas rather than on the plotting of epicentres. The map shows that in northern Europe there are four principal areas of marked frequency—the fringe bordering the Gulf of Bothnia, the country round Oslo in southern Norway eastwards to Lake Vänern, the extreme west of Norway, and the west coast of Norway between the parallels of 64° and 68°. The regions free, or almost free, from earthquakes are southern Finland, Finnish Lapland, the interior of Sweden, and nearly all Denmark.

Pliocene Deposits in California.—The youngest Tertiary rocks on the south slope of the Santa Susana mountains, north of Simi Valley, California, are several hundred feet thick and consist of sandstones and conglomerates that lie unconformably on beds ranging in age from Upper Miocene to Eocene. They were examined during the course of work carried on by the 1929 summer field camp of the California Institute of Technology and the fossils collected determined and enumerated by W. P. Woodring (*Proc. Calif. Acad. Sci.*, Fourth Series, vol. 19). These fossils represent a warm-water Pliocene fauna which has been found at localities from Lower California northward to the Ventura basin and is best known as the fauna of the San Diego formation.

Aa and Pahoehoe Lavas.—In *The Volcano Letter* for Aug. 14, 1930, a review of the *aa-pahoehoe* problem is given by G. L. Chang, with special reference to the basaltic flows of Kilauea and Mauna Loa. The rough, blocky *aa* lava is due to partial crystallisation while the flow is moving rapidly. When the crust has crystallised so that it ceases to flow easily, the under-

lying current may be sufficient to break it up into a tumbled mass of blocks. The smooth, ropy *pahoehoe* lava has a chilled skin of glass. The lava below flows more slowly and the forces are insufficient to break up the smooth crust. The 1823 flow of Kilauea changed from *pahoehoe* to *aa* just as the lava reached the edge of a gentle slope and started down a much steeper incline. This sequence is usual. No flow which begins as *aa* has ever been found changing to *pahoehoe*. It commonly happens, however, that the earlier discharges of an eruption are dominantly of the *aa* type, whereas it is in the declining phases that most of the *pahoehoe* is formed. Chemically there is no significant difference between the two types, except that more iron is in the ferric state in the *aa* form. Gas is more readily released from the latter and the vesicles in consequence are very irregular in size and shape. In *pahoehoe* lava the gases are confined by the skin and the total volume of the vesicles thus tends to be greater than in *aa* lava. In the depths of both types the degree of crystallinity is alike.

Geology of Auckland, New Zealand.—A valuable study of the region south-east of Auckland City has been made by C. W. Firth (*Auckland University College Bull.* 10, Geol. Series No. 3, 1930). The Hokonui (Trias-Jura) strata were deposited in a geosyncline which then covered much of New Zealand. In early Cretaceous times the thick sediments were thrown into sharp folds and before the late Cretaceous submergence they were deeply eroded. Further erosion followed a later orogenesis, and Miocene beds are in consequence found lying on the Hokonui greywackes. Small andesitic volcanoes broke through the floor of the Miocene sea. This period of deposition was closed by the Kaikoura orogeny of the early Pliocene, and great fractures in two sets, north-west-south-east, and north-east-south-west, broke up the district into blocks which were uplifted and tilted to the north-west. Great erosion and successive movements of uplift have since taken place, followed by a comparatively recent subsidence which caused the flooding of the deep, youthful valleys cut during the preceding uplift. Commencing just before this latest submergence, and continuing almost up to the present, basaltic lavas broke out and tuff and scoria cones were built up. A slight uplift of a few feet (relative to sea-level) has since occurred, but its effects on the embayed coastline of the vicinity of Auckland are almost inappreciable.

Solar Radiation at Sea.—The April-May issue of the *Bulletin of the Polish Academy of Letters and Sciences (Mathematical Series)* contains a summary of the results obtained by Dr. W. Gorczynski for the solar radiation at sea-level over the oceans he has traversed during the years 1923-28. Most of his observations were made with thermopiles and millivoltmeters, which were compared with other standard instruments from time to time. Of the 0.032 calorie per second which should be received on a square centimetre of the earth's surface if the sun were vertically over it and there were no atmospheric absorption, the atmosphere if dry absorbs and scatters 9.6 per cent, and if moist, with a humidity which is found to vary little from 80 per cent, 17.5 per cent in the North Atlantic in the latitude of the Azores and 23.7 per cent in the Indian Ocean. Absorption and scattering by dust account for a further reduction of less than 1 per cent in the North Atlantic in the latitude of the Canaries, in the Gulf of Mexico, and in the Eastern Indian Ocean, and of more than 3 per cent in the Mediterranean and Red Seas. As a result, the Red Sea and the Indian Ocean get about 65 per cent, and the Gulf of Mexico, the Atlantic, and Mediterranean about 69 per cent of the possible solar radiation. On land at

sea-level—for example, Bangkok—about 60 per cent is received.

The Ratio e/m for an Electron.—A determination of e/m for free electrons is described by C. T. Perry and E. L. Chaffee (in the first September number of the *Physical Review*) which, unlike other accurate measurements on free electrons, gives a value $(1.761 \pm 0.001 \times 10^7 \text{ abs. e.m. units})$ in agreement with the value obtained spectroscopically. The method used was a development of the classical one of Wiechert, in which the time of passage of an electron between two points is compared with the period of a high-frequency oscillator, the electrons being driven by potentials of 10,000-20,000 volts and timed over a distance of 75 cm. in these experiments. If this result is accurate—and the measurements appear to have been made with great care—the question arises as to why earlier investigations of free electrons have led to a substantially higher value for e/m . The suggestion made by the authors, that this has been due to the effect of residual gas in the apparatus, can presumably be readily checked, and if it proves correct, will provide a welcome solution of an outstanding discrepancy.

Field-free Enclosures.—In an important class of experiments on the properties of gases at low pressures, they are subjected to bombardment by a beam of electrons introduced with known energy into an almost closed metal vessel, and the assumption is made that the whole of the interior of the vessel is at the potential of its walls. A direct test of the validity of this assumption, described by Dr. F. L. Arnot in the October number of the *Proceedings of the Royal Society*, shows that it is not accurately true. Two methods were employed. In the first, the velocities of the positive ions, which diffused out at right angles from the path of the main electron beam, were measured by a retarding field, and it was found that with the particular apparatus used, potential differences of rather more than two volts could occur in the enclosure. In the second method, the condition of the gas was analysed by a small auxiliary electrode and the results deduced from the speeds of the positive ions confirmed, and the electrons outside the main beam shown to have a random distribution of velocities equivalent to more than 20,000° abs. The potential gradient is set up by the unequal rates of diffusion of positive ions and electrons from the main beam (much as in an electrolytic concentration cell), and the method indicated for reducing it to a minimum is to work with as small a current of electrons in the main beam as is compatible with the other requirements of the experiment.

Available Phosphoric Acid in Soils.—An improved method for the determination of available phosphoric acid in soils by means of an extraction with one per cent potassium carbonate instead of the generally employed citric acid solution, has been shown by S. Das to be particularly useful in the case of calcareous soils. This new method has now been tested out on a large number of Indian soils, including acid, laterite, humus, alkali, calcareous, and non-calcareous types, all of known cropping and manurial history, and the results compared with similar estimations based on the citric acid extraction (*Soil Science*, 30, p. 33). The potassium carbonate method is shown to be equally applicable to all varieties of soil, whereas the citric acid method proved untrustworthy on alkali or calcareous types. Further, since potassium carbonate is able to extract phosphorus in organic combination in humus, which citric acid fails to do, the new method gives a truer measure of the probable fertility of the soil with respect to available phosphoric acid, and is recommended as a substitute for the citric acid methods now generally in use.