

Research Items.

THE MORIORI OF CHATHAM ISLAND.—Vol. 9, No. 5 of the *Memoirs of the Bernice P. Bishop Museum*, is a further study of the Moriori, which is the result of a second visit paid to Chatham Island by Mr. H. D. Skinner in 1924, supplemented by an account of their life and customs by Mr. William Baucke. This supplements and extends the conclusions at which Mr. Skinner arrived in his previous memoir, as well as corrects other accounts which he considers vitiated by faulty evidence. He is of the opinion that there were two influxes of the Moriori into the Chatham Islands, of which the southern, the Rauru, was pre-eminent, but holds that the Moriori claim that they were autochthonous is incredible. The theory that the islanders were immigrants from New Zealand is fallible, unless it can be shown that the two types co-existed in New Zealand or that two immigrations into New Zealand were repeated in the same successive and separate manner in the Chatham Islands. It is possible that the northern and weaker strain was the first to arrive and began to decay on the arrival of the second; but there is no evidence to show whether the northern Wheteina or the southern Rauru was the first. Nothing is known of inter-tribal wars which can be construed as history, while there is no evidence for the construction of the fortified villages on the lines of the Maori *pa*, which have been attributed to them, the suggestion that there were being due to knowledge of such structures obtained from Maori stories. Notwithstanding their genealogies, the evidence of the deeply rutted native paths in hard cemented quartzite points to a stay in the islands of not less than a thousand years.

EYE PROTECTION.—Owing to the recent legislation in the United States on the protection of the eyes of workers from injurious radiations, the Bureau of Standards has investigated the best methods of testing the opacities of the glasses used for that purpose, and their results are given in *Technologic Paper*, No. 369. In the case of ultra-violet radiation, the best source is the quartz mercury arc, but the carbon arc with nickel or aluminium cored carbons, or the gas-filled tungsten incandescent lamp may be used. The transmission is measured by the spectroradiometer. For visible radiation a 500-watt 110-volt gas-filled tungsten lamp is used and the transmission measured by photometer. For the infra-red the tungsten lamp is again used, but the transmission is measured by a thermopile with a red glass covering it. The thickness of the glass plates tested is about 0.2 cm. Tables are given of the properties of more than eighty glasses manufactured by eleven American glass makers, and nine other substances, including fused quartz.

TREMATODES OF BIRDS.—The attention of workers on the trematodes of gulls, scoters, and other marine birds is directed to a paper by Edwin Linton (*Proc. U.S. Nat. Mus.*, vol. 73, art. 1, 1928), in which trematodes taken from birds at Woods Hole, Mass., are described and figured. These include new species of *Haematotrephus*, *Psilostomum*, *Petasiger*, *Himasthla*, *Aporchis*, *Ascocotyle*, and *Minuthorchis* (n. gen.).

THREE SPECIES OF BIRD MALARIA.—E. Hartman (*Arch. f. Protistenkunde*, 60; 1927) points out that the nomenclature of the parasites of bird malaria is very confused. He proposes to restrict the name *Plasmodium praecox* to a parasite in birds having crescent-shaped gametocytes and not markedly different in its morphology from *P. falciparum* of man. He describes two new species of *Plasmodium* which have spherical gametocytes; in *P. cathe-*

merium these contain rod-shaped pigment granules and in *P. inconstans* nearly spherical pigment granules. All three species were found in Nature in the English sparrow in the United States and have been grown experimentally in the canary.

INEFFECTIVENESS OF INTERNAL MEDICATION OF POULTRY FOR CONTROL OF EXTERNAL PARASITES.—In view of a general impression among farmers and poultry-men that certain substances administered internally will protect animals from external parasites, the United States Department of Agriculture has carried out investigations on the subject (*Tech. Bull.*, No. 60; 1928). The prevailing idea is that the substance administered is taken up by the blood and excreted on the surface of the body or on the body-coverings, and when the external parasites come in contact with the material they are thereby poisoned or repelled. Hens were used in the experiments, and the substances tested included magnesium sulphate, naphthaline, calcium thiosulphate, sulphite, sulphate and sulphide, sodium carbonate and sulphate, potassium iodide, tartar emetic, sulphur, camphor, powdered tobacco, and quinine sulphate. The tests show conclusively that the external parasites of the hen are not adequately controlled by internal administration of these substances. Such treatment not only involves useless expenditure but also allows the parasites to continue their ravages when they might be destroyed by recognised methods.

THE LONG-TAILED SHREWS OF NORTH AMERICA.—In 1828, when Sir John Richardson described the mammals of the preceding Franklin expedition, only three species of shrews were known from the American continent, and now Hartley H. J. Jackson has examined 10,431 specimens belonging to the genera *Sorex* and *Microsorex*, and finds that they constitute 89 forms belonging to 39 species, all of which he describes in detail (*U.S. Dept. Agr., Bureau of Biol. Surv., North American Fauna*, No. 51, July 1928). Shrews are in many respects primitive mammals; their fur shows no sharp distinction into underfur and overhair, they exhibit little individual variation, no sexual variation, and little variation with age. Seasonal variation, associated with the spring and autumn moults, is limited to the length and tint of the pelage, and geographical variation is shown in variations of paleness and darkness, in size, in tail length, and in the general shape of the skull, particularly in the contour of the brain-case and the length of the molar tooth row. Individual sub-species generally have an extensive geographical range. Of their habits, perhaps the most remarkable are their savage voraciousness (one individual has been known to devour its two companions in the course of eight hours), their normal gluttony (they have been known to eat their own weight in meat every three hours), and the aquatic perfection of the water-shrews, some of which are said to swim with relatively greater speed and skill than the otter, and must be ranked amongst the best swimmers of non-marine mammals.

THE TREATMENT OF FISH DISEASES.—During the year 1927 fifty-seven institutions and individuals in various parts of the world were circularised in an effort to gather data from those who had studied the diseases of fishes. In *Zoopathologica*, vol. 2, No. 1, April 30, 1928, Ida Mellen gives tables which describe the symptoms of a large number of ailments suffered by aquarium fishes and show the treatment recommended by various investigators. These tables can

scarcely be dealt with in a short note, but they merit the attention of those either responsible for or interested in the health of fishes in public or private aquaria.

DEVELOPMENT *IN VITRO* OF THE OTIC VESICLE OF THE CHICK.—Dr. Honor B. Fell (*Arch. f. Zellforsch.*, 7, 1928) has investigated the development *in vitro* of the isolated otocyst of the embryonic fowl. The otic vesicle was dissected from one side of a three-day chick, and placed in a tube on the surface of a clot of plasma and embryo extract, and maintained at 38° C. The otic vesicle of the other side, with its adjacent tissue, was fixed and sectioned. The explanted vesicle was washed every 48 hours in a drop of embryo extract and transferred to a tube with fresh culture medium. Such vesicles gave rise to all the epithelial constituents of the fully formed auditory labyrinth. Regions of tissue identical in histological structure with the normal ductus and sacculus endolymphaticus, sensory areas (including Corti's organ) and the tegmentum vasculosum were formed. The principal epithelial structures developed in these cases in approximately the same relative positions as the corresponding structures in the normal embryonic labyrinths; as compared with the latter, the rate of tissue differentiation in the explanted otocysts was almost normal, but the growth rate was greatly diminished, and there were only slight indications of anatomical differentiation, the tendency being towards the retention of the primitive vesicular form. The author concludes that the normal histological differentiation of the otocyst of the three-day embryonic fowl does not depend upon a vascular system, nervous connexions, association with adjacent organ rudiments, a correlative anatomical differentiation, or a normal rate of growth.

THE ROOT AS AN ABSORBING ORGAN.—In two recent papers, Scott and Priestley re-examine the question of water absorption by roots, and make suggestions tending towards a more simplified view of the whole problem of root absorption (*New Phytologist*, vol. 27, No. 3). The absorbing region of the root is the area lying between the apical meristem and the region with completely suberised membranes. Now the protoplasts of the endodermis are attached to the radial walls of the cells, and thus form a continuous protoplasm membrane round the central cylinder. The authors consider that when water is present in excess the soil solution permeates the cellulose walls of the cortex, and water can be drawn across the endodermis by the osmotic pull of the solution inside the central cylinder. Thus the absorbing surface of the root is considered to be a definite area of endodermis, and the surface area of the root not important. In drier soils, water is less free to move in the soil, and importance attaches to the increase in root surface due to growth and the production of root hairs, since the rate of entry of water from the soil into the root surface necessary to maintain an adequate supply across the endodermis diminishes in direct proportion to the ratio of root surface to endodermal surface. Therefore, in comparatively dry soils, root hairs perform an important function in relation to the entry of water. Experiments with lead salts and dyes showed that the suberised cells of the exodermis are not permeable to these substances, but the un-suberised cells act as passage cells. They may become blocked in older regions. The distance behind the meristem at which suberisation of membranes appears, varies with the season. Examples from diverse groups of plants show that the typical absorbing zone may be eliminated by the development of suberised exodermis and endodermis to within a

short distance of the root apex, and the completion of the closure by fatty impregnation of the walls of the superficial cells.

WIND AND TIDE IN THE IRISH SEA.—In an article on this subject in the *Marine Observer* for October, Mr. M. Cresswell gives some account of observations at the ports of Holyhead, Fleetwood, Preston, and Belfast. These observations show that wind force associated with a rapid change of pressure, that is a sudden gale, alters the sea-level more quickly and to a greater extent than a more gradual change of pressure and wind. On one occasion an excess height of 10 feet occurred in the tide during the passage of a heavy westerly gale. This was the cause of the disastrous floods at Fleetwood and Preston about the end of October last year. The outstanding feature of the year in the area under consideration was the correlation of a mean pressure below the normal with tidal heights departing from the predicted levels. Detailed observations are not given in the paper except in regard to the October gale.

RAINFALL OF AUSTRALIA.—The rain map of Australia for the year 1927 gives maps of the monthly and annual rainfall and maps showing the departure from the average fall. The year showed an improvement on the last five years, inasmuch as 34 per cent of the country had a rainfall exceeding the normal. In previous years the average was 25 per cent of the country. Not since 1921 has 50 per cent or more of the country had an excess. The excess was, however, localised and experienced mainly in the more arid regions of Western Australia and in eastern Queensland. In the greater part of the central plains in Queensland, South Australia, and New South Wales, severe drought conditions again occurred. The agricultural season (April to November) was characterised by several critical periods of rain shortage, but in October the fall improved and the resultant harvest, though below normal in the eastern States, was better than had been anticipated. In Western Australia the wheat and pastoral lands had one of the best of recent years. The maps are based on the records of 1300 stations, and the only area without data is the interior of Western Australia and the adjoining parts of South Australia and the Northern Territory.

THE GILBERT MAP OF 1582-83.—In the sale of the library of Lord Leconfield in the spring of this year, there came to light among a number of documents relating to the early history and geography of America a hitherto undescribed manuscript map of North America and the Arctic regions inscribed with the name of 'Humfray Gylbert.' A reproduction of this map, with an article on its significance by Mr. B. P. Bishop, appears in the *Geographical Journal* for September. The map appears to have been drawn, at latest, in 1583, the year in which Gilbert sailed on his last voyage to Newfoundland. It bears the symbol of Dr. John Dee, who is known to have been interested in projects for colonisation and so may be regarded as partly his work. The chief interest in the map lies in the light it throws on Gilbert's project of the discovery of a sea-route to China by the north-west, and helps to explain his motives in his voyage to Newfoundland in 1583. A strait is depicted as joining the St. Lawrence with the Gulf of California, and so forming a route by which an English colony might be carried to the Pacific coast of America without encroaching on the Spanish sphere of influence. Mercator in 1569, and Ortelius in 1570, had shown the St. Lawrence as a river without any opening to the west, and Gilbert's emendation of the map was apparently done to enhance the chance of his proposals finding acceptance.

CARDITA BEAUMONTI BEDS IN BALUCHISTAN.—The description of the fauna of the *Cardita beaumonti* beds of India was originally entrusted by the Geological Survey of India to the late Maurice Cossmann, who, however, found himself obliged before his death to delegate the task to Prof. H. Douvillé. The latter has already dealt elsewhere with the fauna of their western extension into Persia, and here devotes his first part, which is in French, to an account of the fossils of the Baluchistan representatives of the formation (*Pal. Ind.*, New Series, vol. 10, No. 3). The beds there are characterised by the abundance of Cerithiidae and Melaniidae, among them being a representative of the rare genus, *Pseudoglaucoma*, first described by the author from the Eocene of Peru. The fauna indicates sublittoral or lagoon conditions, and if certain species have their analogues in Parisian Tertiary, they point also to the existence of a warmer environment. Thirty-four species are dealt with, of which just one-half are considered to be new, while five are indeterminate. There are four photo-type plates, which are as good as the process permits of.

PACIFIC OCEAN LAND SNAILS.—Under the comprehensive title of "Land Snails from Hawaii, Christmas Island, and Samoa," by H. A. Pilsbry, C. M. Cooke, jr., and Marie C. Neal, a collection of five papers has been issued by the Bernice P. Bishop Museum (*Bull.* 47). In the first on "*Georissa*, a . . . genus new to the Hawaiian Islands," Dr. Pilsbry describes three new species. Investigation of the "Food habits of *Partula zebrina*, Gould," by C. M. Cooke, founded on specimens taken in American Samoa, goes to show that this herbivorous mollusc has acquired the habit of swallowing other species of snails whole—it is presumed solely with the object of procuring lime. The same author seeks to identify and define "Three Endodonta from Oahu," entering fully into their shell characters and anatomy. Mr. Cooke and Marie C. Neal deal with the "Distribution and anatomy of *Pupoidopsis hawaiiensis*." All the Hawaiian specimens are fossil, but living examples were found on Christmas Island more than 1200 miles distant. The authors conclude that both in shell characters and anatomy *Pupoidopsis* is closely related to *Pupoides*. In her "Anatomical Studies of Achatinellidae," Marie C. Neal seeks to answer the question: Do the genera and species of Achatinellidae differ anatomically? The results of her careful investigations go to show that divisions of the family by shell characters and by anatomical characters do not agree, but that the section *Perdicella* should have generic rank, whilst the similar claim already made for *Newcombia* is confirmed. The series of papers, which are illustrated by text figures, is a worthy addition to the contributions of the Museum.

THE DIELECTRIC CONSTANTS OF AMMONIA, PHOSPHINE, AND ARSINE.—The *Journal of the Indian Institute of Science* (vol. 11A, Part V.) contains an account of an investigation by H. E. Watson of the variation of the dielectric constants of ammonia, phosphine, and arsine with temperature and pressure. It was not possible to extend the work to stibine, as its ready decomposition with the formation of a metallic mirror would result in the breakdown of the insulation of the gas condenser. The measurements were made at high frequency, two coupled oscillating systems being employed, and an accuracy of 1 per cent was aimed at for the final results. It was found that ammonia and phosphine approximately satisfy Debye's equation for the change in dielectric constant with temperature, while arsine appears to behave similarly to the permanent gases in this respect. The

variation of dielectric constant with pressure indicated that it is justifiable to assume that $\epsilon - 1$, where ϵ is the dielectric constant, is proportional to the density. The value of the electric moment is greatest for ammonia and smallest for arsine.

A FREQUENCY STANDARD.—It is interesting to notice that engineering physicists are beginning to question whether the accuracy of the rate of the earth's rotation round its axis is sufficient for their measurements. If the length of the day alters by about one second in ten years, this would soon cause an appreciable discrepancy between reference standards. Hence they are beginning to consider whether something more fundamental than the rate of the earth's rotation should be adopted as a standard. In the *Bell Laboratories Record* for August, W. A. Marrison points out that in electrical communication we have to work with frequencies ranging from less than unity per second to a hundred million or more per second. It seems now possible to maintain frequencies constant to one part in ten million, for several seconds. In fact, in successful television this is done. The new form of reference standard which has been developed is an oscillator controlled by a quartz crystal. The equipment used by the Bell Company for determining the frequency of the crystal is somewhat similar to that used with a tuning-fork standard. A clock is driven by a synchronous motor controlled by a current the frequency of which is an exact submultiple of the frequency of the crystal. When the high frequency has its normal value the clock keeps accurate time; any variation in the rate of the clock is a measure of the error of the standard. So constant is the frequency of the crystal that the clock controlled by it keeps time with a maximum inaccuracy of less than one-tenth of a second per day. In the crystal oscillator standard at present in use, the frequency is 50,000, and the derived frequency of the current which actuates the clock is 1000. The temperature coefficient of the crystal is much smaller than that of a steel tuning-fork, but it is necessary to control the temperature to within about the one-hundredth of a degree centigrade. The accuracy of the beat frequency measurement when interpreted as the accuracy of the oscillator is increased many times.

NEW LOW-POWER BINOCULAR MICROSCOPE.—Messrs. R. and J. Beck, Ltd. (69 Mortimer Street, W.1), have introduced a new form of low-power binocular microscope, the 'Beck Binomax.' It consists of two complete microscope systems, each with a prismatic erecting arrangement, inclined to each other at the natural convergence of the eyes, the interocular distance being adjustable. The object glasses are held in tubular mounts with the lenses at one end. Each object glass is so threaded that it may be inserted in the tube either way, so that the tubular mount projects out of, or inside, the body tube. The distance between eye-piece and object glass is thus variable, and two different powers are obtainable, without interfering with the optical performance. Two pairs of eye-pieces of different powers are provided, and four powers in all are therefore available, with magnifications of 4, 8, 16, and 32 respectively. Various stands for the 'Binomax' are obtainable, and the body may be used interchangeably on any form of Beck stand listed. The working distance is considerable—110 mm. for the two lower powers, and 75 mm. for the two higher ones. We have inspected the instrument and its performance is excellent; it should be of great service for the examination of large opaque objects, such as rock specimens, for dissections, and other purposes.