

Research Items.

Finger-prints of Twins.—A study of the finger-prints of twins has been made by Prof. H. H. Newman (*Jour. Genet.*, vol. 23, No. 3). The material consisted of the prints of 100 pairs of same-sexed twins, 50 of whom were classed as identical and 50 as dizygotic or fraternal. He regards the whorl as the most primitive pattern, while some have given this place to the loop, which occurs in primitive form in anthropoids. He finds that the finger-prints of identical twins may be extraordinarily alike in pattern, although they always differ in minutiae. The distribution of whorls, loops, and arches is the same in both types of twins and agrees with that of the general population. Radial loops and radial whorls are largely confined to the index finger. This is interpreted as a result of the early dichotomy of the limb bud, separating the thumb primordium from the rest of the fingers and tending to produce in the index finger a pattern the reverse of that in the thumb. Tented arches, which are common on forefingers, are interpreted as cases of partial asymmetry reversal. In identical twins the patterns on one or both hands resemble the hands of the other twin more strongly than do opposite hands of the same individual. The reverse is true of fraternal twins, and this difference can be used as a criterion for classifying doubtful twin pairs. If the finger patterns in human twins are compared with the scale patterns in armadillos, it is found that in both man and the armadillo parallel-imaging is about twice as frequent as mirror-imaging of asymmetrical peculiarities. This leads to the conclusion that monozygotic twins in man arise in the same general way as the quadruplets which normally occur in the armadillo, that is, by a process of budding in the early embryo.

Botulism in Wild Ducks.—For several years the death of millions of wild ducks in the western States of America has been attributed to poisoning due to the alkalinity of inland waters after a spell of drought. Further investigation, according to Science Service of Washington, D.C., has shown that there are difficulties in accepting the idea of alkalinity poisoning, one reason being that in some areas where the water was highly alkaline the disease was very much less prevalent than in others where the alkalinity was small, although in general the distribution of the disease agreed with the regions of alkaline waters in the United States. Dr. E. R. Kalmbach, of the U.S. Biological Survey, has now shown that the disease is a form of botulism poisoning, and that the causative organism is different from that which affects human beings. How the organism gets into the duck's body in the first place is not known; but diseased tissues of one bird fed to another produced symptoms of the disease. One attack gives no immunity from another.

Chinese Fishes.—Papers on the fishes of China have appeared in recent numbers of two scientific magazines published in that country; one concludes Henry W. Fowler's account of "The Sharks, Rays, and related Fishes of China" (*Hong Kong Naturalist*, Nov. 1930, p. 177), and has, in addition to short diagnostic accounts of species and clear outline drawings, a list of English, Latin, and Chinese names of all the forms. The second paper, by the same author, describes a collection mainly of fresh-water fishes, obtained at Tsinan, China (*Peking Nat. Hist. Bull.* vol. 5, Dec. 1930, p. 27). The collection contained twenty-two species, of which two gobies, belonging to the genera *Acanthogobius* and *Aboma*, are described as new. In

the same magazine (p. 15) J. T. Nichols gives the synonymy of some Chinese fresh-water fishes in a paper which may be regarded as supplementary to the "provisional check-list" of the fresh-water fishes of China published as a *Bulletin* of the American Museum of Natural History in 1928.

Crustacea of the Vanderbilt Museum.—The *Bulletin of the Vanderbilt Marine Museum*, vol. 2 (Scientific Results of the Cruises of the Yachts *Eagle* and *Ara*, 1921-1928, William K. Vanderbilt commanding. Crustacea: Stomatopoda and Brachyura, by Lee Boone. Huntington: privately printed, 1930), is one of the scientific publications of the Vanderbilt Museum owned by Mr. William K. Vanderbilt, who made extensive collections in various parts of the world; and these collections housed in his own museum, Huntington, Long Island, are being described in a series of bulletins, of which the present volume is the second, the first dealing with fishes. There are several more volumes to come, which will be a great help to all zoologists. Miss Lee Boone is well known for her studies on crabs, and has dealt here with the Stomatopoda and the Brachyura in great detail. Most of the material was obtained in the West Indian region, five separate cruises in five consecutive years having been conducted by Mr. Vanderbilt, besides later work in the West Indies, supplementing the Galapagan Expedition. There are also collections from the Labrador New England region, the tropical American Pacific region, and the Mediterranean, representing terrestrial and littoral, besides deep-water species. A large number of little-known forms are present, and much that is new is included with regard to their distribution, besides colour and notes on habits made on the spot by Mr. Vanderbilt. Some of the crabs are well-known northern species, such as *Portunus holsatus* and *Stenorhynchus longirostris*; but others are extremely rare. All are carefully described and well figured either by excellent photographs or by good line drawings, and the whereabouts of the type specimen (if possible) is given, with notes on general distribution and synonymy.

Culture of Entamoeba.—L. R. Cleveland and E. P. Sanders (*Arch. f. Protistenk.*, 70, 1930) state that when *Entamoeba histolytica* is cultivated on slants of liver infusion agar, covered with horse serum in saline (1:6) and a small amount of sterile rice-flour added to each tube, "the amoebæ become as numerous as blood cells are in the blood stream". A photomicrograph of a culture illustrates the abundance of the entamoebæ in such a culture. A pure line was established from a single cyst and the authors have made many studies on this pure line, for example, variation in size. They state that the size of the cysts when plotted produces a clear-cut unimodal size-distribution curve, as would be expected in a pure line. The authors express the view that *Councilmania dissimilis* is an atypical *E. histolytica* "produced, for the most part, by fixation in Schaudinn's fluid heated to 60° C.", that *C. lafleuri* may very well be atypical *E. coli*, and that the genus *Councilmania* is invalid. The authors have been able to produce countless millions of cysts of *E. histolytica*, and they discuss the conditions of encystation. They have also studied the excystation and the production of the quadrinucleate amoeba and the eight trophic amoebæ which result therefrom. Their work confirms that of Dobell on these stages. They report that the octonucleate cysts occasionally seen in *E. histolytica* result from the encystation of binucleate trophic amoebæ, and

they describe a process of multiple fission in which "everything occurs that occurs during encystation except that no cyst-wall is formed and motility is not lost". In a further paper Cleveland and Collier (*Amer. Jour. Hygiene*, 12, 1930) give details of the improved methods of cultivation of *E. histolytica*.

A New Endoskeletal Organ in the Hind Leg of the Halcinæ.—In a recent note (*Zool. Anzeiger*, 92, 9/10, 1930) R. J. W. Lever has announced that while he was examining a Halcine beetle (*Oxygona acutangula* Chev.) in Trinidad to confirm the presence of Maulik's organ in the hind femur (see NATURE, Oct. 26, 1929, 668), he noticed another structure. He gives a short description and six illustrations to show the form and its situation relative to other structures in the femur. It seems that the importance of Mr. Lever's note lies in the fact that a more comprehensive study of the structure of the femora of these extremely mobile insects is indicated. It is suggested that this study may be suitably taken up by those who have the opportunity of getting a variety of fresh material. Not only will such study throw light on the general question of jumping locomotion of insects, but it will in a great measure enlarge our views on relationships within the group.

Banana Transport.—As Report No. 36 of the Empire Marketing Board, Claude C. Wardlaw and Lawrence P. M'Guire, of the Low Temperature Station, Imperial College of Tropical Agriculture, give an account of "The Behaviour and Diseases of the Banana in Storage and Transport". In view of the fact that the so-called 'Panama disease' has spread to the West Indies from South America, where it has forced the abandonment of thousands of acres cultivated with the 'Gros Michel' strain of banana, it seems imperative to see whether other varieties, apparently not so susceptible to the disease, can be grown for export. Many varieties are available but are not such hardy travellers or have other undesirable qualities. The authors, as a result of preliminary trials on bulk storage under conditions equivalent to a ship's hold, report favourably on the 'Cavendish' variety. They discuss measures for shipping bananas with a minimum of trouble from disease, and examine, from this point of view, the new practice of cutting the stalks with a sterile knife and vaselineing the cut surfaces. With careful handling of the fruit, this method may give still better results. Packing in paper bags may lead to complications because of the difficulty in ventilation and in rapid cooling; perforated paper bags may prove useful; but the practice which is most strongly recommended to the exporter is that, when he packs in crates, the whole bunch should be pre-cooled before cutting up for packing.

The Outer Layers of the Earth.—In the *Bull. Seismolog. Soc. Am.*, pp. 41-52, 1930, Daly discusses the discontinuities revealed by seismological research on the shell structure of the earth. From four different kinds of experimental evidence he deduces that the 'seismically effective' compressibility of a rock is about 20 per cent less than its compressibility as determined by the high-pressure method. He notes, however, that specially designed experiments to test this idea are urgently needed. The tentative conclusion, combined with seismic data, suggests that the uppermost layer of a continental block is essentially granitic down to about 30 km. A shell of granodiorite or quartz-diorite is indicated below this to a depth of some 45 km. The next shell is interpreted as gabbro down to 60 or 70 km. Below this there is,

according to Gutenberg, a drop in the velocities of the longitudinal and transverse waves which is thought to represent the change from crystalline to vitreous conditions. Daly considers that vitreous basalt may extend down to 1200 km., and that there is no suggestion in the wave velocities of a shell of peridotite near the earth's surface. This interpretation implies that all the exposed peridotite of the earth is a derivative from basaltic magma, a thesis difficult to support. It also implies that the basaltic layer has practically no heat of radioactive origin generated within it. Moreover, it should not be overlooked that the outer 30 km. layer visibly contains large masses of granodiorite and more basic rocks, represented in depth by gneisses and amphibolites; the suggestion of 30 km. of granite, therefore, can scarcely be readily accepted.

Length of Glaciers.—The work of the International Glacier Commission, which from 1894 until 1913 published an annual report on the variations in lengths of certain glaciers, was interrupted by the European War. Its work has now been handed over to the Hydrological Section of the International Research Council. In order to make up with arrears before the resumption of the annual report, a statistical account has now been published of the observations from 1913 to 1928 (*Rapport de la commission des glaciers, Bulletin* 14, Section d'Hydrologie: Union Géodésique et Géophysique Internationale, Venice, 1930). Glaciers are grouped geographically and variations in length, where they have occurred, are given to the nearest half-metre. In some areas only one figure can be given for the whole period of the War. The observations come from various sources, and include the French, Swiss, and Italian Alps, Sweden, and Norway. A supplementary report on more scattered and less complete data is promised. The general impression given by the figures is one of retreat, but there are notable exceptions. The most striking is perhaps the frequent record of the advance of Norwegian glaciers since about the years 1921 and 1922. In the scanty Swedish records there is nothing comparable. Alpine records show very variable conditions, but the increase of the Mont Blanc glaciers was most marked about the years 1914-20. Several of the glaciers of the Rhone basin showed an increase towards the end of this period.

The Measurement of Spark-over Voltages by a Sphere-gap.—In the *Scientific Papers* of the Institute of Physical and Chemical Research, Tokyo, vol. 14, p. 278, Nov. 1930, T. Nishi and Y. Ishiguro give a helpful account of the anomalous phenomena when spark-over voltages are employed for measuring the electrical pressure. In high-pressure engineering it is common practice to measure the crest value of alternating pressures by means of a spark-gap with spherical electrodes. It generally happens, however, that a few stray and erratic sparks occur at low voltages before the gap gets into the condition where a definite steady voltage always produces a spark. When the electrodes are small the preliminary sparks at low voltages do not often occur, and rarely affect ordinary testing. Neither do they occur when the spark-gap is very small compared with the radius of either electrode. With spheres a metre in diameter, placed a metre apart, the first flash-over occurred at a voltage which was 6 per cent less than that obtained in the subsequent tests, all of which gave practically the same result. When the surfaces of the electrodes were carefully cleaned by a cloth soaked in alcohol and the test repeated, the first flash occurred when the pressure was 30 per cent less than its normal value; the next occurred when the pressure

was 12 per cent under the normal, the subsequent flashes occurring at practically the same voltage. Washing the surface with alcohol was very effective in lowering the pressure at which the preliminary sparks took place. The curious behaviour of the sparks is attributed to the surface conditions; but the exact cause the authors were unable to determine. They advise that the first few readings for a fixed spark setting should be rejected and only the steady value given.

An Electrical Pendulum.—A novel electrically maintained pendulum which was exhibited by the British Thomson-Houston Company at the recent Exhibition of the Physical and Optical Societies is illustrated in Fig. 1. A primary coil *A* carries a high-frequency current generated by a valve in the box; a secondary coil *B*, forming with its condenser *C* a separately tuned circuit, is suspended from knife-

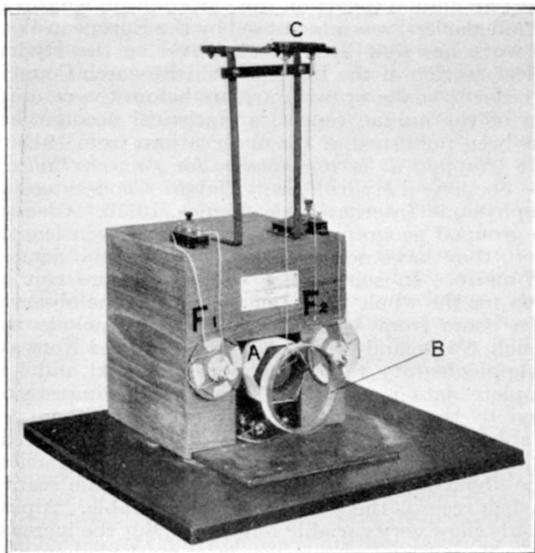


FIG. 1.

edges, so that when swinging to and from *A* the coupling between the two is varied periodically. The electrical constants of the circuits are so chosen that the natural frequency of the secondary is higher than that of the primary when *B* is at the outward point of its swing. At this position the two currents are in phase, and *B* is attracted, but as it approaches *A* an abrupt change of phase of almost 180° takes place when the coupling has increased to a certain critical amount, so that the force between the two becomes repulsive. Simultaneously the frequency assumes a higher value. On the outward path of *B* the converse changes occur, and so the swinging is maintained. The two values of frequency are shown by the alternate lighting of two lamps connected to separate coils F_1 and F_2 , which are tuned by small condensers. The abrupt phase-changes are those which give rise to the well-known 'double-click' effect obtained with resonant circuits.

Trajectories of Electrons in Valves.—It is of some importance in connexion with thermionic devices to be able to find the paths of electrons within the apparatus. When small quantities of gas are of no consequence, the orbits may readily be demonstrated by their optical effects in the inter-electrode spaces—as, for example, has been done by E. Brüche

in a recent test of Størmer's theory of the aurora (*Die Naturwissenschaften*, Dec. 12)—but for various reasons this method is not always permissible, and possibly not always accurate. An arrangement due to Mr. A. J. Maddock, of the British Thomson-Houston Company, which was shown at the recent Exhibition of the Physical and Optical Societies, still enables the points of impact of electrons on an anode to be found in a high vacuum. The anode is coated with carbon, which becomes strongly incandescent at any place where there is a concentration of the electron beams, rendering it very easy to show, for example, the effect of the grid-potential in concentrating the beams to a greater or less degree. The actual valve exhibited had an *M*-shaped oxide-coated filament, and was operated with an alternating anode potential of 700 volts peak value.

Levulinic Acid and Esters.—Sati and Shao-Yuan Ma in the December number of the *Journal of the American Chemical Society* describe a simple procedure for the preparation of levulinic acid from commercial glucose depending on the hydrolysis with boiling hydrochloric acid. An intermediate product is oxymethylfurfural. A yield of 150 gm. per kilo of glucose was obtained, after distillation under 7 mm. pressure, as large glassy crystals, melting at 33° - 35° . From the acid, seven esters were prepared by direct esterification; they were obtained highly pure and their simple physical constants determined. The work was carried out at the National Tsinghua University, Peiping-West, China.

Hydroxylation and Peroxide Production during Slow Combustion of Ethane.—The 'chain theory' of reactions has proved very fertile in accounting for many experimental results otherwise difficult to understand. Peroxide formation is believed to play an important rôle in oxidation processes by determining the length of certain reaction chains, if not as the initial stage in the process itself. W. A. Bone with S. G. Hill (*Proc. Roy. Soc.*, 129 A, 434; 1930) have re-examined the slow combustion of ethane to see how far the view might still be held that the process is one of progressive hydroxylation. Peroxide formation was observed concomitantly with aldehyde formation, but no evidence was found that peroxide production occurred in the initial stages of the reaction and was not a product of oxidation of the aldehyde. While the hydroxylation theory was confirmed, the exact rôle of the peroxides detected must remain uncertain.

Absorption of Hydrogen by Nickel.—Contrary to what is observed with other metals, and also to the hypotheses of Hallwachs and Hermann, absorption of electrolytic hydrogen by nickel wire is accompanied by increase in the electrical resistance of the metal. The results of an investigation into this matter by Franzini, recently described in the *Rendiconti* of the Royal Lombardy Institute of Science and Letters, show also that the temperature coefficient of the resistance is diminished as a result of the absorption of the hydrogen. When the gas appears to be uniformly distributed throughout the mass of the metal, the relation between the increase of resistance and the amount of gas absorbed is probably linear, so that $\Delta r/r = cV$, and if *V* is expressed in volumes of hydrogen absorbed per unit volume of metal, the constant *c* has the value 0.68×10^{-4} . If the gas is non-uniformly distributed, the increase in resistance is lower than that indicated by the above equation. The variation of the temperature coefficient of the resistance is also, in all probability, related linearly to the quantity of absorbed hydrogen.