

Research Items.

An Alleged Moose-Wapiti Hybrid in Montana.—*California Fish and Game* (vol. 17, p. 198; 1931) contains a reference to what is said to be the first known specimen of a 'moose-elk', or in our nomenclature a 'moose-wapiti', hybrid. Known to the United States forest rangers as "the elk with the funny horns", this curious cross was recently killed in the Deerlodge National Forest, Montana. The rangers had for the past five years known of the animal, which associated and grazed with the wapiti, but the horns and the body of which were half moose and half wapiti. When first seen in 1925 he appeared to be about a three-year-old, and his weight when slain was 1100 pounds. Our impression is that so rare and odd a hybrid deserved a much more detailed obituary notice, since experience shows that there is often the possibility of an abnormal member of one species being regarded as a cross with another.

Bird Migration in Switzerland.—An important contribution to the migratory movements of birds in Switzerland, founded upon field-observation and ringing, and summarising in all 16,500 data for the spring movements and 5600 for the autumn, is made by Dr. Konrad Bretscher (*Mém. Soc. Helvét. Sc. Nat.*, vol. 66, mem. 2, 1931). The data cover long periods and refer to sixty-eight species in spring and forty-nine in autumn. There is general agreement between the information gained from the two methods of observation, and the results indicate that the main migratory route lies through the Great Valley between the Alps and the Jura mountains. In spring the journeys run from south-west to north-east, and in autumn take the reverse direction. A second important route lies over the northern Jura, in spring in an eastern, in autumn in a western direction. The northern Alpine valleys are peopled by side movements from the Great Valley, whereas the southern valleys receive their birds from the south, so that both sides of the mountain chain contribute to a cross-migration, in which it is impossible to separate the elements. Further researches, especially by the ringing method, must be made before an understanding can be reached of the movements in the Alps, particularly in the Wallis and Engadine districts.

Weevils of Samoa.—Part 4, Coleoptera, Fascicle 5, of "Insects of Samoa" in course of publication by the British Museum (Natural History), is concerned with the Curculionidæ or weevils of those Islands. Sir Guy Marshall, who is the author of the present contribution, remarks that ten years ago only 22 species of these insects, comprised in 15 genera, were recorded. He is able now, as the result of his studies, to raise these numbers to 86 species belonging to 55 genera, of which 54 species and 15 genera are described for the first time. Only eight of these species are known to occur outside the Pacific islands, and of the remaining 78 species, no less than 80 per cent must, at present, be regarded as being peculiar to Samoa. A study of the different genera of these insects appears to suggest that the Samoan fauna has been derived from the Malay Archipelago by way of New Guinea and not from the south. Since too little is known of the insects of Tonga and Tahiti, it cannot be determined how far they are related to those of Samoa. All that can be said is that the insects of the last-mentioned islands show, on present indications, most affinities with those of Fiji. Sir Guy Marshall's memoir, it may be added, is a noteworthy contribution to a knowledge of the family Curculionidæ, and is admirably illustrated by figures drawn by Mr. A. J. Engel Terzi.

Industrial Shells of the Philippines.—F. Talavera and L. A. Faustino (*Philippine Jour. Sci.*, vol. 45, No. 3; 1931) report on the shells gathered on a commercial scale in the Philippines. The gold-lip pearl shell (*Pinctada maxima*) is utilised primarily in the manufacture of buttons, but other objects, such as knife handles, are made from this shell. Preliminary experiments on culture pearls in 1929 were encouraging; shell-beads 5 mm. in diameter introduced into two-year old 'oysters' had increased at the end of thirteen months to 7 mm. The black-lip pearl shell (*P. margaritifera*) is more widely distributed. The shell, which reaches a diameter of 9 cm., is used for the making of buttons, of inlaid work, cameos, etc. The majority of the *Trochus* shells collected are of *T. niloticus*, and are found chiefly on the islands near the outer edge of the coral reefs. Closely associated with the last species is the green turban shell (*Turbo marmoratus*). Both are used in making buttons and other objects. The window shell (*Placuna placenta*) supports an industry of considerable importance. Although usually found in the littoral zone this species is known to live in water 40 metres deep; it flourishes in mud or sand-mud bottoms in shallow bays and in estuaries. Fishermen in certain regions transplant undersized examples to better grounds. The shell, which reaches a diameter of 55-77 mm. at the end of the first year of growth and about 133 mm. at the end of the second year, is used instead of glass for window panes, shades, etc. The pearly nautilus (*N. pompilius*) is taken in deep sea bamboo traps set to capture bottom fish, and its shell is being used in the manufacture of lamp-shades, spoons, etc.

Life-Cycle of *Moniezia expansa*.—D. F. Sinitsin (*Jour. Parasit.*, 17, June 1931) records observations on the egg of the cestode *Moniezia expansa*. The adult tapeworm lives in the small intestine of sheep, and ripe segments containing the eggs are passed with the excrement. The author describes the three envelopes of the egg, which contains a capsule composed of a spherical body and two tapering horns. In the body of the capsule is the six-hooked embryo and an apparatus for feeding the horns. Experiments extending over forty-five days, during which the eggs were repeatedly dried, showed that the shell provides very efficient protection against desiccation, and the author concludes that under normal conditions in Nature the egg does not reach its prospective host at once, but is destined to be at large rather a long time. In the later period of the experiment the egg shell became very fragile; the slightest touch broke it and freed the capsule with its horns, one of which is twisted round the other at this time. If the horns come in contact with a moist surface they untwist and form a boring apparatus. The mucus of the trachea brings about this boring action, and causes the solution of the capsule in less than thirty minutes. The author concludes that an intermediate host is lacking in the life cycle of *Moniezia expansa*. "The embryo, after a period of about two months' development in moist materials, returns again to the sheep by the air. Perhaps it enters the capillaries of the windpipe or alveoli, and, by the aid of the circulatory system, eventually reaches the intestine."

Mutable Genes in Delphinium.—Two mutable genes in *Delphinium* are the subject of a paper by Demerec (*Jour. of Genetics*, vol. 24, No. 2). The rose-alpha gene is unstable, reverting to the wild purple type of cell both in the sepals and petals (causing purple spots) and in the germ cells. By measuring the sizes of the spots and estimating the number of cell

divisions involved, the frequency of the somatic mutations could be estimated. It was found that it was of the order of 267 per million cells both in gametogenesis and in the sepals. This rate was relatively constant in successive cell generations in different parts of the plant through four sexual generations. The lavender-alpha gene also mutates to purple, so that lavender-variegated plants give offspring which may be lavender-variegated, purple, and purple-lavender chimæras. This gene shows a high rate of mutability in early stages of development of the plant (since half the non-purple plants from seed are chimæras), relative stability in the early stages of sepal and petal development, and high mutability towards its end. The author concludes that these phenomena of variegation are not due to the gene being compound and composed of parts which segregate, but to a mutation which tends to occur in the particular gene at the time when it splits in mitosis.

Earthquakes and Mineral Springs.—The effect of earthquakes on mineral springs has often been noted. Mr. B. M. Radoslavoff traces the relations in Bulgaria as the result of the earthquake of 1928, in *Matériaux pour l'Étude des Calamités*, No. 25, 1931. The thermal springs are all in the neighbourhood of volcanic formations. Some springs dried up and several new ones appeared. The Meritchleri spring was replaced by exhalations of carbon dioxide. The Kovanlak springs ceased for three weeks and then began to reflow. Most of the well-known springs show an increased flow, in some cases as much as 200 per cent. The temperature of the different springs has, on the whole, remained unchanged, while in previous Bulgarian earthquakes the tendency seems to have been for temperatures to increase.

Soil Classification.—The possibilities of an international system for the classification of soils have recently been examined by L. L. Lee, of Rutgers University, the thesis appearing in the *Journal of South-Eastern Agricultural College*, Wye, Kent, 1931, with an extensive bibliography appended. The New Jersey system of classification is discussed at length, and the soils of the New Jersey (U.S.A.) area and of south-eastern England have been classified according to this system, enabling comparisons to be made. In both areas the soils occur in belted zones closely related to the geological formations, and in both cases also a direct relationship exists between the geological formation and climate and the distribution of the soil series, the number of soil classes being greater in central New Jersey. Podsolisation in general is further advanced in the soils of the American areas than is the case in south-eastern England. In both areas the importance of the parent geological materials is such that any system of classification applicable to both regions must be one in which geological factors are dominant, and it is suggested that the New Jersey system based on this foundation might find satisfactory application elsewhere in the British Empire and western Europe. Sandy profiles predominate in New Jersey, and heavy profiles, containing high percentages of silts and clays, in Kent, a direct relation existing between the texture of the soil profile and the geological formation in each district. Climate and soil reaction are also associated. No alkaline soils occur in the American area, whereas they are quite common in south-eastern England, climatic factors having altered the soil reaction more in the former than in the latter case.

A Photoelectric Relay.—The issue of the *Physikalische Zeitschrift* for Sept. 1 contains a note by Dr. L. Bergmann, of the University of Breslau, de-

scribing the arrangement he has devised for measuring small movements such as those of a galvanometer mirror by means of a relay depending on the sensitive selenium cell he described in the issue of the *Zeitschrift* for April 1. The cell consists of a thin layer of selenium in its conducting state, on an iron surface and covered by a semi-transparent film of gold or silver, deposited by cathode spluttering. In the relay a square of the cell of 1.5 cm. side is partially exposed, through a grating of ten parallel opaque strips, to light reflected from the mirror, the movement of which is to be measured. The incident beam forms on the grating an image of a similar grating, in such a way that a narrow strip of cell on one side of each strip of grating is illuminated, and motion of the mirror alters the width of this strip. The deflection of the galvanometer mirror in the cell circuit has by this arrangement been increased to 5000 times that of the mirror from which the reflection takes place.

Negative Ions.—Prof. H. D. Smyth has contributed an article to the July number of *Reviews of Modern Physics* upon the products and processes of ionisation by slow speed electrons. The principle of all the methods which have been employed is much the same; the gas is subject to a controlled source of ionisation, usually electrons, and the products are examined by one of the standard methods of magnetic analysis, or by the more recent electrostatic methods. Perhaps the most remarkable fact which emerges from this report is the scanty knowledge which we possess of the properties of negative ions. With a few exceptions, the usual statement which is made about any particular gas is that negative ions have been observed, but that practically nothing is known about the conditions governing their formation. Even in the case of the strongly electronegative substance iodine there is much uncertainty. I^- , I_2^- , and I_3^- occur in quantities comparable with those of the positive ions, but it is apparently as yet undecided what part is played by primary processes and what part by secondary processes in their formation. Perhaps the most significant observation is that to produce negative hydrogen atom ions by electron bombardment in water vapour, the electron energy has to be very closely either 6.6 volts or 8.8 volts; a similar law of formation is known for certain excited states of atoms, but is not found with positive ions.

Electrokinetics and the Interpretation of Surface Conductivity.—McBain and Du Bois, in the *Zeitschrift für Elektrochemie*, vol. 37, p. 651, point out that Helmholtz's theory of electroendosmose as due to the motion of the inner portion of the double layer should be replaced by the explanation put forward by McBain in 1924 and confirmed by experiments of Laing and others. The ions, water, and wall of the tube are all in motion relative to one another; the double layer is seldom complete, and the greater part of it plays no part in electrokinetics. All ions, walls, colloid particles, gels, diaphragms, etc., according to Laing, take part in the transport of current in the proportion of their actual conductivities, so that if μ is the total conductivity, the ion transport is of the form $c'u'/\mu$, where c = conductivity and u = mobility; and the wall, colloid, etc., transport is of the form $c_1m_1f_1/\mu$, where m_1 is the number of chemical equivalents carrying a faraday of charge and f the mobility. The formula of Smoluchowski has been disproved by experiments of McBain and Peaker on the increase in conductivity of solutions in contact with optically polished glass or quartz, and stearic acid on water; the results would give impossible values of the thickness of the electrical double layer. The classical formulæ of electrokinetics appear to be quite incorrect.