Research Items.

Migration of Birds and Sex Cycles.—By a series of experiments on the junco (*Junco hiemalis connectens*) Prof. William Rowan has shown that the rhythm of the reproductive organs can be interrupted almost at will by appropriate lighting conditions (*Proc. Boston Soc. Nat. Hist.*, vol. 39, No. 5, 1929). He has thus succeeded in arresting the normal spring recrudescence of the gonads, in causing premature recrudescence in mid-winter, and by alternate over and under lighting causing a maximum recrudescence three times and a minimum reduction twice in the course of a normal single cycle of a year. Further, even in the absence of light, increasing periods of compulsory exercise cause a recrudescence of the gonads. It is suggested, therefore, that the increase of light permits increased exercise and that this is the crucial factor in inducing the development of the gonads. Birds which were released while the sex organs were in process of increasing or dwindling migrated, while those set free at the state of maximum or minimum development showed no inclination to move away. Rowan shows that the spring recrudescence of the sex organs cannot be due to rising temperatures, or the autumnal retrogression to falling temperatures, as has been supposed. While these conclusions apply primarily to the junco, he sees no reason to believe that it is exceptional.

Breeding Habits of South African Frogs and Toads.—Three papers in the *Annals of the Transvaal Museum* (vol. 13, No. 3, 1929) describe the breeding habits and the early development of several species of frogs and toads found in the neighbourhood of Stellenbosch. The appearance of temporary puddles and full drainage furrows following the winter rains is the signal for spawning. The distribution of the spawn shows a certain selectivity of pool conditions on the part of the spawners, and a case of mass spawning illustrated differential survival. In a temporary pool two species of *Rana*, one of *Cacosternum* and one of *Bufo*, spawned one morning and the young hatched, but on the examination of the larvæ when the pool had eventually dwindled to a square foot in area, only examples of *Rana greyi* were found. C. G. S. de Villiers describes the food of the different tadpoles, their characteristics and development, and gives hints for keeping alive and preserving examples for subsequent examination. He warns collectors against preserving amphibian larvæ in alcohol, which invariably results in shrinkage of the tissues and serious distortion. Where field conditions make the narcotising of the larvæ and preservation in a fixative containing sublimate impossible, formalin or carbolic acid is recommended. It would have been convenient had titles been attached to the figures and had a short summary followed the longest paper. V. Fitzsimons and G. van Dam give for the first time an account of the breeding of *Breviceps*.

Californian Salmon.—In a paper on the Sacramento-San Joaquin salmon (*Oncorhynchus tschawytscha*) fishery of California, Mr. G. H. Clark (Division of Fish and Game of California, *Fish Bulletin* No. 17) gives a review of the history of this fishery. A serious decline set in after 1918, and in 1926 and 1927 the commercial catches were lower than they had been in any year since 1874. This is attributed to a depletion brought about chiefly by over-fishing, for which ocean trolling is most responsible, and by dams obstructing streams and cutting off spawning grounds. The author includes in his report a survey of the spawning grounds of the Sacramento and San Joaquin river systems and some information on the life-history of the salmon. It is noted that ocean trolling accounts for the taking of numbers of immature fish as well as mature, and the biological work aimed at ascertaining the age of maturity of the salmon and the percentage of age classes which mature in a given year. It was found that 50 per cent of the fish mature at four years of age, the five-year and three-year fish following in order of abundance. It is thought that 70-90 per cent of the young salmon go to the sea during their first year.

Pelagic Polychætes of the *Terra Nova* Expedition.—The Report on "The Pelagic Polychæta" of the British Antarctic (*Terra Nova*) Expedition, 1910 (Natural History Report. Zoology. Vol. 7, No. 3, British Museum (Natural History), 1929), by Dr. William B. Benham, includes eleven species belonging to three families. Of these the Alciopines are the most important, two new species, both from New Zealand only, being described. These are *Vanadis augeneri* and *Callizona gravieri*. The widely distributed *Alciopa cantrainii* and *Torrea candida* are now shown to occur in the waters round the northern coasts of New Zealand. The Alciopines may be regarded as Phyllodocines which are modified for a pelagic life and are here placed in the sub-family Alciopinæ belonging to the family Phyllodocidæ. Of the four species of *Tomopteris*, most is said about the Antarctic *Tomopteris carpenteri* and there is a long discussion as to whether this species possesses a 'tail'. Apparently it has none, and the tomopterid from South Africa recently described by M'Intosh as *T. carpenteri*, which has a 'tail', seems to be a different species.

Elm Disease.—The so-called Dutch elm disease is so insidious in its spread that any research which throws light on this subject is of great economic importance. J. G. Betrem (*Meded. Laborat. Entomol. Landbouwhoogeschool*, Wageningen, Holland) has published a paper in Dutch, with a German summary, in which he considers it proved that the disease is spread by the elm beetle (*Scolytus scolytus*). In a series of experiments he showed that when beetles are shaken up with distilled water and the water is plated out on nutrient agar, the fungus, *Graphium Ulmi*, now usually considered to be the cause of the disease, dominates the resultant growths. Further, beetles allowed to run over sterile nutrient agar caused much infection by *Graphium Ulmi*, and finally, when the intestines of beetles were removed and inoculated into agar, they gave rise to the fungus almost exclusively.

Afforestation in South Africa.—South Africa is about the only Dominion of the Empire with but a small area of indigenous forest extant. A great deal of attention has therefore been concentrated of late years on afforestation work, mainly with exotics. Dr. H. M. Steven's paper, entitled "Afforestation in South Africa", in the second issue of vol. 3 of *Forestry*, makes it evident that a great deal of high-class work has been undertaken and a considerable experience gained in all the branches which such operations entail. Experience has to be bought by 'trial and error' and careful research. Many problems remain to be answered, but the paper gives evidence that the forestry authorities are on the high road to solving certain questions as to the species which will offer the best hope of success whilst at the same time providing the Dominion with an increasing amount of the types of timber hitherto imported.

Falcon Island: a Pyroclastic Cone.—The December, 1929, number of the *Amer. Jour. Sci.* contains an

interesting study of Falcon Island, an active Tongan volcano, by J. E. Hoffmeister, H. S. Ladd, and H. L. Alling. The island is described as a typical South Sea island in the making. It is a pyroclastic cone built by explosive eruptions. Not a single lava flow has been found on the island, but the pyroclasts, which are mainly of dark brown glass, contain labradorite and pyroxene and are clearly of basaltic type. Many islands of the south-west Pacific have been built up in this way from the Eocene onwards. There is here no evidence that pyroclastic action marks the waning stages of vulcanism. Eua, near Falcon, has a core of volcanic tuff which is overlain by Eocene limestone. White Island, near New Zealand, is a modern representative. Such conditions do not exist in the Hawaiian Islands of the north Pacific. The present Falcon Island is considered to be an example of the first stage of island formation in the South Seas. The second stage is the reduction of the mound of ash and scoria to a shoal or submarine bank. Upon this, organic deposits then accumulate and an atoll may ultimately be produced. A fourth stage is recognised when uplift of the limestone-capped bank takes place, Eua being an example. Falcon Island lies on the well-marked fault line which stretches from Samoa to New Zealand, a line on which many volcanoes, active or dormant, are situated.

Chemical Denudation.—In a report on *Den Kemiska Denudationen i Sverige* (with a summary in French), J. V. Eriksson presents the results obtained during the period 1909–25 by the Swedish Bureau of Hydrography and the National Service of Meteorology and Hydrography in the course of a detailed study of the transport by Swedish rivers of materials in suspension and solution (*Medd. f. Statens Meteorologisk-Hydrografiska Anstalt*, Bd. 5, No. 3, pp, 96, Stockholm, 1929). Work was carried out at 69 stations and 11,313 analyses were made. The final results are given in metric tons of material removed per year from each sq. km. of the areas investigated, the latter covering 57 per cent of the whole country. It is noted that it would be unsafe to assume that the total for the whole country could be obtained from the ratio 57 : 100, since the terrains not yet studied are mainly coastal or argillaceous. In a series of excellent maps, the geographical distribution of the results is presented graphically for inorganic materials; organic materials; CaO ; Cl; and SO_3. Annual and seasonal variations are well brought out by tables of comparative figures. In dominantly calcareous regions chemical denudation removes 60 to 70 tons/km.^{2}/year, whereas in forested areas the figure is generally about 10 tons. Comparison with results for other countries (Europe, North America, and the Nile) shows that in recently glaciated lands chemical denudation makes up 80 to 90 per cent of the total, whereas corresponding percentages are: for the Mississippi 13 to 46; for the Rhone 19 to 66, with an average of 23; for the Blue Nile 17, and the White Nile 72. It is concluded that in Sweden chemical denudation amounts to 70 to 90 per cent of the total.

Isotopes of Nitrogen.—The recent discovery of oxygen isotopes of atomic masses 17 and 18, and of a carbon isotope of mass 13 (see NATURE, Mar. 2 and June 1, 1929, vol. 123, pp. 318 and 831, and Aug. 3, 1929, vol. 124, p. 182) has now been followed up by the announcement by S. M. Naudé in the first number of the *Physical Review* for December of the discovery of an isotope of nitrogen of mass 15. If this existed, it should produce some additional band heads near 2156 A. in the spectrum of nitric oxide, and a search for these indicated that they were actually present, very close to the predicted positions. The bands were examined in absorption, and the possibility that the reputed isotope effect was due to the presence of molecules such as $(NO)_2$ ruled out by the fact that the relative intensity of the various band heads was independent of the pressure of the nitric oxide. Nitric oxide $N^{15}O^{16}$ is about as abundant as nitric oxide N^{14} O^{18}. Some very faint absorption lines have also been observed which agree with those calculated for the molecule $N^{16}O^{16}$, but the existence of this third isotope, of atomic mass 16, must still be regarded as uncertain.

An Ammeter for High Frequency Currents.—The problem of measuring alternating currents of very high frequency has come rapidly to the front during recent years owing to the extensive use of radio-communication. In the early days of electric supply, power engineers sometimes thought that possibly there were large losses in their mains owing to the so-called 'skin effect'. This effect caused an uneven flow of current across the section of the main, the current density as a rule being greatest near the surface. One of the advantages of concentric mains in the old days was supposed to be that they largely diminished this loss. It is only, however, when the mains are very large that this loss becomes notable at the standard power frequency of 50. When frequencies of 100 million are used, as in radio work, the skin effect becomes enormous, and many attempts have been made to obviate the difficulties it causes. At this high frequency an ordinary ammeter would, owing to its inductance, allow practically no current to flow in the circuit. In a paper read to the Institution of Electrical Engineers on Feb. 5, Prof. C. L. Fortescue described an ammeter he has invented which practically overcomes all the difficulties hitherto experienced. He points out that these difficulties arise from three main causes: That the capacity effects make the current in the instrument different from the current outside; secondly, even very short conductors have a high inductive reactance at high frequencies; and thirdly, the presence of the measuring device in the circuit changes the value of the current that has to be measured. He gets over the difficulty by using a thin wire screened by and coaxial with a concentric cylinder. The instrument is calibrated with direct current, and he shows how the true current can easily be calculated by theory.

Laboratory Hot-Water Ovens.—We have received from Messrs. Brown and Sons, Ltd., 9 Wedmore Street, Holloway, N.19, an illustrated booklet which contains particulars of the patent 'Sanbro' laboratory hot-water ovens. By means of a very simple device the boiler at the base of the oven can be removed, cleaned, and replaced within a few minutes and without the use of special tools. Moreover, when the deposit in the boiler becomes excessive, the latter can be replaced by a new one at a small cost. The boiler consists of a loose pan to the inside of the top rim of which is fixed a gutter into which the oven proper fits. The two parts when fitted together form the steam chamber, an air-tight connexion being produced merely by a layer of water which forms an effective seal. The ovens, which have already been installed in many laboratories with satisfactory results, can also be combined with water-stills. The great advantage of this new device will be at once apparent to anyone who has had to incur the cost of repairs to oven-stills of the older type, in which hard water has been continuously used. The device can be fitted without much trouble to existing ovens of the sealed-up type and can be adapted to various kinds of heating supply.