

2000 francs to Louis Roule, for continuing and extending his researches on the morphology and biology of the salmon in France.

2000 francs to Jean Pougnet, for the continuation of his researches on the chemical and biological action of ultra-violet light.

2000 francs to C. Dauzère for his work on cellular vortices.

2000 francs to Méd. Gard, for the publication of a work and atlas on material left by the late M. Bornet.

4000 francs to Aug. Chevalier, to meet the expense necessitated by the classification of the botanical material arising from his expeditions in Africa.

2000 francs to Paul Becquerel, for the continuation of his physiological researches relating to the influence of radio-active substances upon the nutrition, reproduction, and variation of some species of plants.

4000 francs to Le Morvan, for assistance in publishing the photographic atlas of the moon.

2000 francs to Jacques Pellegrin, to assist him to pursue his researches and publish works on African fishes.

3000 francs to E. Rengade, for a systematic research on the presence and distribution of the rare alkali metals in mineral waters.

3000 francs to Charles Alluaud, for the publication of work on the Alpine fauna and flora of the high mountainous regions of eastern Africa.

2000 francs to Charles Lormand, for the purchase of a sufficient quantity of radium bromide to carry out methodical researches on the action of radio-activity on the development of plants.

2000 francs to Alphonse Labbé, for researches on the modifications undergone by animals on changing from salt to fresh water or the reverse.

3000 francs to G. de Gironcourt, for the publication of the scientific results of his expeditions in Morocco and western Africa.

3000 francs to A. F. Legendre, for the publication of maps and documents of his expeditions in China.

2000 francs to H. Abraham, for the determination of the velocity of propagation of Hertzian waves between Paris and Toulon.

PAPERS ON VERTEBRATE PALÆONTOLOGY.

TO vol. xxii. (pp. 407-420) of the Bulletin of the American Museum of Natural History Prof. H. F. Osborn contributes two articles on the skulls of ungulates from the Wind River Lower Eocene of Wyoming. A very interesting point is that in the members of the family Uintatheriidae characteristic of this stage, such as *Bathyopsis*, the skull lacks the great bony horn-cores of the later types, their place being taken by small knobs. In the *Perissodactyle Titanotheriidae* it has been found that two phyla of the genus *Eotitanops* are recognisable, one comprising relatively small, persistently primitive light-limbed species, and the other animals of a larger and more progressive type. Several new species are named.

In the Bulletin of the Department of Geology, California University (vol. vii., pp. 169-175), Dr. J. C. Merriam describes a lower molar of a tapir obtained many years ago from the auriferous gravels of California as a new race of a species described by Leidy from the Pleistocene of South Carolina. To this race (*Tapirus haysii californicus*) is provisionally referred a set of three upper molars from the late Tertiary of Oregon. The species appears to be nearly related to the existing Central American *T. bairdi*.

The skeletons of *Saurolophus osborni*, a duck-billed dinosaur of the family Trachodontidae, and of *Hypacro-*

saurus altispinus, a new genus and species of the same family, both from the Upper Cretaceous of Edmonton, Alberta, Canada, form the subject of two papers by Mr. Barnum Brown in vol. xxxii. (pp. 387-407) of the Bulletin of the American Museum of Natural History. The type skeleton of the former, which measures about 32 ft. in length—the same as that of the contemporaneous *Trachodon mirabilis*—has been mounted on a slab for exhibition. *Saurolophus*, it appears, is much more numerous represented in the Edmonton beds than its cousin *Trachodon*. *Hypacrosaurus* is characterised by the great height of the spines of the dorsal vertebrae, coupled with the presence of nine vertebrae in the sacrum, against eight in the allied genus.

Under the name of *Rutiodon manhattensis*, Prof. F. von Huene describes in the volume last cited (pp. 275-283) the remains of a new species of phytosaur (belodont) from the Upper Triassic of Fort Lee, New Jersey, at the base of the "Palisades," opposite New York. In the opinion of the describer, *Rutiodon* and the European *Mystrisuchus*, on account of the taller spines of their vertebrae and the consequently more compressed form of their bodies, were probably better swimmers than the typical *Phytosaurus*. Both were long-snouted reptiles, of larger bodily size than *Phytosaurus*, the new species being the biggest yet described.

From the Trias of Heligoland Mr. H. Schroeder (*K. Preuss. Geol. Landesanstalt*) describes a beautifully preserved skull of a large stegocephalian (labyrinthodont) as a new species (*C. helgolandiae*) of the genus typified by von Meyer's *Capitosaurus nasutus* from the Trias of Burnberg.

Mere reference will suffice for supplementary notes on fossil sharks by Messrs. D. S. Jordan and C. H. Beal, published in the Bulletin of the Department of Geology, California University (vol. vii., pp. 243-256).

In the Bulletin of the American Museum of Natural History, vol. xxxii., pp. 437-439, Dr. R. Broom records additional remains of the extinct South African horse described by himself in 1909 under the name of *Equus capensis*. These are stated to indicate a heavily built, short-legged species, standing about fourteen hands, and apparently distinct from all the existing South African members of the genus, as well as from the Arab stock.

In a second communication the same author (*op. cit.*, pp. 441-437) describes a number of remains of South African dicynodont reptiles, many of which are regarded as representing new species of the typical *Dicynodon*, while others are assigned to new genera. It is interesting to note that a skull described by Huxley as that of a lizard, under the name of *Pristerodon mackayi*, really represents a dicynodont furnished with cheek-teeth.

R. L.

AGRICULTURE AT THE BRITISH ASSOCIATION.

THE meeting this year was one of the most successful held since agriculture has been recognised at the British Association, both the quality of the papers and the attendance at the section being exceedingly good. Prof. Wood, in his presidential address, dealt with a problem which has now assumed very great importance. Hitherto the agricultural expert working in the counties and among farmers, has had to demonstrate certain facts which were already known at the experiment stations. One of the most important is the effect of phosphates in improving grassland, an effect so striking that it can be demonstrated without very refined experiments, so that the

"single-plot method" serves the purpose very well. Another fact which had to be demonstrated and where the same method suffices is that in the case of most of the late-cropping varieties of potatoes the use of seed from certain districts in Scotland or the north of Ireland is profitable. But there are many cases where the somewhat crude single-plot method gives only indefinite results, and careful investigation has shown it to be incapable of revealing differences less than 10 or 15 per cent.; more refined methods are needed as soon as quantities of this order are to be dealt with. Prof. Wood went on to deal with some of these new methods and to urge their more general adoption in field work.

The address was followed by a paper by Prof. Fraser Story, Bangor, on methods of German forestry. The five principal trees occurring in the German forests are Scotch pine (45 per cent.), spruce (20 per cent.), beech (14 per cent.), oak (7 per cent.), and silver fir (3 per cent.) The commonest method of regenerating the pine forest is by planting one- or two-year-old seedlings, the scanty foliage of which resists drying in sandy soils better than larger plants. In the case of spruce, on the other hand, transplanting material is used because the tree is grown in hilly or mountainous districts where there is more precipitation and greater danger of suppression by weeds. Beech and silver fir require shade when young, and therefore natural regeneration is resorted to, so that they may receive the shelter they need from the parent trees. Oak is generally raised from the acorn sown by hand, usually in a sheltered wood.

Mr. Collinge followed with a description of a peculiar disease of cereals and roots and the action of sulphur and lime. The disease is known as "Maysick," and it is most evident on wheat. Mr. Collinge considered it is due to bacteria which interfere with the nutrition of the plant. Sulphur and unslaked lime are found to be successful remedies.

The growing of linseed as a farm crop was next discussed by Mr. Duncan Davidson. Experiments made in this country during the last three years show that the crop can be successfully grown, that 10 to 15 cwt. of linseed per acre can be obtained on medium land at a cost of about 6*l.*, while the present price of the same quantity of linseed meal is 10*l.* The climate both of England and Wales is found to be quite suitable for the crop, and any soil of good texture and depth and not likely to dry out is suitable. The best time for sowing seems to be from the middle of April to the middle of May, but the seed at present obtainable is quite unsuitable owing to its mixed origin, impure condition, and low vitality. There is also some difficulty about the thrashing; there is no market as yet for the straw.

Prof. Barker and Mr. Gimmingham gave a further account of their work on the fungicidal action of Bordeaux mixture which they attribute to the solvent action exerted by the fungus cells on the insoluble compounds of the spray fluid. They found that germinated spores and the thin-walled cells of the fungus hyphæ exert a definite solvent action and are killed by the absorption of the dissolved copper. Similar results are obtained with root hairs and the roots of germinating seedlings. The cuticle of the upper epidermis of apple leaves, however, seems to be practically impermeable during spring and summer; at any rate, no injury follows spraying so long as the cuticle is unbroken. In autumn, however, the cuticle is more permeable and death results more easily.

The second day was devoted to a joint discussion with the Botanical Section on the problems of barley production. Mr. E. S. Beaven opened with a very good account of the experiments he has been carrying out for some years at Warminster on the selection

of barley for productivity. In the case of cereal crops the produce of dry grain on unit area is the sum of the following factors:—(a) number of plants surviving on the area at harvest; (b) the average dry weight per plant, which is the sum of the average number of stems per plant and the average weight per stem; (c) the ratio of the dry matter of the seed to the dry matter of the plant. These factors have been very fully investigated by Mr. Beaven, and a considerable interest attaches to the third, which he calls the migration factor, and which relates to the rate of transfer of material from the stem, leaf, and root to the seed. Mr. Beaven finds that this factor is high in the good yielding varieties, and in good seasons, and he has got evidence that it is a definite character. It will be extremely interesting to follow up this migration factor and see in what way it is related to the other properties of the plant.

This paper was followed by three others dealing with Irish barley experiments. These were commenced in 1899 with the intention of improving the Irish barley crop. It was soon found that the varieties in common use were inferior to the best known elsewhere, and experiments were begun with other varieties, two of which turned out to be very useful, "Archer" and "Goldthorpe." "Archer" is a narrow-eared barley, not usually grown on heavy soils or in late districts, but on light soils and in early districts, the result of its natural tendency to ripen late. "Goldthorpe," on the other hand, is a typical wide-eared barley ripening about a week earlier than "Archer," and therefore more suitable on heavy land. Mr. Bennett showed that the strain of "Archer" raised in Ireland is just as good as that imported from elsewhere. By careful selection improvements have been effected, not only in cropping capacity, but also in quality.

Mr. Hunter described the continuation of these experiments and the method of selection now in use at Ballinacurra. For the past two years a large number of plots on a very small scale are set up, and consequently a number of pure lines can be investigated.

Dr. Hackett discussed the results from a statistical point of view.

Another joint discussion dealing with live-stock problems is reported in the account of the Physiological Section, and need not be further dealt with here (see NATURE, December 18, 1913, p. 462).

"The Utilisation of Sewage in Agriculture" formed the subject of a paper by Dr. Grossmann. He attributed the unsatisfactory results obtained in farming with sewage sludge to the fatty matter invariably present, and described a process whereby the dry sludge is mixed with a small percentage of acid, and subjected to the action of superheated steam, which carries off the fatty matters, whereby an inodorous brown powder is obtained, containing on an average 1-5 per cent. of nitrogen, 3 per cent. of calcium phosphate, 0.5 per cent. of potash, and 30-40 per cent. of organic matter. It was stated that good results had been obtained by the use of this material as manure. The author considers that the process removes one of the great difficulties in dealing with sludge; hence the sewage engineer may now aim at producing more sludge than before.

A group of three papers on soil followed. Dr. Hutchinson described experiments made in conjunction with Mr. McLennan showing that a partial sterilisation effect, intermediate in character between that exercised by heat and mild antiseptics, could be brought about by treating soil with quicklime. In the cases presented somewhere about 1 per cent. of lime was necessary; after a certain incubation period the soil bacteria then began to multiply rapidly and

yield large increases in the amount of ammonia and of nitrate.

This was followed by a paper by Mr. Goodey describing his investigations on the protozoa of the soil. The first forms investigated were the ciliated protozoa, particularly Colpoda. Evidence was adduced to show that this organism probably exists in the soil as cysts, though it must have had some active existence some time because of the large numbers in which cysts occur. Another investigation dealt with the effects of partial sterilisation on two old soils which had been stored in bottles for many years at Rothamsted, one since 1846 and the other since 1870. The 1870 soil behaves normally on partial sterilisation, giving an increase in bacterial numbers and also in ammonia and nitrate, showing that the limiting factor present in ordinary soils was also present in this soil; amœbæ and flagellates also occurred.

The 1846 soil, however, behaved entirely differently and showed the phenomena of a soil already partially sterilised; there was no evidence of any limiting factor being present, and no amœbæ, flagellates, or other protozoa could be found.

In the discussion that followed Prof. Gamble expressed the opinion that amœbæ and flagellates could probably be found in an active condition in the soil although the ciliates probably were not.

A third paper dealt with the nitrification in some pasture soils, and was presented by Mr. Gimmingham. It is known that nitrification is reduced to a minimum in pasture soils rendered acid by the continued use of ammonium salts as manure, and an investigation was therefore made of a soil intermediate in character between the true moor and the true fen soil. This contains 30 to 40 per cent. of organic matter and only traces of carbonate, but the water is neutral in action. The soil was found to be capable of bringing about rapid nitrification of peptone, a remarkable feature being the great amount of action directly the peptone was added. Ammonium sulphate also quickly nitrifies, but the soil in this case takes on a feebly acid reaction.

Prof. Bottomley described experiments in which peat was treated with certain aerobic soil bacteria, and then became converted into a blackish-looking powder of distinct manurial value. It was also stated that the substance conditioned fixation of nitrogen in the soil.

A paper was presented by Miss Taylor on the life-history of *Eriophyes ribis*. When *Ribis nigrum* is the host-plant the embryonic true leaves of the bud are attacked by the mite and the bud develops into a "big-bud." No injury is caused, however, to the foliage of the tree. The migration of mites from infested buds is carried out mainly by the wind. On the other hand, when *Ribis grossularia* is the host-plant the scales leaves of the bud only are attacked and no big-bud is formed. Apparently the mite cannot penetrate the true leaves of the bud, and injury is confined to the foliage. Distribution by wind is not general, migration being mainly due to the mite crawling from the infested bud to the expanding leaves.

Dr. Winifred Brenchley summarised her investigations on the weeds of arable land. On clay soils the weed flora is less rich in species than on light loam, and though several plants have a distinct preference for heavy land no species can be said to be symptomatic of clay, occurring on such soils and nowhere else. Sandy soils possess a much more characteristic weed flora, as they are colonised by a great diversity of plants, a number of which are distinctly associated with light soils. Such plants as spurry, corn marigold, sheep's sorrel, and knawel appeared to be characteristic of sandy soils which are deficient in chalk;

in other words, "sour" soils. Chalk provides a peculiar habitat for weeds, and the weed flora is very rich in species, some of which are markedly characteristic. There is evidence now that a distinct association exists between the species of weed and the soil in which they grow. This association may be local, when the weed is symptomatic of the soil in one district, but not exclusively associated with it in another. On the other hand, it may be general, when a certain species is symptomatic or characteristic of the same type of soil in different districts. The nature of the crop also plays a part in determining the weed flora.

A note was presented by Miss Armitage on the two varieties of corn spurry. *Spergula arvensis* is a rather frequent weed on the red sandy loam in Herefordshire, but the author never observed it in such development as to cause injury to crops. *Spergula sativa*, as she had seen it in Cheshire, is a terrible pest, causing marked injury both to roots and clover. It would be interesting to know whether this was always more harmful than *S. arvensis*.

The section concluded with a very interesting and important paper by Sir Richard Paget on the possibility of partnership between landlord and tenant. A form of agreement has been drawn up on this basis and was distributed at the meeting. An interesting discussion followed, which, however, is rather of general than of purely scientific interest.

PSYCHOLOGY AT THE BRITISH ASSOCIATION.

A SEPARATE Subsection of Psychology was formed this year at the British Association for the first time. The experiment was even more successful than had been anticipated. The general attendance was large and often crowded. Almost every experimental psychologist in Great Britain either attended the meetings or else sent or promised papers. The contributions received were so numerous that four meetings were held during afternoons.

The proceedings of the subsection opened on Thursday with a series of papers, for the most part philosophical in character. The first paper was one by Dr. Wildon Carr, upon "The Absurdity of Psychophysiological Parallelism even as a Hypothesis." Dr. Carr suggested that in considering the relation between body and mind, parallelism was not the only alternative to interaction; the relation might be solidarity of function, in which two independent realities are united. Mr. McDougall's paper upon laughter aroused especial interest. Taking the chief theories of laughter hitherto propounded, he claimed that they did not account for all varieties of laughter, and, further, that they did not even seek to answer the most fundamental problem, namely to what end did the human species acquire this capacity for laughing? The conditions exciting laughter he endeavoured to reduce to (1) situations that are mildly unpleasant, except so far as they are redeemed by laughter; (2) those things which would excite a feeble degree of sympathetic pain, if we did not actually laugh at them. The effects of laughter he described as consisting especially in an increase of the general and pleasurable sense of well-being. He added that the appearance of laughter seemed especially associated with the development of social life. From these considerations he argued that laughter proper (as distinguished from the smile, which in the adult has become secondarily associated with it) is a protective reaction which shields us from the depressing influence of the shortcomings of our fellow-men. Laughter, in short, is the antidote to sympathy.