

known to exist in the atmosphere, the active matter of slow dissipation produced from the emanation must be deposited on the surface of all bodies exposed to the open air. The radio-activity observed in ordinary materials is thus probably, in part, due to a thin surface film of radio-active matter deposited from the atmosphere.

A review is given of methods of calculation of the magnitude of the changes occurring in the radio-elements. It is shown that the amount of energy liberated in each radio-active change, which is accompanied by the emission of α particles, is about 100,000 times as great as the energy liberated by the union of hydrogen and oxygen to form an equal weight of water. This energy is, for the most part, carried off in the form of kinetic energy by the α particles.

A description is given of some experiments to see if the α rays carried a positive charge of electricity, with the view of determining experimentally the number of α particles projected from one gram of radium per second. Not the slightest evidence was obtained that the α rays carried a charge at all, although it should readily have been detected. Since there is no doubt that the α rays are deflected in magnetic and electric fields as if they carried a positive charge, it seems probable that the α particles must in some way gain a positive charge after their expulsion from the atom.

Since, on the disintegration theory, the average life of a given quantity of radium cannot be more than a few thousand years, it is necessary to suppose that radium is being continuously produced in the earth. The simplest hypothesis to make is that radium is a disintegration product of the slowly changing elements uranium, thorium, or actinium present in pitchblende. It was arranged that Mr. Soddy should examine whether radium is produced from uranium, but the results so far obtained have been negative.

I have taken solutions of thorium nitrate and the "emanating substance" of Giesel (probably identical with the actinium of Debierne) freed from radium by chemical treatment, and placed them in closed vessels. The amount of radium present is experimentally determined by drawing off the emanation at regular intervals into an electroscope. A sufficient interval of time has not yet elapsed to settle with certainty whether radium is being produced or not, but the indications so far obtained are of a promising character.

RECENT PUBLICATIONS IN AGRICULTURAL SCIENCE.¹

THE United States Department of Agriculture has issued the fourth annual instalment of the great work upon which its Division of Soils has embarked, the detailed survey of the soils of the whole of the country. The area covered by the present report is little less than 18,000 square miles, which have been surveyed at a total cost of 12s. per square mile. The work is being carried on simultaneously in many parts of the States; the counties dealt with embrace some of the old settled eastern States like New York and New Jersey, the Carolinas and Virginia, the rich lands of Ohio, Kentucky and Illinois, also the recently settled districts in the Dakotas, Texas, Colorado and other areas of deficient rainfall, the Walla Walla wheat area on the Pacific slope, and the lately acquired dependency of Porto Rico.

The method adopted follows that of the earlier reports; a field party maps the distribution of the soils in each section and collects information as to the crops grown and their average yields, the conditions of labour and transportation, at the same time indicating the suitability of the land for new crops and systems of farming. Mechanical analyses of each type of soil are made at Washington and are set out in the report; occasionally chemical analyses are included; statistics of rainfall and mean temperature are also added.

The whole work is based upon the facts that different types of soil can be recognised and the areas which they

¹ "Field Operations of the Division of Soils, 1902." By Milton Whitney. Pp. 842; with a case of maps. (Washington: U.S. Department of Agriculture, 1903.)

"Monographie Agricole du Pas-de-Calais." By M. Tribordeau. Pp. 296. (Paris: Société d'Encouragement pour l'Industrie Nationale, 1904.)

"The Journal of the Royal Agricultural Society of England," vol. lxxv. Pp. 420+clxxxviii. (London: John Murray, 1903.)

occupy can be approximately mapped, and that particular crops and systems of farming can be associated with the various soil types, so that the agriculture of each area can be directed along the most appropriate lines and its farmers saved from many unprofitable experiments. While the volume contains no striking novelty, it is full of interest and instruction to the English student of agriculture or economics.

M. Tribordeau gives an account of the agricultural condition of the Pas-de-Calais, dividing it into regions based upon geological considerations of the nature of the sub-soil. A description of each soil is given, generally accompanied by several analyses by M. Pagnoul; then follows an account of the agriculture, with reports in considerable detail of the system pursued on one or more farms of different sizes in the area. The varieties of each crop generally grown, the races of live stock, the yield, the conditions of labour, even the implements in use on each farm are carefully set out. The latter half of the volume deals more generally with the agricultural economics of the district, and discusses the position both financial and moral of the labouring class, the conditions of tenure, the societies and other means adopted for the encouragement of agriculture, particularly the spread of the movement for credit banks and cooperative associations. The work is liberally illustrated with maps, photographs and diagrams, and presents a valuable picture of the present critical condition of agriculture in western Europe.

The current volume of the *Journal* of the Royal Agricultural Society, which now appears annually only, is somewhat more exclusively occupied than usual with the work of the society. In addition to the usual prize lists there is a general account of the show held at Park Royal last June, another article on the machinery exhibited there, and a full discussion of the trials of wind pumping engines conducted by the society in 1903. Reports of committees and of the scientific officers of the society also bulk largely, including Dr. J. A. Voelcker's account of the experiments in progress on the farm at Woburn and at the Hills pot-culture station. Turning to the general articles, the interest that is being manifested in forestry is seen in the two opening papers; in one Mr. C. E. Curties treats generally of the management of British woodlands, and in the other Mr. R. Anderson deals with the utilisation of home grown timber and its bye products. Mr. Spencer Pickering describes his experiments at the Duke of Bedford's fruit farm at Woburn, which he has repeated on a different soil at Harpenden, on the ill effects produced by growing grass round apple trees.

The volume is completed by one or two statistical papers and an article by Mr. A. D. Hall on the manuring of grass land, in which he takes the Rothamsted experiments upon grass land as his starting point, and then proceeds to discuss the many other manurial experiments upon hay or pasture which are now in progress in various parts of the country.

MAIDSTONE MEETING OF THE SOUTH-EASTERN UNION OF SCIENTIFIC SOCIETIES.

THE ninth annual congress of the South-eastern Union of Scientific Societies opened on the evening of June 9, when Sir Henry Howorth, the outgoing president, resigned his seat to Mr. Henry Rudler, who delivered the annual address at the Town Hall, Maidstone.

Mr. Rudler alluded to his address as a string of common-places, but in it some very important topics were touched upon. He considered, for instance, the constitution of scientific societies, and the matters to be discussed at their meetings in these days of great specialisation. He divided the members of such societies as constitute the union into those (few in number) who do the work and those (the majority) who like to see what is being done. Mr. Rudler was of opinion that the latter should have their wants realised as well as the specialists, for to put it on the lowest plane, the societies generally depended upon the financial support of those intellectual people who take a general interest in the progress of science without aiding in it themselves. Mr. Rudler's advice was to hold sectional meetings for the specialists, where the matters to be considered might be as technical as occasion required, and to