I reserve discussion of the possibility of this part of the peat being of more ancient date than that to which it has generally been referred—an opinion which might be suggested by the occurrence of *Rhinoceros tichorhinus* under the peat at Little Downham, or of the still older *Elephas antiquus* under the margin of the fen deposits near Whittlesea, and will content myself now with stating my own conviction that the peat in which the Shippea man was found cannot be older than Neolithic times, and may be much newer.

Notwithstanding his Neanderthal character I should not be surprised to find that he was a man of much later date, even a monk from Ely, perhaps a foreigner, who had lost his way and sunk down in the peaty swamp of the then undrained fens.

T. McKENNY HUGHES.

FIG. 2.

FIG. 3.

FIG. 4.

FIG. 5.

THE INTERNATIONAL RADIUM STANDARD.

THE committee formed at the Brussels Congress of Radiology and Electricity in September, 1910, for the purpose of fixing an international standard of radium, of which a full account appeared in NATURE of October 6, 1910, met in Paris from March 25–28. There were present Mme. Curie, MM. Debierne, Rutherford, Soddy, Hahn, Meyer, and Schweidler. MM. Geitel, Eve, and Boltwood were unable to attend. The main purpose of the meeting was to compare the standard prepared by Mme. Curie with others prepared by Hönigschmid from the material in possession of the Académie des Sciences at Vienna, during the course of his new determination of the atomic weight of radium, referred to in NATURE of March 21 (p. 68). Mme. Curie's standard consisted of 21·99 milligrams of radium chloride specially prepared by methods similar to those used by her for atomic weight determination, and sealed up in a thin glass tube with every precaution against error. The Vienna standards consisted of three tubes, containing respectively 10·11, 31·17, 40·43 milligrams of radium chloride, which were sealed up in somewhat wider glass tubes, but of the same thickness of wall (0·27 mm.) as the other, and were prepared by methods based on those devised by T. W. Richards for weighing hygroscopic substances.

It may be recalled that Hönigschmid found the value 225·95 for the atomic weight of radium, which is 0·45 lower than that found by Mme. Curie. This is a difference of only 1 part in 500, and, considering the small amount of material, is probably not due to differences in the purity, especially as certain corrections, such as for the solubility of the silver chloride, were introduced into the calculation of the atomic weight from the later determinations. It was therefore of the greatest interest to compare directly these two sets of entirely independent standards. Mme. Curie was sufficiently recovered from her recent illness to take some part, both in the deliberations and measurements of the meeting. Prof. Rutherford was chosen as the president of the committee.

After a visit to Mme. Curie's laboratory in the rue Cuvier, the committee proceeded to the Sorbonne, where, in Prof. Lippmann's department, a room, uncontaminated by radium, had been set apart for the measurements. Here M. Debierne had set up an interesting installation, capable of comparing the γ-rays of the standards by two distinct methods. The first method is based on the well-known null-method, largely employed in Paris, but hardly anywhere else, involving the quartz piézo-électrique of Pierre Curie. The ionisation current due to the γ-rays of the preparation was balanced by the electricity generated by relieving the tension of a stretched quartz lamina, by gradually lifting a weight from the pan, the electrometer needle so being held to its zero and the time measured from the commencement to the end of the lifting of the weight. This requires practice, and the admirable skill of the French observers with the method was humorously illustrated by the attempts of some of the visitors to emulate them. The form of ionisation chamber adopted calls for special remark. The radium standard was laid on the centre of a large circular disc of lead, 1 cm. thick, which formed the upper plate of a condenser, the distance between the plates being small compared with their diameter. A potentional of 800 volts was used to ensure saturation.

The other method was that recently described at the Physical Society by Rutherford and Chadwick, and is also a null-method, the γ-ray ionisa-

tion being exactly balanced by a special form of Bronson's "air resistance." The special feature of the arrangement is that the radium standard is mounted on an optical bench at a distance from a lead ionisation chamber, and the distance is varied until exact balance is obtained. The strengths of different preparations are proportional to the square of the distances, correction being made for air absorption of the γ-rays. Each method naturally has its own advantages and range of applicability.

After comparisons by both methods, the gratifying result was arrived at that the Paris and Austrian standards agreed perfectly with one another within the limits of error of the measurements. Naturally, to obtain the highest possible accuracy with the methods, a much more extended series of measurements than was possible in the short time available would have been necessary. But it was clear that the error of measurement was certainly not greater than 1 part in 300, and was probably much less. For example, for two single comparisons, the 31·17 mg. Vienna standard came out as 31·24 mg. and the 10·11 mg. as 10·13 mg. in terms of the Paris standard. The standards being entirely independent, this result reflects the greatest credit on the care and accuracy bestowed by Mme. Curie and the other investigators responsible for their preparation and for the methods of measurement. In future it will be possible to evaluate the quantity of radium in a preparation, in the absence of other radioactive substances giving γ-rays, by simple γ-ray comparison with these standards without any chemical operations and without opening the tube in which it is sealed, with an accuracy of at least 3 or 4 parts in 1000.

The committee also had the advantage of having a standard, sent by Sir William Ramsay, and prepared from material employed in the just-published atomic weight determinations by him in conjunction with Whytlaw Gray (Proc. Roy. Soc., 1912, 86 A, 270). The quantity of radium was much smaller than in the others, and corresponded to less than 4 mg. of radium chloride. In addition, it was not comparable, either in the manner of its preparation or of its mounting, with the others, the tube in which it was contained being of quartz, relatively thick in the wall. For these reasons no definite comparison was possible of the same degree of accuracy as for the others.

The committee accepted Mme. Curie's standard as the International Radium Standard, and will ask for its preservation in the Bureau International des Poids et Mesures in Paris. They have arranged for the 31·17 mg. Austrian standard to be similarly preserved in Vienna as a reserve standard. These standards are hereafter only to be used for purposes of comparison by the committee, and are not to be taken away from the cities mentioned or to be used for experiment. Arrangements have been made for the preparation of secondary standards, of between 10 and 40 milligrams of radium chloride, to be provided to the Governments of the various countries desiring them for their official testing institutions. These secondary standards will be compared independently at Paris and Vienna with the international and reserve standards, and will be supplied with a certificate showing the result of the comparisons. Further particulars may be obtained from the secretary of the committee, Prof. Stefan Meyer, Institut für Radiumforschung, Waisenhausgasse 3, Wien IX, Austria.

In the course of a few months it will be possible for each country to possess a radium standard which has been compared directly with the international standard, which will enable measurements to be made in future with complete confidence and will be invaluable both for scientific and commercial comparisons.

The necessity of refunding to Mme. Curie a quantity of radium equivalent to that contained in the international standard has been a source of anxiety to the committee, who have no funds at their disposal. It is therefore most satisfactory to be able to announce that as soon as the need was made known, the sum necessary was generously donated in this country by Dr. and Mrs. G. T. Beilby as a personal tribute to Mme. Curie and her work.

NOTES.

THE *Terra Nova*, the vessel of the British Antarctic expedition, arrived at Akaroa, New Zealand, on April 1, and brought the news that on January 3 Captain Scott and five other members of the expedition were within 150 miles of the south pole, and that he intends to remain another year in the Antarctic. A detailed account of the work accomplished by the expedition has been obtained by the Central News, Ltd., agency, and appeared in the daily papers on Tuesday and Wednesday. Captain Scott left the base at McMurdo Sound on November 2, 1911, for the poleward journey, and had arrived at latitude 87° 32′ S. on January 3. Nearly three weeks before this date Captain Amundsen had reached the south pole. Though Captain Scott has thus been forestalled as regards the first arrival at lat. 90° S., the scientific results of the British expedition promise to make up for any disappointment which may be felt from the point of view of national sentiment. Specimens of coal of economic value, and well-preserved fossils, have been found near Granite Harbour by the western geological party. Marine biological work has been carried on continuously, and every phase of seal, penguin, and skua-gull life has been photographed with the kinematograph. By means of small balloons the direction of atmospheric currents has been studied up to a height of six miles, and the temperatures have been recorded up to a height of five miles. Valuable magnetic, electrical, tidal, pendulum, and other observations relating to terrestrial physics have been made, and much has been done also in the fields of ice work and physiography. A summary of scientific work accomplished was published yesterday, and we hope to refer to its details next week. Meanwhile, we offer to Captain Scott and the other members of