

reception by means of this same bedstead as the antenna to anyone interested.

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London, S.W., June 16.

#### Sub-Red Crag Flint Implements and the Ipswich Skeleton.

I WOULD like Mr. Sutcliffe to read p. 199 of vol. i., part ii., Proceedings East Anglian Prehistoric Society, which contains the original description of the discovery of the Ipswich man. I think it would have been better if he had done this before publicly accusing me of inconsistency in regard to this matter.

J. REID MOIR.

#### THE OXYGEN CONTENT OF THE ATMOSPHERE.<sup>1</sup>

THIS memoir, published under the auspices of the Carnegie Institution of Washington, is of a type with which we are becoming increasingly familiar—a publication, in fact, which, it may be argued, the institution was created largely to undertake. None of the regularly constituted scientific societies would probably charge themselves with the issue of such a work, and it is very unlikely that it would see the light if left to private enterprise. Nevertheless, it is an eminently useful work, and will be welcomed by chemists, meteorologists, and physiologists alike.

The work is divided into two parts. Part I is wholly concerned with an historical account of the development of the methods for determining oxygen, in which practically everything contained in the literature has been put together and collated, from the days of Scheele and Priestley to those of Regnault and Bunsen, von Jolly and Morley, down to the methods of our own time depending upon purely absorptiometric processes. Naturally there is nothing very original in this section, and it is well-trodden ground to all who are familiar with the development of eudiometry. It is, however, an interesting and useful compilation, and will be of service to those who are concerned with accurate gasometric analysis, especially in relation to the atmosphere, or who desire to know all there is to know relating to its history.

The second and more immediately important part deals with the experimental work of the nutrition laboratory of the Carnegie Institution, Washington, of which Prof. Benedict is the director.

For some time past the nutrition laboratory has been engaged, among other things, in an elaborate inquiry into the nature of respiratory exchange in relation to metabolic processes, and the necessary instrumental equipment has now been brought to a very high degree of precision. After a careful investigation into the merits of the various types of modern absorptiometric apparatus, it was decided that the arrangement devised by Dr. Klas Sondén, of Stockholm, a development of the apparatus originally contrived some years ago by

<sup>1</sup> The Composition of the Atmosphere, with Special Reference to its Oxygen Content." By F. G. Benedict. Pp. iii+115. (Washington, D.C.: Carnegie Institution of Washington, 1912.)

Prof. Pettersson, more fully fulfilled the essential conditions of expedition, convenience and accuracy than any other existing form; and part ii. is practically made up of a description of the Sondén air-analysis apparatus, illustrated by photographs and woodcuts, together with an account of the plan and methods of research to be undertaken by it, with the results which have been obtained up to the date of publication of the report.

The principle of the apparatus is essentially that of the original Pettersson instrument, in which the absorption and determination of the carbon dioxide and oxygen are made, as in the Hempel, Orsat, and Haldane arrangements, by means of caustic potash and alkaline pyrogallate, but with the use of water-jackets and compensating pipettes so as to ensure much greater accuracy of reading.

The plan of the research involved (1) the estimation of the comparative oxygen-content of uncontaminated outdoor air under all conditions as to wind direction and strength, temperature, cloud formation, barometer and weather, including rain, snow, fog and mist; (2) a study of the influence of the temperature of the reagent upon its absorptive power; (3) an examination of the air over the North Atlantic Ocean; (4) on the summit of Pike's Peak; (5) in the crowded streets of Boston and in the subways of New York and Boston.

Such a programme necessitated a very large amount of experimental work and the analysis of many hundred samples of air. In addition, a large volume of work was needed in control and verification, and especially in tracking down and eliminating sources of possible error. Eventually a routine method was established, and from a long series of determinations it would appear that, as regards oxygen content of outdoor air, no material fluctuation could be detected over a period extending from April, 1911, to January, 1912. This constancy was maintained in spite of all possible alteration in weather conditions, barometric or thermometric changes, or changes in humidity, wind direction, and strength; furthermore, the experiments were made before, during, and after the vegetative season. The average result of 212 analyses showed 0.031 per cent. of carbon dioxide and 20.952 per cent. (corrected) of oxygen. Hence Dr. Benedict concludes "that air is a physical mixture with the definiteness of composition of a chemical compound." We have, in fact, got back to the position maintained by Cavendish in 1783 and by de Marli in 1787, that is, of the uniform constancy of the composition of normal atmospheric air, so far as regards its oxygen content.

Prof. Benedict further concludes that—

While the combustion of fuel and the vital processes of men and animals result in a local increase in carbon dioxide and decrease in oxygen on the one hand, and vegetable growth results in a decrease in carbon dioxide and increase in oxygen on the other, the extraordinary rapidity with which the local variations in the composition of the air are equalised is accentuated by the observations on street air, which show but the slightest trace of an oxygen deficit.

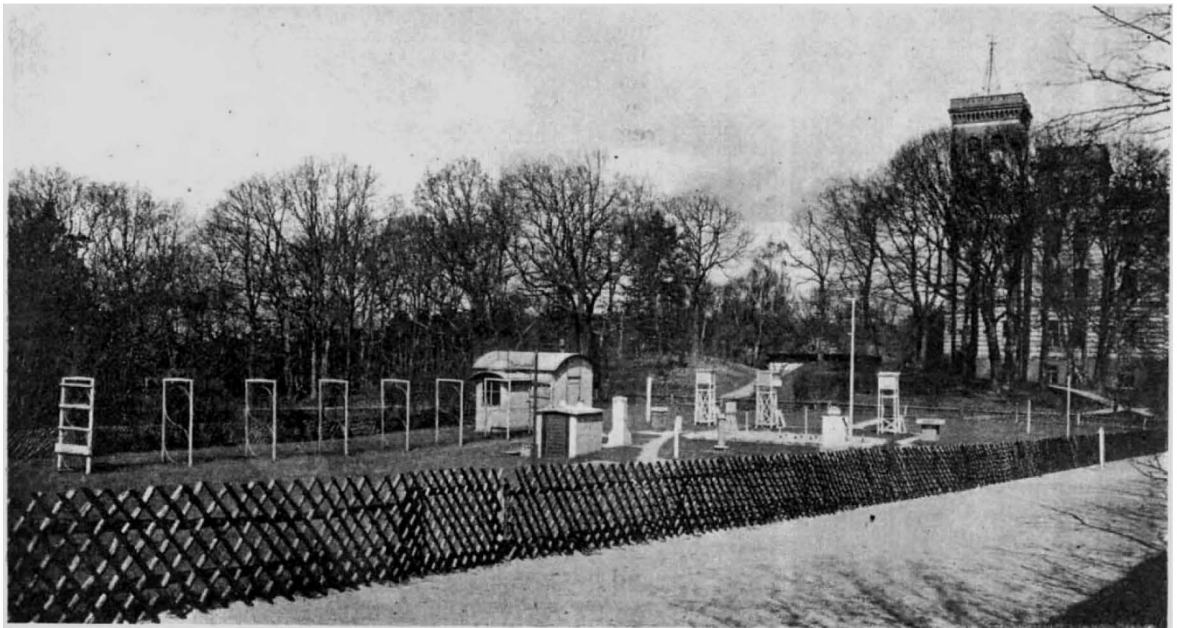
The interdependence between the amounts of carbon dioxide and oxygen is so constant that carbon dioxide estimations made in the Sondén apparatus may be taken as an accurate indication of oxygen content. For every 0.01 per cent. increase in atmospheric carbon dioxide, a corresponding decrease in the percentage amount of oxygen may be safely assumed. T. E. T.

*THE POTSDAM METEOROLOGICAL AND MAGNETIC OBSERVATORIES.*<sup>1</sup>

THE volume referred to below gives a lucid description of the observatories at Potsdam, compiled by Profs. Suring and Schmidt, who are in charge respectively of the meteorological and magnetic departments. A preface by Prof. Hellmann, the director of the Royal Prussian Meteorological Institute, to which the observatories be-

observatories—also situated on the Telegraphenberg—admits of the ready exchange of ideas amongst a number of men of science, each an expert in his own subject. The figure reproduced shows the enclosure devoted to meteorological instruments, especially those recording air and earth temperatures and rainfall. The small building in the corner is devoted to atmospheric electricity. In the background is the main meteorological building, a very large and handsome structure. Its basement contains *inter alia* a physical and chemical laboratory, a photographic dark-room, a workshop, electrical generating apparatus and storage batteries.

On the ground-floor are various rooms for meteorological work, including a large room containing the barographs and other recording instruments. Most of the remaining space under the roof serves to provide accommodation for the



Observation enclosure of the meteorological and magnetic observatories at Potsdam.

long, states that the book is primarily intended for the benefit of those studying at or visiting the observatories, the number of visitors being now large. The text describes the buildings and instruments, while reference is made in footnotes to many researches associated with the place. Thirty-one figures supplement the descriptions of buildings and instruments in the text, and a plate gives a ground-plan of the whole site.

The construction of the magnetic observatory began in 1888, and that of the meteorological observatory in 1890, so that the buildings are all modern. The equipment is also modern and exceedingly complete. The site on the Telegraphenberg, a wooded hill on the outskirts of Potsdam, might be criticised by some meteorologists, but it possesses much natural beauty, and the proximity of the astrophysical and geodetic

resident staff and the director of the Meteorological Institute, but it includes a library and a conference chamber. The roof is flat and surmounted by a low and a high tower, the former devoted to optical and cloud-measuring apparatus. The large tower rises to a height of 32 metres above ground-level. A staging on the top of it carries various wind-measuring apparatus, including a Robinson anemometer, the cups of which are 40.8 metres above the ground and surmount all other objects on the Telegraphenberg.

There are two chief magnetic buildings, the larger about 100, the smaller about 150 metres from the meteorological building. The former contains two sets of magnetographs, in a basement maintained at a nearly constant temperature throughout the year; the latter is devoted to absolute observations. In view of electric-tram disturbances in Potsdam—though these are still exceedingly small—a new magnetic observatory

<sup>1</sup> "Meteorologisch-magnetisches Observatorium bei Potsdam." Pp. 67+ plates. (Berlin: Behrend and Co., 1912.) Price 3 marks.