

PHOSPHORUS IN THE ATMOSPHERE.—Mr. C. McLaren has lately given in the Edinburgh Scotsman, an abstract of a memoir on this subject by M. Barral, which was read to the Academy of Sciences on the 21st November, 1860. It appears that M. Barral had detected phosphate of lime in rain water some years ago, but doubts arose whether its presence might not be due to the glass or porcelain vessels in which it was kept. To obviate this difficulty he employed vases and eudiometers of platinum, and operated upon two portions of rain water, collected, during five successive years, under his own inspection; the one at the Luxembourg in Paris, the other in the Park of Soulins in the open country. The water was evaporated in large quantities, and the residuum examined chemically. Considering this residuum first, simply as *impurities* imbibed by water passing through the atmosphere, he found that 2278 English pints, or 570 gallons, of Paris rain water, yielded 350 troy grains of dry residuum. Of the rain water which fell in the country at the park of Soulins, 171 gallons yielded 46 grains of dry residuum. The impurities, therefore, in 100 gallons of Paris rain water, compared with an equal quantity from the open country, are as 226 to 78, or nearly as *three to one*. In London, with its coal fires, the impurities must be three times greater. M. Barral's experiments, directed to the discovery of the amount of *phosphorus* in the water collected in different localities, did not show any appreciable difference in this particular between the water at Paris, and that of the park of Soulins. The results of his experiments varied considerably; but taking a mean, he computed that 440 gallons of the rain water examined contained from 8 to 15 troy grains of phosphorus. This is an exceedingly minute quantity, and yet the effects deducible from it are not altogether without importance. By calculation, he computes, that the atmosphere delivers annually to the soil *about 2400 troy grains of phosphorus to each acre of land*. Phosphorus is extracted from bones, in which it exists, in the shape of a phosphate of lime. Phosphate of lime is an essential part of the food of cereal plants, and hence the wonderful effects of bone meal in increasing crops. That water, by itself, or its elements, oxygen and hydrogen, is necessary to the growth of plants, has been long known, but it is a new and interesting fact, if Mr. Barral's conclusions are correct, that *the clouds which supply water to the earth, send down a refined and valuable manure with it*. No doubt the quantity is inconsiderable, but small though it be, the restoration of fertility to exhausted lands by allowing them to lie fallow for a course of years—a practice followed by the Arabs—must be partly the effect of it. Wheat is an exhausting crop, because much of its substance consists of phosphoric acid, and Mr. Barral admits that the quantity of this substance carried off by one crop of wheat could not be replaced by the atmosphere in less than twenty years.

Of late years, the discoveries that have been made in regard to ammonia and the apparent power of plants to take up free nitrogen, have modified considerably