mediate value. Of the immense disproportion between the amount of nitrogen in what I may call an inert and active condition, some idea may be formed when I mention that 100lb. of atmospheric air contains about 77lbs. of nitrogen, and, according to a recent determination not more than ¼ of a grain of ammonia. I shall not attempt to enter here upon the question of how the nitrogen of the air passes from its inert into its useful state—a question of much intricacy, which has occupied the attention of many distinguished chemists, without having as yet obtained a perfectly satisfactory answer. It is certain that, under peculiar circumstances, the nitrogen of the air may pass in small quantity into the state of ammonia, but the supply so obtained is small and uncertain. The great source of ammonia is the decomposition of animal and vegetable substances, containing nitrogen, which sooner or later, give off the whole of that element they contain in the form of ammonia. Next to ammonia in importance may be placed phosphoric acid, which is likewise a comparatively rare natural product, and of which also the great source is in animal and vegetable substances, all of which, but especially animal substances, contain it in quantity. It is true that it is found also in the mineral kingdom; but it exists so sparingly that as yet scarcely any advantageous use has been made of that which is obtained from this source. You will observe then, and it is a matter of great practical importance, that the principal source of the two most important constituents of plants is from plants themselves; for even that portion obtained from animals comes originally from the plants upon which these animals have fed. And the same may be said of potash, of which the great source is still from plants. This is a point which I wish to impress particularly upon you, that plants form the great source of these substances, and that this is true, not merely of these substances as manures, but even when you go into a druggist's shop and buy pure ammonia, phosphoric acid or potash, every atom which you get has at some time or other existed in a plant or an animal. These observations lead me directly to the consideration of that manure which consists of the decomposing portions of plants, and that of course is farm-yard manure, the most important of all, that on which the farmer must always be mainly dependant, and, I think I may also say, that, regarding the economical management of which we have the least amount of definite information. I beg it to be understood as my decided opinion, that farm-yard manure must always be the farmer's mainstay. I am aware, indeed, that some have thought otherwise, and we have all heard of an eccentric gentleman who expressed his opinion, that the time would come when the farmer would carry his manure to the field in his waistcoat pocket; and though no one is now-a-days so absurd, some people will seem to expect that some complete substitute will be found for farm-yard manure. I can assure you, however, that any such supposition is entirely extravagant, and is certainly uncountenanced by chemistry. I do not mean to say that chemistry could not produce a substitute; but what I mean is, that the farm-yard manure must always be much cheaper than any substitute which could be manufactured, and the reason is to be found in the fact that the constituents of such a manure must be extracted from plants, which must necessarily be expensive. While even supposing that to be done, farm-yard manure *must*, in the very nature of things, still always be produced. No question can then be conceived of more importance than of obtaining this manure in its most perfect of state, but how that is to be done is exactly one of those questions still unsettled, and which I believe to require very complete and careful field experiments. The exact chemical estimation of the comparative values of different specimens of this manure is a very difficult matter; partly from its extremely complex nature; and, partly, from the many questions it involves. Of course, good farm-yard manure will contain more or less of all the constituents of our crops' but in estimating its value, we must be contented to take into consideration only its most important constituents, and, in this way, I conceive we may obtain a sufficiently near estimate, by knowing the amount of nitrogen and phosphoric acid which it contains; but of these, for many reasons, the first is by far the most important, as it is in respect to it that the value of farm-yard manure appears to vary most. In the management, then, of farm-yard manure, two different questions require to be considered. First, the production of a manure containing the the greatest possible amount of nitrogen and, secondly, the successful convertion of that nitrogen into ammonia. It is not unimportant, of course that the other constituents of the manure should be present in abundance, but it may be assumed, as generally true, that the treatment likely to produce the greatest amount of nitrogen, will be that which produces the most valuable manure in other respects. In regard to the first of these questions, there is a want of definite information. It is a common statement, however, that the value of the manure is dependent upon the nature of food with which the cattle, which produce it, are supplied. That, for instance, cattle fed upon oil-cake produce superior manure to those fed on turnip. I am aware that this opinion is not universal, as I have heard it disputed by farmers of skill and experience. I am inclined, however, to believe that it is to a certain extent correct. Supposing, then, that two samples of such manure differ, it must be obvious that it is the dung and urine of cattle which differ; the *litter* mixed with such dung will be the same in both cases. Now, some experiments