"Shortly after Schultz acquired Lupitz the great discovery of potash salts was made, and about 1860 they began to be produced from the mines of Stassfurth. Schultz made up his mind to try them as manure and he obtained the most surprising results. After lupines had shown themselves to be useless as forerunners of grain, they were excluded from the rotation, and grown on a separate field without any manuring and alternating with sheep pasture. But the harvest on these became worse and worse, until the field in question became quite lupine sick. Schultz made his first trial on this field, manuring it with 300 lbs. kainite per morgen (1 Prussian morgen = 0·631 acre); the sickness was at once cured, and for twenty-five years afterwards Schultz has grown lupines on this ground without interruption, always with the application of 300 lbs. kainite. Schultz obtained similar good results on the ground which had received the marl, by the application of potash salts. This ground had indeed yielded well with lupines for two years after the application of the marl, but in the third year they sickened here too. When, however, the 300 lbs. kainit were applied here and ploughed in in the fall, the ground was cured, although an application of phosphates had not produced the desired results.

"The favourable influence which the manuring with kainite or potash salts had exerted on lupines induced Schultz to try them on grain, in conjunction with phosphates. But in this case he obtained contradictory results, according to the nature of the crop which preceded the grain. For instance, while grain sowed after lupines and manured with potash and phosphates yielded very good and remunerative harvests, these were not to be obtained if grain was grown after grain or after potatoes. This behaviour of these crops was explained by Schultz in this way, that lupines as deep rooted plants leave in the soil after harvest a residue of root, in which a considerable amount of nitrogen has accumulated—an amount sufficient to supply the wants of the following grain crop; that, on the other hand, the application of potash and phosphates to grain, after a preceding grain crop, is without effect, for the reason that the latter had consumed the stock of nitrogen. Grain crops always reduce this stock—never increase it. Schultz has given the name nitrogen collectors to the lupines and similar plants, while grains are called nitrogen consumers. His system of rotation is therefore the following: Sow first nitrogen collectors (lupines, pease, beans, vetches, clover, lucerne, serradella, &c.), or, as they have been called, renovating crops, and give them 300 lbs. kainite per morgen, with perhaps an addition of 20 lbs. phosphoric acid. After harvesting the nitrogen collectors sow a nitrogen consumer, raising a grain or exhausting crop, giving it also 300 lbs. kainite and 20 lbs. phosphoric acid. The grain crop is perfectly successful, because the first crop left behind it nitrogen enough to supply the wants of the grain. In this way the keeping of stock, which is expensive on a poor sandy soil, can be reduced, and the purchase of nitrogenous fertilizers dispensed with, because the nitrogen collectors are able to stock the soil with that valuable element."

The foregoing description is taken from Professor Königs' "Stickstoff Vorrath," published in 1887 (Paul Parey, Berlin). It was in 1884, nearly thirty years after the purchase of his sandy farm, that Schultz, of Lupitz, published the results of his experience, although they did not contain anything very new, and although they only confirmed experiences still older than his own. But his case was surprising, and his explanation of the cause of his successful farming challenged the attention of scientific agriculturists. The consequence has been the issue of many pamphlets on the subject, and an activity in the region of agricultural experimenting which has continued for five or six years, and is not yet ended. Atwater, Wagner, Heiden, Hellriegel, and many others have participated in these investigations, and Professor Woods, of the Storrs Agricultural School in Connecticut, gives the following general conclusions as the result of the work up to the present:—

"1. Pease, alfalfa, serradella, lupine, clover in all probability, and apparently leguminous plants in general, are able to acquire large quantities of nitrogen from the air during their period of growth.

"2. There is scarcely room to doubt that the free nitrogen of the air is thus acquired by plants.