The object of the researches of which a summary is given in the second paper was, to determine the quantity of nitrates contained, at a given moment, in one *hectare* of cultivated ground, one of meadow, one of the forest-soil, and in one *metre* of river or spring water. The quantity in the soil was of course found to vary extremely with the extremes of wet or dry weather. Garden soil, highly manured every autumn, contained on the 9th of August, 1856, after fourteen dry and warm days 316·5 grams of nitre in a cubic litre of soil. On the 29th of the month, after twenty rainy days, the same quantity of the same soil contained only 13 grams of nitre. The greater part had been dissolved out of the superficial soil.

Some specimens of forest-soil, in a state of nature, furnished no indication of nitrates: others gave 0·7 and 3·27 grams of nitre to the cubic metre.

The soil of meadows and pastures afforded from 1 to 11 grams of nitre to the cubic metre. Nineteen specimens of good cultivated land gave, four of them none; others from 0·8 to 1·33; the richer ones from 10·4 to 14·4, and one fallow, of exceptional richness, as much as 108 grams of nitre to the cubic metre. To the latter much calcareous matter had been added.

The soil of a conservatory, from which the nitrates would not be washed away by rains, contained 89, or 161, and some rather deep soil 185 grams of nitre in the cubic metre.

The sources of the nitre are not difficult to understand when we reflect that a manured soil, especially a calcareous one, is just in the condition of an artificial nitre-bed. The ultimate result of the decomposition of ordinary manure is a residuum of alkaline and earthy salts, phosphates, and nitrates, the latter, with the ammonia furnishing the assimilable nitrogen, all-essential to productive vegetation. In incorporating with the soil undecomposed manure, instead of the ultimate results of the decomposition, less loss is suffered from prolonged rains washing out the formed nitrates.

The soluble matters washed out of the soil are to be sought in the water. River and spring waters therefore act as manure by the silex and alkali, the organic matter, and the nitrates which they hold. The spring waters poorest in nitre of those examined contained from 0·03 to 0·14 milligrams of nitre to the *litre;* the richer ones from 11 to 14 grams in the cubic metre.

As to river-water; the Vesle in Champagne held 12 grams, the Seine at Paris 9 grams the cubic metre. These were the richest. The Seine at Paris carries on to the sea, in times of low water 58,000 kilograms, in times of high water 194,000 kilograms, of nitre every twenty-four hours. What enormous amounts of nitre must be carried into the sea by the Mississippi, the Amazon, and by every great continental river; and how active, beyond all ordinary conception, must the process of nitrification be over all the land; and how vast the supply of assimilable nitrogen for the use of the vegetation! A. G.

10. *Action of foreign Pollen upon the Fruit.*—In the last number of this Journal, p. 443, some facts were referred to which led to the supposition that pollen applied to the stigma may exert some specific action upon the ovary itself, independent of its action upon the ovules determining the

formation of the embryo. This was mentioned as furnishing the most probable clue to the explanation of the reputed fact that squashes are spoiled (that is the quality and appearance of the fruit altered) by pumpkins growing in their vicinity, and *vice versa*; and even that melons are spoiled by squashes; and this notwithstanding the fact, ascertained by Naudin, that distinct species of *Cucurbitaceæ* refuse to hybridize, although the various races of the same species cross with the greatest facility. It is generally agreed that the alteration of the character of the fruit is immediate, i. e., that it affects the ovary itself which has been contaminated by strange pollen. It might then equally affect the fruit whether the seeds were any of them fertilized or not; and in Naudin's experiments the application of pollen apparently caused the fruit to set, even when no ovules were fertilized.

Now a similar case of direct action of alien pollen upon the fruit, or grain, occurs in Indian Corn, and is familiar to every farmer in the country, in the form of grains of different varieties on the same ear. A decisive instance is before us in a small ear of Sweet Corn, grown in the vicinity of a patch of the common hard yellow variety; in consequence from three to six grains in every row have become yellow corn, while the rest retain the characteristic appearance of the sweet variety. It is not rare, where several sorts of maize are cultivated together, to find nearly all of them separately represented upon one ear. This must be the result, either of cross-fertilization of the previous year showing itself, not in a blending of the characters of the fruit of the progeny, but in a complete separation into the constituent sorts in the fruit resulting from one seed, which would be a wonderful anomaly, but no impossibility; or else, of an immediate action of the pollen the present year, as is reputed of squashes and melons. But the occurrence of three sorts of corn upon one ear goes far towards excluding the first supposition, since there can have been but two immediate parents to one embryo. A. G.

11. *Structure and development of the Flower and Fruit of the Pear;* by J. Decaisne. From a communication made to that active association, the Botanical Society of France,—of which an abstract is published in the Gardener's Chronicle of Nov. 14th, we learn that Decaisne has proved by direct observation of the development, the correctness of that view respecting the structure of the pomaceous fruit which we have always maintained on general morphological grounds. The pips are the true pistils: they are separate and free at their first appearance: a little later a growth from the receptacle forms an open cup around them, ends by completely investing them, and becomes the flesh of the core. In the Pear, as the base of the at first sessile flower-bud elongates into a peduncle, the upper part of this thickens with the bud itself, and forms the tapering lower part of the pear, which therefore, below the carpels, is formed of the stalk, as absolutely as in *Anacardium* or *Hovenia*. From these observations and others upon *Melastomaceæ*, &c., Decaisne concludes that the orthodox view of the structure of the flower, "as explained by our illustrious masters, R. Brown, DeCandolle, and Jussieu" is demonstrably correct; that "it is not necessary to call into account that axis which is at the present day so often and so willingly appealed to for explaining the structure of flowers and fruits;" that "it is not impossible to