and yet the "humus-theory", which persisted into the nineteenth century, was as grossly erroneous. It may be noted, however, that what we now know in regard to the rôle of bacteria (not to speak of earth-worms) in preparing the soil-food for plants might be used to rehabilitate both the Aristotelian conjecture and the humus-theory.

Towards the end of the sixteenth century (1583) Cesalpino broke away from the bondage of Aristotelian He compared the vessels and fibres of plants tradition. to the veins in animals, and suggested that the food passed into and through the plant by a sort of suction, as oil in the wick of a lamp. Joachim Jung also marks the growing revolt. He insisted that the plant took an active part in its own nourishment, and suggested that the nature of the openings in the root might be such as to admit only what was of advantage. The chemist Van Helmont (1577–1644) deserves to be remembered in this connection as the author of the first recorded experiment in vegetable physiology. He planted a willow in a weighed quantity of soil and watered it with rain; in five years the plant had grown from 5 lbs. in weight to 164, while the earth in the pot showed only a loss of 2 ounces. Not suspecting that the plant drew a great part of its food from the air, he was forced to exaggerate the virtues of rain-water.

J. D. Major (1639–1693) is generally referred to as the founder of the theory of circulation in plants—a subject of discussion all through the eighteenth century, and by no means beyond dispute still; but we reach firmer ground in the work of the keen-sighted histologist Malpighi. To him is due the first suggestion of the fundamental fact that the leaves elaborate the crude sap; he believed that this passed from the roots to the leaves by the fibrous elements of the wood; and his only gross error was in regarding the wood-vessels as respiratory air-tubes.

Equally important were the conclusions of the physicist Mariotte (d. 1684), who maintained, for instance, that different plants draw the same material from the soil, but make different stuffs out of it; that the entrance