formation, or be produced in them by their continued cultivation. Substances of this class, capable of restoring, in the one or the other way, the lost fertility of a soil, are generally known as Manures or Fertilizers, and have been used from the earliest times, long before science enabled us to account for their beneficial action. It is my object to devote the following pages of this treatise to a description of the various kinds of manures employed, and to found upon the resulting facts a series of conclusions relative to their mode of action, and of recommendations in behalf of the most proper mode of action, and of recommendations in behalf of the most proper mode of their management, as best accord with both practical experience and the present state of science.

We still remember, from our knowledge of the functions of the soil, that its fertility depends on two factors: mechanical texture and directly nourishing capacity, the product being the crop. This fact stands in close relation to the wants of plants. The various single substances which serve as nutriments to plants, and which we find as constituents of their body, are naturally divided into two classes, viz: such as are capable of assuming the gaseous state and then form a constituent of the atmosphere—water, carbonic acid, and ammonia—and such as, by their involatility, are bound to the soil through which they are diffused in minute particles, and are not liable to loss unless assimilated by the plants and subsequently removed with the crop—I mean the phosphates, sulphates, chlorides and silicates of the alkalies and alkaline earths, or the mineral constituents of plants.

These latter substances, though they form a comparatively small part of the body of the plant, are nevertheless indispensable for the development of vegetable life; and it is the absolute quantity of these matters present which we regard as the totality of the directly nourishing capacity of the soil. The means by which they may be supplied to soils deficient in them are given to us in various forms, as bones, mineral phosphorites, Mexican and Columbian guanos, super-phosphates, ashes, common salt, plaster of Paris, &c.

The former class of substances, on the other hand, furnish the material for the main body of the plant, inasmuch as the whole of its combustible or organic part is formed from the constituents of these nutriments. Their supply depends to a large extent on the mechanical texture of the soil; for it is the particular proportion in which the fundamental constituents of soil (sand, clay, lime and humus) are present, which causes a more or less perfect communication of the soil with the atmosphere, which furthermore promotes the formation