agents, but acts in the same manner upon them. The necessity of air to the growth of plants, and the conversion of its pure part into carbonic acid by the leaves, in every stage of that growth, have already been noticed ; and Priestley, Scheele, and Ingenhousz, showed that flowers, in like manner, require air, and convert its oxygen into carbonic acid. De Saussure has since ascertained that flowers do not develope in atmospheres destitute of oxygen gas ; that, in proportion to their bulk, they consume more oxygen than leaves ; and that the oxygen which disappears is replaced by an equal volume of carbonic acid gas; so that little or no variation of bulk occurs in the air employed. Unlike leaves, however, flowers do not produce oxygen gas in sunshine. Under such an increase of temperature, they consume even more oxygen than before ; but no trace of the production, either of hydrogen or azote, is discoverable in the atmosphere in which flowers have been made to grow.

Connected immediately with the great consumption of oxygen by flowers, is the high temperature which some of them manifest at the period of fecundation. Lamarck and Senebier observed the flower of *Arum cordifolium* to impart the sensation of heat to the touch ; and to possess, a little after midday, a temperature 12° higher than that of the surrounding atmosphere. In the Isle of Madagascar, M. Hubert found that the same plant raised the thermometer still higher ; that the male parts of the flower possessed, in this respect, greater power than the female, so that twelve stamens, placed round the bulb of a thermometer, raised it, at the moment of bursting, from 70° to 121°; that this power resided in the exterior surface, not within the sub­stance of the organs ; and, lastly, that air was necessary to this elevation of temperature, and was rapidly depraved in the process. In confirmation of these facts, De Saussure has since found that double or imperfect flowers consume less oxygen than those which are simple and perfect; that thee greatest portion of this gas is consumed at the period of fecundation ; and that the stamens, adhering by their base to the receptacle, consumed more than other parts. He further ascertained that the temperature of many flowers rises in proportion to the quantity of oxygen consumed ; and, to the rapid combination of oxygen gas with the car­bon of the flower, he ascribes, with Senebier, the great rise of temperature which occurs, in certain flowers, at the period of fecundation.

This necessity of air to the development of flowers, taken in connection with the chemical changes which it suf­fers, and the high temperature thence arising at the period of fecundation, points to some peculiar action which it exerts in the exercise of the generative function. Not long after the true nature and use of the sexual organs had been made known by Grew, Dr. Blair, in a learned essay on the *Generation of Plants,* maintained, that, while the greater part of the ascending sap passed on to the leaf, a portion was also carried to the petals of the flower, and, in its course through them, underwent that change and elabora­tion which fitted it for forming the pollen, and rendering that matter the proper means of fecundation. Λ similar opinion of the use of the corolla was held by Du Hamel. The petals, says he, are organs necessary to fructification. They not only protect the stamens and pistils, but per­form the office of leaves, in acting on the fluids of the sexual organs, and perhaps effect in them some important prepar­ation. Dr. Darwin likewise considered the petals to act, by the agency of the air, in elaborating the juices destined to nourish and develope the sexual organs. These opinions as­sign to the less important parts of the flower functions es­sential to the perfection of the whole, and corresponding in nature with, those executed by the leaves, only that “nature,” as Grew observes, “hath lapped up the virtue in leaves as in brown paper, but in the flowers as in leaf-gold.”

When lire organs of reproduction have attained their perfect state, and a suitable condition of the atmosphere prevails, the process of fecundation is accomplished by various modes in different plants. By the agency of the solar rays, aided probably by that high temperature which at this period they derive from the decomposition of the air, the anthers burst and discharge the pollen in the form of a fine dust. This dust, in some instances, falls directly on the stigma of the pistil previously prepared, by the secre­tion of a viscid matter on its surface, to receive and detain it. In other instances, the pollen is conveyed to the stig­ma by insects, or by the wind ; and in others. Its convey­ance is accomplished in different modes. When the pollen has been shed, the stamens and petals soon begin to fade and fall ; the filament of the pistil likewise fades ; but the ovary at its base augments in size, and the pulpy globules, or vesicles, previously formed within it, enlarge, and gra­dually assume the form and character of the perfect fruit or seed.

The pollen, which occasions these extraordinary changes in the ovarian vesicles, is composed of small particles, enclosed in two coverings, and possessing a different colour, size, and figure, in different plants. These particles are organized, and, when observed in a bright sunshine with a microscope, may, in some plants, be seen to burst ; and then a liquor like saliva escapes, in which, says Du Hamel, small particles are obscurely visible. Of the chemical nature of the pollen little further is known, than that it yields a pecu­liar matter, called *pollenin,* which is described as being of a yellow colour, without taste or smell, insoluble in water and alcohol, but highly inflammable, and yielding, by dis­tillation, a good deal of ammonia, which approximates, in composition, to animal matter ; but this knowledge gives us no insight into the nature of its peculiar action.

When the grains of pollen have lain for a short time on the stigma, they open at their angles, or in certain definite points of their surface, and emit long slender tubes called *pollen tubes,* which, according to Brongniart and Brown, are formed of the inner lining of the pollen grains. These pollen tubes, which are not above the 1500th or 2000th part of an inch in diameter, pierce the stigmatic tissue, and find their way down to the region of the placenta, convey­ing the matter contained in the grains into the interior of the style. The active molecules of the pollen are thus brought into communication with the foramen of the ovule, and are the means by which impregnation is effected. Although tubes enter the ovarium, and run along the pla­centa. It has not been proved that the true pollen tubes come in contact with the ovule. What is the nature of the communication made by the pollen to the ovule, through the medium of the pollen tubes, and the result of which is fertilization, we have no means of knowing. Some consider it a peculiar stimulus, which is required to call into exis­tence an embryo germ of life, residing in the point of the nucleus ; others say that it is the act of conveying such a germ to the nucleus from the pollen grains. The latter idea has been supported by Schleiden, whose ingenious views on the subject are published in the Nova Acta Aca- dcmiæ Naturæ Curiosorum, &c., vol. xix.

On this subject, Brown remarks, that our knowledge appears not yet sufficient to warrant even conjectures as to the form of the immediate agent derived from the male organ, and the manner of its application to the ovule, in the production of that series of changes constituting fecundation ; and he at the same time remarks, that in investigating the obscure subject of generation, additional light is perhaps more likely to be derived from a further minute and patient examination of the structure and action of the several organs in *asclepiadacea* and *orchideιe,* than from that of any other department either of the vegetable or animal kingdom.

But whether the pollen act directly or indirectly on the