ovarian vesicle, there is little doubt but its influence is necessary to the perfection of the seed : for though, as Ray observed, some fruits may be produced without the concur­rence of the male parts of the plant, just as some birds will produce eggs without the concurrence of the cock, yet such fruits, like such eggs, are altogether barren and unproduc­tive.

To the impregnation of one species of flower by another of a kindred nature, through the agency of winds and in­sects, Du Hamel ascribed most of the varieties of fruits denominated new. In some fruits, the species, in the hybrid production, are kept so distinct, that we are able to distin­guish one part from another, with which it had been asso­ciated at the period of fecundation. Thus, there is a species of orange, which, on the same tree, says he, produces “ des bigarades, des citrons, et des balotins séparés, ou même rassemblés par quartiers dans le même fruit.” In like manner, a certain species of vine produces, on the same shoot, bunches both of red and white varieties ; or on the same bunch both red and white grapes ; or bunches on which the grapes are red and white by halves, or even by quarters. These diversities in fruits he attributed to the impregnation of one species by the pollen of another ; and to a similar cause, as we before stated, he ascribed many of those diversities in the colours of flowers, where different varieties grow and blossom together. Others have made many direct experiments on the reproductive function in plants by *crossing* different species with each other ; and, by a judicious extension of the same methods, Mr. Knight has been able to present us with several new and improved varieties both of seeds and fruits.

Art. VI.—*Maturation of Fruits.*

The period that intervenes between fecundation and that in which the ripening of the fruit or seed is completed, varies in different plants, and even in the same plant, is much modified by climate, season, habit, &c. Whatever, to a certain extent, diminishes the vigour of vegetation, favours the production and accelerates the maturation of the fruit. So long as trees continue to shoot and abound in sap, says Du Hamel, their fruits do not arrive at maturity. By stripping them of their leaves, we hasten this period, not so much, however, by exposing the fruit to the sun, as by weakening the flow of the sap. But if the tree be stripped before the fruit has reached its proper size, both its size and quality are bad. As the powers of vegetation decline, the fruit advances towards maturity ; and then exposure to the sun, by promoting transpiration, and concentrating the juices of the fruit, hastens the ripening process. At an earlier period, however, the same degree of exposure, by exciting too great transpiration, might cause the fruit to languish and wither. When fruits are enclosed in bags to protect them from wasps, transpiration is checked, and the fruit enlarges ; but has not so good a flavour as usual. The present taste for what are called “ fine fruits,” seems directed chiefly to size, and is content to resign the rich and racy flavour, found only in fruits of a moderate bulk, for the pampered and bloated produce of a too luxuriant vegetation.

Ingenhousz formerly maintained that fleshy fruits, whe­ther ripe or unripe, and whether growing in sunshine or in shade, always vitiated the air in which they were con­fined : and in a late Memoir on the Maturation of Fruits, M. Berard has adopted the same opinion, and maintained that green fruits do not decompose carbonic acid and dis­engage oxygen gas in sunshine, but that, through every period of their growth, they uniformly convert the oxygen of the air into carbonic acid gas. To this Memoir, Μ. de Saussure, who had formerly combated the opinion of Ingen­housz, has replied by new experiments; and has satisfactorily proved, that although, during the night, green fruits convert the oxygen gas of the air into carbonic acid gas, yet that, when exposed to sunshine, they again reconvert this carbonic acid into oxygen gas ; so that, if they be placed alternately in sunshine and in obscurity, for two entire days, the air of the vessel undergoes successive changes which nearly coun­terbalance each other, and at the close of the experiment no other degree of change exists in it, than may be attributed to errors of observation. Hence it is inferred, that, both in the shade and in sunshine, green fruits act upon the air like green leaves; but this action is carried on to a smaller extent, and diminishes as they approach maturity.

As thus the air, under similar circumstances, suffers the same changes from green fruits as from leaves. It may be presumed that the fruit owes its green colour to the same action of light upon it. Light seems also to act in the production of the other colours which fruits exhibit. Μ. Bonnet shut up, in cases of white tin, grapes of a black colour, which did not then acquire their natural hue. Pears, says Du Hamel, which grow in the shade, are often green, while others, exposed to the sun, are beautifully coloured ; and the same things are observed in peaches. Neither peaches, pears, nor cherries, assume their proper colours, if, at the period of ripening, says Senebier, they are secluded from light; and if a portion of fruit be covered with tin-foil, that part will continue pale or yellow, while the uncovered portions of the same fruit become perfectly red. If the red juices of fruits be extracted by water or alcohol, they are affected by acids and alkalis like those of flowers ; and similar changes are produced by these agents on the coloured infusions obtained from their skins. These facts show that the same chemical actions, which occasion the colour of leaves and flowers, are employed in the coloration of fruits: but in these latter, they are probably much modified by the chemical changes that go on in the fruit itself during the process of maturation.

To discover the chemical changes that take place in the fruit during its maturation, Μ. Berard analyzed several fleshy fruits at different periods of their growth. With this view, three apricots of the same size were selected, and being plucked in succession, one of them was analyzed at three different stages of growth, namely, in its green state, in a state more advanced, and in a ripe state. The several results are given in the following table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Apricot very | Green. | | Advanced. | Ripe. |
| Animal matter.. | 0,76 | | 0,34 | 0,17 |
| Green colouring  matter } | | 0,04 | 0,03 | Yellow 0,10 |
| Woody fibre.... | 3,61 | | 2,53 | 1,86 |
| Gum | 4,10 | | 4,47 | 5,12 |
| Sugar | traces of | | 6,64 | 16,48 |
| Malic acid | 2,70 | | 2,30 | 1,80 |
| Lime | a very small portion in the three. | | | |
| Water | 89,39 | | 84,49 | 74,87 |

In the interval between the first and last analysis, the fruit had so much increased in size, as nearly to double its weight. It will be seen that, with the exception of the green colouring matter, which had become yellow, all the ingredients found in the unripe fruit were present in the ripe one, but some were in greater proportion. Sugar in particular had greatly increased, and water had diminished. From these results it is inferred, that the different flavours of green and ripe fruits are not owing so much to the dis­appearance of any primary ingredient, or its transformation into another substance, as to the production of new sub­stances, and especially of sugar, made in the progressive stages of growth. Similar analyses of cherries, goose­berries, plums, and peaches, afforded the same results.

There are some fruits, however, as those of apples and pears, which ripen very well after they are detached from