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XXXII. A treatise on the cultivation of the vine, and the method of making wines

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vital air, or, perhaps, of the destruction of mephitic air in the atmosphere, to compensate the losses it sustains, and to maintain constantly the quantity requisite for the preservation of the inhabitants of the earth, without producing a continued increase or diminution in the aerial substances of which the atmosphere is composed. What disorders might ensue if a few hundredth parts of vital air only were wanting? Fire would lose its strength, candles would not diffuse such complete light, and animals would with difficulty receive the vivifying air. No less inconveniences would arise if the atmosphere, on the other hand, were more charged with vital than mephitic air. Animals indeed, by these means, would acquire a freer respiration; but let us only consider the activity which fire would acquire by air of superior purity. We know that, on some occasions, the least spark excites the strongest flame in a combustible body, and which increases so much as to consume it in a few moments: candles then would be no sooner lighted than they would be destroyed, without answering any other purpose than that of dazzling us for a few moments: iron would be calcined, instead of acquiring from the fire that softness necessary for transforming it into various instruments, and which it cannot receive in a more moderate heat. Nothing would be capable to check the progress of this destructive element, which is nourished by vital air, if this æriform substance were not abundantly mixed with mephitic air, which serves to restrain it.

XXXII. *A Treatise on the Cultivation of the Vine, and the Method of making Wines.* By C. CHAPTAL.

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III. *Of the Means requisite to dispose the Wine for Fermentation.*

AS ripe grapes rot on the twigs, the faculty which the sweet and saccharine juice of the fruit possesses of being converted into a spiritous liquor may be considered as the pure effect of art, and it is by the fermentation of this juice expressed

pressed that this change is produced. The method of disposing grapes to fermentation varies in different countries; but as the differences occasioned in so essential an operation rest on certain principles, I have thought it proper to make them known.

We are informed by Pliny (*De brio vino apud Græcos clarissimo*), that the grapes were collected a little before their maturity; that they were dried by being exposed to the ardent sun for three days, turning them three times every day, and that on the fourth they were expressed.

In Spain, particularly in the environs of St. Lucar, the grapes are left exposed for two days to the full ardour of the sun.

In Lorraine, part of Italy, Calabria, and the island of Cyprus, the grapes are dried before they are expressed. It is in particular when white sweet wines are to be made that the grapes are dried, to thicken the juice, and thereby to moderate the fermentation.

It appears that the antients were acquainted not only with the art of drying the grapes in the sun, but even that they were not ignorant of the process employed to boil and concentrate the must; on which account they distinguished wines into three kinds, *passum*, *defrutum*, and *sapa*. The first was made from grapes dried in the sun; the second was obtained by reducing the must one-half by the means of heat; and the third, from must so concentrated that there remained no more of it than a third or a fourth. For very interesting details respecting these operations the reader may consult Pliny and Dioscorides. These methods are still used at present, and we shall show, when we come to speak of fermentation, that it may be directed and managed in an advantageous manner by inspissating a portion of must, and afterwards mixing it with the remainder of the mass; we shall show also that this is an infallible method for giving to all wines a degree of strength to which the greater part of them cannot otherwise attain.

Agriculturists were long divided in regard to the question, whether it is most advantageous to free the grapes from the stalks or not? Each of these methods has its partisans, and

writers of merit may be quoted who have supported both. In my opinion, in this as well as in other cases, both parties have been too exclusive, and by bringing back the question to its real point of view it will be easy for us to terminate the difference.

It is certain that the stalks are harsh and austere, and it cannot be denied, that wines produced from grapes not freed from the stalks do participate in that quality: but these are weak and almost insipid wines, such as the greater part of those made in moist countries, where the slightly harsh taste of the stalks heightens the natural insipidity of that beverage. Thus, in the Orléanois, agriculturists, after freeing the grapes from the stalks, have been obliged to abandon this method, because they observed that the grapes freed from the stalks furnished wines more inclined to become oily. It results also, from the experiments of Gentel, that fermentation proceeds with more force and regularity in must mixed with the stalks than in that which has been freed from them; so that in this point of view the stalks may be considered as an advantageous ferment in all cases where it is to be apprehended that the fermentation may be too slow or retarded.

In the environs of Bourdeaux the red grapes are carefully freed from the stalks when it is proposed to obtain good wine. But this operation is still modified according to the degree of the maturity of the grapes. It is much employed when the grapes have little ripeness, or when frost has taken place before their being collected; but when the grapes are very ripe, it is performed with less care. Labadie observes, in the information with which he has supplied me, that the stalks must be left to facilitate the fermentation.

White grapes are never freed from the stalks; and experience proves, that grapes separated from the stalks give wines less spiritous, and more susceptible of becoming oily.

The stalks, no doubt, add neither to the saccharine principle nor to the aroma; and in this double point of view, they cannot contribute by their principles either to the spiritous quality of the wine or to its flavour, but their slight austerity may correct, with advantage, the weakness of some wines;

wines; and besides, by facilitating the fermentation, they concur to effect a more complete decomposition of the must, and to produce all the alcohol it is susceptible of yielding.

Without wandering from the subject in question, we may consider wines also under two points of view, according to the uses to which they are applied. They are all employed either as a beverage or for distillation. In the former, qualities are required which would be useless in the second. Taste, which forms almost the whole merit of the one, adds nothing to the qualities of the other. Thus, when wine is destined to be distilled, it is necessary to pay attention only to the means of developing a great deal of alcohol: it is of little importance whether the liquor be tart or not; in this case, to free the grapes from the stalks would be lost labour. But if wine is prepared for a beverage, it is then necessary to give it an agreeable taste and a delicate flavour, and for this purpose, care must be taken to avoid every thing that may alter these valuable qualities. On this account, therefore, it is necessary to withdraw the stalks from the fermentation, to pick the grapes, and to clean them with care.

It is, probably, in consequence of a knowledge of these effects, which experience every day places before the eyes of the agriculturist, rather than from caprice or habit, that in certain countries the grapes are freed from the stalks, and that this process is omitted in others. To attempt to reduce the whole to one general method would be showing ignorance of the effects produced by the stalks in fermentation, and of the difference which exists in the various qualities of the grapes. In the south, where the wine is naturally generous, the stalks would only add a disagreeable harshness to a liquor already too strong by its nature. All the grapes, therefore, destined to form wines for the table, are freed from the stalks, while those destined for distillation are fermented with them. But what may appear astonishing is, that in different parts of the same canton in France, we see some agriculturists free their grapes from the stalks, and extol their method, while others in the neighbourhood, equally skilful, reject this practice, and endeavour to sup-

port their method by the result of their experience. The one makes wines more delicate, the other wines of a stronger quality; both find partisans of the liquor which they prepare: but this is a matter of taste, which does not contradict the principles we have here laid down.

In general, a fork with three prongs, which the workman turns and agitates in a circular manner in the vat where the grapes are contained, is employed for freeing them from the stalks. By this rapid motion the stalks are detached from the grapes, and, being drawn up to the surface, are removed with the hand.

They may be freed from the stalks also by means of a common sieve formed of osier twigs, distant from each other about half an inch, and having above it a close osier pad or presser, about four inches thick.

But whether the grapes be freed from the stalks or not, it is indispensably necessary to tread them, in order to facilitate the fermentation, and this process is performed as the grapes are collected and brought home from the vineyards. The operation is nearly the same in all the wine countries, and is performed, for the most part, in a square box, open at the top, and about a yard and a half in breadth. The sides consist of wooden bars, with intervals of such a size that the grapes may not pass through them. This box is placed on the vat, and kept in its position by two beams resting on the edge of the vessel. The grapes are poured into this box as they arrive from the vineyards, and are immediately trod, in a strong and equal manner, by a man, having on his feet large wooden clogs, or strong shoes. While employed in this labour, he rests with his two hands on the edge of the box, stamping with rapidity on the stratum of the grapes, while the expressed juice runs into the vat through the interstices left between the bars. Nothing remains in the box but the pellicle and stalks of the grapes; and when the workman finds that all the juice is expressed, he raises a plank, which forms a part of one of the sides of the box, and pushes the skins and stalks with his foot into the vat. This door slides in two grooves, formed on two perpendicular bars. As soon as the box has been cleaned,

a new

a new quantity of grapes are introduced to be trod in the same manner; and this operation is continued till the vat is full, or until the vintage is terminated.

In some countries the grapes are trod in tubs. This method is perhaps better in regard to the effect than the former, but it is slower, and cannot be employed in countries where the vineyards are of great extent.

There are some countries also where the grapes are poured into the vat as they come from the vineyards; and when fermentation begins to take place, the must, which floats on the surface, is carefully removed in order to be conveyed to the casks, where the fermentation is completed. The residuum is then squeezed under a press, to form wine of a higher colour and less flavour.

In general, whatever be the method employed in treading the grapes, what concerns this important operation may be reduced to the two following principles:

Grapes cannot experience spirituous fermentation unless the sugar be extracted by proper pressure, in order that it may be subjected to the action of those causes which determine the movement of fermentation.

It follows from this fundamental truth, that not only the means proper for treading the grapes ought to be employed, but that the operation will not be complete unless all the grapes are equally pressed; without this the fermentation can never proceed in an uniform manner: the period of the decomposition of the expressed juice would terminate even before the grapes which escaped being trod upon had begun theirs, and there would thus be produced a whole, the elements of which would no longer bear relation to each other. However, on examining the product deposited in the vat after the treading is finished, it will readily appear that the compression has been always unequal and imperfect; and by reflecting a moment on the rude processes employed for treading the grapes, there will be no reason for being astonished at the imperfection of the results.

It appears, then, that to give to this very important part of the labour of the vintage the necessary degree of perfection, it would be necessary to submit to the action of the press all

the grapes as they are brought from the vineyard. The juice would be received in a vat, where it might be left to spontaneous fermentation. By this method alone the movement of decomposition would be exercised on the whole mass in an equal manner; the fermentation would be uniform and simultaneous in regard to all the parts; and the signs which announce, accompany, or follow it, would not be disturbed or obscured by particular movements. The must, freed from the stalks and husks, would no doubt produce wine less coloured, more delicate, and more difficult to be preserved; but if the inconveniences of this method exceeded the advantages, it would be easy to prevent them by mixing the expressed refuse with the must.

In consequence of these principles, care ought to be taken to fill the vat in twenty-four hours. In Burgundy the vintage is terminated in four or five days. Too long time would be attended with the disagreeable inconvenience of a successive series of fermentations, which, on that account alone, would be all imperfect; a portion of the mass would be already fermented, while the fermentation would be scarcely begun in another. The wine thence resulting would then be a real mixture of several wines more or less fermented. The intelligent agriculturist, therefore, anxious for the quality of his products, ought to determine the number of the vintagers according to the known capacity of his vat; and when unexpected rain makes him suspend the labour of collecting the grapes, he ought to leave to ferment separately the juice of those already collected and placed in the vat, rather than run the hazard of exposing himself some days after to the danger of interrupting its movements and altering its nature by the addition of fresh and aqueous must.

[To be continued.]

XXXIII. *Account of New Publications.*

Philosophical Transactions of the Royal Society of London for 1800. Part III. 4to. Elmsly.

THIS part contains: Experiments on the Solar and on the Terrestrial Rays that occasion Heat; with a comparative View