fit for the still. The remainder in the still, too weak for brandy, makes a good vinegar. Lees are likewise a good stimulant for flat, insipid wine, and a portion should always be kept on hand to be thus applied.

Use of the seeds.—Grape seeds are very valuable for fining and strengthening the wine; they may be used either in the manner mentioned, or a few handsful thrown into the cask just as they are. They must be well dried, and kept hung up in an airy place.

DRS. GALL AND PETIOL'S METHOD OF WINE-MAKING, ACCORDING TO THE MODERN PRINCIPLES ADOPTED IN GERMANY AND FRANCE.

In consequence of many failures in the ripening of the grapes, and diseases spreading rapidly over the continent, more or less destroying the crops of whole districts, grape culturists and chemists began to look for remedies and substitutes for those principles in which the vintages are deficient.

Much has been said against this method, and much suggested to neutralize predominating acids without resort to sugar and water, but all experiments have thus far failed, either the wine would get flat at once, or be unfit for use on account of its harshness. More than fifty years ago, Chaptal, Cadet de Vaux, and other eminent chemists, suggested that poor wines might be improved by adding sugar; later, Claudot-Dumont urged his countrymen to abstain from the bad practice of sweating and mixing their poor wines, and recommended sugar as the best agent to improve them. But neither of these chemists were able to point out in what proportion sugar should be used to obtain the desired result. This problem has finally been solved by Drs. Gall and Petiol, and approved by such men as Thénard, Döbereiner, Von Babo, Bronner, and others.

Drs. Gall and Petiol both discovered, after many analytical experiments and researches, that the surplus acids in the grape-juice can be turned to good account, by bringing its other ingredients (sugar and water) to a proper proportion. Every kind of grape-juice is nothing but clear water, in which are dissolved from six to thirty per cent. of sugar, two to four per cent. of free acids, and from three to five per cent. of other matter, or the essence of wine-making principles. Sugar converts itself into alcohol by fermenting, and two per cent. of sugar will produce, in the average, one per cent. of alcohol; the free acids, if they are in proportion to the other principles, give the wine its agreeable vinous character, its flavor, &c.; the last properties contain the principles necessary for fermenting, fining, and keeping. Dr. Gall has further proved the fact that these different acids in the grape do not require particular notice; it is sufficient to find out the whole sum, and then treat them alike. In order to ascertain what per centage of sugar and acids the must, or grape-juice, contains, two different instruments are required, a "must scale" and an "acidimeter;" for the first purpose *Oechsle's must scale* is generally used, and *Otto's acidimeter* for the second; on both are the following calculations based, illustrative of this method. None of these instruments have been yet

introduced into our country, but it may be presumed that, when a demand for them shall be manifested, some of the leading druggists will respond, and import them. They may, however, be procured at any time direct from the manufacturers, Dr. L. C. Marquart, of Bonn, on the Rhine, or J. Diehn, Frankfort-on-the-Main.

Experiments continued for eight years have proved that, in favorable seasons, grape-juice contains, in the average, in 1,000 pounds:

Sugar	240 pounds
Free acids	6 pounds
Water	754 pounds
	1,000

Which proportion may be set down as a normal; therefore, to obtain good wine from a vintage of inferior quality, these proportions must be secured by adding sugar and water. It will be seen that the contents of the acids are the indicating point as to what quantities of sugar and water would be required to bring the wine to such a normal state; further, as has been the case generally, the less sugar the more acids. The per cent. of acid in the grape-juice is the basis on which a calculation must be founded.

All practical grape-growers and wine-makers in Germany and France admit that a wine containing the proportion of sugar, acids, and water above-described, is in every respect preferable to heavier or lighter wines. It has lately been called a "normal wine," and will serve here as well as a standard.

When a must contains, instead of twenty-four per cent., only fifteen per cent., or instead of two hundred and forty pounds, only one hundred and fifty pounds of sugar, but, instead of only six per cent. or pounds, nine per cent. of acids in one thousand pounds, the question arises, how much sugar and water will have to be added, to bring such a must to the proportion of a normal wine? To solve it, we calculate thus: if, in six pounds of acid, in a normal wine, two hundred and forty pounds of sugar appear, how much sugar is wanted for nine pounds of acids? Answer: three hundred and sixty pounds. And again: If, in six pounds of acids, in a normal wine, seven hundred and fifty-four pounds of water appear, how much water is required for nine pounds of acids? Answer: one thousand one hundred and thirty-one pounds. As, therefore, the must which we intend to improve by neutralizing its acids should contain 360 pounds of sugar, 9 pounds of acids, and 1,131 pounds of water, but contains already 150 pounds of sugar, 9 pounds of acids, and 841 pounds of water, remain to be added 210 pounds of sugar, 0 pounds of acids, and 290 pounds of water.

By ameliorating a quantity of 1,000 pounds must
by 210 pounds sugar
and 290 pounds water,

we obtain 1,500 pounds of must, consisting of the same properties as the normal must, which makes a first-class wine. The increase of the quantity is five hundred pounds, or two hundred

and fifteen quarts, which, after deducting the outlay for sugar, two hundred and ten pounds, at twelve and a half cents per pound, amounts to twenty-six dollars and twenty-five cents, and, allowing fifty cents per quart, leaves a clear profit of eighty-one dollars and twenty-five cents.

Another illustration, which probably comes near the qualities of northern wild native grapes—already largely manufactured into wine, but, for want of knowledge, seldom accepted in market—may be thus calculated: Such grape-juice, or must, contains twelve per cent., or one hundred and twenty pounds of sugar, and fifteen per cent., or pounds of acids. One thousand pounds of such must will consist, then, of one hundred and twenty pounds of sugar, fifteen pounds of acids, and eight hundred and sixty-five pounds of water. In order to neutralize these acids, and make them proportionate, corresponding with wine of a good character and normal state, it will require to 15 pounds of acids, 600 pounds of sugar and 1,885 pounds of water; as the must contains 15 pounds of acids, 120 pounds of sugar, and 865 pounds of water, have to be added 0 pounds of acids, 480 pounds of sugar, and 1,020 pounds of water.

Such improved must will, therefore, consist of—

15 pounds of acids,
600 pounds of sugar,
1,885 pounds of water,

2,500 pounds.

Deducting one thousand pounds of must, which furnished the wine-making principles, acids, &c., gives a surplus of fifteen hundred pounds, or six hundred and forty-five quarts of must in a normal state. Value of six hundred and forty-five quarts, at fifty cents per quart, three hundred and twenty-two dollars and fifty cents. Cost of four hundred and eighty pounds of sugar, at twelve and a half cents per pound, sixty dollars. Net profit, two hundred and sixty-two dollars and fifty cents.

It will be seen that such wine is produced at the small expense of nine and a quarter cents per quart, omitting the one thousand pounds, or four hundred and thirty quarts, which furnished the wine-making principles. But a true estimate of the cost of such a wine from the wild native grapes when they have to be bought must be calculated thus:

3,000 pounds of grapes, at 3½ cents per pound	$105
480 pounds of sugar, at 12½ cents per pound	60
	165

And as one hundred and sixty-five dollars make two thousand five hundred pounds of must, or one thousand seventy-five quarts, the actual expense is fifteen and one third cents per quart; allowing interest on capital invested for apparatus, casks, shrinkage, and labor, the whole expense will not average twenty cents per quart.

An immense field of profitable employment presents itself to industrious men. In a favorable season a man will gather five bushels of wild grapes in a day, from which he obtains at least eighty quarts of natural wine, while if ameliorated according to Drs. Gall and Petiol, he will get one hundred and twenty quarts of good normal wine.

It is further proved that such wines made according to these principles mature at least in half the time required by natural wine, and keep better; consequently, permitting a quicker return of invested capital, a better article for speculation, safe transport to distant markets, &c. Thus, too, a good wine can be made of an inferior vintage, grown in an unfavorable season, and the quantity of a rich vintage increased to two hundred per cent., without the least detriment to its quality. It is very important that this method should be introduced into our country; it will not only encourage people to more activity in this lucrative branch of industry, but will furnish us with a wholesome and pleasant beverage; insuring as a pure, cheap article, a large consumption and a ready sale.

Grapes properly cultivated in vineyards or gardens, and in favorable climates and localities, will generally contain sufficient sugar and no surplus of acids; so it may appear that there is no need to practice this method. But Drs. Gall and others found by analyzing the husks or pomace, after the juice had been extracted by means of powerful presses, that these not only still contained a considerable amount of juice, but also a great amount of extracts or wine-making principles, in many cases sufficient for three times the bulk of the juice previously obtained. This fact suggested the question: as there are so many of these valuable properties left, and only sugar and water exhausted, why cannot these principles be substituted till the other are completely used up? It was found that it could be easily done!

The secret of making wine from water was thus solved, and an all-important principle for wine-making established. By further experiments these speculations not only proved to be correct, but it was in most cases impossible to judge which was natural wine, or which the product of this new method; indeed, the preference is generally given to the latter. While natural wine is so very different, according to circumstances which prevailed in its growth, such "Gallized" wine is always in perfect harmony, because its contents are not the results of chance, but the close following of the process of Nature.

The practice of this method is quite simple; for instance, let the vintage be of an average good quality, the must containing twenty-four per cent. of sugar and six per cent. of acid, and the quantity one thousand pounds. The grapes are mashed in the usual way, but not pressed; the juice, if it be white wine, drawn off into casks to ferment; if claret or red wine, it is fermented on the husks, as described in a former paragraph, and then drawn off into casks. Before this is done, however, two hundred and forty pounds of sugar are dissolved in seven hundred and fifty-four pounds of water, and as soon as the grape-juice is drawn off, this solution is put on the husks in the fermenting vat. It is absolutely necessary to have sugar-water prepared and ready for an infusion before the wine is drawn from the fermenting vat, and put immediately on the pomace as soon as the wine is off, to prevent their

coming in contact with the air, getting dry, moldy, and spoiled. It is practicable to draw off this infusion once and put it on the husks again in order that their fatty substances may be better dissolved; but this operation has to be performed without delay, as fermentation commences immediately, and must not be interrupted. The water used for that purpose should be soft rain or cistern water. A large iron or copper kettle is put over a fire and heated, in which the sugar is thoroughly dissolved, and then the whole brought to a temperature of 70° and poured over the husks in the vat.

The mode of fermenting, temperature, and the entire operation, is the same as before described. To obtain a certain color, it may be necessary to let this second wine remain longer on the husks and in the vat. The proper period for drawing will be best found out by often examining samples till the desired result is obtained. When this is the case, the young wine is drawn off and filled into casks.

Again, two hundred and forty pounds of sugar are dissolved in seven hundred and fifty-four pounds of water put on the husks and managed as before stated. Should this second wine, after it has fermented and been drawn off from the lees, contain less than five per cent. of acid, it will be necessary to add two ounces of tartaric acid to each one hundred pounds, or twenty ounces to one thousand pounds of wine; the tartar is pulverized and dissolved in two quarts of heated wine, which is then put into the casks and well stirred.

After this third wine (second infusion) has fermented and been drawn off, the husks are taken out and put under the press, and the extracted juice added to the rest in the casks. This wine is treated like other wines, only left some time longer on the lees before drawing and fining. There is, from one thousand pounds, or four hundred and thirty quarts of must, an increase of two thousand pounds, or eight hundred and sixty quarts of wine, which, after charging for four hundred and eighty pounds of sugar, at twelve and a half cents per pound, will equal sixty dollars, or not quite seven cents per quart.

The must-scale and acidimeter have to be used often while such wine is in its fermenting process, and before it is drawn off from the vat, in order to examine and find out the capacity of the husks, whether they contain sufficient properties for another infusion, or only for a part. If the result of the examination of the young wine shows an undiminished amount of acids, the husks will bear another infusion of sugar-water to the same amount as before; or if there is found a deficiency of one and a half or two per cent., the quantity of sugar and water must be regulated accordingly. For instance, after the first infusion has fermented, the pomace shows a decrease of two per cent. of acids, or wine extracts, but there is still four per cent. remaining, which, if fermented with a proportionate quantity of sugar-water, will make as good a wine as any. Therefore, to determine of what proportion the second infusion should consist, we calculate thus: If six per cent. of acids require two hundred and forty pounds of sugar, how much is wanted for four per cent.? Answer. One hundred and sixty pounds. Now, if six per cent. of acid required seven hundred and fifty-four pounds of water, how much is wanted to four per cent.? Answer.

Five hundred and two and two third pounds. There is consequently wanted for the second infusion one hundred and sixty pounds of sugar and five hundred and two and two third pounds of water.

It will sometimes be found that, after two infusions have been fermented, and two hundred per cent. obtained, the pomace still contains several per cent. of wine extract; therefore, a third infusion of sugar-water may be applied, and a still larger quantity of wine obtained. The calculation in regard to the amount of sugar and water to be used is the same. In either case, should a stronger vinous taste be desired, tartaric acid is added by degrees till the object is attained.

To facilitate these manipulations, it is necessary to construct tables, in which the proportion of weight and measure to each other are calculated. It will be found more convenient in practice to measure the must and water, instead of weighing, and as must will differ in its specific weight, according to its acids and saccharine properties, it is necessary to have a table, on which can be ascertained, according to the indication of the scales, the exact amount of each. On the table, for instance, which has been calculated and constructed to Oechsle's must-scale, when ninety-five per cent. is indicated, it will be found that the must contains 21.8 per cent. of sugar. The acids and extracts which the must contains increase its specific weight, and prevent the scale from sinking and showing the amount of sugar correctly, being deducted, and the exact amount of sugar found on it. For the acidimeter, a table is constructed, on which is found the calculation how the per cents. of acid compare with those of sugar, and how much water is required for certain per cents. of acids and sugar in weight and measure.

These tables, as they are compiled in conformity with the scales, are generally supplied with the instruments, and with directions for use.

As the sugar contains more or less water, even when it appears perfectly dry, it is necessary, after a certain quantity has been dissolved for such ameliorating purposes, to use the must-scale, find out how it compares with the intended purpose, and regulate the balance by either adding more sugar or water till the desired point on the scale is correct.

It is a matter of course that only sugar of the best quality should be used; grape sugar is the best; but as this cannot be had cheap and in large quantities, white loaf sugar must be used. Still, there is no doubt that enough of the former will be manufactured as soon as a demand is manifested.

Since the introduction of this new method of wine-making into Germany, several grape-sugar factories have been established, and are all doing well, as the demand for this article increases from year to year. Grape sugar can be produced from forty to fifty per cent. cheaper than white loaf sugar; it is, therefore, a great desideratum that this method should be adopted.

It has been suggested to keep each part of the wine by itself: as the natural wine, the first, second, and third, that a fair chance of judgment may be had; but afterward, when the result has given satisfaction, and all doubts are removed, it will be found that no reason exists why they should not be mixed at once, as the care and management

will be considerably facilitated, without interfering in the least with its quality.

But as experience and judgment are required to put this method in practice, it will be best to begin with a small quantity.

Success will follow good management in this branch, as well as in any other of horticulture or agriculture, and more so here, as these principles correspond precisely with Nature.

ON THE PRODUCTIONS OF THE IONIAN ISLANDS AND ITALY.

BY S. B. PARSONS, OF FLUSHING, NEW YORK.

We landed opposite the little town of Samos, on the island of Cephalonia. Our ride up the mountain, from this place, was full of interest, with delightful glimpses of the coast and sea, patches of vines, with the peculiar ant-hill culture noticed first in Zante, and wild flowers and trees, many of which were new to us. Cyclamens, anemones, and iris were abundant. The *Quercus ilex*, or holly oak, growing in the plains of large size, became dwarf as we ascended, until, at the greatest altitude, it creeps like a vine upon the ground, in large rich masses, with very small leaves. Although flourishing here in the snow region, it has not proved hardy about New York, but would doubtless be so wherever the *Quercus virens*, or live oak, will grow. With its rich, glossy, holly foliage, it would be a valuable addition to our ornamental trees. That which most excited our admiration, however, was the *Ceratonia siliqua*, or carob tree. It is round headed, evergreen, with leaves placed and formed like the locust, but thick and glossy as the *Pittosporum*. It bears a pod, which is eaten by cattle, and is used largely for government horses in Malta. In Sicily, a spirit is distilled from it. It grows wild everywhere, and is said to be the same tree which furnished food to John the Baptist. A superior variety is cultivated by grafting upon the wild species. It would doubtless succeed in our extreme southern States, for we found it on high positions, and in the snow region. Some seeds for distribution will be forwarded to the Patent Office, and it will be found worthy of careful trial, combining, as it does, great beauty with the production of a useful article of food.

At one of the villages, we found the women crocheting capes and sleeves with a thread made from the fibers of the aloes. The fabric was light, glossy, and beautiful; and the fiber could readily be cultivated in our southern States.

The culture of grape and currant, on Mr. Pana's estate, is very thorough. It was pleasant to notice his frank, kind manner with his laborers, and their respectful, ready answers. He is said to be unequaled on the island for the thought and intelligence which he gives

to his estates. His gardens were full of oranges, pears, Japan medlars, grapes, and quinces, while roses were blooming everywhere.

We wished to ascend the Black mountain, to see the noble specimens of *Picea cephalonica*, which are found here only, and took mules up the almost precipitous sides, among piles of rocks and stones, with a few flowers struggling from among them, and very little vegetation, except mosses and the dwarf *Quercus ilex*. After some hard work, we reached the forest of pines, and, passing through a part of it, arrived at the government cottage, where rangers are kept to protect the wood. The sight of the trees fully repaid us. Here were superb specimens of *Picea cephalonica*, fifty or sixty feet high, growing where they had abundant room to develop, straight as an arrow and symmetrical as a pyramid, with the rich, glossy foliage peculiar to the species. Some of the specimens had trunks three feet in diameter, and covered as much ground as a large live oak in Florida. As the tree is perfectly hardy near New York, we were anxious to procure some seed, but looked in vain for cones. One was brought us by a ranger, but the seed was all worthless. We could now readily understand why it is that the French and English have been unable to procure this seed; and that the tree is still a rare one in England, notwithstanding the great rage there for all fine coniferæ. From the overhanging rocks, nearly three thousand feet high, we caught a superb view of the island and sea, as the clouds rolled away below us for a few minutes. The barren peaks loomed up, white with limestone; rich olive groves and small villages dotted the plain; and the sea, winding in among the islands, gave the coast many little coves with picturesque effect.

In Cephalonia, the sides of the mountains below the snow line are planted with vines on the steepest declivities. The whole ground is white with small pieces of limestone, and these are often a foot deep. Among them the vine is planted, and one can scarcely conceive how great must be the change, on the appearance of vegetation, from their present white barrenness to the living green of the new leaves. No soil was to be seen on the surface, where the vines had not yet been touched with the hoe. On digging down there is found a rich-looking, bright red soil, called *terra rosa*, which is sometimes used for mortar, and is evidently full of iron. In some places the vines were planted in water-courses, and much earth had been washed away from the roots. These are said to produce the best wine. It is evident from their experience in Cephalonia that the vine thrives well with plenty of stone and surface water. We noticed many fossils, and passed a fathomless lake two thousand feet above the sea. The whole road down the mountain was full of glimpses of beauty. In the valley we again met the luxuriant vegetation which this climate and soil give.

Cephalonia is not so highly cultivated as Zante, but its specialities are the same—currants, grapes, and olives. We saw no cows on the island, and but few oxen, of inferior breed, imported from Morea. There are few horses, and those of inferior character. Fish are plentiful and good. Lemons and oranges are abundant, but not exported. The blood-oranges are the best, and we could hear of no insect upon them. They have a singular mode of propagating the lemon, in order to insure the same variety. A branch, two or three feet long, is buried