

The Committee's report was adopted by a rising vote.

A paper on "The Improvement of American Grapes," prepared by Prof. S. A. Beach, of the New York State Agricultural Experiment Station, Geneva, N. Y., was submitted by its author, who suggested that, on account of the heat and the length of the session, the reading of the paper be dispensed with, as the paper could be read in the published proceedings.

A motion by Prof. Beach to the above effect was agreed to.

THE IMPROVEMENT OF THE AMERICAN GRAPES.

BY PROF. S. A. BEACH, N. Y. STATE EXPERIMENT STATION, GENEVA,
N. Y.

The cultivation of American varieties of the grape, either for table use or for wine, is distinctively an American industry. American grape growers need fear no competition in this line. They have the whole field to themselves. Their fruit finds no market outside of America because the foreigners prefer other grapes. Even in those portions of this continent where varieties of the old world species, the *vinifera*, can readily be grown, the American varieties meet with little demand. Professor Wickson says that except for the production of resistant roots on which to graft *vinifera* varieties, the nursery trade in California in American vines, is almost infinitesimal. Probably less than one-tenth of one per cent of the vine acreage of California is devoted to American vines grown for fruit. A very few are grown for home use and for a very uncertain market demand. It is not a question of the ill adaptation of these grapes to local conditions, he says, but simply the fact that *vinifera* varieties are preferred for all purposes.

BETTER MARKET GRAPES NEEDED.

This may be an unwelcome truth to those who are interested in the native grapes, but being the truth it is best that it be frankly admitted. Two or more decades ago when the interest in the progress of American grape culture was running high and much excitement still attended the introduction of new varieties, the statement before this Society that such fruit as that of Delaware or Iona, or the best of the American hybrids, is inferior for dessert purposes to *vinifera* grapes, doubtless would have been called heresy and aroused vigorous opposition. Although some of these varieties have now been in cultivation thirty, forty and even fifty years, yet at the present time none but Americans eat American grapes. It is folly to expect to further the advancement of viticulture by closing the eyes to facts which are ap-

parent to unprejudiced observers. A taste for peculiar flavors and qualities in fruits, as in other articles of diet, is frequently developed by cultivation, and often unconsciously. It is not surprising that those who have been accustomed to American grapes from childhood should really prefer them to *vinifera* sorts. It must be admitted, however, that the outside world in general prefers the latter. The Californians turn from the American to the European varieties where both are to be had. The efforts which have been made to find a market for American grapes on the other side of the Atlantic have thus far failed. These facts have an important bearing on the development of viticulture and its associated industries in that vast region where only American vines succeed, a region extending from Canada to Mexico and from the Atlantic to the Rocky Mountains. Within its limits the vine acreage is now determined by the demand for the fruit for home consumption, and it must continue to be so until American varieties are sufficiently improved to make them acceptable in foreign markets.

THE DEVELOPMENT OF GRAPE CULTURE IN EASTERN AMERICA.

From the earliest settlement of the country grape growing has from time to time received some attention. Along the coast from Massachusetts to Florida and at various interior locations, many efforts have been made to grow *vinifera* varieties. None of these have thus far been permanently successful. Early in the present century two varieties of native grapes of the *Labrusca* species having fruit of purer flavor and better quality than the typical *Labruscas*, were found as chance seedlings and introduced into cultivation. These proved so desirable that they gradually became widely disseminated, and both of them are still handled by nurserymen and grown to some extent in commercial vineyards. One, the Catawba, is said to have been found wild in the woods of Western North Carolina. The other, the Isabella, is said to have originated in South Carolina. At the time this Society was organized, fifty years ago, these two grapes were the leading cultivated American varieties.

AMERICAN VITICULTURE FIFTY YEARS AGO.

The principal vineyards of the country at that time were near Cincinnati, Ohio. These were planted chiefly to Catawba. They comprised several hundred acres. A small acreage in the vicinity of New York and Philadelphia was devoted mostly to furnishing table grapes for those cities. There were practically no vineyards along the Hudson River. In the interior lake region of Western New York grape culture had not yet spread beyond the boundaries of the gardens. In most of the markets of the country American grapes were rarely seen, and the *vinifera* kinds, being either imported or grown under glass, were a luxury beyond the reach of the common people. Although many native grapes had from time to time been cultivated in a limited way, the list of really desirable kinds, especially for the north, was very small. In many places Catawba could not be ripened, and even as late as 1854, Hovey in the Magazine of Horticulture, said of the Isabella, "From its introduction in 1819 to the present time it has been the only variety, with the exception of the Diana, worth growing in the northern and eastern states." The Diana, it will be remembered, was introduced about 1843.

ORIGIN OF THE CONCORD GRAPE.

Towards the close of the first half of the century interest in the improvement of American grapes became especially active in New England. Work in this direction was undertaken by various persons and encouraging results soon followed. The most notable success was obtained by E. W. Bull of Concord, Mass. Finding that even Isabella did not always ripen early enough in his garden to perfect its fruit, he endeavored to raise an earlier variety. A chance seedling of the *Labrusca* species which came up on his place he transplanted to a trellis by the side of a Catawba vine. It proved to be a very early variety, ripening in August; but the fruit did not hang well to the clusters, and for other reasons the vine was not worthy of cultivation. Nevertheless because it was sweet, good in quality and had the very desirable characteristic of earliness in ripening, Mr. Bull decided to grow seedlings from it. The best one of the seedlings which he thus obtained is today the most widely cultivated of American grapes. It is a significant fact that this, the Concord, was produced by one of the very earliest efforts to improve the native grape by breeding from purely American vines. It will be remembered that Isabella and Catawba are chance seedlings. At one time Mr. Bull was growing over two thousand seedlings, but all things considered none of his seedlings has proved equal to the Concord, although some of them are still cultivated.

INFLUENCE OF CONCORD AND DELAWARE ON AMERICAN VITICULTURE.

About the time that the Concord made its appearance the Delaware was brought to notice. The introduction of these two hardy and early ripening grapes, whose merits and defects are too well known to need discussion here, gave a wonderful stimulus to the interest in viticulture. It really inaugurated a new era in American grape growing. Vineyard planting rapidly extended, especially in localities naturally suited to the vine which also had good facilities for transporting the fruit to market, for it was found to be much more profitable to grow grapes for table use than for wine.

As an illustration of the prices at which the new varieties were then introduced it may be said that Concord vines at first sold at \$5 each. A nursery firm in Geneva, N. Y., lost 10,000 rooted one-eye cuttings of the then new Isabella and Iona by the burning of some propagating houses. Since these vines would have met ready sale at \$1 each, by their destruction the firm lost \$10,000. In one instance a little box of grape vines which a man could carry, was forwarded C. O. D., and the express company collected for it and returned the sum of \$1,425. Under such circumstances it is not strange that new varieties were being constantly introduced. For thirty years at least interest in the improvement of the American grape was well sustained, as the records of this and other similar societies plainly show.

THE INTRODUCTION OF VINIFERA HYBRIDS.

The hybridizing of American vines with *vinifera* sorts received much attention. It was hoped by this means to combine the hardiness of the one with the desirable fruit of the other. Allen and Rogers were among the first to obtain good results. The first authentic hybrid between the two species mentioned was Allen's hybrid between Golden Chasselas and Isabella, which

was first exhibited in 1854. Many others took up this line of work, and within less than a quarter of a century scores of new hybrids, descended in part from the *vinifera* species, were disseminated among American grape growers. These, together with the varieties belonging to purely native species which have been named and introduced into cultivation within the last fifty years now number several hundred, while the number of seedlings which have been discarded as unworthy of cultivation has, during the same period, reached far into the thousands.

DECLINE OF THE INTEREST IN THE IMPROVEMENT OF THE GRAPE.

For many years well located vineyards were very profitable. Finally there came a period of depression. The price which the grower received for his grapes dropped from fifteen or more cents per pound to twelve cents, then to ten cents, then to eight cents and in succeeding years gradually lower and lower. In some of the prominent vineyard sections of New York the growers now feel well satisfied if they receive on the average two cents per pound for their fruit. Grapes are now grown on as narrow a margin of profit as the ordinary staple farm products. There are no prospects that the high prices of former years will ever be regained. Grapes are now so cheap that they are freely used by the common people throughout the country, and will doubtless remain so. The following incident illustrates the way in which, under modern methods of transportation, the grapes of one locality may be placed upon the markets in a distant part of the country and be retailed there at low prices.

A gentleman reports that in September, 1894, when he left the Chautauqua grape belt for a western trip the Chautauqua growers were receiving for their grapes by the car load, eleven cents per eight-pound basket, above commission and freight charges. The next day he found the same class of grapes retailing on the street corners of Chicago at fifteen cents, the dealer claiming that he made a profit of but one-half cent per basket. At St. Paul, Minn., he found the same kind of grapes retailing in stores at eighteen cents. At Fargo, N. D., they were twenty-five cents, and in little railroad towns in extreme parts of the State they were retailing at thirty-five cents per basket.

In consequence of the low prices at which grapes are now selling commercial vineyards are becoming more and more centered in favored localities, and are being extended in but few places. In many localities the vine acreage is even less than it was ten years ago.

The markets do not show sufficient discrimination to encourage the planting of grapes of superior quality, so that vineyardists are growing the more productive sorts of a lower grade, and many of the varieties of best quality are gradually disappearing from vineyard culture and from the nurserymen's lists.

LEADING VINEYARD VARIETIES.

It will be instructive to inquire here what kinds are persisting in vineyard cultivation. This may give some suggestions as to the direction in which to look for the further permanent improvement of commercial sorts. I have endeavored to learn what varieties are now grown most extensively in commercial vineyards, or for home use in sections where there are no commercial vineyards. I desire here to acknowledge my indebtedness to the station horticulturists, the nurserymen and the vineyardists who have with uniform

courtesy replied to my inquiries on this subject. Responses have been received from several localities in each of the states and territories, with but few exceptions, and from various parts of Canada. Correspondents were asked to rank the most important variety in their region at 100 and other varieties on a corresponding basis. The tabulation of these results cannot, of course, show the relative commercial importance of the varieties reported on, because the vineyard area of the different sections is not known; but surely it will give some approximate idea of their relative rank and the extent of their distribution, taking into consideration all sections of the country where grapes can be grown, exclusive of the regions where the *vinifera* varieties succeed. The following list shows the relative rank of the principal varieties which were reported on, the rank being determined by averaging the above mentioned reports.

LEADING GRAPES RANKED ACCORDING TO THE EXTENT OF THEIR DISTRIBUTION AND THEIR IMPORTANCE IN THE REGIONS FROM WHICH REPORTS WERE RECEIVED.

100.0, Concord.	5.7, Vergennes.
35.4, Niagara.	4.7, Norton <i>Virginia</i> .
32.3, Moore <i>Early</i> .	3.4, Wyoming.
29.5, Worden.	3.3, Hartford.
13.3, Delaware.	3.3, Winchell (Green Mountain).
12.9, Brighton.	3.2, Lutie.
9.8, Ives.	3.1, Janesville.
8.9, Diamond.	3.0, Wilder.
8.4, Lindley.	2.4, Campbell.
6.5, Pocklington.	2.4, Perkins.
6.3, Martha.	2.1, Champion.
6.3, Salem.	1.8, Isabella.
6.1, Catawba.	1.3, Bacchus.
5.8, Agawam.	0.9, Elvira.

The Herbemont and Lenoir are important wine grapes in some sections of the south. The Scuppernong and some other varieties of the southern muscadine grapes, are frequently mentioned in reports from southern states as being desirable varieties for home use.

Since Concord stands pre-eminent in the above list it is ranked at 100. Next in order, but far below it in importance, come Niagara, Moore Early and Worden. These each stand at about 30. Next come Delaware and Brighton, ranking about 12 each, Ives at 10, Diamond 9, Lindley 8 and below these a long list of varieties of less general importance.

The origin of Concord has already been noticed. Neither the variety itself nor its pure seedlings give evidence of anything but *Labrusca* ancestry. It is simply an improved type of the northern *Labrusca* grape. The three varieties which rank next to it in importance, Niagara, Moore Early and Worden, are Concord seedlings, as also are Brighton, Diamond, Pocklington and Martha. Prominent among the grapes of recent introduction are the Campbell, Hicks, McPike and Charlton, and these all have Concord blood. If the Concord and its progeny were swept away what a vacancy it would leave in American vineyards. We little realize the benefits which Ephraim Bull conferred on American viticulture when he originated the Concord grape. According to the figures given above, the important varieties in general cultivation outside of Concord and its seedlings, rank in the order named below: Delaware, Ives, Lindley, Salem, Catawba, Agawam and others.

VINIFERA HYBRIDS.

About the time the Concord was introduced, as has already been observed, the hybridizing of American with *vinifera* grapes was undertaken. The work was prosecuted with much zeal. It was then freely prophesied that it would soon result in producing hardy American vines with fruit rivaling that of *vinifera* varieties. Some of the kinds which were thus originated do bear fruit of great excellence, but we now know that *vinifera* parents have invariably given to their American hybrids, so far as these have been thoroughly tested, some one or more serious defects or weaknesses. Up to the present time none of the first or primary hybrids between *vinifera* and any of the American species has gained a leading place commercially in any grape growing section of this country. Some might claim that the Delaware is an exception to this statement, but who can tell the parentage of the Delaware? It is by no means certain that it is a primary hybrid between *vinifera* and an American species. Indeed some hold that it is purely American in its origin.

As has already been shown, none of the primary hybrids with *vinifera* have become leading sorts in commercial vineyards. Consider now their descendants. The two grapes of this latter class which are most widely grown are Niagara and Brighton. The parentage of Niagara is Concord crossed with Cassidy. The variety has the appearance of a pure *Labrusca*, but as I have shown by growing pure seedlings of it, it has some *vinifera* blood. This fact affords a satisfactory explanation for one of its defects, namely, a somewhat tender root. It is well known that Niagara suffers more than Concord from root injury in severe winters.

The parents of Brighton are Concord and a hybrid between Concord and *vinifera*. Brighton has a good degree of hardiness, though not equal in this respect to the Niagara. It is vigorous and often very productive, but it is almost completely self-sterile, so that it needs to be planted near some variety which blooms at the same time. Without mentioning the particular weakness or fault of each one, for these will come to mind as their names are called, it is sufficient to name as further representatives of this class among the older varieties, Croton, Elorado, Geneva, Lady Washington and Oneida. In fact, so far as I know, among this class of hybrids there are no varieties which have been tested for fifteen years that do not show that the infusion of *vinifera* blood has brought with it undesirable characteristics and sometimes as in the case of Niagara, without bestowing any compensating advantage.

It is not the purpose of this paper to attempt to point out the particular individuals which appear to be desirable parents for use in breeding grapes for special purposes, but rather to consider certain phases of the subject of general interest. It may be said, therefore, that should one choose to use even the *vinifera* hybrids in attempting to improve the type of American grapes, the facts which have been presented show that it is extremely important to make the selection of the parents only after thorough acquaintance with the individuals, and to use great discretion in the combinations which are made.

The primary *vinifera* hybrids have uniformly been deficient in one or more of the following essentials of a good commercial grape, namely, in vigor, health of foliage, hardiness of root or vine, self-fertility, constitution or reliable productiveness from year to year. In view of such records it is not

surprising that in this country nothing is now being done in the direct hybridization of *vinifera* with any of the American species. However, new varieties are constantly appearing which are known to be descended either wholly or in part from some *vinifera* hybrid, or which are chance seedlings resembling known *vinifera* hybrids in certain well marked characteristics. Time is needed to demonstrate whether satisfactory progress may be made more rapidly by breeding this class of plants rather than by giving attention wholly to plants having no *vinifera* blood. Granting that their good qualities may be maintained and the undesirable features eventually bred out, it may still be considered an open question whether it would not be better to hold strictly to vines of purely American origin. Indeed there are strong reasons for thinking that permanent advance may be made more rapidly by breeding only from grapes of purely American origin, thus avoiding altogether the weaknesses which are inherent in the exotic *vinifera*. While we may not thus succeed in producing a grape combining with the size of the Concord the beauty and high quality of the Delaware, yet by following such a course we shall bring nearer to perfection the peculiar types of grapes which grow naturally in this country, and by ameliorating their harsher features and developing their good qualities, eventually produce fruit which shall be acceptable in the markets of the world, distinct in type from the grapes now found in foreign markets and which shall be produced as cheaply as the Concord. As the improvement of the grape progresses, the varieties which survive the process of selection will naturally be those which are best adapted to the local environment and the market demands. In this way the different grape regions will doubtless develop quite different types of fruit each having its peculiar merits. It is not at all probable that any other variety will ever hold the unique position of superiority over so great an extent of territory as the Concord now does. In its place will be various types, each superior to Concord in fruit and each taking the lead for commercial purposes in a comparatively limited area to which it is specially adapted.

CULTIVATED NATIVE SPECIES.

Several native species are represented in cultivation at the present time and still further accessions to the list will be made in the future.

From Virginia southward varieties of the southern muscadine grape, such as Scuppernong and Thomas, are more and more coming into general cultivation for wine making and home use.

The Post Oak grape, *V. aestivalis*, var. *Linsecomii*, Bailey, is the parent of very promising varieties specially adapted to the southwest. Some of them also appear to be well adapted to the north.

From Virginia and Missouri southward the types represented by Norton, Virginia and Herbemont find favor in many localities, especially for wine.

By far the most important species horticulturally is the *Labrusca*, the northern type being represented in cultivation by Concord and the southern type by Catawba.

The Riverbank grape of the north *V. vulpina* L. (*riparia* Mx.) has not yet given important table grapes, but some of its varieties are esteemed for wine. Clinton, Elvira and Empire State are descended wholly or in part from this species. The range of this species extends northward into Canada, Minnesota and North Dakota. Professor Hansen informs me that the Janesville, a hybrid between *riparia* and *Labrusca* has proved hardy in Dakota, where

pure *Labrusca* varieties like Concord and Worden winter-kill. It is probable that from *vulpina* or its hybrids there will be eventually produced a type of fruit sufficiently hardy to extend the cultivation of the grape, for home use at least, considerably beyond its present northern limits.

American grapes have practically been under regular vineyard cultivation for but little more than a half century. The *vinifera* grapes have been brought to their present high standard through thousands of years of cultivation. Vineyards of them have been grown in the Old World from time immemorial. The American species which have given rise to so many varieties of great merit in the brief period in which they have been under cultivation, will surely add varieties of universally acknowledged excellence to the future lists of cultivated grapes. We firmly believe that the improvement of American grapes will continue till the fruit of our vineyards finds sale in foreign markets. Thus the field of American viticulture will be broadened and the industry given increasing stability and prosperity. The next fifty years should witness more rapid improvement than has been seen in the last fifty years. Greater success than now seems possible may crown well directed persistent effort.

Work in the direction of improving the types of American grapes may well accompany the variety testing, which is being conducted at many of the agricultural colleges and experiment stations of the country. Students may easily be led to take an interest in it, and by their labors hasten its progress. More rapid advance may doubtless be made by continued systematic effort looking toward some definite result. Too much of the work that has been done in the past has been unsystematic and unscientific. It has been entered upon with vague notions as to what results were desired and if some indefinitely anticipated good variety has not come like a lottery prize with the first batch of seedlings, the work has often times been dropped. In but few instances has there been anything done which may properly be dignified by the name of grape breeding. How often has effort been well directed toward a certain end, for more than two generations of vines? Where grapes have been bred with a definite purpose in view encouraging results have been attained, notably in the work of Bull, Munson, Campbell, Hoag, Ricketts, Moore and a few others.

In closing I desire to call attention to the great service which those who are interested in the improvement of the grape may render to the cause by publishing the results of work in this line so that the records will be accessible to other workers. These records should be sufficiently complete to set forth the general type of the seedlings which come from any known parent or combination of parents. They should show the undesirable parents and uncongenial unions as well as those which give desirable results.

The published records which throw light on this subject are still very meagre and each worker is compelled to depend largely upon personal experience and observation for the knowledge which he needs in order to work to advantage in any definite line. The members of this and other kindred organizations, the horticulturists of the colleges and experiment stations, and those who are associated with the horticultural press or who contribute to horticultural literature may do much towards securing the publication of data of this kind which would be of great value to American viticulture. Not until more definite information is accessible concerning the pedigree of cultivated varieties and the characters which particular parents

may be expected to transmit to their offspring can grape breeding be put upon anything like a satisfactory basis.