

July 14, 1900
All cuts in

TEXAS AGRICULTURAL EXPERIMENT STATIONS.

POSTOFFICE:

COLLEGE STATION, BRAZOS COUNTY, TEXAS.

BULLETIN NO. 56.

Special Services.—NOVEMBER, 1899.—*Horticulture.*

INVESTIGATION AND IMPROVEMENT

OF

AMERICAN GRAPES

AT THE

MUNSON EXPERIMENT GROUNDS

NEAR

DENISON, TEXAS,

FROM 1876 TO 1900.

BY

T. V. MUNSON, M. S.



AUSTIN, TEXAS:

VON BOECKMANN, SCHUTZE & CO., STATE CONTRACTORS.

1900.

(215)

TEXAS AGRICULTURAL EXPERIMENT STATIONS.

OFFICERS.

GOVERNING BOARD.

(BOARD OF DIRECTORS A. & M. COLLEGE.)

M. SANSOM, President.....	Alvarado.
F. A. REICHARDT.....	Houston.
D. A. PAULUS.....	Hallettsville.
P. H. TOBIN.....	Denison.
A. P. SMYTH.....	Mart.
JOHN W. KOKERNOT.....	San Antonio.
JEFFERSON JOHNSON.....	Austin.

STATION STAFF.

THE PRESIDENT—TREASURER OF THE COLLEGE.

J. H. CONNELL, M. SC.....	Director.
H. H. HARRINGTON, M. SC.....	Chemist.
M. FRANCIS, D. V. M.....	Veterinarian.
R. H. PRICE, B. S.....	Horticulturist and Mycologist.
B. C. PITTUCK, B. S. A.....	Agriculturist.
P. S. TILSON, M. S.....	Associate Chemist.
W. C. MARTIN, B. S.....	Assistant Chemist.
H. C. KYLE, B. S.....	Foreman of Farm.
J. G. HARRISON.....	Bookkeeper.
A. M. FERGUSON, M. SC.....	Assistant Horticulturist and Mycologist.
T. V. MUNSON, M. S.....	Special Service.

SUPERINTENDENT OF BEEVILLE STATION.

S. A. MCHENRY.....	Beeville, Bee County.
--------------------	-----------------------

NOTE.—*The main station is located on the grounds of the Agricultural and Mechanical College, in Brazos County. The postoffice address is COLLEGE STATION, TEXAS. Reports are sent free of cost to farmers of the State upon application to the Director.*

Errata==Bulletin 56.

Page 223, ommit one *c* from "Poccklington."

Page 225, in eighth line from top, read may, instead of *might*.

Plate I, *V. Solonis* should read *V. Longii*. *Solonis* is a French corruption of *Longii*, and is now applied only to a variety cultivated in France.

Table of Cultural Properties of Species, under *Endurance*, read of *heat* and of *cold*, instead of *To heat* and *to cold*; and under *Size*, read *cluster* and *berry*, instead of *Cluster* and *Berry*. Read *Chiri-Simpleses*, instead of *Chiri-Simplese*, and *Coriaceæ*, instead of *Goriaceæ*, under *Series*; read *palmata* instead of *pamata*, under *Species*, in parenthesis, after *rubra*.

Page 233, for *their*, line 15 from top, read *its*.

Page 239, omit 5th, 6th, 7th and 8th lines and the word *selves* under the heading.

Page 240, 2nd line under *V. Champini*, for *counties*, read *counties*.

Page 271, as pollen parent of Tryone, read *Carman*, and of Wetumka, read *Gold Coin*, instead of the ditto marks for *Rommel*.

INVESTIGATION AND IMPROVEMENT OF AMERICAN GRAPES.

By T. V. MUNSON.

INTRODUCTION.

In undertaking the preparation of this bulletin for the Texas State Experiment Station, the author has understood that the object of the Board of Trustees and Director of the Station, in engaging the work done, was to preserve the knowledge and results of the work to others who may be engaged along similar lines, or who may wish to take it up and carry it forward in part or whole; to stimulate this character of development in horticulture, and to present facts and principles discovered, bearing upon practical grape growing. To be more explicit, the author is expected to make known the causes which led to the work; the plan of the work; the methods and extent of search and research to prepare for the experiments and to secure the necessary materials; a mention and classification of materials employed; the character of experimental work done and explanation of its application; the results obtained, both in principles established and varietal development; prospectively, what may yet be done in this special field, and the profitableness of such experimental work.

Thus stated, the object of the management of the State Experiment Station pretty well outlines the bulletin, and to meet its expectations to the fullest extent and aid in establishing broad permanent foundations for American viticulture, without bias or selfish interest, shall be the constant aim of the author.

For so great a nation as ours, both in expanse of territory and demand for every variety of vineyard product, the foundation should be laid most intelligently broad and deep. It is quickly apparent to any practical vineyardist, that, *The Chief Material Structure of American Viticulture*, must necessarily be,—

THE NATIVE GRAPES OF AMERICA.

Without these we cannot secure adaptability and endurance. To secure the best results from these, requires that the best wild varieties that have been, and may yet be found, should be sought out before they forever perish by browsing cattle and the woodman's ax; brought together and tested for the various uses in which grapes are employed in the home and in commerce; then intermingled with each other and the best adapted varieties of the Old World, as experience may show, to give best results, so as

eventually to supply every use and season with this most beautiful, most wholesome and nutritious, most certain and profitable fruit, which will succeed in some one or other of its numerous varieties upon almost every soil and in nearly every climate.

THE PASSION FOR EXPERIMENTATION WITH GRAPES AROUSED.

In the fall of 1873 the writer visited the vineyards of Dr. Robert Peter, residing near Lexington, Kentucky. In these vineyards were all the leading, and nearly all the then introduced varieties of American grapes.

The vines were bearing generally, and the fruit on nearly all was ripe or ripening. The Doctor, having been my instructor in chemistry in Kentucky State Agricultural College, in which I had completed the scientific course in 1870, discoursed freely upon the character of vine and fruit of the varieties. It seemed to me that there might be numerous combinations, which would naturally occur in such a vineyard, and that one could expect some of the seedlings grown from such crossed seeds to turn out better than any in the vineyard, by combination of excellencies of both parents in the crosses.

This reflection aroused within me a strong desire to test the matter. The Doctor gave me clusters of all wished, some thirty or forty kinds. The seeds of these were carefully saved, separately labeled, and noted as to varieties standing near the vine which bore the seeds. These seeds were planted at my new home in Nebraska, but the season and other conditions being adverse, all were lost, yet the kindled flame of passion for experimentation continued to burn. The timbered belts along the streams of that bleak country were ransacked for the few wild grapes growing there, and the vines bearing the best fruit were marked to be removed to vineyard and later hybridized with larger berried kinds, as the only species there (*V. vulpina*) has small berries, although often quite sweet, and pure in quality. However, a series of years of adversity,—with drouth, intensely hard winters, and grasshoppers,—coming on, further experimentation there in that line was dropped.

Coming to Denison, Texas, in April, 1876, a rough piece of dark limestone, timbered land on the bluffs of Red River was improved. In the woods surrounding, innumerable wild grape vines grew. On the higher sandy lands, covered with post-oak, black jack, hickory, scarlet oak and other timber, grew many "Post-Oak Grape" vines (*V. Linsecumii*), generally climbing the post-oak trees, hence the name of Post-Oak Grape.

Along the ravines of the uplands, and in the river bottoms, were numerous vines of the "Mustang Grape" (*V. candicans*), the "Sour Winter," or "Frost Grape" (*V. cordifolia*), and "Sweet Winter Grape" (*V. cinerea*), the latter penetrating and growing luxuriantly in the lower bottoms, where the others were seldom found. Directly along the high banks of Red River were found vines of the "Sand," or "Bush Grape" (*V. Longii*), drifted down from the Texas Pan Handle regions, where it grows in great profusion. Hybrids of it with the Mustang Grape are often found

along Red River. Occasionally are also found vines of the "Riverside Grape" (*V. vulpina*, or *riparia*), along Red River banks.

There were rarely found on the high bottoms of Red River and larger creeks in this, Grayson County, when the writer came to the State, wild vines of the "Southern Muscadine" species (*V. rotundifolia*), and this appears to be its western limit of distribution along Red River. Here were six or eight good species of wild grapes, several of which had not been seen by me previously. I had found my grape paradise! Surely now, thought I, "this is the place for experimentation with grapes!"

It was soon learned from that veteran experimenter with, and writer on grapes, Mr. Gilbert Onderdonk, and by my own observations, that in all the southwest, especially in the dry, hot parts of the State, the northern varieties of *Labrusca* and its hybrids with *Vinifera*, were subject to many diseases, short-lived, and their fruit lasted only a short season in July.

But here was a profusion of native grapes, perfectly suited to the soils and climate; little attacked by disease, and "what should hinder the obtaining of a long succession of most desirable varieties, by judicious selection, crossing and hybridizing with fine quality grapes?" was the question of my mind.

Thus was rekindled my passion for experimental work with grapes.

Already, pretty familiar with what had been done by others in the improvement of our native grapes, it seemed so inadequate to the needs and capabilities of the country, that I determined to devote a portion of my time and ground to aid the study and development of vine-culture in America.

SPECIAL STUDY OF GRAPE BOTANY NECESSARY.

It was at once apparent to me that a thorough botanical investigation of all species of our wild grapes must be made before much valuable work in this field could be done.

The characters and properties of each species must be learned; the climatic and soil conditions under which each thrives best; the climatic and soil conditions in general of the various sections of country, so that varieties best suited to each may be produced, must be sought and thoroughly studied.

Such work requires long continued and extensive investigation. The originator must travel much in the woods of every section where wild grapes grow, and study the habits; search out and collect together the best varieties from every region and breed up their good properties if he would most certainly produce varieties best adapted to those sections.

At various times during the past twenty-five years, the writer traveled through thirty-five of the states and territories of the Union, never neglecting any opportunity to hunt and study the wild plants, especially the grapes and other wild fruits. In these journeys altogether were not less than fifty thousand miles traveled by railway, and many hundreds on

horseback and on foot. In these travels thousands of vines of nearly every species of American grape were studied growing in their native habitats.

Correspondence was had with botanists, vineyardists and other good observers in nearly every state and territory.

Botanical specimens and vines of all American and most of the Asiatic species were collected. Seeds and plants of the best varieties were obtained of all these species and grown in experimental vineyards.

CRITICAL STUDY OF GRAPE BOTANY TAKEN UP.

The standard botanical classification of American grapes, at the time the study was begun by the writer, was that of Dr. Geo. Engelmann. This, with most of the other works extant upon our native grapes, was taken up and carefully studied, and used, in trying to identify the species of the vines found in the woods. Many imperfections and errors were discovered in these works, and it was apparent that they were inadequate, as guides, in identifying all the existing species, and this led the author to undertake the task of completely working over American grape botany into a new, more natural and thorough classification.

Beginning original botanical research among our wild grapes in 1880, it has been continued up to the present time, rewarding us with the correction of many errors in the old classification and nomenclature, and with the discovery of a number of new species; besides, what was of far more importance to practical vine culture, the finding of much valuable material, such as fine wild varieties with which to start new families of market, table and wine grapes, and most excellent resistant graft stocks, and many cultural principles of great practical value, necessary to apply in order to reach the higher development of vineyard varieties.

The grape herbariums of Harvard in Cambridge, of the Academy of Sciences, Philadelphia; of the Division of Botany and of the National Museum in Washington, D. C.; of Dr. Geo. Engelmann, in the Missouri Botanical Gardens of St. Louis, were studied and noted. All the species and numerous hybrids were studied and noted in germination and development in the seed beds, in the test vineyards and in all points for practical vineyard purposes, as well as to learn strict botanical characters, both in form and biological, or life, action and habit. The notes were always made on the spot, in presence of the vines under study.

Several years of thus accumulating facts were spent before any attempt was made in constructing a new classification.

At that time the writer was in correspondence with Professors E. Planchon, A. Millardet, Pierre Viala and other leading French ampelographers, who have always held front rank in such work. Their works on grape botany were carefully studied.

Not until 1885 did the writer attempt a new classification of species, and that has undergone much revision and change in its author's hands.

PRACTICAL BENEFIT TO VITICULTURE, THE CHIEF AIM.

It was not only necessary to know the general botany of grapes, but as well what was desirable and undesirable in varieties in cultivation, and how much of the season and market demand they covered, so as to direct effort to the best advantage in creating varieties to fill up the vacancies.

AN IDEAL LIST, OR SUCCESSION OF VARIETIES.

To keep the object of the work clearly in view, an ideal succession of varieties was constructed which might be in time filled with excellent and profitable kinds.

It was observed, that, any considerable market demands all the time, three colors of grapes to satisfy all customers. These are, in the order of preference, or extent of demand:—(1) *bright, lively red*, such as Delaware, Flame Tokay, etc.; (2) *black, or dark purple*, with clear complexion, such as Black Hamburg, Black Prince, Violet Chasselas, etc.; Concord is too dull, has too much white, flour-like bloom; (3) *translucent, yellowish varieties*, such as Golden Chasselas, Calabrian, etc. Niagara, when thoroughly ripe in sunny weather does pretty well. Varieties that are *green* when ripe do not sell well.

In the South, some varieties of grapes, such as Champion, begin ripening in June, and by August 1st all the varieties commonly grown in the North are gone in the South, and yet at the time when grapes are most relished, through August, September and October, only Herbemont, Le Noir and the Muscadines, such as Scuppernong, Thomas, could be used to fill up the latter part of the season, yet these pass away in August and early September, still leaving the best half of the season unsupplied, except by importation.

Ripe fruit cannot be profitably retained on the vines in the heat of summer, except in rare cases, longer than about ten days after ripe enough to market. But when the cool nights of September and October come, it can hang twenty to thirty days in good condition. This would give three periods of ten days each for July and August; two periods of fifteen days each for September and one period for October, making nine in all, each requiring three colors, thus giving room for profitable growing no less than twenty-seven varieties, to cover the entire season, with only one variety of each color at any one time, to say nothing of strictly wine grapes, and to make apparent the needs the following scheme was devised:

SKELETON FOR IDEAL SUCCESSION OF GRAPES FOR THE SOUTH.

27 Varieties.

<i>Translucent Red.</i> Should be as good as Brighton.	<i>Bright Black.</i> Never poorer than Concord.	<i>Translucent Yellow, or White.</i> Never poorer than Niagara.
1. July 1st to 10th.....	1	1
2. July 10th to 20th.....	2	2
3. July 20th to 31st.....	3	3
4. Aug. 1st to 10th.....	4	4
5. Aug. 11th to 20th.....	5	5
6. Aug. 21st to 31st.....	6	6
7. Sept. 1st to 15th.....	7	7
8. Sept. 15th to 30th.....	8	8
9. October.....	9	9

Let any one try to fill this skeleton list with varieties generally cultivated and he will quickly become aware of the inadequacy of existing varieties for the purpose.

We make the attempt below, admitting a number of varieties not up to the standard of excellence desired, but the best of each season and color available among the commonly grown kinds. In several of the seasons more than one variety of the same color are named, to give greater variety in quality. This shows the 3rd and 4th periods well supplied for northern regions which cannot extend beyond the 5th period, and few of these varieties are satisfactory in the South.

MOST AVAILABLE LIST OF COMMON VARIETIES OF GRAPES.

	<i>Red.</i>	<i>Black.</i>	<i>Yellowish Green.</i>
1.		Champion. Early Ohio.	
2.	Moyer. Norfolk (Progress).	Moore Early. Nectar. Campbell Early.	Lady. Green Mountain.
3.	Brighton. Wyoming. Delaware. Lindley. Salem, Agawam	McPike. Worden. Early Victor. Ives. Herbert.	Moore Diamond. Niagara.
4.	Jefferson. Diana.	Concord. Wilder. Barry.	Martha. Missouri Riesling. Poccklington.
5.	Catawba. Goethe.	Highland.	Triumph.
6.	Herbemont.	Lenoir.	
7.		Thomas.	Scuppernong.
8.			
9.			

This shows the South with little more than half the available time supplied with grapes, and then, when we remember that only some four or five of the varieties named are adapted to the climate, while the others are subject to many diseases and are short-lived, and most of these are of ordinary or poor quality, and not a variety in the list without some serious defect, we come to understand the vast work yet to be done by originators of new varieties of grapes.

VINEYARDS PLANTED BY THE AUTHOR.

Vineyard No. 1: Two acres, planted in 1878-9, on strong, black limestone soil, containing 25 to 40 per cent. of lime, with eastern exposure at top of Red River bluffs, south side of river, in northern suburbs of Denison, Texas.

Vineyard No. 2: One acre, planted in 1881-2, adjoining vineyard No. 1, lower down the eastern slope.

Vineyard No. 3: One-half acre, adjoining vineyard No. 2, on the south.

Vineyard No. 4: Two acres, planted in 1886-7, on deep light sandy soil on yellow clay subsoil, eastern slope, in southern suburbs of Denison, Texas, two miles southwest of vineyards 1, 2, 3.

Vineyard No. 5: Four acres, planted in 1887, southwest of vineyard No. 4 two hundred yards, on a deep reddish sandy soil, on a red clay sub-

soil 18 to 24 inches below surface, with southern and southwestern exposure.

Vineyard No. 6: Two acres, adjoining vineyard No. 5 on the east, with same character of soil, and southern slope.

Vineyard No. 7: One acre, planted in 1894, adjoining vineyard No. 4 on the south, with same character of soil, with eastern, western and southern slope.

Vineyard No. 8: One-eighth acre, adjoining vineyard No. 6 on the east, with similar soil and exposure.

The leading and most of the better American varieties, and a good many Vinifera varieties, and vines of all the native species were planted in the vineyards. Not all were planted in all the vineyards, but all, or nearly all, were grown in both the limy and sandy soil. The leading varieties were grown in marketable quantities. [See Chapter II. for list of species and varieties planted in the vineyards.]

GRAPE NURSERIES, PLANTED WITH CUTTINGS.

Each year since 1880, from one to five acres of land have been devoted to growing plants from cuttings of nearly all introduced varieties that were planted in the vineyards, including, during several years, all the native wild grape species of the United States, excepting *V. rotundifolia* and *V. Munsoniana*, which do not grow from cuttings, but are propagated by layering in vineyard.

SEEDLING GRAPE NURSERIES.

Since 1881, when the first were planted in Texas, some ten different years, have large numbers of select and hybridized grape seeds been planted, carefully tilled, studied, culled and the young vines been transplanted and rigidly tested in test vineyards, as described in Chapter III.

After thus educating myself for the work and making such extensive preparation for the origination of varieties, which were essential to vineyard culture, to enable it to fill its entire sphere, few persons regarded my effort otherwise than that of a "crank," and often have I heard myself mentioned as the "vine crank." This, to me, was good evidence that my object was not comprehended; that the special knowledge necessary to comprehend it, and become interested in it, was lacking generally among grape growers, and even among the majority of writers upon grapes. It was clear to me that in order to make the work generally beneficial, and regarded with any degree of favor by the public, that,

THE PEOPLE MUST BE EDUCATED.

Those who are to plant the varieties must know, as well as the originator, why the new varieties are preferable to the old, and be demonstrably convinced that they are better and more profitable. It must be shown that the most essential virtues of varieties are founded in specific blood.

Especially must experimenters understand the nature and character of species in order to create the best varieties. Such intelligent experimenters are exceedingly few. Many more are needed.

But it is no little work to educate the public, or even the vineyardists up to a full comprehension of such matters, so that they can derive full benefit therefrom.

In order that each successive generation of experimenters and vineyardists might take up the work where the last left off, and continue to progress all the time, and not merely repeat old work, with little or no advance, there must be carried forward a system of general education on the subject.

The horticultural press and horticultural societies are very generous in publishing information of this character, and have often invited articles from my pen concerning this specialty. But such treatment of the subject is fragmentary at best, and very inconvenient for future reference, hence more enduring methods have also been sought and used.

RESUME OF THE AUTHOR'S EDUCATIONAL WORK ON AMERICAN GRAPES AND THEIR DEVELOPMENT.

It is presumed that a short mention of the writer's educative work on grapes will not be out of place here.

By invitation and request of Mr. Parker Earle, President of the American Horticultural Society and Chief of the Horticultural Section of the Cotton Centennial Exposition, the writer, in 1885, exhibited, in the Horticultural Hall of the exposition, a complete set of herbarial specimens, classified in glass frames, of all the known species of American grapes, and specimen plants of the same growing in pots. This was supplemented by a paper read before the American Horticultural Society, holding its sessions in the exposition building in New Orleans, in February, 1885, and the paper was published in the report of the society for that year. This paper contained my first attempt at a new botanical classification of grape species.

The specimens, at the close of the exposition, were presented to the University of Missouri, and were taken in charge by Professor S. M. Tracy, Botanist of the University, and placed in the University herbarium, Columbia, Mo.

This new classification, with some revision, was set forth in a paper by the writer before the American Pomological Society, meeting in Grand Rapids, Michigan, in September, 1885, and was published in the Society's report of that year, and favorably noticed by the horticultural press. The new classification was yet very imperfect.

Following this, during several years, *The American Agriculturist*, *The Rural New-Yorker*, *The American Gardening, Garden and Forest, Farm and Ranch*, *The Révue de Viticulture*, of France, and other leading horticultural and agricultural journals published illustrated articles upon

classification, hybridization and varieties of grapes prepared by the writer at request of their editors.

During 1887 to 1892 the author supplied complete sets of botanical specimens of American grapes, arranged according to his plan of classification, to the herbariums of various educational institutions, one going to the School of Viticulture, Montpellier, France; one each to Harvard University, Cornell University, Columbia University, N. Y.; Philadelphia Academy of Sciences, the National Herbarium in National Museum, and one to the herbarium in the Division of Botany, Department of Agriculture. To Dr. Vasey, Botanist of the Department of Agriculture, eleven sets were supplied. These were placed in as many agricultural colleges. These sets contained young and mature wood, leaves, flowers and fruit of each American species.

Sets of photographs, life size, of wood, leaves, flowers, fruit and seeds of all American species have been supplied to about a dozen colleges and botanists in the United States and Europe.

A large number of complete sets of live plants of all species of American grapes have been supplied to state experiment stations and individuals in the United States and Europe.

To stimulate experimentation, over 1000 packets of hybridized grape seeds of select varieties were distributed, gratis, to some 500 grape-growers, located in all parts of the Union. Quite a number of these already have bearing vines from those seeds, and several have sent specimen clusters, showing some very fine fruit, well worthy a place in any vineyard.

In 1889, the Division of Pomology published its Bulletin No. 3, containing an outline skeleton of my classification of grapes, as an announcement of an exhaustive monograph of American grapes, which the Secretary of Agriculture, through the Pomologist, H. E. Van Deman, engaged me to prepare. The manuscript for this monograph, with accurate life-size colored plates of all our native grape species, was prepared and delivered, but from lack of sufficient appropriation by Congress the work remains unpublished.

In 1893, in the Horticultural Building of the Columbian Exposition, Chicago, the writer exhibited all American and most Asiatic species of grapes, represented by growing plants, by roots preserved in natural appearance in liquid, by sections of wood from aged and young growth, by pressed leaves, upper and lower surfaces, and in all stages of development by flowers, by clusters of ripe fruit in plates, and preserved in liquid in jars, by seeds, and by life-size photographs of wood, leaves, flowers, fruit and seeds, all labeled with their common and technical names, and presented in classified arrangement according to the plans shown in Plates I. and II. In addition to this, over 150 old and new varieties, representing all manner of crossed and hybrid combinations, were shown in ripe clusters on plates for three months in succession.

This exhibit was the most complete botanical display of the grape genus ever made. It was presented to the Department of Agriculture, and since

the Exposition all its durable parts have been mounted near the entry in the National Museum in Washington.

CULTURAL STUDIES.

The habits of the species and varieties as to germinating from seed, rooting from cuttings, leafing out, flowering, bearing, growing on trellis, requirements in pruning for best results, have been carefully studied and notes preserved, which shall be drawn upon in the preparation of the body of this bulletin, except my method of trellising and training the vine, which has frequently been published in horticultural journals and in bulletins. The best presentation of it was in *Farm and Ranch*, October 21st, 1899.

THE CHIEF WORK.

All this botanical and cultural study was only preliminary to the author's chief work with grapes, which has been to collect the best wild and cultivated varieties, to test them side by side, and intermingle them by crossing and hybridizing, to produce new varieties of best possible qualities, in the endeavor to fill out the ideal list of varieties as presented heretofore, and to provide the best possible resistant graft stocks upon which to graft *Vinifera* varieties.

For this undertaking all the details of the science and art of hybridization have been studied, and the different methods put into practice, as amplified to some extent in the body of the bulletin.

To fully set forth all the details of the work, in the customary bulletin method, would require the space of a large book, hence we must content ourselves with the statement of the chief practical results and principles reached. My aim shall be to make the statements as clear, comprehensible and practical as my ability and space allotted will permit.

The bulletin can attempt only a skeleton outline of the basal work so far accomplished at the Munson Experiment Grounds, and to thereby aid the practical vineyardist to make the best selections for his region, and to help other originators to choose the best materials with which to push forward special lines of development among grapes.

It would be desirable to take up and fully describe and classify according to a scale of meritorious points all the varieties tested and originated by the writer, but that alone would be sufficient to fill a large bulletin. However, some of the most essential points in descriptions will be given in connection with each variety, as mentioned in the variety lists.

No excellence for the literary composition of the bulletin is claimed. The writer is painfully aware that it has defects in this respect. The mind has been kept riveted so closely on the subject matter that all embellishments in composition have been pushed aside. But it is believed that a body of fresh facts in viticulture, sufficient to well compensate any experimental or practical vine-grower for its perusal and study, is given with sufficient clearness as to make it easily understood.

CHAPTER I.

Wild, or Native Grapes of the United States.

In order to well understand the full scope of the phrase "Improvement of American Grapes," we must have a clear idea of the kinds and character of the wild grapes which are native in the United States, and in what regions, locations and conditions they grow.

Hence, some tangible presentation of the different species is necessary. A study of the botanical characters of all the species is necessary to comprehend their relationships, and why they should be classified one way rather than another, but that would require more space than can be allowed here, so we must make it suffice by presenting some engravings of typical specimens of the species best adapted to be used as first parents in crossing and hybridizing to get varieties profitable in practical vineyard culture; and to show by skeleton or outline classifications how the species have been found by critical study to be related, without attempting to *prove* such relationships.

At this point, a careful study of all the plates is suggested.

The seeds, Plate I., are shown arranged in groups, designated as *Series*, according to natural relationships, as nearly as it is possible to do so, after years of critical study of all the species side by side.

The species in each series are much more nearly allied to the other species shown in the same series, than to species in any other series, not only in botanical character, but in habits of growth, flowering, fruiting, and soil and climatic adaptation, hence the recognition of these relationships is of much practical importance in vine culture, especially to the intelligent originator of varieties.

As to the relationships of the series to each other, there is much more division of opinion among botanists, and it is of less practical application.

VARIATION AND DIVISION.

The tendency in nature of the progeny of any individual to vary and diverge wider and wider from the original parent form with each generation, as influenced by surrounding conditions, is the subtle agency seized by the originator to produce at will whatever product he designs in harmony with the character of the original individual, or individuals, and conditions under which he operates. Even the blind law of "the survival of the fittest," as stated by Herbert Spencer, or of the "unlike," as Professor L. H. Bailey puts it, fills the world with infinite, yet related forms.

The process of individual, varietal, specific and generic variation, is well typified in every tree, by its body, forks, large branches, secondary branches, sprays and buds.

CENUS, VITIS.

Section I. Euvitis.

- Series 1 / *V. rupestris*,
- Series 2 / *V. vulpina*, *V. hiphana* (Mx.),
- Series 3 / *V. Solonis*,
- Series 4 / *V. Doaniana*,

- Series 5 / *V. Arizonica*,
- Series 6 / *V. Texense* 1,
- Series 7 / *V. Californiana*,

- Series 8 / *V. Champini*,
- Series 9 / *V. canalicans*,
- Series 10 / *V. coriacea*,
- Series 11 / *V. Labrusca*,

- Series 12 / *V. Vinifera*,
- Series 13 / *V. Boarquiniana*,
- Series 14 / *V. Lince cumii*,
- Series 15 / *V. inecumii*, var. *glauca*,
- Series 16 / *V. bicolor*,
- Series 17 / *V. æstivalis*,
- Series 18 / *V. Simpsoni*,

- Series 16a / *V. cordifolia*,
- Series 17 / *V. cordifolia*, var. *semperovirens*,
- Series 18 / *V. monticola*,

- Series 19 / *V. B. A. legana*,
- Series 20 / *V. Berlandieri*,
- Series 21 / *V. cinerea*,
- Series 22 / *V. cinerea*, var. *Floridana*,
- Series 23 / *V. Caribæa*,
- Series 24 / *V. Blancoti*,

Section II. Len thoelosis

- Series 24 / *V. rotundifolia*,
- Series 25 / *V. Munsoniana*,

All species represented above, except A. B. 22, and 23, are native of the United States.

A, is native of Central and Southwestern Asia.
B, is native of Southern Europe.
22, is native of the West Indies.
23, is native of Southwestern Mexico.

GRAPE SEEDS.

Plate II.
Botanical Exhibit.



THE VINE, (GENUS VITIS)
Species & Hybrid's
BY **T. V. MUNSON**
— DENISON, TEXAS —



Handwritten text on a card, possibly a list of grape varieties or hybrid names.

FROM ABOVE: 55
FROM BELOW: 56
FROM BELOW: 57

The known grape genus would be represented by a forked tree, having one division much larger than the other. The larger division would represent the true grapes (*Euvitis*), the smaller the warty-wood section (*Lenticellosis*). The body below the fork would represent the primordial form, once a species itself, but different from any species at present existing, yet that out of which all existing, and several extinct species, as proven in fossil forms, have sprung. The larger fork, or division, branched much more numerous than the smaller. Its great branches represent the series *Ripariae*, *Occidentales*, *Coriaceae*, *Labruscae*, *Aestivales*, *Cordifoliae*, and *Cinerascentes*, as shown in the classification of American species in Plate I. and two or three Asiatic series. The secondary branches represent the species in the series; the sprays represent the subspecies and botanical varieties, and the buds represent the individual vines, which, when we cultivate, we call varieties. They are multiplied not by seeds, but by cuttings, layers, grafts. Seeds produce other distinct individuals, or vineyard varieties.

The smaller division of the tree, representing the warty wood grapes (*Lenticellosis*), would have only two secondary branches, the whole division, constituting the section *Lenticellosis*, and also the Series *Chiri-Simpleses* (simple-tendrill species), generally designated by botanists as *Muscadinia*. In this section, there is but one series and two species known. Botanical varieties are few, although individual vines are very numerous.

The comparatively little variation in this section and its uniform, stubborn resistance to change by hybridizing, indicates that its individuals have been confined to very similar, or almost identical, conditions of climate and soil for a great length of time, and have not intermingled by natural hybridization with other species, as have the species of true grapes (*Euvitis*).

NATURAL DISTRIBUTION OF OUR WILD SPECIES OF GRAPES.

It is reasonable to suppose that a variety of any species of grape will succeed better in the climate and soil where its progenitors were naturally developed than in very different soils and climates; and by practical experience we find this true; therefore, distribution of species becomes an important matter to know, by the originator and vineyardist, and hence a brief statement of the distribution of our species is justified at this place.

As it is planned to present a somewhat different arrangement of series and species from that shown in *Plate I.* by using *size of berry* as a character or principle of division, and thus make the classification conform to a cultural idea rather than to a purely scientific one, yet without seriously departing from natural relationships, the species will be mentioned in the order of this new arrangement. See table of cultural characters, page—. As this new arrangement is presented for the purpose of affording practical cultural study, throughout, the distribution becomes a part of it and should be studied with it.

By it, the true grapes (*Euvitis*), are divided into two groups, namely,

the Small Berry (*Microcarpae*) Group, comprehending the four series, *Ripariae*, *Occidentales*, *Cordifoliae* and *Cinerascentes*, and the Large Berry (*Macrocarpae*) Group, comprehending, likewise, four series, including the cultivated Old World grapes as a series, *Vineferae*, *Aestivales*, *Coriaceae* and *Labruscae*.

The section *Lenticellosis* remains unchanged in arrangement.

Now taking the species in their order in this arrangement; *V. rupestris* is found wild in limestone regions, where the soil is generally black, from the Rio Grande in the region of Eagle Pass and Del Rio, in the hilly country running northeastwardly through Uvalde, Kerr, Gillespie, Lampasas, Hays, Travis, Burnet, Bell, Williamson, Coryell, Bosque, Johnson, Tarrant counties, in Texas, then again in the Indian Territory among the hills, or old mountain ranges, which are a continuation of the Ozark uplift, thence through northwestern Arkansas and southern Missouri, thence across into southern Kentucky, through Tennessee, and thence up the Cumberland range as far north as into southern Pennsylvania, nearly always along gravelly banks and beds of ravines, which have running water only a portion of the year, but plenty of growing moisture at all times within reach of the roots.

V. Longii is found along the banks and bluffs, nearly always in ravines and gulches putting into the larger streams, and on the banks of Red River, and its tributaries and along the Canadian, Cimmaron and Arkansas rivers, all through the Texas Panhandle, westward into New Mexico, eastward into Oklahoma and northward into Kansas and southeastern Colorado.

V. vulpina (or *riparia*) is very widely distributed along the sandy banks of streams and lakes, beginning sparingly on Red river, Texas, extending throughout all States northward into Canada, and eastward from Salt Lake to the Atlantic coast. The vines of this species in the Dakotas and Minnesota endure 40° to 60° below zero.

V. Treleasei is found wild along the ravines and gulches of western New Mexico, Arizona and southern Utah.

V. Arizonica, very closely allied to *Treleasei*, is found in similar situations in the same regions and extending farther south into parts of western Texas, northern Mexico, and into southern California east of the San Jacinto and San Bernardino mountains.

V. Girdiana is found as the only species of wild grape all through southern California, especially west of the San Jacinto mountains and south of the Colorado or Mojave desert, along streams.

V. Californica ranges as the only wild species through the northern half of California, along streams, west of the Sierra Nevada mountains, and north onto Rogue river in southern Oregon, its northern limit.

V. monticola is found about the tops of the limestone hills, in very limy soils, in a dozen counties, more or less, westward and northward from Austin, Texas.

V. rubra (or *palmata*) grows wild in the river bottoms of the southern

part of Illinois, and southward into southeastern Missouri and northeastern Arkansas.

V. cordifolia occurs in its western limits on the Brazos river, Texas, southeastern Kansas, southeastern Iowa, into Illinois to the 41° parallel, thence eastward to the Atlantic slope along high land ravines, in limestone soils mostly, and into the higher bottoms of creeks and rivers. It has produced vines having the largest trunks of any American species.

V. Baileyana is native only in the higher altitudes along streams among the Apalachian ranges in South and North Carolina, Virginia and West Virginia.

V. Berlandieri occurs in the same regions with *V. monticola*, but is less restricted locally, growing from the tops of the hills all along down and along the creek bottoms of those regions. It also extends over a wider extent of county somewhat.

V. cinerea covers the same range with *V. cordifolia*, except on the south it goes nearer the Gulf, and on the southwest extends across the Rio Grande as far as into southwestern Coahuila. It does not occur so abundantly on upland ravines, and extends farther into river bottoms.

V. Bourquiniana, represented in the United States only by varieties in cultivation; seems to be an exotic from southern Europe, but is well adapted to the South, especially southwestern Texas, represented by Herbeumont, Le Noir, etc.

V. vinifera, an Asiatic species, but mentioned because it enters into so many of our hybrids, and is the source of fine qualities to a greater extent than any other species, and by judicious use can be made of great value in hybridizing, and by grafting on resistant roots. It loves a warm, dry climate, and thrives in almost any well drained soil, and will grow in quite limy soils, where some species turn yellow in foliage (*chlorose*), and soon die. Its weakness lies in its non-resistance to Phylloxera, Mildew, Black Rot and severe cold.

V. Linsecumii grows wild abundantly on high, well drained sandy timbered lands, throughout the eastern half of Texas, the Indian Territory, northwestern Arkansas, and southern Missouri. It is never found on the black lands nor in low bottom lands. It will do well in black sandy soils, and endures great heat, drouth and cold.

V. bicolor ranges northeastwardly from where *Linsecumii* is found, in north Missouri, Illinois, southern Wisconsin, Indiana, Michigan, Ohio, Kentucky, Pennsylvania, New York and southwestern Ontario, New Jersey, Maryland, in similar soils and locations liked by *Linsecumii*, its chief difference from that form being in much smaller fruit, and a glaucous undersurface of leaves.

V. aestivalis ranges east of the region occupied by *Linsecumii* and south of the region where *bicolor* grows, to the Gulf and Florida. It differs from *bicolor* chiefly in having a rusty, cottony thin wool, on lower surface of leaves, and larger, more open clusters of fruit, and the leaves often more numerous and deeply lobed. It grows on high, warm, sandy soils.

V. Simpsoni is confined almost entirely to Florida. It differs from *aestivalis* in having a much stronger longer growth, in the young wood and leaves being much more woolly, and more deeply and numerous lobed, with scalloped teeth; clusters larger, more open, with less astringent berries. It flowers and ripens much later, and can endure very little cold. It prefers warm, sandy soil.

V. coriacea, native only in Florida. Leaves small, triangular or D shaped, with scalloped teeth, and dense white or brownish white felt on under surface. Thrives in either sandy or limy soil. Very sensitive to cold.

V. candicans, native in southern parts of the Indian Territory and Oklahoma, all through Texas, east of the Pecos river, especially abundant along upland ravines in "black waxy" lands, but also extends into the river bottoms, and canopies the tallest cottonwoods along the river banks. It endures great drouth and heat, but little cold, ten to fifteen degrees below zero being sufficient to kill it, unless well protected in the woods.

V. Doaniana has nearly the same range with *V. Longii*, but is not so abundant and occurs more on the limy soils. It readily endures great climatic extremes.

V. Chan pini natively occurs in the same regions in which *Berlandieri* occurs, less in the bottoms and less numerously.

V. labrusca is confined almost entirely to the Atlantic slope from Georgia to Massachusetts, in rather low, moist sandy lands, acquiring the common name thereby of "Swamp Grape," in some regions. It occurs in limited regions in such lands in southern Tennessee and southern Indiana, along the Ohio river.

V. rotundifolia grows wild abundantly on high, well drained bottom and hammock lands all through the South as far north as Norfolk, Va., Tennessee, Arkansas, Texas to about the 97th meridian, where it is rare.

V. Munsoniana is native in the southern half of Florida and on the Florida Keys. It can endure no more than a zero temperature, and differs from *Rotundifolia* in having more slender vines, smaller, fewer, but larger toothed leaves, larger clusters with smaller berries, and much smaller seeds, and fruit of a different flavor, bright shining black, with thin skin, juicy without pulp.

Space will not permit full descriptions of the species, but to familiarize the reader with those species found most promising in aiding viticulture, half-tone engravings of them have been presented in their proper places in the foregoing mention of species, and to make this still more practical, it is supplemented with a table of cultural characters.

DISCUSSION OF THE TABLE.

It will be noticed that species having wide distribution vary greatly among their individual vines from different regions in nearly all their characters, hence vines for experimental purposes taken at random can promise little in development toward improvement of varieties for cultiva-

Section.	Group.	Series.	SPECIFIC AND COMMON	} NAME.	Growth 1 to 5 5 strongest	Soil Preferred.	
						Sandy 1 to 5 5 most	Limy 1 to 5 5 most
Eucotis, True Grapes.	Microcarpæ or Small Berry Grapes.	Ripariæ.	Vitis rupestris.....	Rock Grape.	1 to 2	1	1 to 4
			V. Longii, (Solonis).....	Bush or Gulch Grape.	2 to 3	2	3
			V. vulpina (riparia).....	Riverside Grape.	2 to 4	3 to 5	1
			V. Treleasei.....	Smooth Canyon Grape.	1 to 2	1 to 2	1 to 2
			V. Arizonica.....	Downy Canyon Grape.	2 to 4	1 to 2	1 to 3
		Occidentales.	V. Girdiana.....	South California Grape.	3 to 5	1 to 2	2 to 3
			V. Californica.....	North California Grape.	3 to 4	1 to 2	2 to 3
			V. monticola.....	Sweet Mountain Grape.	1 to 2	1 to 4	5
			V. rubra (pamata).....	Cat Bird Grape.	2 to 3	1 to 3	3 to 4
			V. cordifolia.....	Frost, or Sour Winter Grape.	4 to 5	1 to 3	3 to 4
		Cordifoliæ.	V. Baileyana.....	Possum Grape.	2 to 3	1 to 3	1 to 3
			V. Berlandieri.....	Little Mountain Grape.	3 to 4	1 to 4	4 to 5
			V. cinerea.....	Sweet Winter, or Ashy Grape.	4 to 5	1 to 4	3 to 4
			V. Bourquiniana.....	Southern Aestivalis.	3 to 5	1 to 4	2 to 3
			V. vinifera.....	Asiatic Wine Grape.	1 to 5	1 to 4	2 to 4
	Vineferæ. Cinerascentes.	V. Linccumii.....	Post-Oak or Turkey Grape.	3 to 5	1 to 5	1 to 3	
		V. bicolor.....	Blue Grape.	3 to 4	1 to 5	1	
		V. aestivalis.....	Summer Grape.	3 to 4	1 to 5	1	
		V. Simpsoni.....	Simpson's Grape.	3 to 5	1 to 5	1 to 2	
		V. coriacea.....	Leather Leaf Grape.	3 to 5	1 to 5	2 to 3	
	Aestivales.	V. candicans.....	Mustang Grape.	4 to 5	1 to 5	4 to 5	
		V. Doaniana.....	Texas Panhandle Large Grape.	3 to 5	1 to 5	3 to 4	
		V. Champini.....	Adobe Land Grape.	3 to 5	1 to 5	4 to 5	
		V. labrusca.....	Northern Fox Grape.	2 to 3	1 to 5	1	
		V. rotundifolia.....	Southern Muscadine.	4 to 5	1 to 5	2 to 3	
	Gorfaceæ.	V. Munsoniana.....	Florida Bird Grape	3 to 5	1 to 5	2 to 3	
		Labr uscæ	Muscadina.				

Lenti-
cellulosi.

Chiri-Sim-
plesc.

Muscadina.

ES OF GRAPE SPECIES.

ance. to Cold ^{0 to 5} _{5 most}	Resistance.			Size.		Persistence to Pedicel ^{0 to 5} _{5 most}	Quality of Fruit ^{0 to 5} _{5 best}	Season of Leafing, Flowering, Ripening.					
	to Phylloxera ^{0 to 5} _{5 most}	to Mildew ^{0 to 5} _{5 most}	to Black Rot ^{0 to 5} _{5 most}	of Cluster ^{1 to 5} _{5 largest}	of Berry ^{1 to 5} _{5 largest}			Very early	Early	Medium	Late	Very late	
3 to 4	5	5	5	1 to 2	2	3 to 4	2 to 4	×					
3 to 4	4 to 5	4 to 5	5	1 to 2	2	4 to 5	2 to 4	×	×				
5	4 to 5	4 to 5	4 to 5	1 to 3	1 to 2	3 to 4	2 to 4	×	×				
2 to 4	3 to 4	1 to 2	1 to 2	1 to 2	2	3 to 5	2 to 4			×			
2 to 3	3 to 4	1 to 2	0 to 1	1 to 2	1	4 to 5	4 to 5			×	×		
1 to 2	2 to 3	0 to 1	0	2 to 4	2	4 to 5	3 to 4			×	×		
1 to 3	1 to 3	0	0	2 to 3	2	4 to 5	3 to 5			×	×		
2 to 4	5	3 to 5	4 to 5	1 to 3	2 to 3	5	1 to 3			×	×		
4	5	5	5	2 to 4	1 to 2	5	2 to 4						×
2 to 4	5	5	4 to 5	2 to 4	1 to 2	5	1 to 2				×		
2 to 4	4 to 5	4 to 5	4 to 5	2 to 3	1	5	3 to 4				×		
2 to 4	5	4 to 5	5	2 to 5	1 to 2	5	3 to 5				×	×	
2 to 4	5	4 to 5	5	3 to 5	1	5	2 to 4						×
2 to 3	3	1 to 3	1 to 4	2 to 5	2 to 3	5	4 to 5				×		
1 to 2	0 to 1	0 to 2	0 to 2	2 to 6	2 to 6	5	4 to 5		×	×	×		
2 to 4	4 to 5	2 to 4	1 to 5	2 to 4	2 to 4	0 to 4	0 to 4				×	×	
4 to 5	4 to 5	3 to 4	5	2 to 3	2	1 to 5	0 to 1					×	
2 to 4	3 to 4	4 to 5	4 to 5	2 to 4	2 to 3	1 to 5	0 to 4					×	
1 to 3	4 to 5	4 to 5	4 to 5	3 to 4	2 to 3	3 to 4	0 to 4					×	×
1 to 2	4 to 5	5	4 to 5	2	2 to 4	5	0 to 1				×	×	
2 to 3	5	5	5	1 to 2	3 to 5	5	0 to 2			×	×		
3 to 4	5	3 to 5	4 to 5	2 to 3	2 to 4	5	1 to 3	×	×				
2 to 4	5	2 to 5	5	1 to 2	2 to 4	5	2 to 3	×	×	×			
3 to 4	2 to 3	5	3 to 5	1 to 3	3 to 5	0 to 3	0 to 3	×	×	×			
1 to 3	5	5	5	1	3 to 5	0	3 to 4						×
1 to 2	5	5	5	1 to 2	2 to 3	1 to 2	3 to 4						×

tion. Species native in high, arid regions, as are *Vinifera* and all the species west of the Rocky Mountains where the air is too dry to permit the growth of mildews and rots, quickly are attacked and greatly weakened or destroyed when transplanted into low, moist climates. Likewise, vines of species growing in regions where Phylloxera does not exist, when transplanted into regions infested by it, soon perish by its attacks, and when the insect is transported into the soil where such vines grow, no matter how well the vines have always grown, will pale and die in three or four years after the insect begins to feed and multiply upon the roots.

The Phylloxera-resistant vines of the world are all native between the Rocky mountains and the Atlantic coast in North America, where the Phylloxera is common wherever wild vines grow in all that territory, and by long struggling against the insidious enemy, by "the survival of the fittest" law, now grow luxuriantly while the louse obtains a precarious living by tugging at the hard wiry roots, which their infinite attacks have developed. Then it is perfectly clear, that to have vines which will resist Phylloxera, mildew and rot, we must select as parents those which are least attacked by these, and such are found only in the regions east of the Rocky mountains in the United States.

CLIMATIC CONDITIONS AT THE MUNSON EXPERIMENT GROUNDS.

The section in which the writer lives and has his experiment grounds, latitude $34^{\circ} 30'$, is abundantly supplied with Phylloxera in the black limestone soils, mildew, Black, Brown, Bird's-eye, Bitter and other rots, with Leaf-folders and Chafers, and no better place could be found in which to test varieties against these maladies. Besides the climate is an exceedingly variable one, subject to sudden and severe changes, the summer temperature reaching 110° in the shade some days, and extreme drouths occur some years, which kill many forest trees in the woods, where a little crowded; sometimes the temperature falls forty, fifty, sixty, and even seventy or more degrees in twenty-four to forty-eight hours, occasionally going as low as 8 to 15° below zero (F.); where the average annual rain fall is over forty inches, yet some seasons less than twenty, and others near 100 inches. In spite of all these maladies and extremes we have succeeded in finding and producing varieties which resist them all, and annually bear heavy crops of fine fruit.

By critical study of the foregoing table of specific cultural facts, even for one who has not seen the test work, from which it was compiled—a history of which space will not permit here—can quickly select with certainty the species promising best results, either as direct producers, or for graft-stocks for various regions and soils.

PRACTICAL USE OF THE TABLE.

Selecting thus by the aid of the table, we would get excellent graft-stocks for northern regions of countries like California, France, and other

temperate climates where *Vinifera* grapes endure, for sandy soils, the following: (1) *V. vulpina*, (2) *V. rupestris*, (3) *V. Longii*, named in order of preference; and for moderately limy soils *V. rupestris* and *V. Doaniana*. For very limy soil *V. Champini*, where ground does not freeze over 18 inches deep. All of these just named do well in sandy soils in the regions designated.

GRAFT-STOCKS FOR VERY HOT, DRY REGIONS,

in any soil, such as Southwest Texas and South California:

(1) *V. Champini*, (2) *V. Doaniana*, (3) *V. Berlandieri*, (4) *V. candicans*, (5) *V. monticola*.

The last three, being difficult to grow from cuttings, are better utilized in hybrid varieties with the first two and with *V. rupestris*. *V. monticola*, *V. Berlandieri*, *V. candicans* and *V. Champini*, while doing finely in sandy soil, grow the best of any species in very limy soils, up to 60% of carbonate of lime.

SELECTING TO BREED DIRECT PRODUCERS OF FRUIT.

For Market and Table, for the North, we would select best varieties of *V. labrusca*, *V. vulpina*, *V. Lincecumii*, *V. bicolor*, *V. rupestris*, *V. Doaniana*, and use *V. vinifera*, its hardiest, healthiest varieties, in attenuation of $\frac{1}{4}$ to $\frac{1}{3}$ or less, by using hybrids, and hybrids of hybrids as parents, such as Brighton, Brilliant, Moore's Diamond, Jefferson, etc.

BREEDING DIRECT PRODUCERS FOR THE SOUTH.

Here is almost unlimited range. All the above named for the North, *V. Labrusca*, *V. Vulpina*, and *Vinifera*, in attenuation not over $\frac{1}{4}$, with the addition of *V. Champini*, *V. Bourquiniana*, *V. Berlandieri*, *V. monticola*, *V. rotundifolia*, and for Gulf regions and Florida, *V. Simpsoni* and *V. Munsoniana*. In another place it will be shown that all these species have given good evidence of their usefulness alone, or in combination. (See Chapter IV.)

BEST SPECIES FOR WINE.

It is found that small-berry species generally possess properties for wine-making far superior to the large-berry species, hence if one seeks to produce varieties for wine-making he should not neglect those with small berries.

The species possessing best wine properties are those in the series *Ripariae*, *Viniferae*, *Aestivales*, *Cinerascentes* and *Coriaceae*, especially the



Vitis rupestris.

Plate IV. *Vitis Longii*.

"Hutchison"

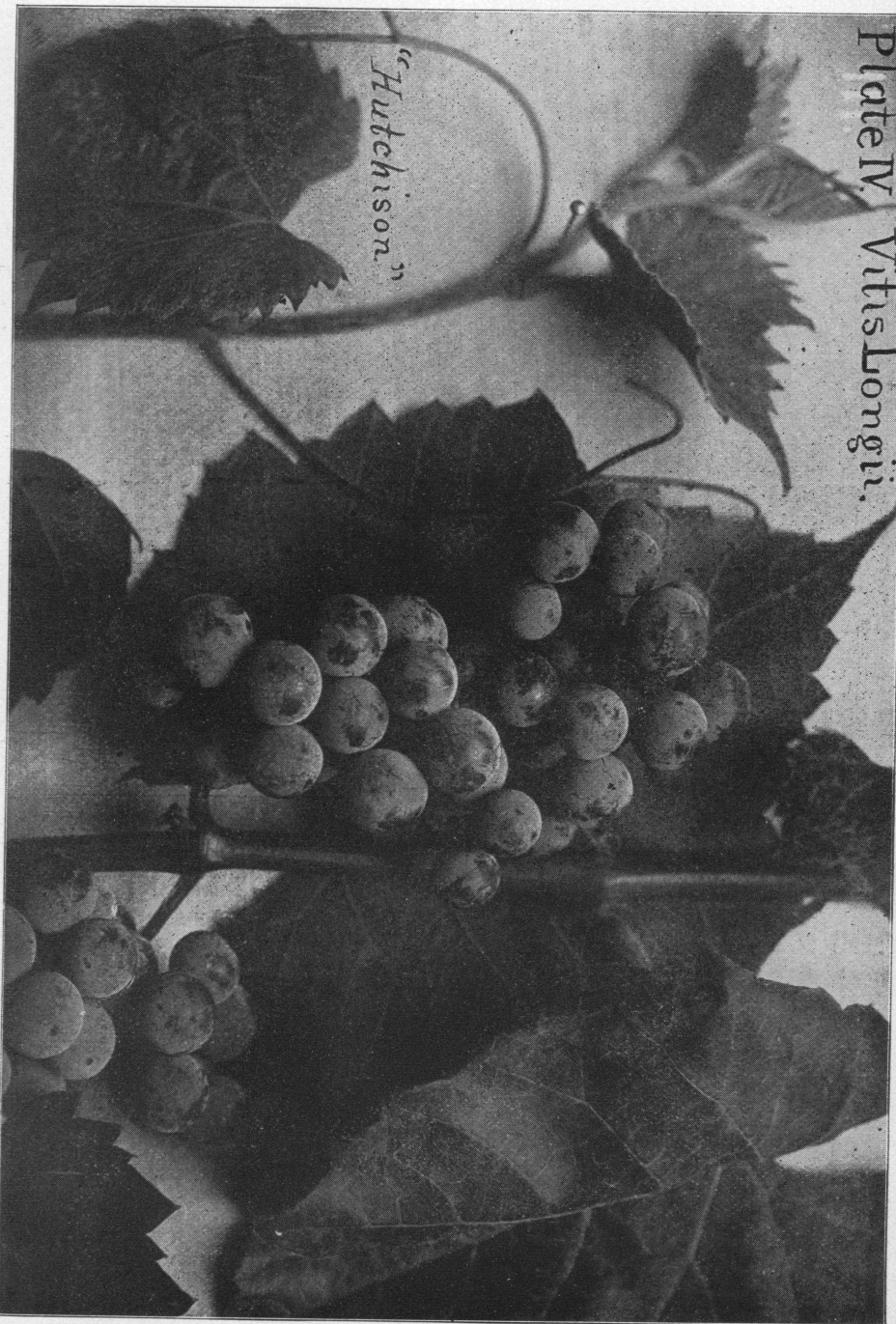
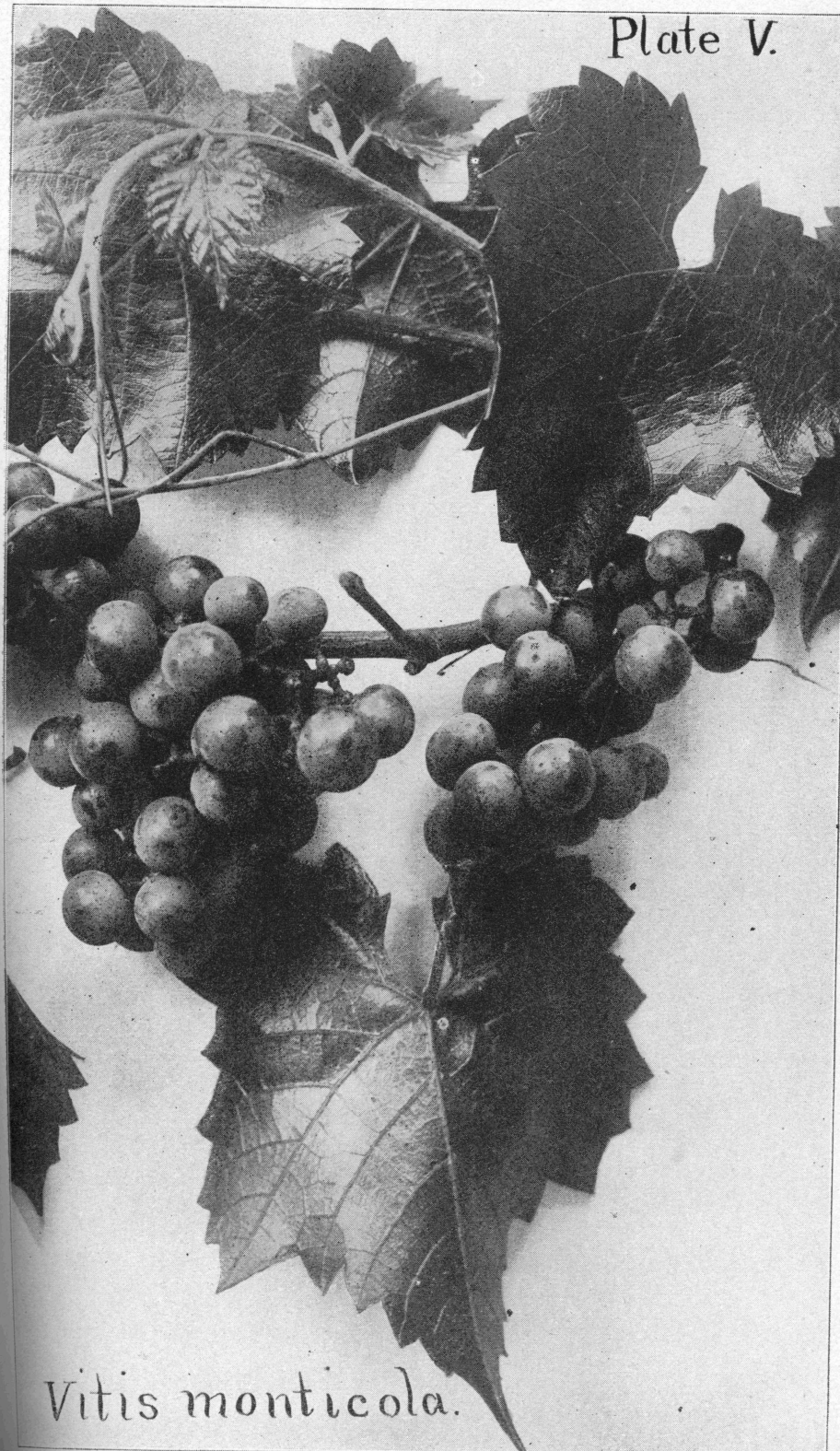


Plate V.



Vitis monticola.

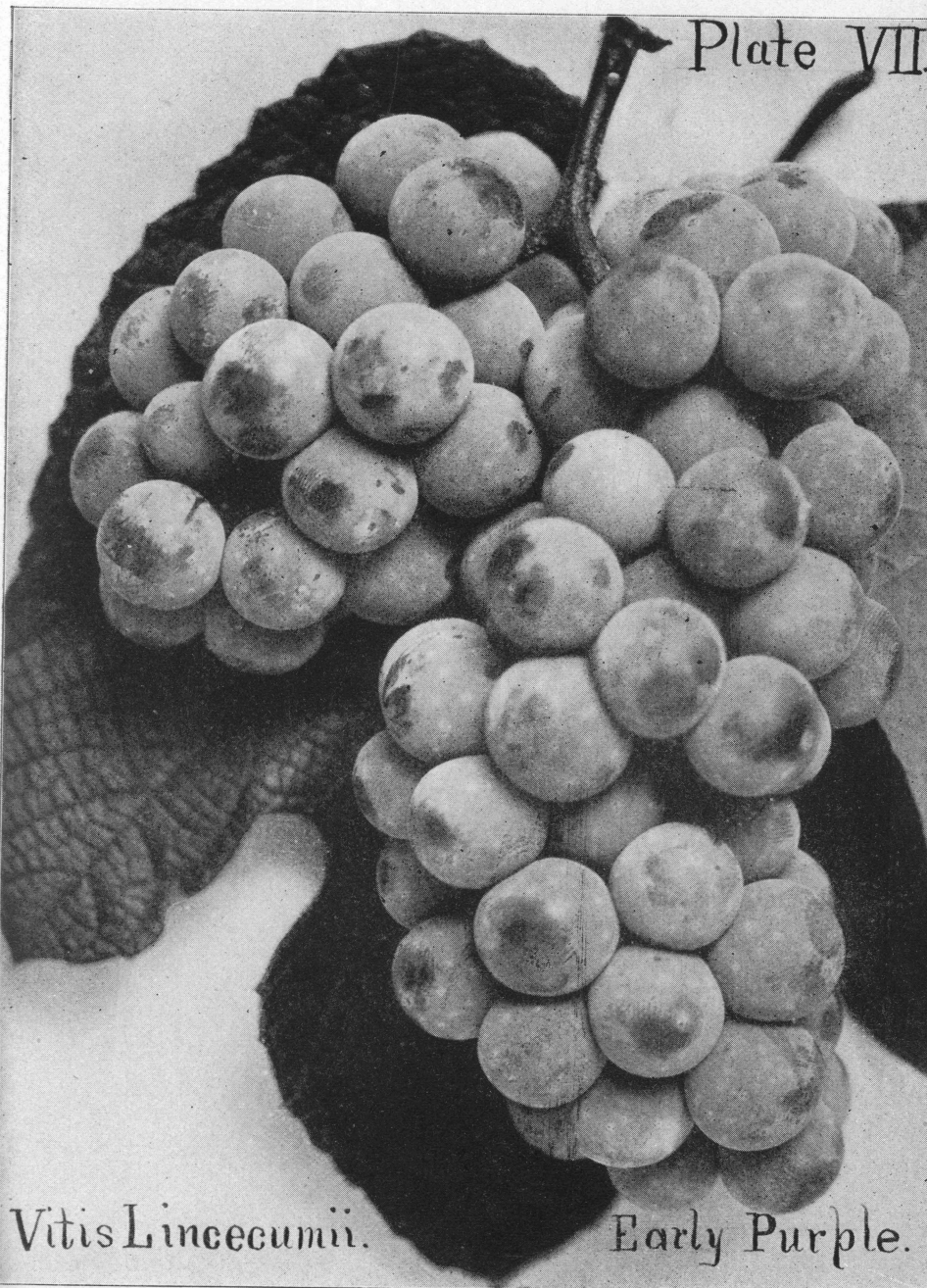
Plate VI.



"Millardet."

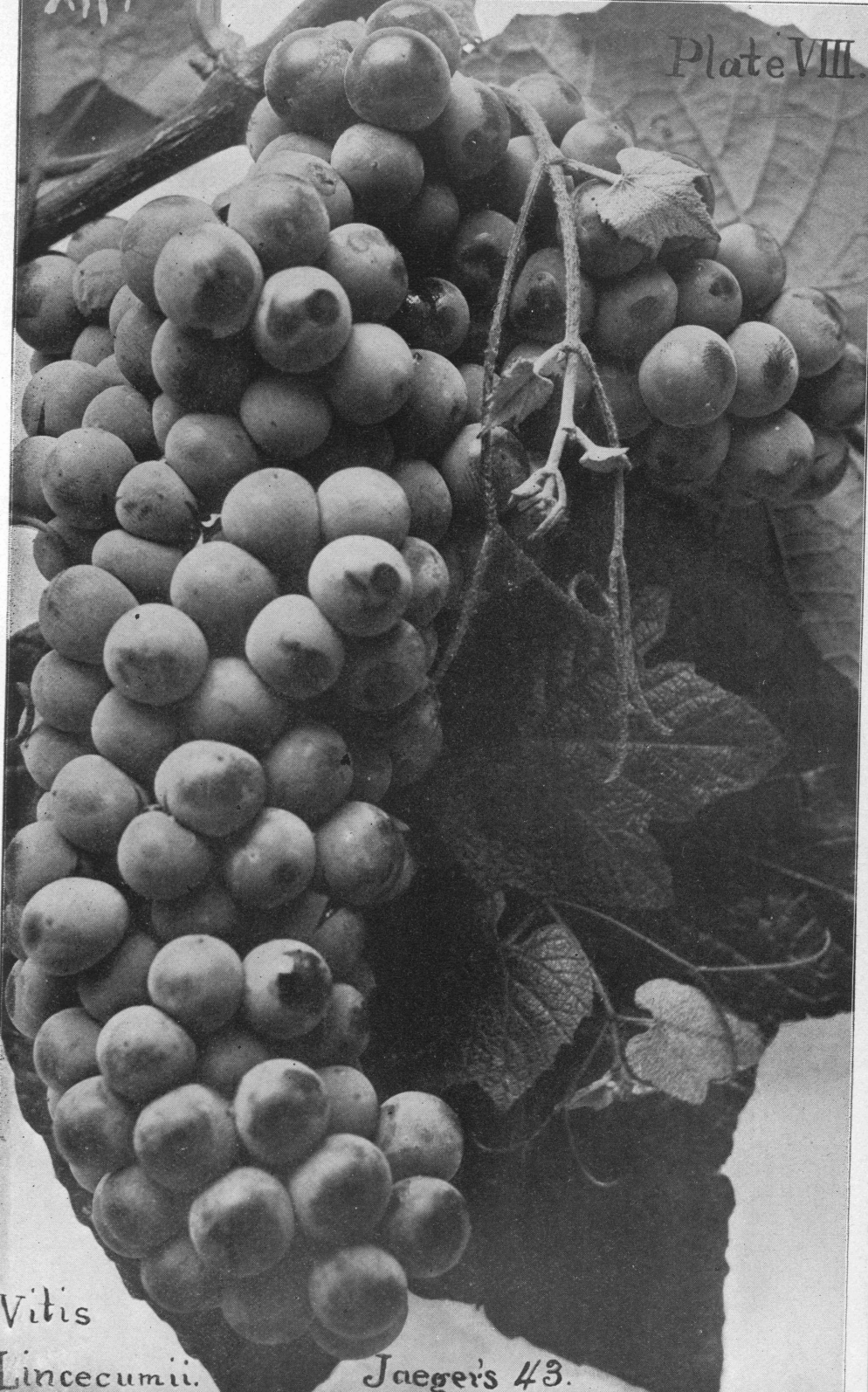
Vitis Berlandieri.

Plate VII



Vitis Lincecumii.

Early Purple.



Vitis
Lincedumii.

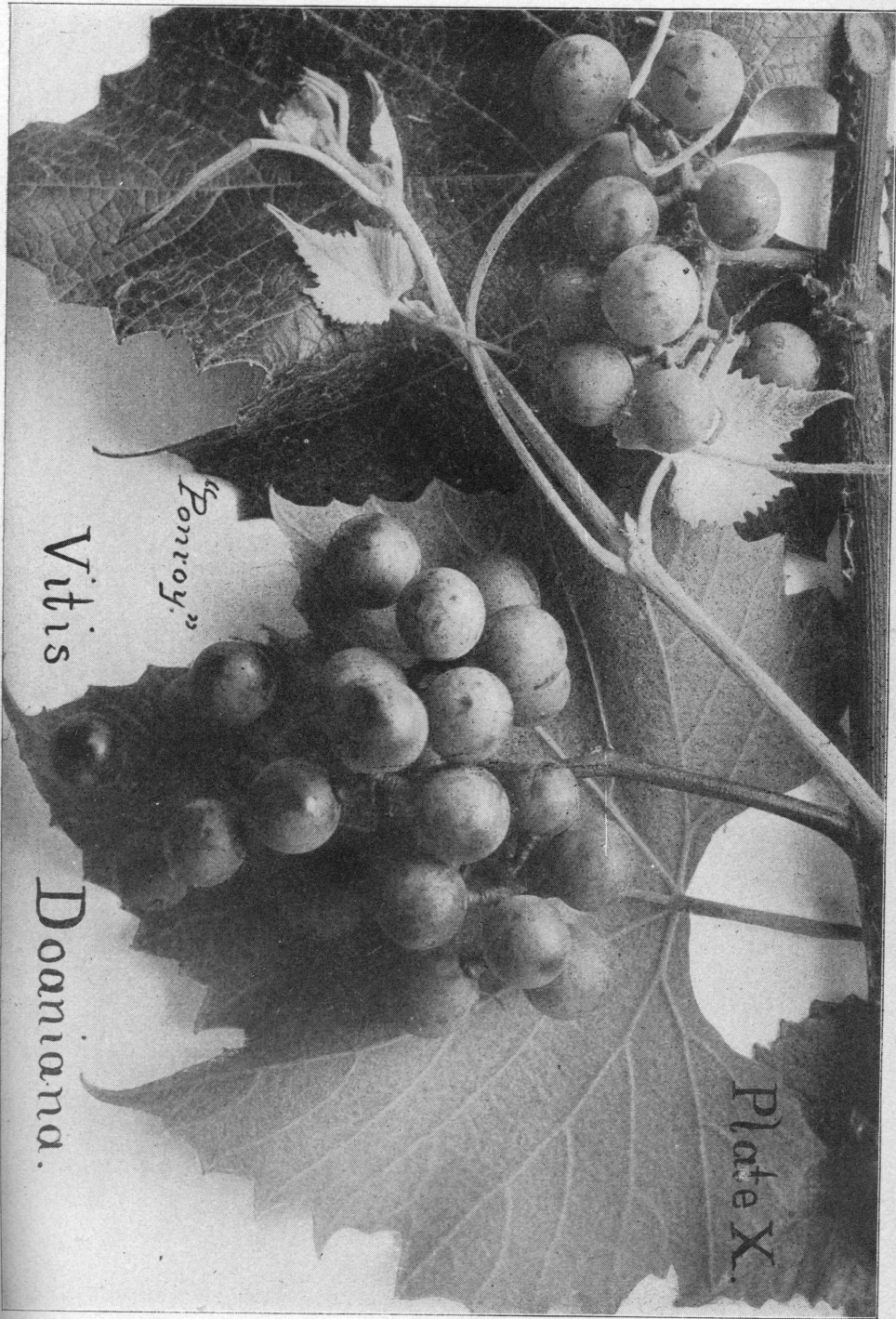
Jaeger's 43.

Plate IX.



"Alachua."

Vitis Simpsoni.



"Lorroy"

Vitis

Doaniana.

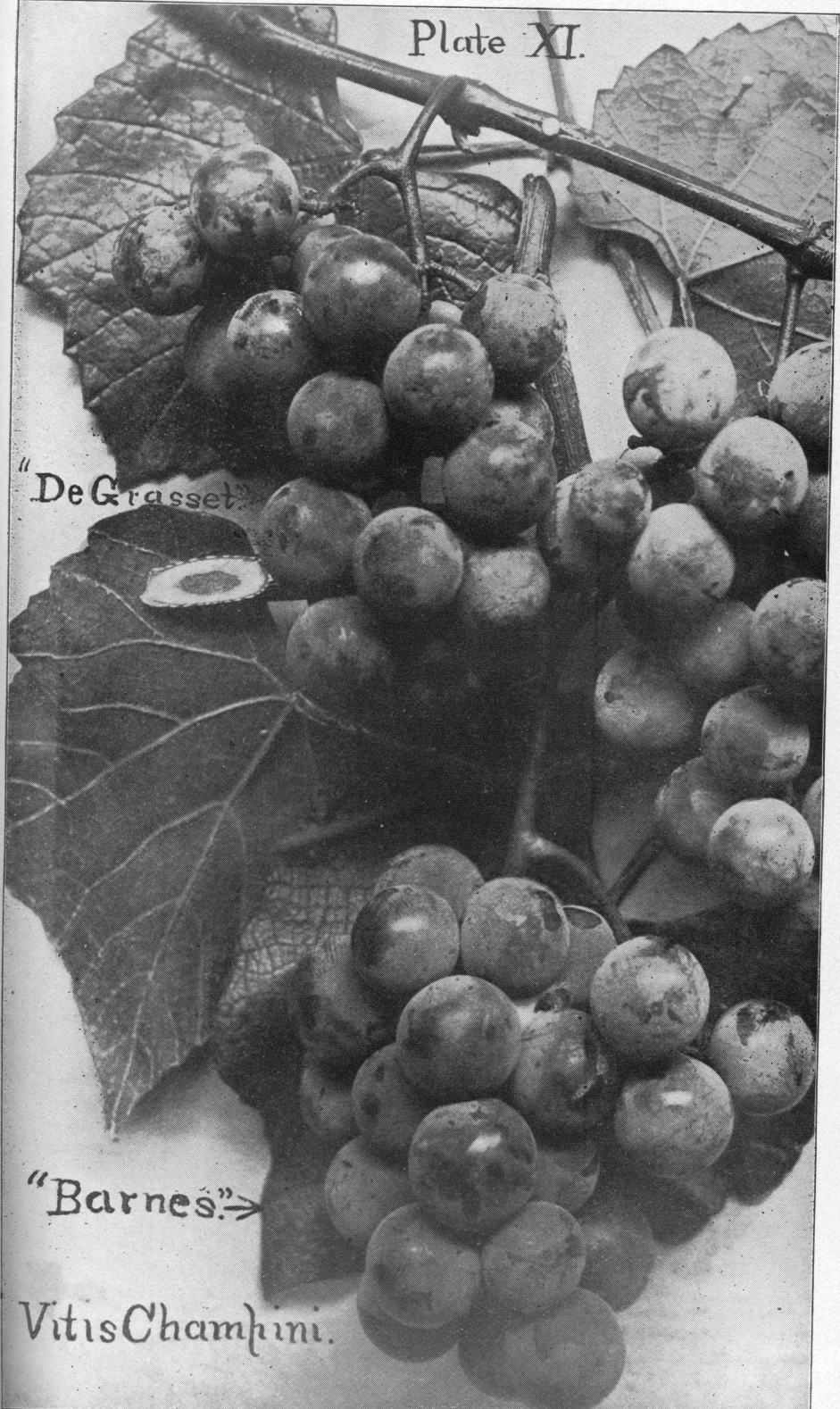
Plate X.

Plate XI.

"De Grasset."

"Barnes" →

Vitis Champini.



Vitis labrusca.

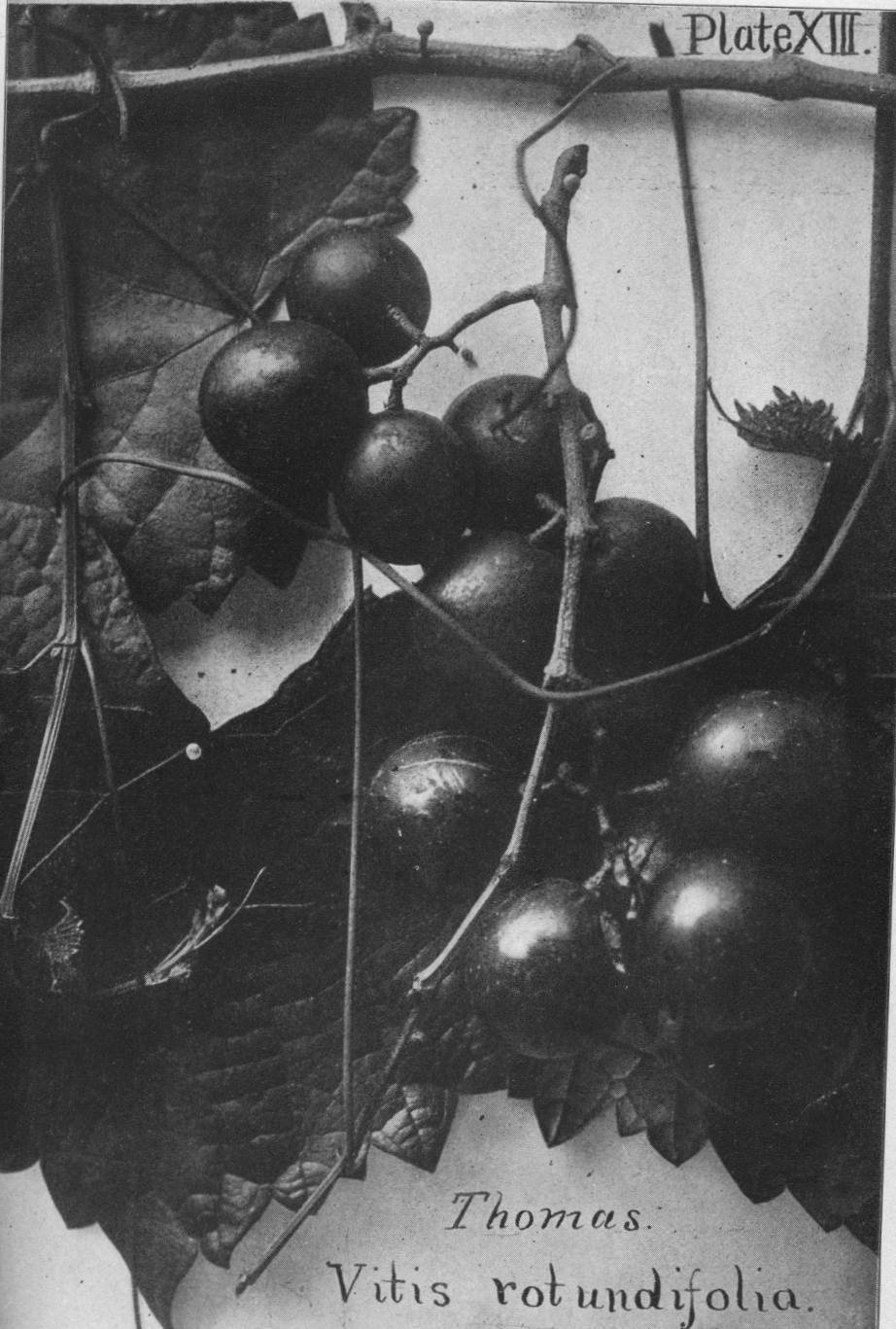
Plate XII.



Red

Giant.

Plate XIII.



Thomas.
Vitis rotundifolia.

species *Rupestris*, *Bourquiniana*, *Lincecumii*, *Berlandieri*, *Champini*, *Doaniana* and *Vinifera*.

We thus reach the conclusion as to,—

The Specific Basis of American Viticulture.

Rupestris, *Longii*, *Vulpina*, *Monticola*, *Berlandieri*, *Bourquiniana*, *Vinifera*, *Lincecumii*, *Bicolor*, *Aestivalis*, *Simpsoni*, *Candicans*, *Doaniana*, *Champini*, *Labrusca*, *Rotundifolia*, *Munsoniana*, seventeen in all.

These with proper application as to climate and soil can well supply all parts, from Puget's Sound and Dakota to Puerto Rico.

All the other species can be neglected without loss.

An abridgement of the above, which would still supply nearly every requirement, and be the best possible list for the number of species included, would be, *Rupestris*, *Vulpina*, *Berlandieri*, *Bourquiniana*, *Vinifera*, *Lincecumii*, *Simpsoni*, *Doaniana*, *Champini*, *Labrusca*, *Rotundifolia*.

CHAPTER II.

Selecting Parent Varieties of Grapes.

At first thought, it seems a very simple and easy election to make, but when one learns by sad and expensive experience, involving years of nursing and solicitude, that he has been breeding weakness and producing only food which disease will consume, by starting with inherently weak, non-resistant parents, he becomes very cautious in undertaking to originate more varieties. Better to study first the work of others who have made known the errors which lead to failure.

Let a variety be taken for parent, no matter how beautiful and fine in quality of fruit, which is puny, easily hurt by climatic changes and extremes, a prey of insect and fungus diseases, dropping easily from cluster, skin easily cracking, non-productive, etc., and its progeny will bring forth its weaknesses to the third, fourth, and even to the tenth generation.

By hybridizing with varieties, very strong in points where the other parents are weak, the maladies can be somewhat counteracted, and much more rapidly reduced than simply selecting the best generation after generation of pure seedlings.

How much more satisfactory, more economical of time, more profitable to originator and planter, would it be to have the parentage on both sides of the very best in constitution and productiveness as well as in quality!

THOROUGHbred VINES.

While there are no truly thoroughbred varieties of grapes, or other plants, as there are of domestic animals, yet no cause can be shown why good results may not as well be obtained with grapes, so bred as with cattle or horses. The nearest approach to a thoroughbred grape that I can cite is the McPike, if its parentage is as reported, a seedling of Worden, which is a seedling of Concord, which is a seedling of a good wild grape of Massachusetts. But such a thoroughbred is very different in its genealogy from a thoroughbred animal.

A true thoroughbred grape would be obtained by intercrossing Concord, Ives, Perkins, Hartford and other distinct, select pure varieties of *Labrusca*, and then perpetually intercrossing the progeny of each new generation, but avoiding direct "in and in" breeding as of Concord seedlings upon Concord seedlings and these upon their pure progeny perpetually, which would finally run out.

In the first and better sense we would have a true *Labrusca* breed, and many other pure *Labrusca* breeds distinct from this could be established by starting with another set of wild or distinct varieties. The second would be a pure Concord breed.

But a better breed still, for grapes, seems to be made by starting with

the best of several species, and then by hybridizing and crossing among these, to reach certain ideals, would probably give best results. This very thing in a manner has gradually taken place among several species of Old World grapes, giving the complex *Vinifera* species in cultivation. This is more a breed of grapes than a species. But it is not strictly thoroughbred.

E. S. ROGERS AND HERMANN JAEGER.

The first intelligent step toward starting thoroughbreds among grapes in the United States was by Mr. E. S. Rogers, of Massachusetts. But he seemed to look forward to nothing but the immediate hybrids—one generation—produced, yet what a grand start that generation gave us!

Mr. Hermann Jaeger, of Neosho, Mo., went ahead of this, by diligently and intelligently searching extensive ranges of forests where wild grapes grew, collecting the best varieties of several species, and hybridizing them with each other, and with the varieties in cultivation most resistant to grape diseases, which are numerous and destructive in the region where he operated. For more than twenty years did he hunt and hybridize grapes. How few, indeed, were the vines, among all the tens of thousands he examined in the woods, with which he was content to begin with as breeders! The list is soon told. Out of hundreds moved into his grounds and numbered, he used less than half a dozen to breed from!

Of the Post-Oak (*V. Linccumii*) grape the Neosho and his No. 43 are the only ones that produced varieties considered good enough to make the foundation of his breed, in combination with a male variety produced from his No. 60 *Rupestris*, the best of this species found by him. The best of this union was his No. 70, named Munson, and from this has arisen my America family. (See Chapter IV.) By pollinating his 43 with Herbeumont he obtained two very good grapes, which he named Dufour and Longworth. Neosho he never used as a parent, but the writer has with excellent results. (See Neosho Family, Chapter IV.)

This glimpse of my greatly esteemed co-worker is given as a small tribute to great merit, and because with him the writer corresponded, visited, exchanged specimens and varieties and discussed every phase of grape development during more than ten years. His sad disappearance was a great loss to the development of American vine culture.

However, the results of his work in neither this country nor in Europe were lost. In France they are reporting fine hybrids on his No. 43, and best *Rupestris* for "direct producers" in vineyard culture, and an examination of the Jaeger 43 Family in Chapter IV. will show some of its fruits in this country.

HUNTING GOOD WILD GRAPES FOR PARENT VINES.

Bordering Red River, several miles wide, both in Texas and the Indian Territory, on the sandy uplands, from Texarkana to above Henrietta,

before the lands were so much cleared, and browsed by cattle, innumerable Post-Oak grapes grew, when the writer came to Texas twenty-four years ago, and a good many vines yet are to be found, especially on the Territory side. It was my delight for many years to traverse these woods, in ripening time, on horseback, where little of the country was fenced, seeking and tasting the fruit of many thousands of vines; hoping perchance to find some good enough to move into my vineyards to use as parents in hybridizing. Hundreds of miles of such travel in this Red River belt only whetted my desire to hunt in others, and I gratified it. I hunted wild grapes about Tyler, Troupe, Jefferson, Palestine, Crockett, and in the counties of Gonzales, Caldwell, McLennan, Bell, Williamson, Burnet, Travis, Blanco, Kerr, Gillespie, Llano, Lampasas, San Saba, Del Rio, Jeff Davis, Donnelly, Wilbarger, Clay, Montague, Cooke, Denton, Tarrant, Dallas and others, and much in other States. The varieties found in these hunts considered worthy to begin with as parents for table and market grapes did not exceed a score. With these and others found by friends and sent me, in connection with the best introduced varieties, afford a very ample collection from which to choose parents for any purpose, soil or climate. However, all the good wild grapes have not yet been found, and other experimenters may, as we have, find much recreation, if not money, in hunting for them.

Of the writer's collected varieties, only the cream for special purposes and regions are used, and yet there is room for combinations enough to require the full life of dozens of persons to make, without exhausting the materials.

So it appears, that to the pioneers in this broader viticultural foundation work, the selection of parents with which to begin the development of new races of vineyard varieties is, in itself, quite a large and expensive task. The extent of this foundation will be better understood by giving a summary of the parts, which is now presented.

PARTIAL LIST OF VARIETIES OF GRAPES THAT HAVE BEEN, OR ARE, GROWING IN THE MUNSON EXPERIMENT GROUNDS.

For Study, Testing, Improvement, and Market Purposes, Not Including Varieties Originated by the Writer.

EXPLANATION.

After each species and variety are placed some characters and figures; for example, *V. rupestris* †, $20\frac{4}{30}$. This (†) means that the vine or vines have staminate flowers. This , that the vine or vines have flowers with pistils and reflexed stamens and can bear fruit if the flowers

are pollenized by vines having erect stamens, but cannot fertilize themselves. In other words, (†) means male vine or vines and (,) means female vine or vines; (♂) means, hermaphrodite, or perfect, flowers with erect stamens. The figures tell the date at which the species or variety blooms at Denison, Texas. The upper figure is for the month, the lower for the day of month. The above figures mean April 20th to 30th. b. means black, r. red, and w. white; thus, Concord ♂ $5\frac{5}{10}$ b. means that Concord has perfect flower, erect stamens, blooms May 5th to 10th, at Denison, and is black.

This will be found a very convenient and useful table both for the experimenter and practical vineyardist, as varieties with reflexed stamens must have vines with erect stamens, flowering at same time near by to bear well.

LIST.

Species.	Individual Vines or Varieties.
<i>V. rupestris</i> , †, $20\frac{4}{30}$,	about 125 vines, from Texas and Missouri, including Mr. Jaeger's best kinds.
<i>V. Longii</i> , †, $20\frac{3}{30}$,	twenty-five or more vines from various parts of north-western Texas, and hybrids for graft-stock.
<i>V. vulpina</i> , †, $10\frac{4}{25}$,	over a dozen vines from Minn., Wis., Mich., N. Y., (riparia.) Mo., Kans., Ind. Ter., and hybrids with Concord and other varieties.
<i>V. Treleasei</i> , †, $5\frac{5}{15}$,	from Bradshaw mountains, Ariz.
<i>V. Arizonica</i> , †, $10\frac{5}{20}$,	a score of vines from Western Ariz. and South California.
<i>V. Girdiana</i> , †, $5\frac{5}{15}$,	a dozen vines from southern California and Mexico.
<i>V. Californica</i> , †, $10\frac{5}{20}$,	many vines from Napa, Sacramento, and Feather river, Cal., and Rogue river, Oregon.
<i>V. monticola</i> , †, $2\frac{7}{10}$,	a score or more of vines, collected from San Saba, Lampasas, Llano, Coryell, Bell, Travis, Burnet, Kerr, Uvalde, and other counties of Texas. and its hybrids with other species.
<i>V. rubra</i> , (or <i>palmata</i>), †, $10\frac{5}{15}$,	a dozen or more vines from Mississippi river bottom, above St. Louis.

- V. cordifolia*, †, $\frac{5}{515}$, many vines from Fla., Mo., Tex.
V. Baileyana, †, $\frac{5}{25}$ to $\frac{5}{25}$, some dozen vines from Va., W. Va., N. Car.
V. Berlandieri, †, $\frac{5}{25}$ to $\frac{5}{25}$, 100 or more vines from same counties in which *monticola* was obtained, also hybrids.
V. cinerea, †, $\frac{5}{25}$ to $\frac{5}{10}$, many vines from Fl., Ark., Mo., Texas, and Coahuila, Mex.
V. Bourquiniana, cultivated varieties. Herbemont ' $\frac{5}{1825}$, LeNoir ' $\frac{5}{1520}$, Cunningham ' $\frac{5}{15}$, Pauline, Purple Favorite ' $\frac{5}{15}$, Deveraux ' $\frac{5}{16}$, Warren, Louisiana ' $\frac{5}{15}$, Harwood ' $\frac{5}{15}$, Bertrand ' $\frac{5}{15}$, and many seedlings and hybrids of Herbemont.
V. vinifera, $\frac{5}{15}$, cultivated varieties, Black Hamburg ' , Black Morocco ' , Calabrian ' w., Carminet du Medoc ' b., Chavoochee ' w., Crujidero ' w., Faher Szagos ' w., Favorita ' w., Flame Tokay ' r., Golden Champion ' w., Griesa de Piemonte ' b., Malaga ' w., Mission ' r., Millenium, ' w., Olivet de Cadinet , b., Quiliano ' r., Rose of Peru ' b., Sauvignon Jaune ' w., Verdelho ' w., Violet Chasselas ' and others from different parts of Europe, Persia and Japan.
V. Linccumii †, $\frac{5}{820}$, numerous vines from southwest Mo., northeast and south Texas, and some hybrids of it with other species.
V. bicolor, †, $\frac{5}{1525}$, several vines from Wis., Mich., Ills., Ind., Ohio, N. Y., N. J., and hybrid with *V. vulpina*.
V. aestivalis, †, $\frac{5}{820}$, from Va., including Norton ' $\frac{5}{15}$ b., N. Car., S. Car., Ga., Tenn.
V. Simpsoni, †, $\frac{5}{2030}$, a score or more from different parts of Fla., and hybrids with *V. coriacea* and *V. cinerea*.
V. coriacea, †, $\frac{5}{1525}$, six or eight vines from central and south Fla.
V. candicans, †, $\frac{5}{25}$ to $\frac{5}{4}$, many vines from various parts of Texas.
V. Champini, $\frac{5}{25}$ to $\frac{5}{25}$, a dozen or more vines collected from San Saba, Lampasas, Llano, and Bell counties, and hybrids.
V. Doaniana, †, $\frac{5}{2030}$, more than a dozen vines from Greer Co., Okl., and Wilbarger, Donley and Motley counties in the Texas Pan Handle.
V. labrusca, †, $\frac{5}{110}$, wild varieties from N. Car., Tenn., Md., Pa., Mass., and many cultivated varieties as follows:

Cultivated Pure *Labrusca* Varieties.

Ann Arbor ' $\frac{5}{10}$, w., Concord ' $\frac{5}{10}$, b., Champion ' $\frac{5}{15}$, b., Columbian, ("Columbian Imperial"), $\frac{5}{10}$ prp., Cottage ' $\frac{5}{49}$, Danville, b., Eaton ' $\frac{5}{712}$, b., F. B. Hayes ' $\frac{5}{10}$, w., Hartford, ' $\frac{5}{15}$, b., Hicks ' $\frac{5}{10}$, b., Ives ' $\frac{5}{15}$, b., Lady ' $\frac{5}{49}$, w., Martha ' $\frac{5}{10}$, w., Mary Ann, b., Moore Early ' $\frac{5}{88}$, b., McPike ' $\frac{5}{10}$, b., Perkins ' $\frac{5}{88}$, r., Pocklington ' $\frac{5}{12}$, y., Red Giant, ' $\frac{5}{49}$, r., Rockwood ' $\frac{5}{10}$, b., Whitehall ' $\frac{5}{10}$, w., Worden ' $\frac{5}{88}$, b., Zylphan b.

Labrusca × *Vinifera* Hybrids.

Agawam, $\frac{5}{10}$, r., Barry, $\frac{5}{49}$, b., Black Eagle, $\frac{5}{10}$, Brighton, $\frac{5}{88}$, Catawba, $\frac{5}{88}$, r., Campbell Early ' $\frac{5}{49}$, b., Dutches ' $\frac{5}{10}$, w., Dinkel ' $\frac{5}{88}$, r., Delawba ' $\frac{5}{10}$, r., Diamond ' $\frac{5}{49}$, w., Diana ' $\frac{5}{11}$, r., Eumelan, $\frac{5}{10}$, b., Excelsior ' $\frac{5}{18}$, r., Empire State ' $\frac{5}{10}$, wh., Goethe ' $\frac{5}{12}$, r., Geneva ' $\frac{5}{1015}$, w., Green Mountain ' $\frac{5}{49}$, wh., Herbert ' $\frac{5}{49}$, b., Irving ' $\frac{5}{10}$, w., Isabella ' $\frac{5}{88}$, b., Jefferson ' $\frac{5}{17}$, r., Laura ' $\frac{5}{10}$, purp., Lindley, $\frac{5}{10}$, r., Lady Washington ' $\frac{5}{49}$, w., Mrs. McClure ' $\frac{5}{10}$, w., Mills ' $\frac{5}{12}$, b., Niagara ' $\frac{5}{49}$, w., Naomi ' $\frac{5}{12}$, w., Norfolk ' $\frac{5}{88}$, r., Peter Wylie ' $\frac{5}{11}$, w., Prentiss ' $\frac{5}{49}$, w., Rogers No. 2, $\frac{5}{1015}$, b., Ruckland ' $\frac{5}{1015}$, r., Salem ' $\frac{5}{49}$, r., Secretary, b., Superb ' $\frac{5}{11}$, b., Triumph ' $\frac{5}{15}$, w., Ulster ' $\frac{5}{88}$, r., Vergennes ' $\frac{5}{49}$, r., Woodruff ' $\frac{5}{7}$, r., Wyoming, $\frac{5}{10}$, r., Wilder, $\frac{5}{10}$, b., Waverly, b., and others received from originators for testing.

Labrusca × *Vulpina* Hybrids.

Bacchus ‘ $\frac{4}{5}$ to $\frac{5}{7}$, b., Bartholomew ‘ $\frac{5}{27}$, b., Berckmans=(Clinton × Delaware) ‘ $\frac{5}{24}$, r., Clinton ‘ $\frac{4}{30}$, b., Elvira ‘ $\frac{5}{8}$, w., Missouri Riesling ‘ $\frac{5}{8}$, b., Montefiore ‘ $\frac{5}{8}$, b., Nectar ‘ $\frac{5}{10}$, b., Noah ‘ $\frac{5}{8}$, w., Sherman ‘ $\frac{4}{25}$, b.

Supposed Labrusca × *Bourquiniana* Hybrids.

Delaware ‘ $\frac{5}{10}$, r., Early Victor ‘ $\frac{5}{2}$, b., Golden Gem ‘ $\frac{4}{30}$ to $\frac{5}{4}$, w., Jessica ‘, w., Poughkeepsie ‘ $\frac{5}{18}$, r., Walter ‘ $\frac{5}{10}$, r.

- V. *rotundifolia* †, $\frac{6}{15}$, a number of wild vines from Arkansas and East Texas, and the following cultivated varieties,—Flowers, $\frac{6}{8}$, b., James, $\frac{6}{10}$, b., Scuppernong, $\frac{6}{8}$, amber, Tenderpulp, $\frac{6}{10}$, b., Thomas, $\frac{6}{15}$, b.
- V. *Munsoniana* †, $\frac{6}{15}$, b, more than a score of vines from different parts of Florida.

From the foregoing list it appears that the most promising elements in American and Foreign grapes have been before the writer for study and use in his work of selecting and hybridizing. (See results in Chapter IV.)

THE IDEAL VARIETY.

In order to make intelligent selection of vines for parents, it is not only necessary to have abundance of material; that is, varieties of diverse character to suit all purposes; but the originator must have determined the special character of variety desired, to suit a particular soil and climate, and best serve the use for which it is designed, as for market, table or wine.

But included in every variety for special purposes, there are general qualities that every valuable variety must possess, and these general qualities, combined, go to make up the ideal vine.

These general qualities are:—

1. Great vigor, hardiness, long life, in the climate for which it is desired.
2. Greatest possible resistance to Phylloxera, Downy Mildew, Black Rot, and Leaf Folder.
3. Easily grown from cuttings.
4. Perfect flowers, so that the vine will bear well standing alone.
5. Prolific bearing.
6. Large, full, handsome clusters.
7. Berries persistent to the pedicles, with thin, delicate, yet tough, non-cracking skin, without astringency or bitterness; color bright; pulp meaty, yet tender, juicy, readily freeing the seeds, of pure fine quality, rich in sugar and agreeably sprightly with acid, and having a pleasing characteristic flavor; seeds few and small; if for table or market, berry large; of good keeping quality.

Of course, no such perfectly ideal varieties are ever found wild, but the more of these points possessed by the parent the less the time required in breeding to secure valuable varieties.

With the very best that nature ever does, there yet remains a vast amount for the experimenter to accomplish by selection and hybridization.

PERSONAL QUALIFICATIONS NECESSARY IN THE ORIGINATOR.

This work requires not only theoretical knowledge, but also direct personal knowledge, experience, skill and much of the inventive faculty, with great patience and perseverance, without the stimulus of money-making in it, for there is little to the originator. There is no law providing protection to the inventions (varieties) of an originator, as there is to the less meritorious mechanical inventor. The originator must have a great fund of enthusiasm, and an ambition to add something to the general fund of human development for the benefit of the world at large, and, that he may reap some personal compensation, or enjoyment, he must have an intense love of close communion with nature, causing him to admire the infinite correlated life movements; to study the loves and hates prevailing in all organic life and growth, discovering the great fundamental truth in ethics, as well as in the development of organic beings, that *love breeds life, hate breeds death*. Such a spirit of investigation leads the student of biology, especially when working in this field of most practical application of the principles of biology, to the contemplation of the all-binding energies and impulses belonging to and circulating through, by mutual reciprocation, influencing and controlling all objects, thus creating the best concept of the *self-governed Infinite*.

CHAPTER III.

Creation of New Varieties.

At length we have arrived at the very core of our consideration.

Here, the writer feels most keenly the inadequacy of a bulletin space to present his actual work with grapes, the history of which, for the last twenty years, day by day, in the experimental grounds, would require large books. Even the abbreviated notes preserved cannot be given, and the best we can do is to discuss briefly some principles discovered, and methods found most practical and expeditious. This brevity of presentation, of necessity gives the treatment a dogmatic appearance, while the writer detests dogmatism. Feeling well assured that the actual work from which the conclusions are drawn, fully sustain them, they are presented, with the request that they be given all the more critical examination, so that if there be error it may be detected.

PURE-BREEDING, CROSSING AND HYBRIDIZING.

If a vine grows from a Concord seed, produced by receiving Concord pollen, then the vine is termed a pure seedling of Concord. If this should produce likewise pure seedlings of itself, and these still others, and so on under intelligent selection, as of large berries, or clusters, or both combined, presently a fixed type would be secured to the extent, that all the progeny would have large berries and large clusters, and thus far a pure-breed or thoroughbred, of the "in and in bred" type would be secured. Experience shows that such breeds become feeble in constitution and growth, and cease to be prolific, easily succumbing to attacks of disease. Concord in several of its third and fourth generations of pure-bred varieties, Lady, for example, and all of a lot of pure Moore's Early seedlings grown by me, are feeble and poor bearers.

Crossing and hybridizing come to our rescue here, and enable us, by judicious selection of parents, to derive full benefit of selection, and give the added benefit of often increasing vigor and actually creating new flavors, and increasing quality, just as in chemistry the union of two or more different substances gives us practically a new substance, often little resembling either component part.

In practice, crossing and hybridizing are identically the same in manipulation, but in the selection of parents, different; those in a cross being chosen from the same species, as if Concord and Ives should be united, the progeny would be a cross, and of pure *Labrusca* blood still; but if Concord and Black Hamburg, or Black Prince, as was the case in producing the Black Eagle variety by Mr. S. W. Underhill, the result is a *Labrusca* × *Vitifera* hybrid, and the variety shows characters not like either parent, but usually intermediately between the two, so that a botanist will quickly

decide that the vine is not of pure specific blood, but a combination of the two species, *Labrusca* and *Vinifera*.

Thus, selection and cross- and hybrid-pollination are the conjury of the originator in intelligently creating new and valuable varieties.

How is it done?

SIMPLE SELECTION.

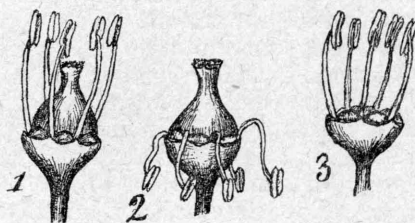
To produce varieties one may know nothing about the flowers, their parts and functions. The best of a lot of seedlings are selected. Seeds of these are planted, and when these bear, seeds of the best again are taken, regardless of whether they are pure or cross pollenized in flowering.

Farmers and gardeners everywhere practice this much in preserving and improving their varieties. How much they are failing to advance as rapidly as they might, did they use judicious hybridation and crossing, they will never realize until they study and practice cross pollenization.

This requires an intimate knowledge of the essential organs of the flowers of the species to be operated upon, the periods of successful conjugation of the pollen grain and ovule, and how to screen away pollen not wanted and apply that selected.

STRUCTURE OF GRAPE FLOWERS.

There are three kinds of flowers in grapes, as shown in the cut, greatly enlarged. Fig. 1 represents the perfect, hermaphrodite, self-impregnating flower. Fig. 2 the practically pistillate flower, with weak, recurved stamens, generally incapable of self-impregnation. Fig. 3 a staminate, or male, flower.



DISCUSSION OF SEX AND IMPREGNATION IN GRAPES.

The vines producing male or purely staminate flowers are non-bearing in the very necessity of their character, having no pistil, the part in bearing vines that develops into the grape.

But the pistil in the great majority of cases will not develop into a

grape unless one or more of the ovules (female germs) within it have been impregnated by a pollen grain.

SEEDLESS VARIETIES.

In rare cases such development takes place without the ovules being impregnated, as in Seedless Sultana and Thompson's Seedless, both of the *Vinifera* species. No American variety bears all seedless berries, yet occasionally berries without seeds occur on a good many varieties. There is no known way to produce seedless varieties at will. Such are accidental, yet we believe there is a cause for such, whether practically controllable by human agency or not. The cause is undiscovered.

NATURE'S METHOD OF IMPREGNATION.

Nature's preferred method, and the only one we can practically apply, is to place pollen grains upon the stigma, when in a receptive condition, which is shortly after the flower has opened, and the stigma has thrown out a minute quantity of protoplasm upon its surface, appearing moist. In this liquid the pollen grain germinates within 30 to 60 minutes, when the temperature is 70° to 90°, and the light, and fair weather present. Naturally, gentle winds and small winged insects, which visit the flowers, carry pollen from flower to flower. The slender, thread-like root of the pollen grain grows down one of the microscopic tubes in the style and pistil until it comes against the ovule cell-wall, which it penetrates and then intermingles its substance—protoplasm—with the protoplasm of the ovule. The pistil holding such impregnated ovule or ovules at once begins to enlarge, and in time becomes a mature grape, and the ovules mature seeds within.

As the male flower has no pistil it is clear that its vine cannot bear, unless the vine changes its action from producing purely staminate flowers, to bearing pistillate flowers, which in two or three instances only, in all my observation, have I known to occur.

MALE VINES SHOULD NOT BE NEGLECTED.

The male vines are certainly of value to the species or they would not have been developed in nature. They come by the law of *division of labor*, in reproducing the species, and thus not burden a vine with a double function, that of furnishing both male and female elements in reproduction. It seems that the genus *Vitis* (grapes) has, in comparatively recent epochs, geologically speaking, developed separate sexes, for by cultivation and stimulation we get them to develop true hermaphrodite flowers—both sexes in one flower—as in most vineyard varieties, just as all other genera of the grape family (*Vitaceæ*) have; thus easily going back to a less developed or specialized state. By dividing the burden of reproduction between separate individuals greater vigor and longer individual life is maintained among the vines, and the pollen from a male vine is more *viril*—potent—than that from a hermaphrodite vine, and still more than that from a vine with weak recurved stamens. The flowering of the male vines appears

to be as great a strain upon them as the bearing of fruit is upon the vines having recurved stamens—practically pistilate flowers—incapable of impregnating themselves with their own pollen. In fact, in a large number of vines of *V. rupestris*, about equally staminate and pistilate, from seed of the same vine, the male vines, although at first as vigorous, or more vigorous than the bearing vines, soonest began to die by exhaustion, although the pistilate vines bore heavily annually. No other cause of such earlier failure could be discovered. It is to be noted that the clusters of flowers on male or staminate vines are far larger—often two to four times as large as the clusters on bearing vines, showing that nature provides the male element far more abundantly than the female, providing for great losses that must occur by wind, rain and insect consumption.

It is a pretty general rule in nature for the females to outlive the males. This preserves the species better than for the males to outlive the females.

To state the whole matter of pollination or impregnation among grapes, but not to be too rigidly exact, as many other causes come in to have their effects, the following are suggested as

GENERAL LAWS OF CONSTITUTIONAL DEVELOPMENT IN GRAPES WITH
REFERENCE TO PARENTAGE, IN POLLINATION.

1. The most vigorous and enduring progeny are produced by vines, as mothers,—other things being the same,—which have recurved stamens and well developed pistils, when pollinated by purely staminate vines, as for example, when Moyer, Lindley, Brighton, etc., are pollinated by staminate seedlings of say Dracut, Perkins, Presley, etc.
2. Next in vigor are the progeny of mothers having reflexed stamens with large pistils, impregnated by hermaphrodite vines; e. g., Brighton or Lindley by Concord, Ives, Delaware, etc.
3. The third in vigor and endurance would be the progeny of hermaphrodite vines, such as Concord, Ives, Perkins, Catawba, and the majority of varieties in cultivation (See the Tables of Varieties in Chapters II. and IV.), impregnated by staminate vines. But in this case the majority of the progeny will be staminate vines.
4. Fourth in vigor would be the progeny of hermaphrodite vines pollinated by other hermaphrodite vines; for example, Concord pollinated by Delaware or Ives, and still weaker if pollinated by itself, or its own progeny, such as Moore's Early, Worden, Martha, etc., making "in and in" breeding. The progeny of such impregnations generally have hermaphrodite or self-pollinating flowers, the kind preferred by vineyardists, who do not understand sex among vines, because they bear planted alone in vineyard. Most hybrids of *Labrusca* with *Vinifera* have been of this class.
5. More feeble still, when any progeny at all are produced, is that of vines with recurved stamens, impregnated by varieties with re-

curved stamens, as in case Moyer could be impregnated by Brighton, or Lindley.

6. In case a variety with recurved stamens should impregnate itself,—if possible,—Mr. Jaeger thought his No. 43 did that—we would expect the feeblest progeny. Such impregnations, however, are very rare, if at all. Pistilate varieties thus pollinated generally cast the pistils in a few days afterward, but the pistils may first enlarge a little. Professor S. A. Beach has designated such varieties “self-excitant,” or “self-irritant,” but sterile.

DESIRABILITY OF HERMAPHRODITE VINES.

As has been stated, the vineyardist not understanding pollination, prefers varieties with hermaphrodite flowers, so that they will bear in solid vineyard of one kind. To produce such, and yet maintain as much vigor as possible, the parentage mentioned under Laws 2 and 3 is preferable, if possible to get varieties with erect stamens thereby.

But under method 4, there is more certainty of getting perfect flower kinds, and if that is used then the parents had better be of distinct species, or if of same species, then entirely distinct varieties in origin.

With these hints the ingenious originator will find it easy to select parents to good advantage, remembering that *vigor*, hardiness, healthiness and productiveness are always essentials every variety must possess to retain position with practical vineyardists.

Having now prepared the way we can venture into the details of

HOW TO CROSS AND HYBRIDIZE THE GRAPE, WHEN THE PARENT VINES BLOOM AT THE SAME TIME.

As the operation is the same in each after we have selected our parents, we can include both under one description of method.

The common, old method has so often been given, of lifting the flower caps, removing the anthers from the mother flowers, applying the pollen with a moist camel's hair pencil, enclosing the cluster in gauze or tissue paper sack, etc., that more than the mere mention of it would be out of place in a bulletin intended to convey fresh facts.

As few hybrids, as well as simple seedlings, prove to be truly valuable, the hybridizer, to make speedy progress, must have some way of more rapidly doing the work than by the common method.

It has been shown that the best mother, other things being the same, is a vine having short, recurved stamens, incapable of self-impregnation, hence in the operation of pollenizing, the anthers need not be removed, and this permits a very

SPEEDY METHOD OF HYBRIDIZATION.

The writer has, by much practice, found the following to be very speedy and certain, when the mother vine has reflexed stamens. (See variety

tables, giving character of flowers.) Nearly all wild bearing vines have such flowers, and that largely accounts for such endless variation among wild grapes.

The selected mother vine should be in the best condition, and as soon as the flower-clusters appear, the small and illy shaped ones should be clipped off and the others noticed daily until they begin to flower. Then clip off every flower that has opened.

Enclose each cluster in a tissue paper sack so insects cannot enter. The next day, if warm, still and sunny, visit the vine, and if found blooming within the sacks, collect a few clusters of the variety or varieties to be used as male parents, seeing that many flowers on such clusters are freshly opening. Remove the paper sacks, one at a time, from the clusters of the mother vine, and brush each over gently with one of the pollenizing clusters. This will knock off all the caps, exposing the stigmas and spilling pollen profusely in the air all through and about the cluster and each exposed stigma will be almost certain to receive pollen from the cluster used as pollenizer. Then, if the clusters used for pollenizing are numerous enough, put one in each sack, above and resting on the cluster being impregnated, enclosing both together until the next day, when, with fresh clusters from the same pollenizing vines, the operation is repeated, the old pollen cluster thrown out and a new one put in each day for three to five days in succession. After each operation other flowers on the enclosed clusters will open and the process of pollenization continues after the operator has gone. The sacks are allowed to remain on several days longer, until all flowers on the enclosed mother clusters have opened. Then the number of little grapes set on the clusters will show what has been the success. It is almost certain that all seeds borne by the sacked clusters will be crossed or hybridized by the variety used as the pollenizing parent.

By this method probably a hundred fold more hybrid seeds may be produced with the same expense of time and far less tediousness in manipulation than by the old method, with equal or greater certainty of making the intended combination, and so a person can have time to produce a far greater number of different combinations and more individuals of each combination during the flowering season, than he can by the old method.

If a variety with hermaphrodite flowers, such as Concord, Herbemont, etc., is chosen for mother vine, then there is no surer or better method than that commonly recommended. However, by planting the two vines to be crossed or hybridized side by side in the vineyard row, the writer has been enabled to greatly expedite the work. The selection of parents was made when the vineyards were planted, and the various crosses or hybrids intended arranged by planting the pairs of vines in vineyard, to be operated upon when coming into bearing. In pruning time, an arm of each parent is trained alongside each other on same wire, and at flowering time a shoot of the *mother* vine has all the open flowers clipped off, and then all caps just about ready to shed, which will lift by inserting the point of a needle at base of petals and lifting gently are removed, the anthers all

hooked off with a minute hook made by bending the point of a pin back upon itself at an acute angle, the hook being one-sixteenth of an inch long. After all flowers that will release their caps are thus treated, a cluster in bloom from the other parent vine is taken, turning it so as to touch the disc of the stigma of the emasculated flower, with the opening face of an anther just discharging pollen, each exposed stigma is thus treated, and then the shoot with the clusters of emasculated flowers, along with a shoot having flowers abundantly opening on it, from the other vine, are completely enclosed in gauze, or cheese cloth, to keep off insects and outer pollen in the wind. If many seeds are wanted, all the bearing shoots of the arm of each parent trained together may be treated and protected together. Each day at 9 or 10 a. m. the operation must be repeated so as to have all flowers of the mother vine, enclosed, emasculated before they have pollinated themselves. At the last operation all *unopened* flowers on the shoots enclosed of the mother vine must be removed, as they would become self-pollinated. Whatever fruit ripens on the enclosed shoots of the mother vine are supposed to be crossed or hybridized.

If the mother vine have reflexed stamens while the other growing by its side has erect stamens, either male purely, or hermaphrodite, all that is necessary is to cover both vines together with a sheet or other sufficient light cloth, so insects cannot readily enter, during blooming time, and daily shake the pollen-bearing vine to cause the pollen to be well distributed all inside the covering. All the seeds developing on the vine with reflexed stamens will quite surely be impregnated by pollen from the other vine.

HYBRIDIZING VARIETIES NOT BLOOMING TOGETHER.

When the intended parent vines do not bloom at same time, then either the earlier variety must be retarded, by cutting off the primary shoots, and thus forcing the secondary later; or the later must be made to bloom earlier by pruning close in the fall soon after leaf-fall, and the earlier belated as directed above, or by not pruning until buds start in spring, or by both, if natural times of flowering of the two intended parents are wide apart, or else by saving pollen of the earlier to apply to the stigma of the later.

Pollen can be preserved for weeks, and even a year, and still be efficient in impregnating, as proven by the writer, by practicing the following method.

COLLECTING AND PRESERVING POLLEN.

From the vine chosen to be male parent, which must be either staminate or hermaphrodite, collect the clusters when fullest of opening flowers, which time will generally be from 10 to 11 a. m. of a still sunny morning. Carry the clusters at once, without shaking or jarring, to a well lighted, dry, warm room, free from currents of air. Having provided a new, clean tin box, say three inches square by one inch deep, with tightly fitting lid; take up each cluster by the stem and strike it gently several times into the

open box. This will cause the pollen to fall out of all open anthers and adhere either to the bottom or sides of the box, the pollen being a little gummy. When all the clusters have been so treated, then with small sharp scissors clip off all the anthers of open flowers, into the box, and set the box, open, on window sill, window closed, so strong diffused light, but not direct sun rays, enters the box. Every twenty or thirty minutes close the lid of box and shake sharply, then open and expose to light again. Repeat the shaking three or four times, when all the pollen will be dislodged from the anthers that will come out; then gently winnow off the shriveled anthers, corollas, and other foreign particles that may have fallen in with them from the clusters. The pollen will appear as a pale yellow flour about the sides, top and bottom of the box. Now let the box stand open in the warm air and diffused light for an hour or two, when it will be dry and in good keeping condition. Close the box and paste over the seam between lid and box a strip of paper to keep out air and minute insects. Wrap and label the box with variety name of grape, and keep in a dry warm room, never below 60° nor above 80°, if possible.

TO USE PRESERVED POLLEN.

When the flowers to be pollenized are opening, properly prepare them, as heretofore directed, and with the tip of a delicate camel's hair (or cat's tail hair) pencil, moistened in pure water, take up some of the pollen from the box and apply to the stigmas, and cover the pollenized clusters in tissue paper sacks.

SAVING THE SEEDS.

Every cluster thus pollenized in our work is at once labeled and recorded, and the fruit carefully guarded, by sacking, and gathered as soon as well colored. The seeds are taken from the berries and dried on paper in room, then carefully wrapped, labeled as to parentage, and put away from mice.

PLANTING THE SEEDS.

A warm, rich, piece of level or nearly level soil, free from weed seeds as possible, protected from sweeping winds, and scratching fowls, is selected and pulverized deeply with spade or plow, made fine and smooth with the rake, in November or December. The seeds are then sown in drills, about three feet apart, and about as thickly along the drills as radish seeds are sown, and one to one and a half inches deep; covered with mellow soil and firmly pressed down, by walking on the row after covering, then smoothing again with rake. Each variety is labeled on a stake driven at its beginning, and a record of the plantation made in the experiment book.

The seeds germinate slowly, and being very hard, nut-like, do better to thus get frozen in the moist soil. The plantlets of the early leafing spe-

cies will appear in spring about with the young oak leaves, some varieties much sooner than others, the slowest species coming two, three or four weeks later than the first. As will be observed in table of Cultural Characters, Chapter I., species which leaf out, or germinate early, will generally also flower and ripen early. There are, however, some exceptions to this rule, the *V. candicans* (Mustang) being one such, which leaves, flowers and ripens early, but the seeds germinate very late.

TENDING AND CULLING THE SEEDLINGS.

In spring the seed bed is carefully watched, and no weed seeds allowed to more than show their germs above ground until they are destroyed, and the soil kept well pulverized without disturbing the grape seeds.

As soon as the grape plantlets are well up and have formed their second leaves, they are carefully gone over, and every weakly and deformed plant pulled out. Within a month after first culling, and when the hot moist weather of May and June is very favorable to development of mildew, the plants are again critically examined, every feeble and mildewed plant pulled out. Plants which resist mildew at this stage will rarely ever be injuriously attacked when older.

When the plants are five or six inches high, they are staked, as the gardener stakes peas which climb, and none allowed to sprawl on the ground. By thus carefully cultivating and training the first year, they generally fruit a year sooner, than if not staked and well cultivated.

THE TESTING VINEYARD.

By using good fresh land, well prepared, and planting the selected one-year seedlings in November, cut back to three or four buds, four feet apart between plants and rows eight feet apart, and trellising at once, or before growth starts in spring, so as to train onto the trellis the first season after setting, and allowing only a single shoot to grow up, the writer has succeeded in getting about three-fourths of the vines to fruit the second season after transplanting, or third season after sowing the seeds. The remainder fruit the next year. As ordinarily grown, it requires one to two years longer than this. This is a big clear gain to one doing much experimental work, and in the course of fifteen or twenty years of extensive experimentation makes a large saving in time and labor.

NOTING AND SELECTING THE VARIETIES.

While the vines are fruiting the first time, they are very carefully examined and noted in every particular of growth, foliage, season of leafing, flowering, ripening, quality, diseases affecting, leaf-fall; the character of flower, whether staminate, pistilate or hermaphrodite; degree of perfection in setting fruit, persistence to pedicel, etc., are recorded.

After all the vines that can bear (some will be staminate) have fruited, and those decidedly not worthy further trial, are grafted to the most

promising (it will be found the great majority are not worth trying further), then comes the long careful test of three to five years, to determine the complete character of the few that turn out worthy of recommendation for general trial over the country. Their record in all points should be high, approaching the "ideal vine" in character. Several vines of each of those of high merit are planted in various different soils and situations and fruited several years before they are disseminated.

AGE AT WHICH YOUNG VARIETIES REACH FULL DEVELOPMENT.

On an average, it requires about eight years from germination, under good treatment, for a variety to fully display its true permanent character, hence should not be disseminated until that old, unless its parentage is exceptionally good, and itself every way satisfactory.

Oftener there is improvement rather than deterioration in a young variety, but sometimes a variety changes from good promise to worthlessness.

PERCENTAGE OF MERITORIOUS VARIETIES.

Out of over 75,000 grape seedlings, chiefly hybrids, having been subject to culling and selecting by the writer, not over 100 have passed meritoriously through the entire period of testing and been considered worthy of recommendation for general trial by planters.

Hence it may be safely estimated that one really good variety to every 1000 carefully selected and hybridized grape seeds will be the originator's reward.

However, this is a ratio obtained by starting with much new material—untried combinations of new species in a large degree. By now using only the best of the varieties tested and new ones produced, a much greater percentage of worthy varieties should be obtained.

Some lots of hybrids, especially in my later work, have yielded as high as one or two per cent of good varieties, and as the work progresses farther and farther toward *thoroughbreds*, the greater and greater will be the percentage of valuable varieties; providing all the laws of adaptation, congeniality, health, etc., and fine judgment in selecting and making combinations are employed.

FIELD OF DEVELOPMENT ILLIMITABLE.

When we view the development, both natural and artificial, arrived at, and then reflect and compare the small cymose cluster and minute, skinny, seedy, pungent fruit of the Virginia Creeper (*Ampelopsis quinquefolia*) with the larger clustered, but scarcely larger berried, skinny, seedy, pungent, Frost Grape (*V. cordifolia*) we can notice a decided advance in quality. When we compare the Frost Grape with the Fox Grape (*V. labrusca*), the Southern Muscadine (*V. rotundifolia*), or the Post-Oak Grape (*V. Linccumii*), we fall in love with nature for teaching us what

wonderful development, the blind, haphazard selection by natural circumstances, aided doubtlessly by birds and other animals eating the best and carrying the seeds into new regions to start new and better families, have produced during several million years, since the true grapes were evolved out of a wild vine, with probably inferior fruit to the *Ampelopsis* or *Sumach*. But when we compare the best wild grapes ever found with a Malaga, Cornichon, Muscat, Black Hamburg, and know that the keen yet unsystematic selection of man for only a few thousand years has done this, and when such men as E. S. Rogers have taught us that by hybridization we can, at a single bound, transplant these fine fruits, almost perfect, into our vigorous, healthy natives, we enjoy an encouragement unknown to the ancient, slow-plodding world. Moreover, our native species excel in many points the Old World grapes. Some have rare delicious flavors unknown in the *Vinifera* varieties, others great size of cluster, others very large berries, others small and few seeds, all great vigor and resistance to disease, adaptability to our variable climate, and our experience clearly shows that all the species can be intermingled at will of the intelligent hybridizer. The lists of American varieties given in this bulletin with their parentage are ample proof that the process of selection and hybridization can produce almost any desired character within a comparatively short time.

We are assured by all these facts that the field of development is illimitable and full of grand prospects and encouragement.

BREEDING FOR SPECIAL CHARACTER AND PURPOSE.

While it appears that there is no direct road in breeding up to a special-purpose ideal, yet the only way to approach such ideal is to have it clearly in mind and continue from generation to generation to select and pair varieties which embody the greatest number of the elements of the ideal.

WHITE, RED AND BLACK VARIETIES PRODUCED AT WILL.

All of many seedlings of Triumph (a white variety, a Concord \times Muscat hybrid), grown by the writer, were white. Of a large number of pure seedlings of Elvira, a greenish white variety, the majority were white, some black and some amber or pale red. Elvira crossed by Triumph produced all white varieties, the Rommel being one of the lot. Pure Rommel seedlings are all white. Rommel crossed with Brilliant produced all yellowish white varieties, of which Wapanuka is one. In this case the white blood is most potent as to color, but the vines of this cross resemble Brilliant more than Rommel, yet Rommel was the mother. The Gold Coin, a hybrid of Norton, black, impregnated by Martha, a pure greenish white seedling of Concord, has produced many pure seedlings for the writer, all yellowish white. Concord is well known to occasionally produce white varieties among its pure seedlings. Of Norton I have grown many pure seedlings, of which about one-third were yellowish white, none as good as the parent, and the others all black, a few equal,

and the Winona a little superior to the parent. Neither Concord nor Norton have ever produced pure, red seedlings. The tendency to white or albino varieties in them when united, as in the Gold Coin, completely dominates the color in all its pure seedlings, and these seedlings are all much more feeble in growth than the black varieties, resulting from hybridizing Concord and Norton. Many other examples following the same course can be produced, but these are considered sufficient illustration of the general law, that to produce white varieties surely, cross or hybridize white varieties. To avoid or overcome the element of weak growth in white varieties, only the most vigorous of this color should be used for parents.

This consideration of producing white varieties has been specially amplified, because the writer was once told by an eminent hybridizer of grapes that he thought that white grapes could be produced as readily out of black varieties as out of white, and cited Empire State as an example, said to be a hybrid of Hartford and Clinton, two black varieties. But the botanical characters in Empire State do not show the least bit of Clinton, but plainly some light wooded *Vinifera*, or *Labrusca* × *Vinifera* hybrid, proving clearly an error in the supposed parentage.

In my work with red (See Lindley, Delaware and Delago families, in Chapter IV.) and black varieties (See America, Concord and other families of black grapes, Chapter IV.), there is abundant proof that the same law holds good as with white varieties, that "like produces like," the commonly accepted rule, as to reproduction in nature, yet in this matter of white and red varieties occasionally coming out of black varieties, as they surely do, from some occult cause not fully understood, we must admit that the law is not absolute, but has occasional exceptions.

BREEDING FOR SPECIAL SEASON.

It has likewise been found generally true, yet with occasional exceptions, that early ripening parents produce early ripening progeny. Where there is much variation from this rule in pure seedlings of a variety as in Concord, in which the majority are early or medium, as Moore's Early, Worden, etc., while rarely like Miner's Victoria, some of its seedlings are very late; or as in Jaeger's No. 70, and America, a combination of *Rupes-tris*, a very early species, and Jaeger's No. 43, a very late variety of *Lincecumii*, a late species, the progeny ripen all along from early to late. It would seem that such varieties, the progeny of which vary much in season and other characteristics, contain different specific blood in their make up. The latest introduced variety produced by the writer is the Marguerite, a hybrid of a very late Post-Oak grape with Herbermont, a very late variety; and a much later kind still is the Winterwine, a hybrid of *V. Simpsoni* with Marguerite, both very late, *Simpsoni* being latest. Little or nothing could be gained by uniting very early with very late kinds.

Generally season of leafing, flowering and ripening belong to species, as the table of cultural characters in Chapter I. shows.

BREEDING FOR SIZE IN CLUSTER AND BERRY.

Like season, size of cluster and berry belongs originally to different species, although it varies considerably in all the species, and in some, as *V. Linccumii*, greatly. The rule holds good generally throughout the genus, that *where the berry is large, the cluster is small, and where the cluster is large, the berry is small*; but several species have both berry and cluster small. This is true of all the earliest ripening species.

It seems a necessary result from this fact that the large clustered, large berried varieties are the result of selection and breeding by man. History of grape culture sustains this conclusion. It is in this particular piece of development where the hybridizer of American grapes may accomplish wonders. Contemplate the union of the largest berried *Labrusca*, *Linccumii*, *Rotundifolia* and *Vinifera* varieties (see Red Giant, Early Purple and Thomas plates) with the numerously berried clusters of *Berlandieri*! The largest clustered foreign grapes may be excelled in American species some day.

BREEDING FOR QUALITY.

It is found generally with grapes, as with most other fruits, that "as size goes up, quality comes down." This will probably ever remain so with wine grapes, for it appears that the perfecting of the juices, developing large percentage of sugar and other desirable wine properties, the berries must be small to admit the better action of light and air to the smaller packages of juice; in other words, giving greater surface to the same amount of juice to be acted upon. But by developing size and texture of pulp with flavors agreeable to the palate, large grapes may be produced of excellent table quality which would have very ordinary or poor wine properties.

So the originator finds his wits taxed to the utmost in endeavoring to get into one variety a large cluster, with large, handsome berry, of very fine quality. It surely has been done in a number of foreign grapes, such as Muscat, Hamburg, Malaga and others, and why not in the future thoroughbred American grape?

In the matter of quality, the common law, that "like produces like" holds more rigidly than in almost any other character, and is brought out by long and careful selection through many generations.

PREPOTENCY, OR SUPERIOR POTENCY, OF ONE PARENT OVER THE OTHER.

Some experienced hybridizers have claimed that it is a general law among grapes and other fruits that the mother transmits more of the vine, or tree characteristics, while the male, or pollen parent, more of the fruit characteristics. After observing and studying my crosses and hybrids with reference to this point, there seems no adequate ground of support to lay it down as a law, farther than that the mother appears to transmit its

degree of hardiness in resisting climatic extremes and diseases better than the male parent. Theoretically this would be reasonable, as the ovule, after impregnation, receives all its support and growth from the mother, until it becomes a mature seed; hence the mother vine should always have greatest capability possible to endure hardships and resist disease and yet include excellence in fruit.

The following list of species and varieties which have been used in cross and hybrid combinations is given for what it is worth, which seems little, as the point has not been put to the test of special experimentation.

The species, or variety in each pair, which is *italicized*, seems to be strongest in impressing its characters upon the progeny in the unions made. Where they unite equally, both are in Roman print. Where the union produces puny, sickly progeny, when both parents are vigorous, they are marked *Incongenial*. The first named is always the mother.

Scientific demonstration is not claimed in this work. It is only tentative, and it is hoped will call out careful work on this subject from others.

Rupestris × *Vulpina*. *Rupestris* × *Longii*.

Rupestris × *Candicans*. *Rupestris* × *Labrusca*.

Rupestris × *Vinifera*; *Rupestris* controls vine, *Vinifera* the fruit.

Rupestris × *Bourquiniana* (Herbemont and Rulander).

Rupestris × *Lincecumii*. *Rupestris* × *Cinerea*; *Cinerea* controls the vine and fruit.

Rupestris × *Berlandieri*. *Rupestris* × *Monticola*.

Rupestris × *Rotundifolia*, *Incongenial*.

Longii × *Lincecumii*. *Longii* × *Candicans*.

Longii × *Labrusca*; *Longii* controls vine, *Labrusca* the fruit.

Vulpina × *Longii*. *Vulpina* × *Candicans*.

Vulpina × *Labrusca*; *Vulpina* controls the vine, *Labrusca* the fruit.

Vulpina × *Bicolor*. *Vulpina* × *Cinerea*.

Vulpina × *Vinifera*; *Vulpina* controls the vine, *Vinifera* the fruit.

Girdiana × *Vinifera*.

Champini × *Labrusca*; *Champini* controls the vine, *Labrusca* the fruit.

Champini × (*Labrusca* × *Vinifera*).

Candicans × *Rupestris*; *Candicans* controls both vine and fruit.

Labrusca × *Vinifera*; *Labrusca* controls vine, *Vinifera* the fruit.

Labrusca × *Vulpina*.

Bourquiniana (Herbemont) × *Labrusca*, (Martha).

Bourquiniana (Herbemont) × *Aestivalis*, (Norton).

Bourquiniana (Herbemont) × *Triumph*; *Herbemont* controls vine, *Triumph* the fruit.

Lincecumii × *Rupestris*, *Lincecumii* × *Labrusca*; *Lincecumii* controls vine, *Labrusca* the fruit.

Lincecumii × *Candicans*.

Lincecumii × *Cordifolia*.

Lincecumii × *Herbemont*; *Lincecumii* controls vine, *Herbemont* the fruit.

(*Lincecumii* × *Herbemont*) × *Vinifera*. In these *Vinifera* appeared to control vine in botanical markings, but *Herbemont* and *Lincecumii* in vigor and fruit. Several such hybrids were quite uniform. *Aestivalis* (*Norton*) × *Labrusca* (*Concord*), the union quite even.

Cinerea × *Cordifolia*. *Berlandieri* × *Monticola*.

Berlandieri × *Champini*. *Berlandieri* × *Fern*.

Monticola × *Rupestris*. *Monticola* × *Fern*.

Rubra × *Herbemont*.

Rotundifolia (*Scuppernong*) × *Post-Oak Grape* hybrid. *Rotundifolia* is very persistent in impressing its character upon its hybrid progeny, both in vine and fruit.

Rotundifolia × *Munsoniana*.

Generally, the more distinct and uniform a species the more prepotent it is over less distinct and less uniform species. In conformity to this, the more complex a hybrid is the less it shows of itself in combination with a pure variety of a pure species.

Also in conformity to this law, the more complex a hybrid is the more variable among themselves are its pure seedlings.

We may expect the male parent to more often control in appearance and quality in fruit, and the female in vine; yet, if we designate it a general law, there will be found many exceptions.

CHAPTER IV.

Some of the Results of Twenty Years Selection and Hybridization.

After dwelling upon the *materials* and *processes* in development, the reader naturally asks for *results*.

It is, in a matter of this kind, difficult in the limited space to present any adequate idea of results, for full descriptions and life size illustrations are necessary to convey knowledge of varieties, and varieties are the results. Besides an originator, of all persons, can descriptively mention his own varieties with the least impartiality.

Again, the originator, in mentioning his own work, however correctly, labors under the disadvantage that he is hardly credited with unbiased statements.

With all these impediments in view will the reader's question, "What have you accomplished?" be candidly, truthfully, briefly answered.

No attempt will be made to mention all, nor any but a small fraction of the number of varieties produced by the author.

It is in quality where the originator is probably more apt to over estimate, therefore special mention of quality in connection with the varieties is generally avoided, but would say that Concord being tolerated by the majority of Americans as a fairly good table grape, and consumed more largely than any other grown in America, it is taken as the "low watermark" by the writer in quality for varieties produced by him to allow dissemination.

The varieties are so selected, arranged and described as to be instructive as a study for the scientific experimenter, and the practical planter as well. Fuller descriptions would be very desirable, but space will not allow it.

A few of the best wild grapes of different species found by the writer, or by other wild grape hunters, and sent him to test and use in his work, are first mentioned, and then, if any worthy of mention, either pure or hybrid seedlings, have been made of that species they are given underneath the wild varieties.

The list of seedlings and hybrids is the cream from over 75,000 pure and hybrid seedlings, germinated and carried through partly or entirely the rigid cullings and testings instituted in our experimental grounds.

A few life-size photo-engravings of varieties are distributed through the list to illustrate the results of certain combinations. When it is understood that for the true "bunch-grapes," that no variety with a cluster smaller, that is, having fewer berries than *Lukfata*, nor smaller berries than *Talaquah*, nor poorer in quality than *Concord*, is considered worthy of introduction for market, and that the varieties mentioned in this list

not marked discarded will come up to or surpass this standard, some conception can be formed of how the collection would look if all were illustrated as are the few represented by engravings. Plate II., Chapter I., shows, among other things, 47 of these varieties on as many plates, which will give a faint idea of results accomplished.

THE MUNSON "SCHOOL" OF GRAPES.

INCLUDING A FEW FOUND BY OTHER PERSONS, TO SHOW PARENTAGE.

Explanation.

The parentage of each variety, when given at all, is given immediately to its right, the mother being named first.

Those preceded by a (o) have been discarded, and are mostly out of existence now, 1900.

Those preceded by one star(*) have passed the long crucial vineyard test favorably, and have been considered worthy of general trial by planters.

Those preceded by two stars (**) have been numerous and highly commended by experiment stations and impartial vine growers.

Those preceded by no mark are yet under the final vineyard test. Many of these are of great promise, but further test, with higher standard required, will reject a good portion of them.

The description of varieties stands directly to right of parentage in same line, and consists in giving the kind of flower, the (†) dagger meaning staminate or male; the (,) large comma signifying pistilate, with short reflexed stamens; the (‘) large inverted comma signifying hermaphrodite flower, capable of self-impregnation. Next after flower stands average date of flowering, first date the beginning, second date the closing, at Denison, Texas. Next comes season of ripening, the size of cluster, then size of berry, and last, color.

RUPESTRIS GROUP. I.

Name of Variety, Species.	Parentage. Female. Male.	Character of Sex. Flower.	Date of Flowering.	Ripens.	SIZE.		Color.
					Cluster.	Berry.	
o Giant, Rupestris, wild from Mo.....		†	mo. day. 4—20.				
o Red Leaf, Rupestris, wild, from Mo.....		,	4—23.	earliest.	very sm.	sm.	black.
o Small Leaf, Rupestris, wild, from Tex.....		,	4—24.	"	"	"	"
o Rupel, Rup. × 25th, July.....		‘	5—1.	early.	sm.	sm.	"
o Sharp Beak, Rup. × Elvira.....		,	4—28.	"	"	"	"

V. rupestris does not seem to be a good mother, but it has given excellent results as a pollenizer of *V. Linccumii* (see Jaeger 43 Family), and in France as pollenizer of *Vinifera* to give "producteurs direct," it is considered superior to all other species.

LONGII GROUP. II.

NAMED WILD VARIETIES AND HYBRIDS.	Sex.	Flow- ering.	Ripe.	Clus- ter.	Ber- ry.	Color.
Australis. <i>V. Longii</i> , found on bank of Red River.....	,	16 ⁴ / ₂₂	v.ea. s to m		v.s.	b.
Adobe. <i>V. Longii</i> , Hutchinson Co., Texas, "Pan Handle".....	,	20 ⁴ / ₂₅	ea.	s.	s.	b.
Davis. <i>V. Longii</i> , Hutchinson Co., Texas, "Pan Handle".....	,	20 ⁴ / ₂₅	ea.	s.	s.	b.
Hutchinson. <i>V. Longii</i> , Hutchinson Co., Texas, "Pan Handle".....	,	20 ⁴ / ₂₅	m.	s.	s.	b.
Large Berry. <i>V. Longii</i> , Motley Co., Texas, "Pan Handle".....	,	21 ⁴ / ₂₈	e.	s.	m.s	b.
Large Leaf. <i>V. Longii</i> , Motley Co., Texas, "Pan Handle".....	,	21 ⁴ / ₂₆	e.	s.	s.	b.
Robusta. <i>V. Longii</i> , Motley Co., Texas, "Pan Handle".....	,	22 ⁴ / ₂₇	e.	s.	s.	b.
Solonis. <i>V. Longii</i> , Arkansas River, Cult. in France.....	,	20 ⁴ / ₂₅	e.	s.	s.	b.
Hutporup. Hybrid. <i>V. Longii</i> , × (<i>Lincecumii</i> × <i>Rupestris</i>).....	,	24 ⁴ / ₃₀	e.	s.	s.	b.
Solrupo. Hybrid. <i>V. Longii</i> , (<i>Lincecumii</i> × <i>Rupestris</i>).....	,	25 ⁴ / ₃₀	e.	s.	s.	b.

These are excellent graft-stocks in sandy and moderately limy soils.

VULPINA (RIPARIA) GROUP. III.

Grote. <i>V. vulpina</i> , from near Mauston, Wis.....	,	18 ⁴ / ₂₀	ea.	s.	s.	b.
Luders. <i>V. vulpina</i> , from near Madison, Wis.....	†	16 ⁴ / ₂₀				
Mauston. <i>V. vulpina</i> , from near Mauston, Wis.....	,	20 ⁴ / ₂₅	ea.	s.	s.	b.
o Minnesota. <i>V. vulpina</i> , from near Carver, Minn.....	,	16 ⁴ / ₂₀	v.e.	s.	vs.	white.

No hybrids of *Vulpina*, as mother, have been made by the writer. These are good graft-stocks in sandy soils in the North.

MONTICOLA GROUP. IV.

Big Cluster. <i>V. monticola</i> , Bell Co., Tex.	,	5-8	v.lt.	m to lg.	s to m	purple.
Monlintawba. <i>V. monticola</i> , × Fern....	,	5-8	v.lt.	l.	s.	"
Montisella. <i>V. monticola</i> , × Laussel....	,	5-8	v.lt.	m.	m.	"
* Pukwana. <i>V. monticola</i> , × <i>Rupestris</i> ..	,	$\frac{1}{3}$ to $\frac{2}{3}$	m.	s.	s.	b.

A most unique species, promising a very distinct class of hybrid varieties, exceedingly sweet, and peculiarly flavored. Pukwana is a most excellent graft-stock in limy soils and hot climate. Big Cluster is the best variety found.

BERLANDIERI GROUP. V.

Millardet. <i>V. Berlandieri</i> , Llano, Co. Tex.	,	6-5	v.lt.	v.lg.	sm.	b.
Berlaussel. " × Laussel.....	,	5-25	v.lt.	lg.	m. s.	purp.

Owing to the large compound clusters and fine quality in berry of the best varieties of this species, it offers an excellent base on which to build for great clusters and fine quality fruit with small seeds, and no better graft-stock can be made for hot, dry climate and limy soils, but to grow easily from cuttings should be hybridized with *Rupestris* or *Champini*.

BOURQUINIANA GROUP. VI.

Herbemont Family.

o Bush, Herbemont, × <i>Lincecumii</i>	•	5-16	v.lt.	m.	m.	b.
o Black Herbemont, Herb × Norton.....	•	5-18	late.	v.lg.	sm.	b.
o Compacta, Herbemont, × Triumph...	•	5-20	v.lt.	lg.	m.	wh.
o Exquisite, Herbemont, Seedling.....	•	5-18	lt.	lg.	s.	wh.
o Miller, " × Martha.....	•	5-12	lt.	lg.	m.	wh.
o Multiple, " × Triumph.....	•	5-18	lt.	lg.	m.	purp.
o Nell, " × Norton.....	•	5-19	v.lt.	lg.	s.	wh.
* Onderdonk " × Irving.....	•	5-15	lt.	lg.	m.s.	wh.
o Planchette " × Triumph.....	•	5-18	lt.	l.	m.	wh.
o Texas, Pure " Seedling.....	•	5-20	v.lt.	l.	m.s.	prpl.

Many other pure and hybrid seedlings of Herbemont were produced, mostly red and white in color; many quite tender in enduring cold, a zero temperature killing them to the ground. Herbemont has not proven a good mother, but as a male parent, especially with *Lincecumii*, has given some excellent results.

The next group (VII.) promises more for American grape culture than any other, and possibly than all others combined, and deserves careful study.

LINCECUMII GROUP. VII.

Best Wild Varieties, Collected from the Woods.—Heads of Families.

	Found.					
o Big Berry, <i>V. Lincecumii</i> , N. Texas.....	1882	,	$\frac{5}{8}$ to $\frac{5}{15}$	m.lt.	lg.	lg. blk.
o Early Purple, <i>V. Lincecumii</i> , N. Texas.....	1888	,	$\frac{5}{12}$ to $\frac{5}{17}$	m.	lg.	lg. purp.
* Jaeger's 43, <i>V. Lincecumii</i> , S. W. Mo.....	1880	,	$\frac{5}{12}$ to $\frac{5}{20}$	v.lt.	v.lg.	m. blk.
o Lucky, <i>V. Lincecumii</i> , near Denison, Tex.....	1885	,	$\frac{5}{12}$ to $\frac{5}{18}$	ea.	lg.	m. blk.
o Neosho, <i>V. Lincecumii</i> , near Neosho, Mo.....	1868	,	$\frac{5}{12}$ to $\frac{5}{18}$	v.lt.	lg.	m.s. "
o Post-Oak Grape No. 1. <i>V. Lincecumii</i> , Denison, Tex.....	1881	,	$\frac{5}{10}$ to $\frac{5}{15}$	lt.	lg.	m.s. "
o Post-Oak Grape No. 2. <i>V. Lincecumii</i> , Denison, Tex.....	1883	,	$\frac{5}{15}$ to $\frac{5}{20}$	v.lt.	m.	m. "
o Post-Oak Grape No. 3. <i>V. Lincecumii</i> , Denison, Tex.....	1883	,	$\frac{5}{12}$ to $\frac{5}{18}$	v.lt.	m.	m. "
o Ten Dollar Prize, <i>V. Lincecumii</i> , Denison, Tex.....	1883	,	$\frac{5}{15}$ to $\frac{5}{16}$	v.lt.	lg.	m. "

Many other wild Post-Oak grapes were collected, but none better than above. Jaeger's Neosho and No. 43 are included, because so intimately connected with and much used as mother vines by the author. All those in the above list preceded by a (o) were lost when the writer moved to a new place in 1887.

BIG BERRY FAMILY. Hybrids.

* Bailey, Big Berry × Triumph. First fruit 1889.....	‘	$\frac{10^5}{8^5 1^3}$	lt.	lg.	lg.	b.
** Beacon, Big Berry × Concord. First fruit 1889.....	‘	$\frac{8^5}{1^3}$	m.	v.lg.	lg.	b.
* Big Extra, Big Berry × Triumph. First fruit 1888.....	‘	$\frac{10^5}{1^6}$	lt.	lg.	m.	b.
* Big Hope, Big Berry × Triumph. First fruit 1889.....	‘	$\frac{12^5}{1^7}$	lt.	v.lg.	m.	red.
* Delicious, Big Berry × Heribemont. First fruit 1889.....	‘	$\frac{14^5}{1^9}$	lt.	lg.	m.	b.
* Dr. Collier, Big Berry × Concord. First fruit 1888.....	‘	$\frac{10^5}{1^5}$	m.	lg.	lg.	red.
* Long John, Big Berry × Triumph. First fruit 1889.....	‘	$\frac{12^5}{1^6}$	lt.	v.lg.	lg.	b.
o Newman, Big Berry × Triumph. First fruit 1889.....	‘	$\frac{18^5}{1^8}$	v.lt.	lg.	v.lg.	b.
* R. W. Munson, Big Berry × Triumph. First fruit 1889.....	‘	$\frac{10^5}{1^5}$	m.	lg.	lg.	b.

BIG HOPE FAMILY.

Hopeon, Big Hope × Carman.....	1899	‘	$\frac{10^5}{1^5}$	lt.	lg.	lg.	wht.
--------------------------------	------	---	--------------------	-----	-----	-----	------

(See the Ben Family, further on.)

EARLY PURPLE FAMILY.

Bokchito, Early Purple × Brilliant... 1899	‘	$\frac{10^5}{1^5}$	m.	lg.	m.	b.
Epurill, “ × “ ... 1897	‘	$\frac{8^5}{1^4}$	lt.	m.	v.lg.	red.
Nonpareil, “ × “ ... 1896	‘	$\frac{6^5}{1^2}$	ea.	m.	lg.	red.
Octavia, “ × “ ... 1896	‘	$\frac{7^5}{1^2}$	m.	lg.	lg.	red.
Quintina, “ × Jaeger..... 1897	‘	$\frac{8^5}{1^3}$	lt.	lg.	m.	b.
o Secunda “ × Brilliant... 1896	‘	$\frac{6^5}{1^1}$	ea.	m.	lg.	red.
Septimia “ × Carman ... 1897	‘	$\frac{7^5}{1^2}$	lt.	lg.	m.	b.

Early Purple is a good mother, and promises varieties of good quality and great productiveness.

JAEGER'S NO. 43 FAMILY.

Jaeger's No. 70, No. 43 × Male <i>Ru- pestris</i>	1888	$\frac{5}{10\ 15}$	m.	m.	m.	b.
Jaeger's No. 72, No. 43 × Male <i>Ru- pestris</i>	1895	$\frac{5}{12\ 17}$	lt.	sm.	lg.	b.
* Kiowa, No. 43 × Herbemont	1895	$\frac{5}{18\ 24}$	v. lt.	lg.	m. s.	b.
Waubeck, No. 43 × Laussel	1896	$\frac{5}{20\ 25}$	v. lt.	lg.	m.	b.

Jaeger's 70 (Munson) and 72 are inserted because used by the writer as heads of some of his most important families.

JAEGER'S NO. 70 (MUNSON) FAMILY.

** America, Munson (J's 70) × Seed- ling	1888	$\frac{5}{10\ 15}$	m.	lg.	m.	b.
o Early Wine, Munson (J's 70) × Seedling	1888	$\frac{5}{7\ 12}$	ea.	m.	m.	b.
o Gulch, Munson (J's 70) × Seed- ling	1888	$\frac{5}{11\ 16}$	lt.	lg.	m.	b.
Lobata, Munson (J's 70) × Profusion ..	1897	$\frac{5}{6\ 12}$	lt.	lg.	m.	b.

JAEGER'S NO. 72 FAMILY.

Estella, No. 72 × Rommel	1899	$\frac{7}{7\ 12}$	lt.	m.	m.	wh.
--------------------------------	------	-------------------	-----	----	----	-----

(See under Ben Family, further on.)

AMERICA FAMILY.

Ambecon, America × Beacon	1897	$\frac{5}{8\ 12}$	lt.	lg.	m.	b.
Amerison, America × Profusion	1899	$\frac{5}{14\ 18}$	lt.	lg.	m.	b.
Amonta, America × Monticola	1899	$\frac{5}{10\ 15}$	lt.	m.	m.	b.
Anuta, America × Beacon	1899	$\frac{5}{10\ 15}$	m.	l.	l.	b.
Arbeka, America × Profusion	1899	$\frac{5}{11\ 16}$	lt.	l.	m.	b.
* Atoka, America × Delaware	1895	$\frac{5}{10\ 15}$	lt.	l.	s.m.	red.
Captain (Superior), America × Beacon ..	1899	$\frac{5}{10\ 15}$	lt.	l.	l.	b.
Cloeta, America × Beacon	1899	$\frac{5}{10\ 15}$	m.	l.	l.	b.
Daykina, America × Beacon	1899	$\frac{5}{7\ 12}$	m.	l.	l.	b.
Eufaula, America × Laura	1895	$\frac{5}{6\ 10}$	lt.	v.l.	m.s.	red.
Gula, America × Beacon	1899	$\frac{5}{11\ 16}$	m.	l.	l.	b.
* Kenena, America × Dr. Collier	1895	$\frac{5}{10\ 15}$	lt.	l.	m.	prpl.
Kruger, America × R. W. Munson	1899	$\frac{5}{6\ 11}$	lt.	v.l.	m.	b.
La Reine (Superior), America × Beacon ..	1899	$\frac{5}{11\ 16}$	m.	l.	l.	b.
Mylitta, America × Beacon	1889	$\frac{5}{12\ 17}$	lt.	l.	l.	b.
Newtonia, America × R. W. Munson	1897	$\frac{5}{10\ 15}$	ea.	l.	m.	b.
Rupert, America × Brilliant	1894	$\frac{5}{8\ 13}$	m.	l.	m.	d. rd.
Shala, America × Beacon	1899	$\frac{5}{8\ 13}$	m.	l.	l.	b.
Sheruah, America × Beacon	1899	$\frac{5}{10\ 15}$	m.	l.	l.	b.
Talaquah, America × Herhemont	1895	$\frac{5}{12\ 16}$	lt.	l.	m.s.	red.
Universal, America × Profusion	1897	$\frac{5}{7\ 12}$	v. lt.	l.	m.	b.
Vinrouge, America × Laura	1897	$\frac{5}{4\ 5}$	ea.	l.	m.	b.
Warmita, America × Beacon	1899	$\frac{5}{11\ 16}$	m.	l.	l.	b.
* Wewoka, America × Beacon	1899	$\frac{5}{9\ 14}$	lt.	v.l.	l.	b.
Xlna, America × Beacon	1896	$\frac{5}{5\ 10}$	m.	l.	l.	b.

America is one of the best of mothers, as well as one of the most healthy and prolific of varieties (with long-arm pruning), and an excellent market and wine, and also one of the very best resistant graft-stocks. Grows very easily from cuttings.

The entire family is uncommonly healthy and vigorous.

LUCKY (Post-Oak Grape) FAMILY.

Aluwe, Lucky × Carman.....	1899	•	13 ⁵ / ₁₈	lt.	l.	m.	b.
Catoosa, Lucky × Carman.....	1899	•	12 ⁵ / ₁₇	lt.	l.	m.	b.
Choteau, Lucky × Carman.....	1899	•	11 ⁵ / ₁₆	lt.	l.	m.	b.
Lukyne, Lucky × Sweety.....	1897	•	13 ⁵ / ₁₈	lt.	l.	m.	b.

And many others, hybrids of Lucky.

NEOSHO FAMILY.

* Mrs. Munson, Neosho × Herbemont	1889	•	16 ⁵ / ₂₀	lt.	l.	m.s.	purp.
* Muench, " × "	1889	•	15 ⁵ / ₂₀	lt.	l.	m.	"
* Neva " × "	1889	•	20 ⁵ / ₂₅	v.lt.	l.	m.s.	"

These and the Kiowa are the hardiest Post-Oak × Herbemont hybrids to endure cold, produced by the writer.

POST-OAK GRAPE NO. 1 FAMILY.

** Carman, P-O 1 × Triumph.....	1885	•	13 ⁵ / ₁₈	lt.	v.lg.	m.	b.
** Fern, " 1 × Catawba.....	1885	•	18 ⁵ / ₂₃	v.lt.	lg.	lg.	dr.rd.
** Jaeger " 1 × Herbemont	1885	•	12 ⁵ / ₁₇	lt.	lg.	m.	b.
Kemp, " 1 × Herbemont.....	1885	•	18 ⁵ / ₂₄	v.lt.	lg.	m.	dr.rd.
o Sweety, " 1 × Herbemont.....	1887	•	15 ⁵ / ₂₀	lt.	lg.	s.	dr.rd.
o Texas Highland, P-O 1 × Agawam	1885	•	10 ⁵ / ₁₅	lt.	m.	m.	b.
o Winedrop P-O 1 × Herbemont....	1887	•	16 ⁵ / ₂₀	lt.	lg.	s.	dr.rd.

Post-Oak No. 1 was the best in quality of this species known to the writer, and so far as used one of the best mothers. It was a misfortune to lose it.

POST-OAK GRAPE NO. 2 FAMILY.

** Laussel, P-O 2, × Gold Coin.....	1888	•	17 ⁵ / ₂₂	v.lt.	m.	lg.	purp.
* Marguerite, P-O 2, × Herbemont...	1890	•	21 ⁵ / ₂₆	latest	m.	m.	"
* Perry, P-O 2, × Herbemont.....	1889	•	18 ⁵ / ₂₃	v.lt.	l.	m.	"
* Vinita, P-O 2, × Herbemont.....	1888	•	18 ⁵ / ₂₄	v.lt.	l.	m.s.	"

POSTOAK GRAPE NO. 3 FAMILY.

o	Beach, P-O No. 3, × Triumph.....	1889	‘	$\frac{12^5}{17}$	ea.	lg.	m.	b.
o	Belyin, “ × Elvira.....	1889	‘	$\frac{10^5}{15}$	m.	lg.	m.	b.
o	Curtis, “ × Triumph.....	1889	‘	$\frac{14^5}{19}$	m.	lg.	m.	b.
	W. B. Munson, P-O No. 3, × Triumph..	1889	‘	$\frac{16^5}{21}$	lt.	lg.	m.	b.

Nearly all the progeny of this variety are subject to mildew in foliage, otherwise an excellent mother. No. 3 itself mildewed badly in moist seasons.

TEN DOLLAR PRIZE POST-OAK GRAPE FAMILY.

In 1883 the writer offered \$10 for the best wild Post-Oak grape, to be shown ripe, at the annual exhibition of the North Texas Horticultural Society, in Denison, Texas, on condition that the vine from which the premium grapes came should become his property. A remarkable display was brought out,—some twenty varieties from various parts of Grayson county. The one shown by Mr. Hopkins, a gardener and fruit grower, now deceased, won the prize by decision of the committee of five good grape judges, according to a scale of ten points covering each quality of value in a vine. Many hybrids of it were produced. A few of the better of these are given, following:

	Armlong, \$10 Prize × Black Eagle....	1889	,	$\frac{16^5}{21}$	v.lt.	v.lg.	lg.	b.
o	Badart, “ × Triumph.....	1889	,	$\frac{10^5}{15}$	lt.	lg.	lg.	b.
o	Ben, “ × Norton.....	1889	,	$\frac{16^5}{21}$	lt.	lg.	m.	b.
o	Bumper, “ × Norton.....	1889	,	$\frac{16^5}{21}$	lt.	v.lg.	m.	b.
*	Hopkins, “ × Norton.....	1889	,	$\frac{18^5}{23}$	v.lt.	lg.	m.	b.
o	Hopherb, “ × Herbemont.....	1889	,	$\frac{18^5}{23}$	v.lt.	lg.	m.s.	b.
o	Hopmont, “ × Herbemont.....	1889	,	$\frac{18^5}{23}$	v.lt.	lg.	m.	b.
	Profusion, “ × Norton.....	1889	,	$\frac{18^5}{23}$	v.lt.	lg.	m.	b.

ARMLONG FAMILY.

	Armbilong, Armlong × Brilliant.....	1899	,	$\frac{14^5}{19}$	lt.	vlg.	m.	red.
*	Husmann, Armlong × Perry.....	1896	,	$\frac{11^5}{23}$	v.lt.	vlg.	m.	purp.
	Olitatoo, Armlong × Excelsior.....	1896	,	$\frac{10^5}{15}$	lt.	vlg.	m.	wh.

Olitatoo is a most beautiful variety in vine and fruit, and of finest quality, but much subject to mildew and black rot. It would be superb in Southwest Texas.

BEN FAMILY.

Albania, Ben × Green Mountain.....	1899	‘	$\frac{15}{13} \frac{5}{17}$	lt.	lg.	m.	wh.
Ben Hur, “ × Laura.....	1899	‘	$\frac{10}{12} \frac{5}{15}$	ea.	lg.	m.	b.
Blondin, “ × Green Mountain.....	1899	‘	$\frac{12}{8} \frac{5}{17}$	v. lt.	lg.	m.	wh.

Albania, Blondin, Estella, Hopeon and Olitadoo are all the good white varieties yet sprung from the Post-Oak grape species. They promise much for fine late to very late white market and table grapes.

BICOLOR GROUP. VIII.

An excellent accidental wild hybrid of *V. bicolor* (the northernmost type of *V. aestivalis*) with *V. vulpina* (or *riparia*) was found in central Wisconsin by Dr. Hunger, and obtained and sent me by Judge C. U. Grote, of Mauston, Wis., some ten years ago. This is a combination peculiarly adapted to the extreme North, where temperatures of 40° to 50° below zero must be endured almost every winter.

Upon this northern base the writer has made one generation of hybrids, specially intended for the far North, by using upon it Pollen of Bell, a very sweet, fine early white grape, produced from Elvira impregnated by Delaware, all American, capable of enduring severe cold.

Out of several dozen fairly good improvements of the wild variety, a few of the best have been selected for further development and to place with experimenters in the North. The original vine is named Bicrip, a combination of the abbreviations of Bicolor and Riparia, and giving the start of what may be termed the *Bicrip Family*.

These Bicrip hybrids have fruited only once, but some are so fine in vine and fruit that surely a wise experimenter can get a great northern race out of them in a few generations.

AESTIVALIS GROUP. IX.

The only variety of this species yet found considered worthy of cultivation and hybridizing is the Norton. By the closest comparison and study of vines from most reliable sources under the names Norton and Cynthiana, the writer is unable to discover the slightest difference in any respect. They are considered synonymous of one variety. The Norton has become the head of a small family.

NORTON VIRGINIA FAMILY.

o Cyncon, Norton (Cynthiana) × Concord	1885	‘	$\frac{16}{8} \frac{5}{21}$	v. lt.	l.	m.	b.
* * Gold Coin, Norton (Cynthiana) × Martha.....	1885	‘	$\frac{12}{8} \frac{5}{17}$	lt.	l.	l.	yel.
Winona, a pure seedling of Norton.....	1889	‘	$\frac{12}{8} \frac{5}{18}$	lt.	l.	m. s.	b.

While Cyncon was discarded on account of straggling cluster, I have seen a Norton × Concord hybrid from near Bowling Green, Ky., named Kentucky, that has a very large, handsome, compact cluster. This and the Gold Coin prove the Norton a good mother in hybrid combinations. Winona better than Norton.

GOLD COIN FAMILY.

Icterida, Gold Coin × Bell.....	1897	'	$\frac{5}{6} \frac{1}{2}$	lt.	l.	l.	yel.
Watova, Gold Coin × Rommel.....	1899	'	$\frac{5}{7} \frac{1}{8}$	lt.	l.	l.	yel.

Many other seedlings and hybrids of Gold Coin; mostly puny, and not so good in quality as parent.

WINONA FAMILY.

Wine King, Winona × America.....	1898	'	$\frac{5}{12} \frac{5}{16}$	lt.	l.	m.	b.
----------------------------------	------	---	-----------------------------	-----	----	----	----

SIMPSONI GROUP. X.

Simpsoni is the South Florida representative of the great and variable *Aestivalian* series of species, and while incapable of enduring severe cold, endures great heat and drouth, and resists fungus diseases well, especially black rot, and promises well as a base for Gulf States varieties for extremely late ripening. Out of many hybrids with Fern, Laussel and Marguerite only one is mentioned. It has endured 15° below zero well, and bore following season a heavy crop of good grapes, more agreeable to eat than Norton, ripening in October. Alachua and Manatee are the only named vines.

MANATEE FAMILY.

Winter Wine, <i>Simpsoni</i> × Marguerite	1898	,	ext. lt.	lg.	m. s.	b.
---	------	---	----------	-----	-------	----

CANDICANS GROUP. XI.

Wild Vines Under Study.

o Williamson, from Williamson Co., Tex.....	,	$\frac{4}{2} \frac{5}{7} \frac{5}{2}$	ea.	s.	v.l.	b.
o Blanco, from Blanco Co., Tex.....	,	$\frac{4}{2} \frac{4}{8}$ to $\frac{4}{3} \frac{5}{8}$	ea.	s.	l.	b.
o Grayson, from Grayson Co., Tex.....	,	$\frac{4}{2} \frac{4}{5}$ to $\frac{4}{1}$	ea.	s.	l.	b.

Have not used this species any as a mother. Its extremely rampant habit, its very pungent or acrid skin of fruit, and its great difficulty in growing from cuttings, render it not promising either as a parent of "direct producers" or of graft-stocks; yet it gives some indication of value, as seen in the Elvicand, an Elvira × Mustang hybrid, which see under Labrusca Group, Elvira Family.

DOANIANA GROUP. XII.

Named Wild Varieties.

Greer,	<i>V. Doaniana</i> ,	Greer Co., Okla.....	†	$\frac{4}{20}$ $\frac{4}{25}$	.....	.....	.....	.....
Judge,	"	Greer Co., Okla.....	†	$\frac{4}{22}$ $\frac{4}{27}$	.....	.....	.....	.....
Motley,	"	Motley Co., Tex.....	,	$\frac{4}{25}$ $\frac{4}{30}$	ea.	s.	med.	b.
Ponroy,	"	Wilbarger Co., Tex....	,	$\frac{4}{20}$ $\frac{4}{25}$	ea.	m.	med.	b.
Salt Creek,	"	Greer Co., Okla.....	,	$\frac{4}{22}$ $\frac{4}{27}$	ea.	s.	s.m.	b.
Silvain,	"	Greer Co., Okla.....	†	$\frac{4}{20}$ $\frac{4}{25}$	.....	.....	.....	.....

These all are excellent graft-stocks in any soil. No hybrids of this species yet made, but it seems valuable for that. Excellent wine has been made from the fruit gathered from wild vines.

CHAMPINI GROUP. XIII.

Wild Varieties Named.

Barnes, <i>V. Champini</i> ,	Bell Co., Tex.....	,	4-30	med.	sm.	med.	b.
De Grasset, <i>V. Champini</i> ,	Llano Co., Tex.....	,	4-29	ea.	"	"	b.
Dog Ridge, <i>V. Champini</i> ,	Bell Co., Tex....	,	4-25	med.	"	"	b.
Joly, <i>V. Champini</i> ,	Lampasas Co., Tex....	,	4-28	ea.	"	"	b.
Ramsey, <i>V. Champini</i> ,	San Saba Co., Tex.....	,	4-26	"	"	"	b.
Vermorel, <i>V. Champini</i> ,	Williamson Co., Tex.....	,	4-25	"	"	"	b.
Viala, <i>V. Champini</i> ,	Coryell Co., Tex.....	,	4-27	"	"	"	b.

The *Champini* is a noble graft-stock for dry, very limy and "adobe" soils, while it does equally well in sandy soils. All varieties of it named above root readily from cuttings, and endure the climate of Massachusetts as well as Texas. The species promises much in hybrid combinations.

BARNES FAMILY, Especially Good for Limy Soils.

* Champanel, Barnes × Worden.....	.....	‘	$\frac{4}{30}$ to $\frac{4}{25}$	med.	lg.	lg.	b.
* Lukfata, Barnes × Moore Early.....	.....	,	$\frac{4}{5}$ to $\frac{4}{25}$	ea.	m.	lg.	b.

DE GRASSET FAMILY.

o	Belton, De Grasset × Brilliant.....	‘	4—25	me.	m.	m.	b.
o	Champovo, De Grasset × Brilliant....	;	4—28	m.	m.	lg.	b.
*	Oktaha, De Grasset × Delaware.....	‘	$\frac{4}{3}$ to $\frac{5}{4}$	me.	m.	m.	b.
o	Salado, De Grasset × Brilliant.....	;	5—1	m.	lg.	m.	b.
o	Valverde, De Grasset × Brilliant.....	;	5—1	m.	lg.	lg.	b.

LABRUSCA GROUP. XIV.

Wild Varieties Collected.

o	Buncombe, <i>V. labrusca</i> , from N. Cor.....	,	$\frac{5}{8}$	m.	sm.	lg.	b.
o	Colp, “ “ Md.....	,	$\frac{5}{6}$	m.	sm.	v.lg.	wh.
*	Red Giant, “ “ Pa. 1897.....	,	$\frac{4}{5}$	m.	sm.	largest.	rd.
o	Spinosa, “ “ N. C.....	,	$\frac{4}{30}$ to $\frac{5}{4}$	m.	v.sm.	lg.	bk.

Of these only the Red Giant is worthy of special notice, on account of its great size, healthy vine and abundant bearing; although not yet used as a mother it would appear to be a foundation for a family of very large-berried varieties, especially for the Northeastern States. But far better than any of these for northern regions are a number of pure Labrusca varieties in cultivation, namely: Concord, Dracut, Eaton, Ives, Moore Early, McPike, Perkins, Worden.

CONCORD FAMILY.

o	Atavite, pure Concord Seedling.....	1885	‘	$\frac{5}{1-5}$	v.ea.	m.	m.	b.
o	Conelva, Concord × Elvira.....	1885	‘	$\frac{5}{5-10}$	m.	m.	m.	b.

And a number of others; none of value. Including the seedlings and hybrids of Concord produced by others, this is by far the largest family of American grapes.

MOORE'S EARLY FAMILY.

o	Denison, pure Moore Ea. Seedling	1885	‘	$\frac{5}{3-5}$	v.ea.	m.	lg.	b.
o	Gov. Ireland, “ “ “ “	1885	‘	$\frac{5}{5-8}$	“	m.	lg.	b.
o	Grayson “ “ “ “	1885	‘	$\frac{5}{5-10}$	“	m.	lg.	b.

These were better in quality than the parent, but less vigorous and less prolific. Too much “in and in” bred.

A number of others were still less meritorious.

LABRUSCA HYBRIDS FURTHER HYBRIDIZED BY T. V. MUNSON.

DELAWARE FAMILY.

(Delaware is supposed to be a *Labrusca* × *Bourquiniana* hybrid.)

*	Delago, Delaware × Goethe	1885	;	$\frac{5}{8-13}$	lt.	m.	lg.	red.
*	Olita, Delaware × Irving	1885	;	$\frac{5}{5-10}$	m.e.	m.	m.	wht.

Many other Delaware crosses were made, but they were generally very feeble. Delago has been used as a mother in the production of a large number of hybrid crosses with splendid results, especially in giving very beautiful red varieties, but also gave some very fine black and white varieties. The best of these are named below.

Every one of them is extra good in quality, some of the very finest quality. Remembering the parentage of Delago (Delaware × Goethe), and that Brilliant and other excellent varieties were used as male parents, we should expect fine qualities, and we have them.

DELAGO FAMILY.

Amethyst, Delago × Brilliant. First fruit	1899	“	$\frac{5}{5} \frac{5}{10}$	med.	m.	lg.	red.
Blackwood, Delago × Gov. Ireland.....	1897	“	$\frac{4}{4} \frac{5}{9}$	ea.	lg.	lg.	b.
Delmerlie, “ × Gov. Ireland	1898	“	$\frac{8}{8} \frac{5}{12}$	m.	lg.	lg.	b.
Hidalgo, “ × Gov. Ross	1899	“	$\frac{8}{8} \frac{5}{13}$	m.	lg.	lg.	yel.
Kiamichi, “ × Brilliant	1899	“	$\frac{8}{8} \frac{5}{10}$	m.	m.	lg.	purp.
Kosoma, “ × Beacon	1899	“	$\frac{10}{10} \frac{5}{15}$	m.	lg.	lg.	purp.
Meanko, “ × Brilliant.....	1899	“	$\frac{8}{8} \frac{5}{13}$	m.	m.	lg.	red.
Melasko, “ × Gov Ireland.....	1899	“	$\frac{5}{5} \frac{5}{5}$	m.	lg.	lg.	b.
Modena, “ × Gov. Ireland	1899	“	$\frac{8}{8} \frac{5}{13}$	m.	lg.	lg.	b.
Ninekah, “ × Brilliant	1899	“	$\frac{8}{8} \frac{5}{13}$	m.	m.	lg.	rd.
Onyx, “ × Golden Gem.....	1899	“	$\frac{7}{7} \frac{5}{12}$	ea.	m.	m.	dk. rd.
Pontotoc, “ × Brilliant	1899	“	$\frac{8}{8} \frac{5}{11}$	ea.	lg.	lg.	rd.
Tamala, “ × Gov. Ross	1899	“	$\frac{8}{8} \frac{5}{13}$	m.	m.	lg.	yel.
Tishomingo, “ × Gov. Ireland	1899	“	$\frac{8}{8} \frac{5}{11}$	m.	m.	lg.	b.
Tonkawa, “ × Brilliant	1899	“	$\frac{8}{8} \frac{5}{11}$	m.	lg.	lg.	rd.
Tuskahoma, “ × Brilliant.....	1899	“	$\frac{8}{8} \frac{5}{13}$	ea.	lg.	lg.	rd.
Washita, “ × Gov. Ireland	1899	“	$\frac{8}{8} \frac{5}{10}$	ea.	m.	lg.	b.
Waneta, “ × Brilliant.....	1899	“	$\frac{9}{9} \frac{5}{14}$	lt.	m.	lg.	rd.
* Yomago, “ × Brilliant.....	1897	“	$\frac{8}{8} \frac{5}{5}$	ea.	m.	m.	rd.

ELVIRA FAMILY.

o Beagle, Elvira × Ives Seedling..	1885	“	$\frac{5}{8} \frac{5}{8}$	ea.	m.	m.	b.
* Bell, “ × Delaware.....	1885	“	$\frac{3}{3} \frac{5}{8}$	ea.	m.	m.	w.
o Early Market, “ × Bacchus.....	1885	“	$\frac{4}{4} \frac{5}{9}$	ea.	m.	m.	b.
o Elvin, “ × Irving.....	1885	“	$\frac{5}{5} \frac{5}{10}$	m.	m.	lg.	w.
* Elvicand, “ × Mustang Grape	1886	“	$\frac{5}{5} \frac{5}{10}$	m.	sm.	m.	rd.
o Old Gold, “ × Brighton.....	1885	“	$\frac{1}{1} \frac{5}{5}$	m.	lg.	lg.	yel.
o One Seed, “ × Humboldt.....	1886	“	$\frac{8}{8} \frac{5}{13}$	lt.	sm.	lg.	w.
* Presly, “ × Champion.....	1886	“	$\frac{1}{1} \frac{5}{5}$	v.ea.	med	m.	rd.
** Rommel, “ × Triumph.....	1885	“	$\frac{5}{5} \frac{5}{10}$	m.	med	lg.	wh.

Numerous other Elvira crosses produced, but unworthy of mention here. (See Rommel and One Seed Families farther on.)

EUMELAN FAMILY.

o	Eumedel, Eumelan	× Delaware.....	1887	'	$\frac{5}{5 \frac{1}{10}}$	ea.	lg.	m.	rd.
o	Eumorly,	“ × Moore Early.	1887	'	$\frac{5}{4 \frac{5}{8}}$	ea.	lg.	lg.	b.

It has been supposed, and so published by some writers on the grape, that Eumelan is a variety of *Aestivalis*, and several experimenters on this supposition used it largely as a base for hybridization, D. S. Marvin more largely than any other. But a critical study of it by the writer reveals only *Labrusca* and *Vinifera*, in combination. Marvin's Laura, which appears to be a cross of Delaware on Eumelan, is probably the best he produced. (See below.)

LAURA FAMILY.

*	Marvina, Laura	× Brilliant.....	1897	'	$\frac{5}{4 \frac{5}{8}}$	ea.	lg.	m.	w.
---	----------------	------------------	------	---	---------------------------	-----	-----	----	----

LINDLEY FAMILY.

**	Brilliant, Lindley	× Delaware.....	1883	'	$\frac{5}{4 \frac{1}{2}}$	ea.	lg.	lg.	rd.
o	Gold Dust,	“ × Martha.....	1883	,	$\frac{5}{6 \frac{1}{11}}$	ea.	m.	m.	yel.
o	Golden Grain,	“ × Delaware.....	1883	,	$\frac{5}{6 \frac{1}{11}}$	ea.	m.	m.	yel.
o	Lindel,	“ × Delaware.....	1883	,	$\frac{5}{6 \frac{1}{11}}$	ea.	m.	lg.	red.
o	Lindherbe,	“ × Herbemont...	1883	'	$\frac{5}{1 \frac{5}{8} \frac{2}{10}}$	lt.	m.	m.s.	red.
o	Lindmar,	“ × Martha.....	1883	'	$\frac{5}{6 \frac{1}{11}}$	ea.	m.	m.	yel.
o	Opal,	“ × Martha.....	1883	'	$\frac{5}{9 \frac{1}{14}}$	lt.	lg.	lg.	yel.

ONESEED FAMILY.

	Oneovem, One Seed	× Rommel...	1897	,	$\frac{5}{1 \frac{5}{8}}$	lt.	m.	lg.	w.
	Silkyfine,	“ “ × “ ...	1898	,	$\frac{5}{1 \frac{1}{8}}$	lt.	m.	lg.	w.
	Tryone,	“ “ × “ ...	1897	'	$\frac{5}{1 \frac{5}{8} \frac{1}{8}}$	vlt.	lg.	lg.	w.
*	Wetumka,	“ “ × “ ...	1896	'	$\frac{5}{5 \frac{1}{10}}$	lt.	lg.	lg.	yel.

See One-Seed under Elvira Family.

ROMMEL FAMILY.

	Linley, Rommel	× Delaware.....	1897	'	$\frac{5}{5 \frac{1}{10}}$	ea.	m.	m.	yel.
	Rombrill, Rommel	× Brilliant....	1897	'	$\frac{5}{6 \frac{5}{11}}$	m.	lg.	lg.	“
*	Wapanuka, Rommel	× Brilliant..	1896	'	$\frac{5}{4 \frac{5}{10}}$	ea.	lg.	lg.	“

ROTUNDIFOLIA GROUP. XV.

This exceedingly healthy, large-berry species is well represented in the Thomas (see Plate XIII.). Several other good varieties have been found wild and taken into cultivation. Scuppernong is the oldest cultivated variety, being found in 1585, by colonists under Sir Walter Raleigh, on an island in the Scuppernong river, N. C., and is the only white or yellow variety yet found wild, and in quality is the best ever found wild.

It long has been the ambition of the writer to make hybrids of the Scuppernong with the finer, large cluster, tightly clinging true grapes, and thus secure the valuable properties of both in one combination. To combine the perfectly disease and heat and drouth resisting character of the Scuppernong, and its rich fruity flavor with the great cluster, persistent berry and other distinct flavors, and possibly the capability of growing readily from cuttings of the true grapes, would truly make an epoch in grape development worth a place in history.

Success in this direction has partly crowned the efforts of the writer, as the following varieties testify.

From among several hundred seedlings and hybrids of Scuppernong the following have been selected as the best, and are quite an improvement upon the parent.

SCUPPERNONG FAMILY.

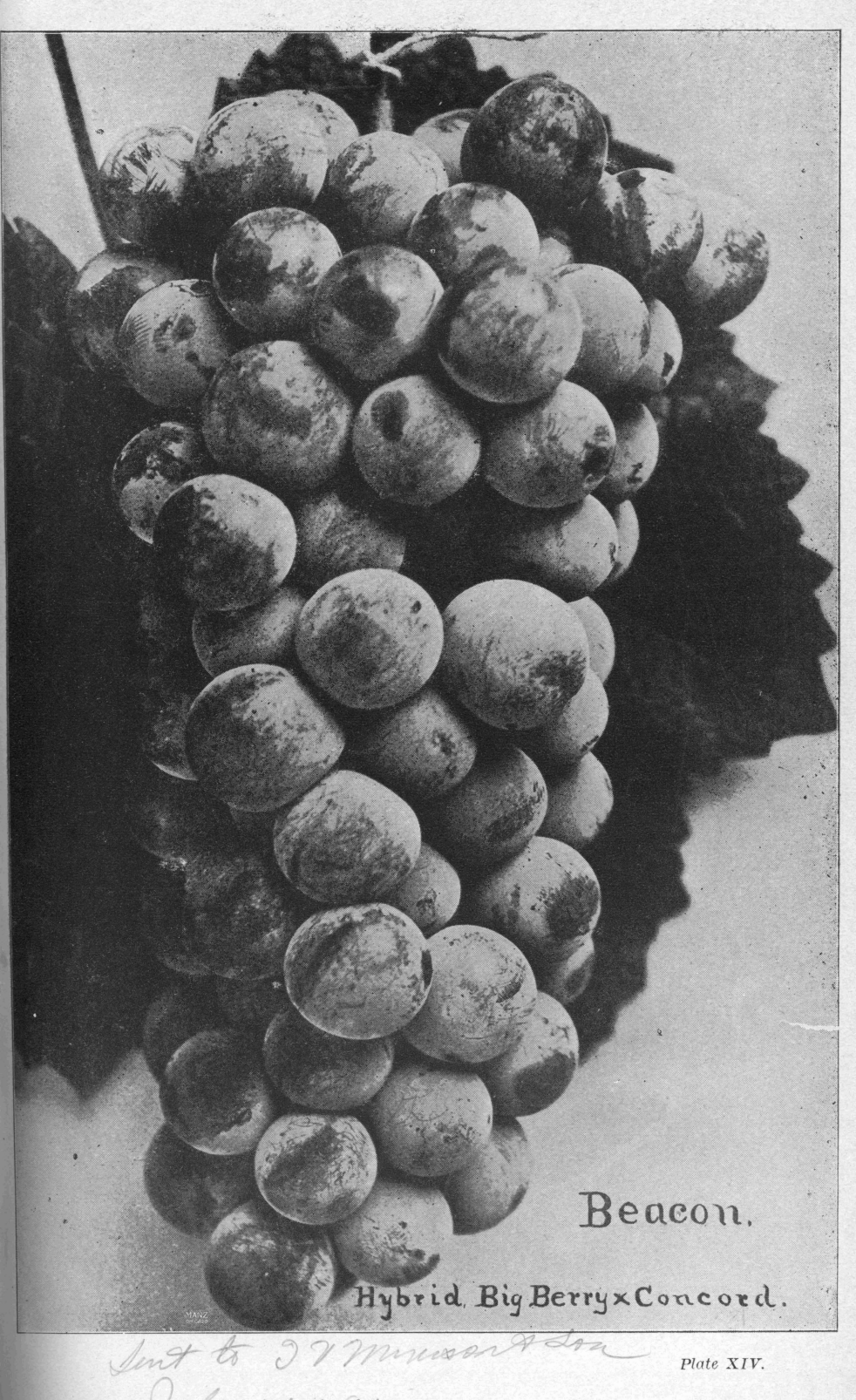
o	De Soto, Scup × <i>Munsoniana</i>	1896	,	$\frac{5}{10}$	v.lt.	s.	m.	b.
*	La Salle, " × <i>Linc.</i> × ? hyb.....	1896	,	$\frac{1}{5}$	lt.	s.	lg.	b.
*	San Jacinto, Scup × <i>Linc.</i> hybrid.....	1896	,	$\frac{5}{10}$	v.lt.	s.	lg.	b.

The clusters, in comparison with Concord, are small, but in comparison with Scuppernong are very large—two or three times as large, and the quality better. San Jacinto and La Salle were little injured by 15° below zero, and bore the following summer, 1899, while Scuppernong was killed to the ground and De Soto entirely killed. The La Salle and San Jacinto hold their berries on cluster better than Scuppernong, yet drop too easily to allow marketing in the cluster. They are more prolific than Scuppernong, and altogether a great improvement upon it. (See exact life-size engraving from photo of San Jacinto in back of bulletin.)

SAN JACINTO FAMILY.

	Dixie, San Jacinto × Brilliant.....	1899	,	$\frac{1}{5}$	lt.	s.	lg.	amber.
--	-------------------------------------	------	---	---------------	-----	----	-----	--------

The berries of this variety are very persistent to the cluster. This is one out of about 100 San Jacinto hybrids which has fruited. Its vine, although so young, only two years old, passed the 15° below zero without damage. The quality is excellent. Several others of this lot came through unhurt, and they all promise to fruit in 1900.



Beacon.

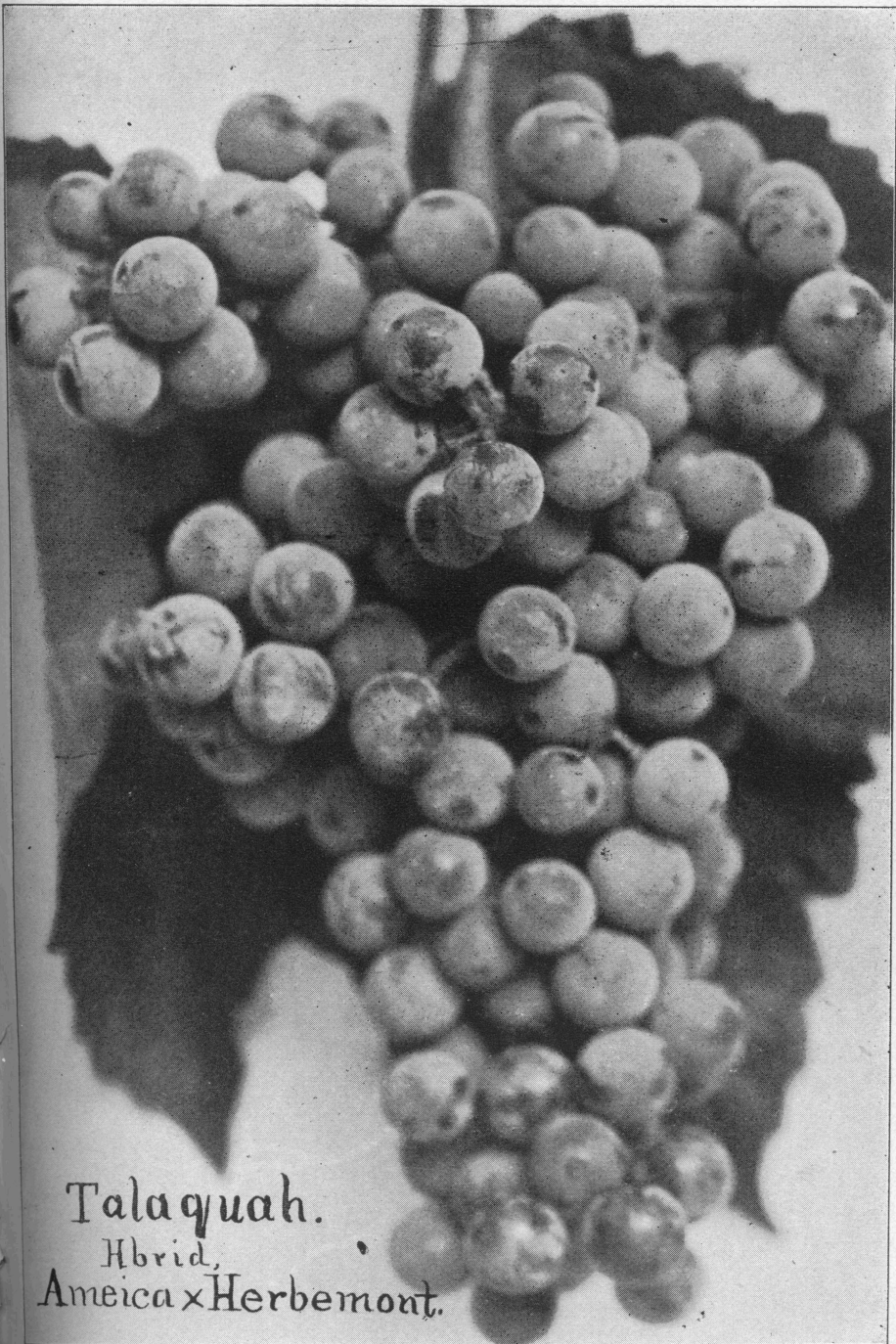
Hybrid, Big Berry x Concord.

Sent to J. V. Munnich & Son

Plate XIV.



Plate XV. America.



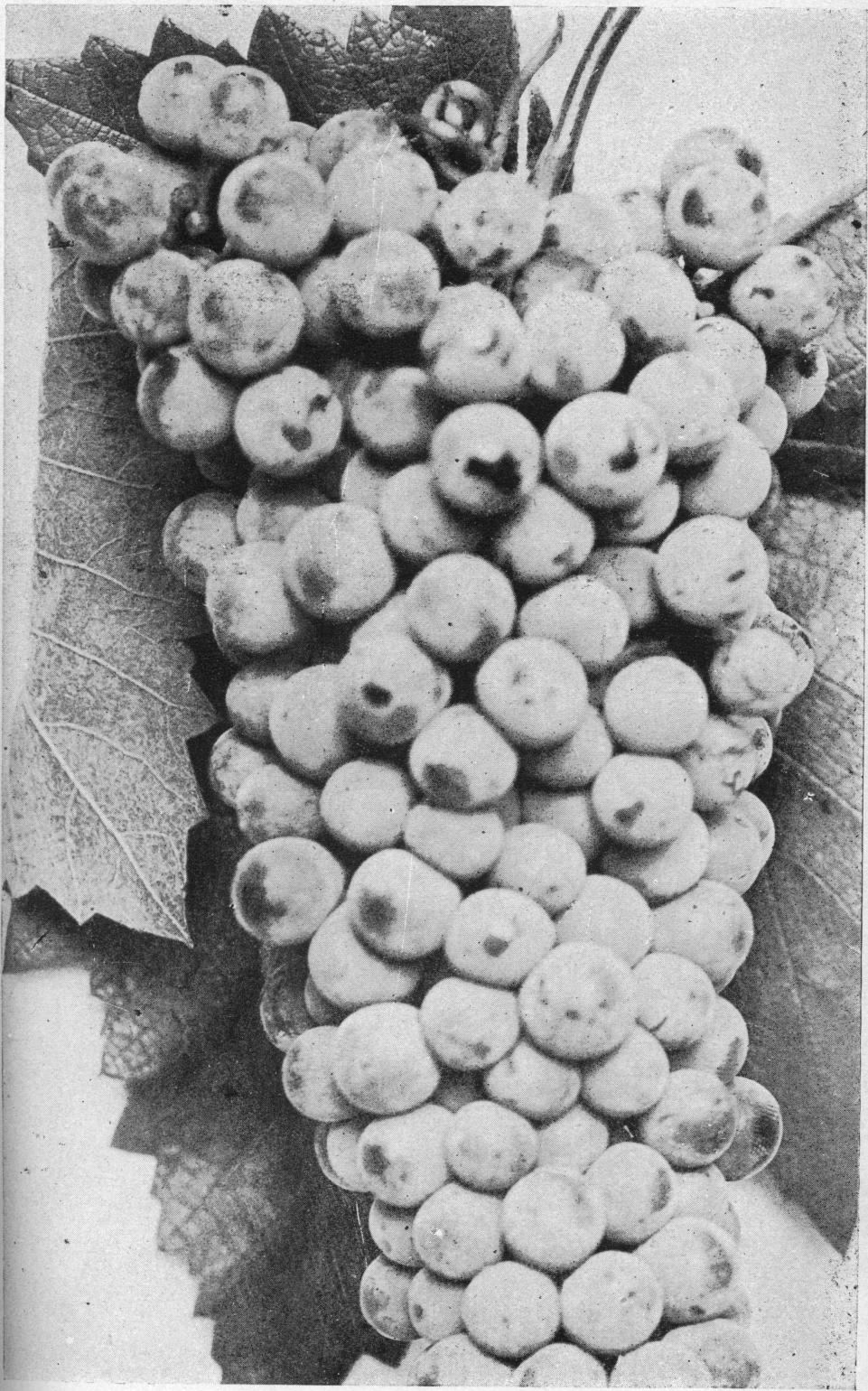
Talaquah.
Hbrid,
America x Herbemont.



Armlong.

Hybrid

\$10. Prize x Black Eagle.



Scrub to 25 Plate XVIII. Husmann.

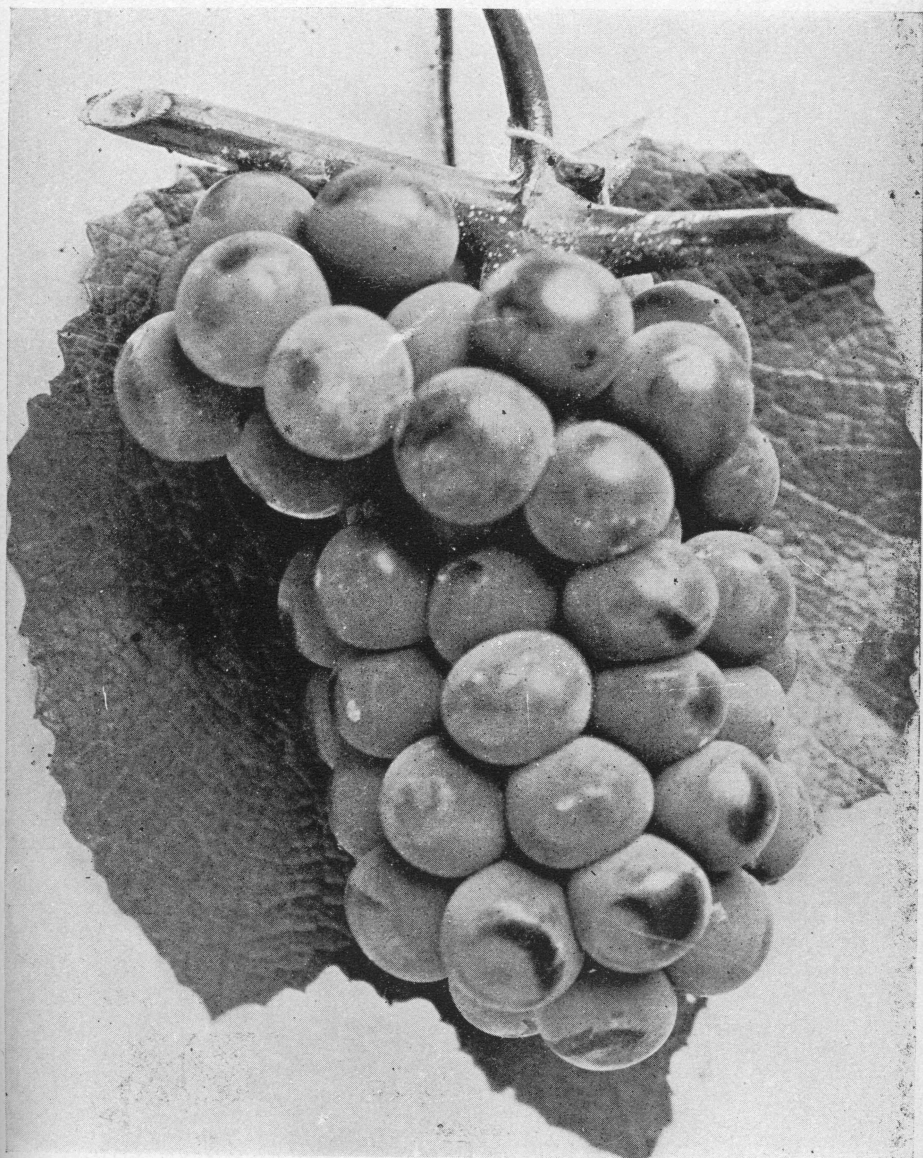


Plate XIX. Lukfata.

Sent to J V Munson & Son
July 14 1908

These hybrids appear just as healthy as the pure Scuppernong, and it would seem that what we have so much desired may soon be accomplished. This is, so far as known to the writer, the only other variety of the species besides the Scuppernong of a yellow or amber color.

MUNSON VARIETIES IN THE SKELETON LIST.

Many will naturally ask, "What have you done toward filling your Ideal Skeleton List for the South?"

In order to answer this question to our best ability at this time, the varieties which will best fill the colors and seasons, all things considered, are arranged in the skeleton outline.

MUNSON VARIETIES TRIED IN THE SKELETON LIST.

<i>Translucent Red.</i> as good, or better than Brighton.	<i>Bright Black.</i> as good as Concord, or better.	<i>White, or Yellowish White,</i> as good, or better than Niagara.
1 Headlight and Presly.	Manito.	Marvina.
2 Pontotoc. Onyx. Tuskahoma.	Washita, Blackwood.	Bell.
3 Brilliant. Yomaga.	Lukfata.	Wapanuka.
4 Amethyst. Tonkawa.	Delmerlie, Modena.	Rommel, Hidalgo.
5 Waneta.	Beacon, R. W. Munson.	Estella, Tamala.
6 Big Hope.	America, Bailey, Captain.	Wetumka.
7 Fern, and Laussel.	Carman, Xinta, LaReine.	Hopeon.
8 Marguerite.	Hopkins, Universal.	Albania.
9	Muench, Wine King.	Gold Coin.
	Klowa, Husmann.	Onderdonk.
	Profusion, La Salle, Waubeck.	Dixie.
	San Jacinto, Winter Wine.	

It is perfectly true to say the grape season in the South is far more completely covered by the new list than by the old, the quality throughout higher, the resistance to disease and climatic hardships in the South much greater, the profits in actual test for several years much larger, especially after the first of August, and this puts the seal of approval on the work. But it is not finished. There is abundance to occupy the lives of many originators before the highest type in constitution, size, color, quality in all the seasons is reached.

WHAT MAY YET BE DONE?

It is quite clear to the writer that, he who may ask this question will more satisfactorily answer himself by a careful study of the bulletin, than in any other way; and believing that there is material for much study within its pages, its perusal, at least, is invited, and its preservation, as a work of reference for the intelligent experimenter and practical vineyardist, will be compensated by its classified records of many facts, costing years of the best efforts of the author to discover.

CHAPTER V.

Descriptions of Introduced Varieties which Originated in the Munson Experimental Grounds.

It is thought best that the bulletin include fuller descriptions of varieties which have been introduced by the writer, than the foregoing lists give, to meet a wish of readers which will be certain to arise. This is suggested by the Director of the State Experiment Station, after examining the manuscript of the bulletin up to this chapter.

The descriptions are made up partly from Prof. R. H. Price's observations, at College Station, as published in Bulletin 48, and partly by the originator from notes made in presence of the vines in his grounds, at Denison, Texas, during the entire life of these varieties, and are as nearly correct as it is possible to have, without making them too minute and tedious.

As for the older varieties, originated by others, which have been described over and over in other works, and in many catalogues, growing in the grounds of the writer, it would be out of keeping with the scope of this bulletin, and stale to most readers to redescribe, hence they will not be again taken up. Ripening period is for Denison, Texas, in every case.

It is thought improper to burden the bulletin with full descriptions of the many new varieties mentioned in the different families, most of which will never be introduced.

For tracing parentage, flower characters, etc., further than given in the description in this Chapter (V.) refer to the varieties in their proper families in Chapter IV.

AMERICA (*Seedling of Jaeger No. 70*).—Growth very strong, vine much branched, shoots smooth, glaucous; leaves medium size, lively green, smooth, shallow 3-lobed, margins deeply unevenly toothed; clusters conical, sufficiently compact, peduncle medium too long; berries very persistent, medium size, globular, black with little bloom, and scatteringly dotted jet black with white speck in center of dots; skin thin and tender, but does not crack, pulp melting, juicy easily freeing the 3 to 4 slender seeds, when fully ripe very rich in sugar, having measured as high as 120° on Oeschle's scale, also rich in agreeable acid possessed of a very distinct peculiar flavor, much liked by some, and not by others, not foxy, making a good combination market and wine grape, a very good port wine having been made from it without fortifying; ripens at Denison, Texas, July 20th to August 1st, a little after Concord, and always evenly; very prolific with long arm pruning and when pollenized by other varieties, as it does not thoroughly pollenize itself. Beacon is a good mate. For several years it has sold as well in market as Concord with equal satisfaction, and much more profit, as it far out-yields it. Grows very readily from cuttings, and endures the severest drouth with ease. Has passed through 27° below zero without damage. Not attacked by mildew or rot, and has given excellent results in California as a resistant graft-stock for Vinifera varieties.

ATOKA (*America* × *Delaware*).—Growth vigorous, less branching than *America*, shoots smooth; leaves medium, somewhat more deeply 3-lobed than *America*, teeth less prominent and more rounded; clusters large, slightly conical to nearly cylindrical, often with short shoulder, fairly compact, peduncle medium; berries persistent, small to medium, globular, dark purplish red, with little bloom, skin thin and sufficiently tough, never cracks, pulp juicy, tender, very sprightly, and agreeable when well ripened, easily freeing the 2 to 3 seeds, of medium size, rich in both sugar and acid, quality pure and fine, not so agreeable to eat as *Delaware*, yet sells readily in the market, and gives satisfaction. Resists diseases and climatic changes excellently. Grows easily from cuttings.

BAILEY (*Big Berry Post-Oak* × *Triumph*).—Growth strong, shoots slightly cottony; leaves large, deeply 3 to 5 lobed, downy on under side, teeth rounded, not very prominent; clusters large to very large, cylindrical, or often branched, generally compact; berries persistent, large, black, with little bloom, skin thin and tough, never cracking, pulp meaty but not tough, juicy, sprightly, of pure very good quality, considerably above *Concord*; seeds 2 to 4 medium, readily parting from the pulp. Ripe July 20th to 30th. The foliage is attacked to some extent by mildew, but easily preserved by spraying. Fruit little subject to rot. It has behaved better at College Station and in Victoria county than at Denison, and there is considered a valuable market grape, easily superseding *Concord*.

BEACON (*Big Berry Post-Oak* × *Concord*).—Growth medium in South Texas to strong in North Texas, and very strong in Missouri; shoots dark brown, a little cottony, less thickened than in the *Bailey*; leaves medium to large, 3-lobed, nearly devoid of cotton, rich dark green, teeth rather prominent; very prolific, of large cylindrical clusters, often shouldered, moderately compact; berries as large or larger than *Concord*, black with rather heavy white bloom, hang to cluster about equally well with *Concord*, but not so well as the *Bailey*, skin a little tougher than *Concord*, never cracks, pulp rather more tender than *Concord*, very juicy, sprightly and of a very similar flavor to *Concord*, rather more agreeable; seeds 2 to 4 medium size, readily leaving the pulp. Ripe July 15th to 25th. The vines have continuously borne very heavily, and endured the climatic hardships well in North Texas and in Missouri and Illinois, passing 27° below zero at Palmyra, Mo., in the grounds of Dr. Jaudon, and bore heavily the following season.

BIG EXTRA (*Big Berry* × *Triumph*).—Growth strong, shoots nearly smooth, not much branched; leaves large, deeply 3 to 5 lobed, little cottony, teeth little prominent; cluster oblong to cylindrical, sometimes shouldered, moderately compact; berries persistent, globular, medium to large, dark purple to black, with moderate bloom, skin thin, tough, never cracks, pulp tender, juicy, sprightly, agreeable, sweet, seeds 2 to 4 medium, easily parting from pulp. Ripe July 25th to August 10th. Foliage mildews slightly in very rainy, sultry seasons at Denison. Does better, like *Bailey*, in South Texas.

BIG HOPE (*Big Berry Post-Oak* × *Triumph*).—Growth strong, of similar description to *Big Extra*, but less attacked by mildew, and excessively prolific, requiring shorter pruning; clusters very large, often forked and rather open; berries persistent, globular, dark red, handsome; skin thin, tough, never cracks, pulp tender, sprightly, juicy, of good quality, seeds 2 to 3, small, parting from the pulp easily. Ripe July 25th to August 10th. Handles and sells well in the market after *Concord* is out.

BRILLIANT (*Lindley* × *Delaware*).—Growth strong, shoots when growing, dark purple, light brown when mature, internodes rather long, buds large, showing the *Vinifera* blood coming from *Lindley*, buds do not endure cold very well, 15° below zero being about their limit of endurance, and 20° below zero often kills the vine back in Iowa, Illinois, etc. Endures Texas climate well; leaves large, more or less 3-lobed, distinctly felted underneath with a whitish or rusty tomentum, beautifully bronze violet on upper surface when young; clusters large, cylindrical, or somewhat conical, often shouldered, open to compact; berries large, globular, light to dark red, translucent, with a thin bloom, very handsome when well

ripened, skin thin, rather tender, but seldom cracks, unless on some clusters which are very compact, pulp meaty, yet very melting and delicious, usually preferred for table and eating fresh, to Delaware, with which it outsells 5 to 10 cents per 8 pound basket in the markets where it is known, seeds 1 to 3 medium, readily parting from pulp. Ripens just before the Delaware, and yields on an average nearly twice as much. It ships about equally well with Concord. Its foliage, like Delaware, is attacked by mildew, but less severely. Less subject to mildew in South Texas than northward. It is favorably reported at College Station and at several places near the gulf coast. Grows readily from cuttings, and endures heat and drouth fairly well, much better than Concord.

CARMAN (*Post-Oak Grape No. 1* × *Triumph*).—Growth at Denison vigorous, at College Station medium, at Hornsby, Travis county, vigorous, at Experiment, Ga., and Knoxville, Tenn., strong; very prolific; wood a little cottony; foliage never mildews; leaves medium to large, 3 to 5 lobed, little cottony beneath; dark green, margins prominently toothed; clusters large to very large, have reached two pounds in rare instances, shouldered or branched, conical, very compact; berries very persistent, medium, globular, black with thin bloom, skin thin and tough, never cracking, pulp meaty, firm, yet tender, when fully ripe of pure rich quality, much superior to Concord, seeds 1 to 3, easily leaving the pulp. At Denison, vines 13 years old that have borne ten heavy crops show no signs of decline, while younger vines at College Station show decline. Soil at Denison, sandy on red clay subsoil, at College Station, dark gravelly on stiff "joint-clay" or "hard-pan" subsoil. There are hundreds of vines in bearing at Denison and four at College Station. It has been one of the most profitable market grapes in the Denison market, ripening one to three weeks after Concord was gone.

CHAMPANEL (*Barnes* × *Worden*).—Growth rampant, young wood cottony; foliage dark green, resistant to mildew, but attacked late in season by Leaf-Folder; exceedingly resistant to heat and drouth, growing well in limy black soils; leaves medium, little or not at all lobed, margins with small obscure teeth, underneath quite cottony with white felt; clusters large conical, with long peduncle, rather open; berries globular, large black with white bloom, persistent, skin thin, tough, pulp tender, juicy, very sprightly, acid unless well ripened, then quite agreeable, seeds 2 to 4, rather large, easily leaving the pulp. Ripe about with the Concord, which it much resembles in cluster and berry. Valuable for black, limestone lands in the South. Ripens evenly and not given to cracking or dropping, as is Worden, in the South.

DELAGO (*Delaware* × *Goethé* [*Rogers No. 1*]).—Growth moderate, a little stronger than Delaware, and foliage less inclined to mildew; wood smooth; leaves a little larger than Delaware, less lobed, a little more downy beneath, a duller shade of green; cluster below medium, very much the shape of Delaware; berries large, ovate, persistent, dark red with little bloom, skin thin, tough, pulp similar to Delaware but not so tenacious, and freeing the seeds easier, very juicy, rich, with a Muscat flavor, seeds 1 to 3, above medium. A splendid shipping, market and table grape. The flower has reflexed stamens, and some perfect flowered variety blooming at same season, such as the Beacon, Brilliant and Delaware, growing near, is necessary to have it bear well. Rather difficult to grow from cuttings.

DELICIOUS (*Big Berry Post-Oak* × *Herbemont*).—Growth moderate, strong at College Station, but healthy and enduring. Grows with difficulty from cuttings, wood a little cottony; leaves deeply 3 to 5 lobed, dark, rich green, nearly free from down, medium size; clusters medium, conical, rather open, with long peduncle; berry medium, globular, black with little bloom, persistent, skin tough, pulp tender, very juicy, sweet and sprightly; seeds rather large; a fair market grape, and very promising for wine.

ELVICAND (*Accidental hybrid of Elvira* × *Mustang*).—Growth very strong, much branched, young wood and foliage white with cotton wool; leaves medium to large, shallow 3 lobed and very cottony on lower surface, less on upper; cluster

small, moderately open; berries medium globular, dark purplish, translucent red, persistent, when fully ripe, sweet, sprightly, with a little of the Mustang flavor, pulp tender and juicy, seeds large; makes a very mild pleasant wine of excellent keeping qualities. A shy bearer on short pruning, but bears heavily on very long arm pruning. Will succeed finely in "black waxy" lands where few other varieties succeed, and recommended for such only, although it grows well anywhere, and is very hardy. Leaf-Folders attack it.

FERN MUNSON (*Post-Oak No. 1* × *Catawba*).—Growth very strong, shoots a little downy; leaves large to very large, shallow 3-lobed, nearly devoid of cotton on under side, attacked by mildew in very wet, sultry seasons, but rarely sufficient to damage crop; flowers very late, and although it has erect stamens, does not alone pollinize itself thoroughly, so that the clusters are open, but when grown near Laussel, Marguerite or Herbemont, it sets a good heavy crop when pruned long, of medium to large clusters with long peduncles; berries globular, medium to large, very persistent, very dark purplish red to nearly black, skin thin, tough, pulp firm but not tough, very juicy, sprightly, with a very agreeable Catawba flavor when fully ripe, seeds 1 to 3 medium, leaving the pulp readily. Ripens very late, in August or early September, and hangs on until frost if desired, becoming excellent in quality and giving full satisfaction in market. About 100 vines now 12 years old have never failed since two years of age to produce good crops that have been very profitable, as the grapes come when all old varieties are gone, and before shipments from the North set in. Black rot has never attacked the variety at Denison. At Palmyra, Mo., it has endured 27° below zero, and borne well, and is considered by Dr. Jaudon, of that place, a critical judge of grapes, as one of the most valuable varieties. It endures the climate at Denison excellently.

GOLD COIN (*Norton* × *Martha*).—Growth medium, rather slender; young shoots and under sides of leaves thinly covered with a rusty cotton; leaves large, very shallow 3-lobed, dark dull green, not attacked by mildew, but to some extent by Leaf-Folder late in season; clusters medium, or above, ovate shouldered, proper degree of compactness, always sets a good crop of well filled clusters, peduncle medium to long; berries large, globular, yellowish when fully ripe, persistent, skin thin, tough, never cracks, and rarely attacked a little by rot; pulp about same consistency as in Concord, very juicy and exceedingly sweet, lacks somewhat in sprightliness, retains a little of the Martha flavor, liked by most persons, seeds 2 to 4 medium, leaving the pulp with some difficulty; very handsome in the basket and markets excellently, has always been very profitable; ripens with Catawba, endures all extremes of climate well; favorable reports of it from all parts of the South, and as far north as 40° latitude.

HOPKINS (*\$10 Prize Post-Oak* × *Norton*).—Growth very strong, young wood a little downy, dark reddish brown, roots with difficulty from cuttings; leaves large to very large, shallow 3-lobed, dark bright green, not attacked by mildew or Leaf-Folder, endures climatic hardships well. At College Station does not do well, not suited to that soil. Clusters large, conical, branched, compact; berries globular, black, with little bloom, medium size, skin and pulp similar to Norton, quality nearly as good, about a dozen vines for ten years have yielded fully twice as much as same number of Norton under same conditions. A valuable red wine grape. Ripens a little later than Norton.

HERMANN JAEGER (*Post-Oak No. 1* × *Herbemont*).—Growth very strong, wood a little downy; grows from cuttings fairly well, endures the Texas climate well and succeeds well at College Station; leaves large, deeply 3 to 5 lobed, little cottony on undersurface; bunches large to very large, shouldered, conical, very compact, peduncle short; berries small to medium, black, persistent, skin thin, tough, does not crack, pulp tender, very juicy, easily freeing the 1 to 3 medium seeds, quality better than Concord; a profitable market and wine grape; prolific; ripens about a week after Concord; not attacked to any extent by mildew, rot or Leaf-Folder.

HUSMANN (*Arlmong* × *Perry* [See §10 *Prize and Post-Oak 2 Families for partentage of these*]).—Growth vigorous, young wood and under surface of leaves a little cottony; endures Texas climate well, foliage attacked by mildew in very damp, sultry seasons, otherwise healthy; leaves very large, deeply 3 to 5 lobed; clusters very large, long cylindrical, sometimes shouldered, on medium peduncles, compact; berries medium size, globular, black, persistent, skin thin, delicate, yet tough, pulp melting, very juicy, sprightly, of high, pure flavor, more satisfactory by far as a market and table grape than Herbemont, and excellent for red wine; seeds 2 to 3, small. Very prolific, even on rather short arms. Ripens with Herbemont, and belongs in the same range of country. Rather slow to grow from cuttings.

KENENA (*America* × *Post-Oak Grape Hybrid*).—Growth very strong, much branched, wood smooth; leaves small to medium, deeply 5 to 7 lobed, handsome; cluster medium to large, cylindrical, with long peduncles; berries small to medium, dark purple, nearly black, globular, persistent, skin thin, tough, pulp tender, juicy, sprightly, agreeable quality, seeds small. Ripe just before Herbemont. Very healthy, a fair market and good wine grape. Endures heat and cold excellently.

KIOWA (*Jaeger's No. 43* × *Herbemont*).—Growth very strong and healthy, shoots smooth; leaves large, leathery, shallow 3-lobed, of a rich dark bluish green; cluster large, cylindrical, shouldered and sometimes branched, peduncle of medium length; berries small to medium, a good size larger than Herbemont, globular, persistent, black, skin thin, never cracks, pulp very juicy and sprightly, quality nearly equalling Herbemont, juice red, seeds 2 to 3, small, rarely touched by rot, a good market and excellent wine grape. Ripens after Herbemont a week. Requires wide planting and long pruning. Cuttings grow about as easily as Herbemont.

LA SALLE (*Scuppernong* × *Post-Oak Hybrid*).—Growth equally as strong as Scuppernong, and like it will not grow from cuttings; perfectly resistant to all maladies, endures cold considerably better than Scuppernong, going through 15° below zero and bearing well, while same weather killed Scuppernong to the ground and the James outright; leaves larger than Scuppernong, yet much more resembling the Muscadine species than the Post-Oak grape; vine and foliage throughout smooth; flowers and ripens very late; cluster two to three times as large as Scuppernong, yet small in comparison with Concord or Ives, ovate, short peduncle; berries large to very large, black with white specks, drop when ripe, pulp and quality similar or better than Scuppernong, very juicy and high flavored, seeds 2 to 3, smaller than Scuppernong, ripe a week earlier, very prolific on long pruning.

LAUSSEL (*Post-Oak No. 2* × *Gold Coin*).—Growth strong, shoots thick, smooth; difficult to grow from cuttings; leaves very large, shallow 3-lobed, unevenly toothed, leathery, dark rich green, not attacked by mildew or Leaf-Folder; vine endures drouth and cold excellently; clusters ovate, very compact, medium size, short peduncle; berries medium or above, purplish, nearly black, globular, persistent; skin thin, tough, pulp firm, juicy; sprightly, sweet and well flavored, seeds 2 to 4, rather large; ripens very late, just after the Fern Munson, about September 1st to 5th, and hangs on into October if desired. About 75 vines have always been fruitful and quite profitable, the fruit selling well in the market. Makes a fine white or amber wine, the juice having little coloring matter.

LUKFATA (*Barnes* × *Moore Early*).—Growth strong, shoots cottony; grows readily from cuttings, very healthy, endures heat, drouth and cold remarkably well, vine succeeds well in black limy soils; leaves medium size, slight tendency to be 3-lobed, dark green, cottony beneath, not injured by mildew, Leaf-Folder attacks occasionally; cluster medium, ovate, sometimes shouldered, compact; berries globular, large, persistent, do not crack, pulp about same as Moore Early, more juicy and very sweet and agreeable, seeds 2 to 3, rather large; ripens early and evenly, sells in market as well as Concord, and ships for better; little attacked by

rot. A good market and fair table grape. Flowers have reflexed stamens, hence it must grow near some variety with erect stamens flowering at same time, such as Ives, then it bears well.

MANITO (*America* × *Brilliant*).—Growth very similar to America, foliage a little larger and a little more lobed, very healthy, grows freely from cuttings, endures extremes of climate very well, not cottony on wood or foliage; clusters long, cylindrical, rather open, with long peduncle; flowers perfect, bears well alone, very prolific; berries medium, globular, persistent, dark purple with white specks, very distinct and unique in appearance, skin thin, tough, pulp very tender, juicy, sweet and agreeable, parting from the seeds with ease, seeds 2 to 4, slender. Ripens very early, about with Moore Early, packs beautifully and ships excellently; a very profitable market and table grape, also a good wine grape.

MARGUERITE (*Post-Oak Grape No. 2* × *Herbemont*).—Growth very strong, annual wood beset with spiny pubescence, but not downy, foliage bright green, leathery, and not attacked by mildew, endures Texas climate perfectly; cuttings root with some difficulty; leaves medium to large, 3 to 5 lobed; clusters medium, cylindrical, shouldered, with short peduncle, compact; berries a good size larger than *Herbemont*, globular, dark purple, persistent, skin thin and tough, never cracks, pulp tender, juicy, sprightly, about equal to *Herbemont*, seeds 2 to 3, medium; ripens some three weeks later than *Herbemont*, and hangs on through October, and sells well in the market. It makes a fine white wine. A shy bearer on short pruning, but on long arms bears heavily. Succeeds everywhere in the South.

MARVINA (*Laura* [*Marvin's*] × *Brilliant*).—Growth medium, shoots a little cottony; grows readily from cuttings, foliage healthy, rarely touched by mildew; leaves medium to large, shallow 3-lobed, little downy on under surface; clusters above medium, cylindrical, often shouldered, compact, peduncle short; berries medium to large, globular, persistent, clear yellowish white, skin thin, delicate, does not crack, pulp meaty, tender, delicious, easily freeing the 1 to 3 small seeds. Ripe with the Green Mountain, than which it is better in quality and less subject to rot, better adapted to the Texas climate, and promises to succeed wherever Niagara does well.

MRS. MUNSON (*Neosho* × *Herbemont*).—Growth vigorous, shoots and foliage smooth, little attacked by mildew in wet sultry seasons, much less than Delaware; leaves medium, shallow 3-lobed, bright clear green; clusters medium to large, cylindrical to subconical, shouldered, compact, with medium peduncles; berries medium to small, grayish purple, globular, persistent, skin thin and delicate, yet tough, pulp tender, very sweet and agreeable, seeds 2 to 3, small. Ripe with *Herbemont*, much less subject to rot, sells well in market, and an excellent shipper, and a fine white wine grape, well adapted to the Southern climate. Grows poorly from cuttings, about same as *Herbemont*.

MUENCH, same parentage as *Mrs. Munson*.—Vine similar but stronger grower, clusters and berries larger considerably, about equally good in quality but more sprightly, berries good medium size, clusters large to very large, sell readily in market. Ripens a little later than *Mrs. Munson*. Well adapted to the South. Rather easier to grow from cuttings than *Herbemont*.

NEVA MUNSON, same parentage as *Mrs. Munson*.—Growth very strong, foliage similar but a little more lobed and of much darker green, never mildews, clusters a little larger than *Mrs. Munson*, more compact, but berries never crack, same size and color of berries, quality equally fine and more sprightly. Ripens about two weeks later, about with Laussel; a fair late market grape and an excellent wine grape. A wine made of it in California and tested by the wine expert of the Experiment Station at Berkeley, Cal., placed it among good French wines. Requires long arm pruning to bear heavily. In short, all the *Linccumii* × *Herbemont* hybrids require long pruning.

OKTAHA (*De Grasset* [*V. Champini*] × *Delaware*).—Growth medium, healthy,

well adapted to the climate; grows well from cuttings; leaves small, shallow 3-lobed, fresh bright green, not downy; clusters small to medium, cylindrical, shouldered, much same shape of Delaware, peduncle short; moderately compact; berries globular, medium or below, persistent, black, with little bloom, skin thin, tough, pulp very juicy, sprightly, very good, seeds 2 to 3, medium. Ripens about with Ives, sell as well or better in market, and much better for eating and a far better wine grape; prolific, well adapted to black limy lands.

OLITA (*Delaware* × *Irving*).—Growth moderate, shoots smooth; foliage attacked by mildew not so much as the Delaware; grows fairly well from cuttings, wood pale brown, and flattened; leaves medium, shallow 3-lobed, pale green, somewhat downy on under surface, clusters small to medium, ovate, shouldered, short peduncle, open; berries medium, globular, persistent, pearly translucent white, skin thin, delicate, tough, pulp melting, of highest quality when well ripened, seeds 1 to 3, medium. Strictly an amateur grape, exquisite for desert. Ripe a little later than Delaware, about equally prolific, but of light yield in weight.

PRESLY (*Elvira* × *Champion*).—Growth medium, young shoots reddish, a little cottony; grows readily from cuttings; leaves large, usually deeply 3-lobed, smooth dark dull green on upper, and rusty felted on lower surface, resists mildew well; bunches ovate, shouldered, compact, with short peduncle; berries small to medium, a shade larger than Delaware, slightly ovate, moderately persistent. At first light red, becoming dark when fully ripe, handsome as Delaware when packed in basket; skin thin, tough, do not crack, pulp tender, moderately juicy, fair quality, much better than Champion, seeds 2 to 3, small to medium. Ripe with or before Champion, and a profitable first early market grape. Endures the climate better than Ives, but belongs farther north to be fully at home.

ROMMEL (*Elvira* × *Triumph*).—Growth medium, shoots smooth, short jointed, tapering rapidly, requires short pruning, prolific, endures the climate better than Concord; leaves medium, shallow 3-lobed, smooth above, a little felted below, teeth prominent, irregular, attacked by mildew in wet sultry seasons, but less than Delaware, always hold on until crop matures; clusters medium to small, ovate or cylindrical, often shouldered, compact, peduncle short; berries large, globular, persistent, greenish yellow when fully ripe, skin very thin and delicate, but rarely cracks on vine, too tender for long shipment, carries well 50 to 100 miles in 5 pound baskets; pulp melting and perfectly delicious when well ripened, but acid when under ripe, or if weather is wet and cloudy at ripening time. Several hundred vines have always been very profitable in local market. Ripe just before Concord. Fruit rarely attacked by rot.

R. W. MUNSON (*Big Berry Post-Oak* × *Triumph*).—Growth strong, shoots short, stiff, rather upright, smooth, grows readily from cuttings, endures the climate well, mildew and rot rarely attack it, and then not seriously; leaves 3 to 5 lobed, smooth, dark, rich, bright green; clusters medium to large, cylindrical, often shouldered; peduncle medium; berries, when well grown, medium to large, globular, persistent, black, without bloom, skin never cracks, pulp tender, juicy, and of very good quality, better than Concord, or Beacon, seeds medium, few. Ripe just before Concord, gives good satisfaction in market. Bears heavily on long pruning, and when pollinated by other erect stamened varieties flowering at same time, its own pollen not fully adequate, although its flowers are perfect. Concord a good pollinator for it. Ships well.

SAN JACINTO (*Scuppernong* × *Linceumii Hybrid*).—Growth and general appearance very similar to La Salle, its sister, the description of which will also cover this, except that the cluster of this is a little the larger (see back of Bulletin) and the fruit ripens about two weeks later; quality even better—the best of any of this class of grapes known to the writer. Endured 15° below zero and bore a fair crop same season—1899.

WAPANUKA (*Rommel* × *Brilliant*).—Growth medium to strong, equal with Concord; resembles Brilliant in vine more than Rommel; wood smooth and darker brown, grows readily from cuttings; leaves quite healthy, less attacked by mildew

than brilliant; cluster medium to large, cylindrical, shouldered, properly compact, peduncle short to medium; berries large, five-eighths to seven-eighths inch in diameter, globular, persistent, rich, yellowish white, translucent, skin very thin and delicate, yet seldom cracks, and handles better than the Rommel, seeds few and small to medium. Ripe about with Delaware. Far superior to Niagara and Green Mountain. For nearby market and the table there is no other variety superior, if equal to it. Very prolific, requires rather short pruning.

WETUMKA (*Onesced* × *Gold Coin*).—Growth medium, healthy, shoots slightly cottony, grows fairly well from cuttings, and withstands mildew and rot well; leaves large, shallow 3-lobed, smooth, or little cottony beneath; bunches medium to large, ovate, sometimes shouldered, peduncle medium; berries large, globular, persistent, yellowish green, skin never cracks, pulp juicy, tender, freeing the 1 to 2 rather large seeds, quality better than Niagara. Ripe late, after Concord is off. Bears heavily on short arms. A profitable market and table grape, and will make an excellent white wine.

XLNTA (*America* × *Beacon*).—Growth strong, shoots smooth, foliage healthy and persistent, little attacked by mildew in wet seasons; grows well from cuttings; leaves medium, shallow 3-lobed; clusters large, cylindrical, shouldered, with medium peduncle, fairly compact, unless not well pollenized, then loose, flowers have reflexed stamens, and vine should be near perfect flowering kinds, such as Brilliant or Delaware and Gold Coin; berries medium to large, globular, persistent, black, with little bloom, skin thin, never cracks, pulp meaty, tender, of very agreeable sprightly quality, seeds 2 to 3, small. Ripe with or later than Concord, very prolific on medium to long pruning, an excellent market and wine grape. Endures climatic extremes well.

YOMAGO (*Delago* × *Brilliant*).—Growth medium, shoots smooth, foliage endures against mildew better than Delaware, and fruit like Delaware, rarely damaged by rot, grows pretty well from cuttings—better than Delaware; leaves medium, shallow 3-lobed, little cottony on under surface; clusters about same size and shape and compactness as Delaware; berries good, medium size, about twice as heavy as Delaware, globular, translucent red, persistent, skin very thin, yet tough, never cracks, pulp very juicy and melting, much tenderer than Delaware, and of the purest, finest flavor, even excelling Delaware, seeds 1 to 3, medium, about same size as in Delaware. Ripe a few days earlier than Delaware. Endures the climate well, and will probably succeed wherever Delaware does well. Out-sells Delaware in market. Ships well.

CONTENTS OF BULLETIN.

	PAGE.
INTRODUCTION.	
	217 to 227
The Chief Material Structure of American Viticulture must be the Native Grapes of America.....	217
The passion for experimentation with grapes aroused.....	218
Special study of grape botany necessary.....	219
Critical study of grape botany taken up.....	220
Practical benefit to viticulture the chief aim.....	221
An ideal list or succession of varieties.....	221
Skeleton for ideal succession of varieties.....	222
Most available list of old varieties.....	223
Vineyards planted by the author.....	223
Grape nurseries planted with cuttings.....	224
Seedling grape nurseries planted.....	224
The people must be educated.....	224
Resumé of the author's educational work on grapes.....	225
Cultural studies.....	227
The chief work.....	227
CHAPTER I.	
	228 to 235
Wild or native grapes of the United States.....	228
Natural distribution of the wild grapes.....	228
Discussion of the Table of Cultural Characters.....	232
Climatic conditions at the Munson Experiment Grounds.....	233
Practical use of the Cultural Table.....	233
Graft-stocks for very hot dry regions and limy soils.....	234
Selecting species from which to breed direct producers for market, table and wine in the North, also for the South.....	234
Best species for wine.....	234
The specific basis of American viticulture.....	235
CHAPTER II.	
	236 to 242
Selecting parent varieties of grapes.....	236
Thoroughbred varieties.....	236
E. S. Rogers and Hermann Jaeger.....	237
Hunting wild grapes suitable for parent vines.....	237
Partial list of varieties grown in the Munson Experiment Grounds, giving flower character, dates of flowering, and color of fruit.....	239 to 241
Explanation of signs used in list.....	239
The Ideal Variety.....	241
Personal qualifications necessary in the originator.....	242
CHAPTER III.	
	243 to 257
<i>Creation of New Varieties.</i>	
Pure-breeding, crossing, and hybridizing.....	243
Simple selection.....	244

	PAGE.
Structure of grape flowers.....	244
Discussion of sex in grapes.....	244
Male vines should not be neglected.....	245
General laws of constitutional development in grapes with reference to kinds of flowers in parents.....	246
Desirability of hermaphrodite vines.....	247
How to cross and hybridize the grape when the parent vines flower at the same time.....	247
Speedy method of hybridization.....	247-8
Hybridizing varieties not flowering together.....	249
Collecting and preserving pollen.....	249
To use preserved pollen.....	250
Saving the seeds.....	250
Planting the seeds.....	250
Tending and culling the seedlings.....	251
The testing vineyard.....	251
Noting and selecting the best varieties.....	251
Age at which young varieties reach full development.....	252
Percentage of meritorious varieties.....	252
Field of development illimitable.....	252
Breeding for special character and purpose.....	253
White, red, and black varieties produced at will.....	253
Breeding for special season.....	254
Breeding for size in cluster and berry.....	255
Breeding for quality.....	255
Superior potency of one parent over the other.....	255-7

CHAPTER IV.

258 to 274

Some of the results of twenty years' selection and hybridization.

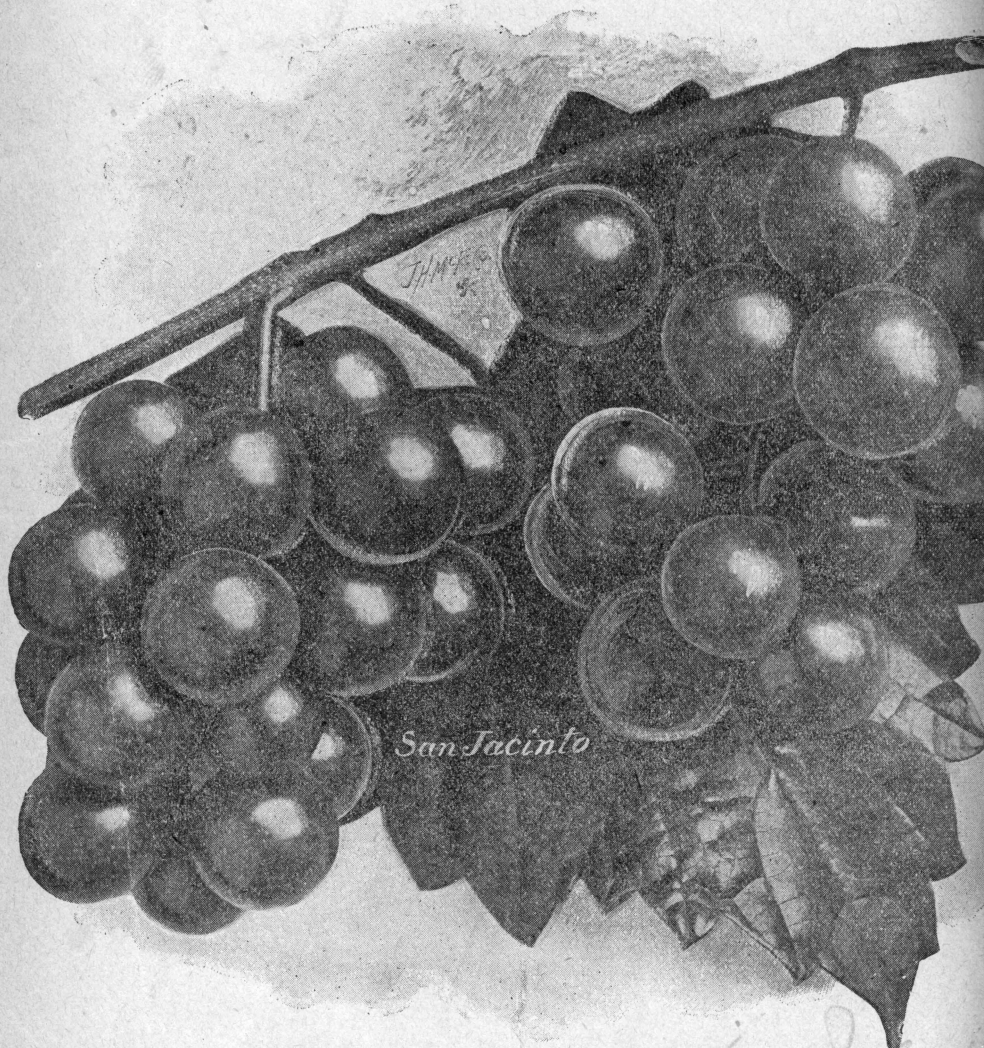
The Munson "School" of Grapes.....	259
Rupestris Group.....	259
Longii Group.....	260
Vulpina Group.....	260
Monticola Group.....	261
Berlandieri Group.....	261
Bourquiniana Group.....	261
Herbemont Family.....	261
Lincecumii Group—Heads of Families.....	261
Big Berry Family.....	262
Big Hope Family.....	262
Early Purple Family.....	262
Jaeger 43 Family.....	263
Jaeger 70 Family.....	263
Jaeger 72 Family.....	263
America Family.....	263
Lucky Family.....	264
Neosho Family.....	264
Post-Oak Grape No. 1 Family.....	264
Post-Oak Grape No. 2 Family.....	264
Post-Oak Grape No. 3 Family.....	265
Ten Dollar Prize Family.....	265
Armlong Family.....	265
Ben Family.....	266
Bicolor Group.....	266
Aestivalis Group.....	266
Norton Va. Family.....	266

	PAGE.
Gold Coin Family	267
Winona Family	267
Simpsoni Group	267
Manatee Family	267
Candicans Group	267
Doaniana Group	268
Champini Group	268
Labrusca Group	269
Concord Family	269
Moore Early Family	269
Delaware Family	269
Delago Family	270
Elvira Family	270
Eumelan Family	271
Laura Family	271
Lindley Family	271
Oneseed Family	271
Rommel Family	271
Rotundifolia Group	272
Scuppernong Family	272
San Jacinto Family	272
Munson varieties tried in the Skeleton List	273
What may yet be done	273

CHAPTER V.

274 to 281

Descriptions of the leading introduced varieties of grapes originated in the Munson Experimental Grounds.....	274 to 281
--	------------



J.H.M. 1855

San Jacinto

Plant to W. W. Munson & Son July 14

[Blank Page in Original Bulletin]