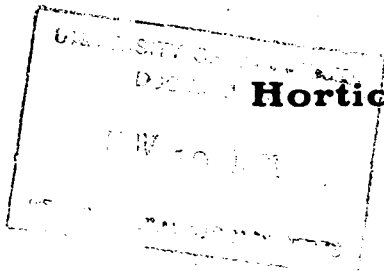


UNIVERSITY OF MINNESOTA.

Agricultural Experiment Station.

BULLETIN No. 83.



Horticultural Division.

JULY, 1903.

Apples and Apple Growing in Minnesota.

ST. ANTHONY PARK, RAMSEY COUNTY, MINNESOTA.

EAGLE PRINTING CO., PRINTERS, DELANO.

UNIVERSITY OF MINNESOTA.

BOARD OF REGENTS:

	Term Expires
The HON. SAMUEL R. VAN SANT, WINONA, The Governor of the State.	<i>Ex-Officio</i>
CYRUS NORTROP, LL. D., MINNEAPOLIS, The President of the University.	<i>Ex-Officio</i>
The HON. JOHN W. OLSON, ALBERT LEA, The State Superintendent of Public Instruction.	<i>Ex-Officio</i>
The HON. ELMER E. ADAMS, B. A., FERGUS FALLS,	1908
The HON. THOMAS WILSON, ST. PAUL,	1909
The HON. WILLIAM M. LIGGETT, ST. ANTHONY PARK,	1909
The HON. A. E. RICE, WILMAR,	1909
The HON. GREENLEAF CLARK, M. A., ST. PAUL,	1904
The HON. T. L. SCHURMEIER, ST. PAUL,	1904
The HON. STEPHEN MAHONEY, B. A., MINNEAPOLIS,	1907
The HON. O. C. STRICKLER, M. D., NEW ULM,	1907
The HON. JAMES T. WYMAN, MINNEAPOLIS,	1907

THE AGRICULTURAL COMMITTEE:

The HON. WILLIAM M. LIGGETT, *Chairman.*
 The HON. ELMER E. ADAMS,
 The HON. J. T. WYMAN,
 The HON. A. E. RICE,
 The HON. T. L. SCHURMEIER.

STATION OFFICERS.

WM. M. LIGGETT, *Director.*
 J. A. VYE, *Secretary.*

EXPERIMENT CORPS.

WILLET M. HAYS, M. Agr., *Agriculturist.*
 SAMUEL B. GREEN, B. S., *Horticulturist.*
 HARRY SNYDER, B. S., *Chemist.*
 T. L. HÆCKER, *Dairy Husbandry.*
 M. H. REYNOLDS, M. D., V. M., *Veterinarian.*
 ANDREW BOSS, Associate Agriculturist, in Charge of Live Stock.
 FREDERICK L. WASHBURN, M. A., *Entomologist.*
 T. A. HOVERSTAD, B. Agr., *Superintendent, Crookston.*
 H. H. CHAPMAN, B. S., B. Agr., *Superintendent, Grand Rapids.*
 J. A. HUMMEL, B. Agr., *Assistant Chemist.*
 COATES P. BULL, B. Agr., *Asst. in Agriculture.*

The bulletins of this Station are mailed free to all residents of the State who make application for them.

PREFACE.

The object of this bulletin is to bring together concise and accurate descriptions and illustrations of and notes on the varieties of apples that are of interest to the horticulturists of this section, including the most of those for which our state fairs and horticultural societies offer premiums. In addition to such notes a few pages are devoted to the cultivation of the apple in this section.

There are now on file at this Experiment Station over five hundred descriptions and outlined drawings of apples and one hundred and seventy photographs of apples. It has been thought that the publication of all these would very likely lead to confusion and on this account the work has been limited to varieties of special interest.

This bulletin represents the results of many years of observation in the orchards and experiment stations of Minnesota and adjoining states. In getting the material together I have had the help of my esteemed friend, the late J. S. Harris, of La Crescent; my former assistant, Professor R. S. Mackintosh, of Alabama, and in the preparation of the field notes and in many other ways the cordial co-operation and assistance of Mr. Clarence Wedge, of Albert Lea, now president of the Minnesota State Horticultural Society.

SAMUEL B. GREEN.

INTRODUCTION.

The growing of apples in this state has been attempted from its early settlement, but the peculiar and at times severe climatic conditions here prevailing, and the lack of suitable varieties, caused much disappointment to the pioneers in this work until the belief was general that apples could not be grown here. The varieties first planted were the standard sorts of the eastern states, which are not nearly so hardy or desirable for us as the best varieties now cultivated. About twenty years ago varieties from Russia were largely distributed and a few of these together with seedlings of local

origin, form today the varieties that make up our best planting lists.

Many seedlings of local origin have appeared during the last decade, some of which are especially promising. Among the circumstances which have most contributed to the great increase in seedling apples in this section should be mentioned the large premiums offered by the State Agricultural Society and the State Horticultural Society for the exhibition of such fruits and especially to the Horticultural Society, which has for several years offered a premium of \$1,000 for an apple that should be as hardy as the Duchess of Oldenburg, as good in quality as the Wealthy, and as long keeping as the Malinda.

Another feature that has contributed much to the interest in seedling apples in this section has been the success which has crowned the efforts of the late Peter M. Gideon in originating the Wealthy apple, which has proven immensely valuable to the people of this and other sections. Mr. Gideon, about 15 years ago, also distributed about 10,000 seedling apples to interested parties in this state, and the result of this action is seen in the many hundreds of new seedling apples to be found in various places. Such men as Patten, Harris, Lyman, Akin, and a host of others have raised large numbers of seedling apples and greatly stimulated an interest in this subject.

St. Anthony Park, July, 1903.

SAMUEL B. GREEN.

NOTES ON THE CULTIVATION OF THE APPLE IN MINNESOTA.

SAMUEL B. GREEN.

The introduction of hardy varieties and the more general spread of horticultural information has led to a great increase in the growing of apples in this state during the last ten years, so that from a mere experimental stage the growing of this fruit in some parts of this state at least, is recognized as a safe commercial venture. The soils of this section are well adapted to the growing of fruit; the climate is likewise favorable, except for a short time during exceedingly severe winters, and as there comes a more general increase in horticultural information throughout the state we shall see more attention paid to growing this important fruit.

The locations especially adapted to orcharding are those that are high, so the trees can get good air drainage and thus be free from the danger of late spring frosts, while at the same time they should receive some protection from the severest winds. There are also favorable locations which have a modified climate, due to the proximity of large bodies of water. It is doubtful if we shall ever see orcharding successful in a commercial way upon some of the flat, heavy, black soils of this section, and in no part of the world are successful orchards found on such formations. On the other hand, it is very doubtful if there is any portion of the state where enough apple trees for a home supply of fruit cannot be grown, if reasonable judgment is used in their management. In this connection it may be interesting to note that some enterprising horticulturists have succeeded in growing a goodly number of the larger kinds of apples as far north as Manitoba.

Among the worst places for an apple orchard is in what is known as a warm, sheltered spot, to which the sun has free access during the middle of the day and the winds are entirely shut off. Into such a place the cold air from surrounding higher elevations settles at night, and while it is

the hottest in the day time, it is the coldest at night. In such places blight and winter killing are to be expected, and the flowers are liable to be killed by late spring frosts.

The best slopes for orcharding are those that fall to the north and northeast, but there are some excellent orchards in Minnesota on southern exposures. Perhaps a western exposure is most unfavorable.

While in the more favored portions of the state wind protection is not necessary for orchards, yet in western and southern Minnesota good wind protection will add very much to the hardiness of trees, and on our western prairies trees will be found greatly improved if they have a good, substantial windbreak on all sides. In most locations on our western prairies the wind will circulate sufficiently even if we have windbreaks around the whole orchard.

The soil best adapted for the growth of apples is what might be called a deep, open clay loam that is well drained, either naturally or artificially and which does not suffer from an excess of water. In the loess loams of this section we find perhaps the ideal soil for fruit growing of all kinds, but apples may be grown successfully, in a small way at least, even on soils that are quite dry and gravelly, but in such land the trees require very careful management.

In selecting trees it is important to plant only those varieties which have been thoroughly tested and have proven of value. It frequently happens that beginners are charmed by the advertisements of some new seedling and plant more of them than good judgment would dictate. It should be more generally understood that it is quite unsafe to plant seedling kinds, even though the original tree may be doing well, until the variety has stood the test of grafting and growth in orchards in various soils. Such a tree may, for instance, be perfectly hardy and yet be so tardy about coming into bearing as to be of little or no use.

The list of trees recommended by the Minnesota Horticultural Society is submitted herewith. It is the result of much study and experimenting in this section, and is a good general guide for planters. In using it the descriptions here given should also be consulted.

List of fruits adopted by the Minnesota State Horticul-

tural Society December 4, 1902, for the guidance of planters in Minnesota.

APPLES.

Of the first degree of hardiness for planting in Minnesota: Duchess, Hibernial, Charlamoff, Patten's Greening.

Of the second degree of hardiness: Wealthy, Longfield, Tetofsky, Malinda, Okabena, Peerless.

Varieties for trial: Repka Malenka, Anisim, Yellow Sweet, Raump, Brett, Northwestern Greening, Scott's Winter, University, Newell, Lowland Raspberry, Estelline.

Valuable in some locations: Wolf River, McMahan, Yellow Transparent.

CRABS AND HYBRIDS.

For general cultivation: Virginia, Martha, Whitney, Early Strawberry, Minnesota, Sweet Russet, Gideon No. 6, Briar Sweet, Florence, Transcendent.

Varieties for trial: Lyman's Prolific, Faribault, Shields.

The varieties of apples generally grown in the southern and eastern states and in the countries of Northern Europe have almost without exception been tried here and their behavior is well known, so that there is no need of beginners experimenting with them. The common varieties of the older states, such as the Baldwin, Rhode Island Greening, Jonathan, Tompkins, and Bell Flower, have all been tested here and have proven failures.

Kind of Trees to Buy.—In buying trees it is very important to get those that are thrifty and this point is of more importance even than the shape or age of the tree, for if the tree is thrifty its form can be easily changed. Young trees are better than those that are old, and it will often happen that a two year old tree will bear as soon as one that is three years old, and it is not desirable to set out trees that are more than three years old. Root grafts and small trees one year old from the graft are too small to plant out in orchard rows, as they are liable to be broken down, and it is better to get those that are at least two years old.

Most of the apple trees in this country are raised by root grafting two year old apple seedlings. These seedling roots are generally raised here from seed of wild apples grown in France. This French seed is generally preferred to American

seed, since on account of its having been cured with greater care it germinates more surely. But it is probable that Vermont seed is better than French seed when it is properly cured, as seedlings of it are hardier. Of late years there has been an increasing amount of Vermont apple seed used. Seedlings from the best hardy varieties of this section are much to be preferred to those from either French or Vermont seed, but are difficult to obtain on account of the scarcity of seed.

Root Killing.—The climate of Minnesota is at times very severe on apple trees. Occasionally we have a cold winter when there is very little moisture in the land and no snow. Under such conditions the roots of trees are very liable to serious injury and only those that are exceedingly hardy will live. The degree of hardiness of seedlings from Vermont or French seed is rather doubtful and they are seldom if ever as hardy as the more commonly grown varieties of apples of this section which are grafted on them. For this reason we will sometimes have severe losses from the root killing of trees when the tops are apparently not injured at all. These facts have led nurserymen to look for a more hardy root for their trees, and has resulted in the use of seedlings of the *Pyrus baccata* (known also as the wild crab of Siberia) of which the common yellow and red Siberian crab apples are types, and of hybrids of these, such as Transcendent, Brier Sweet, Virginia and Florence, which are commonly sold as crab apples. Experience with the seedlings of *Pyrus baccata* seems to show that while some of the cultivated varieties are well adapted to it, others do not grow satisfactorily when grafted on this stock, but these experiments have not been continued long enough to get conclusive results. Seedlings from the hybrid crabs seem to be better adapted to most of our cultivated apples than the pure *Pyrus baccata*, and at present form the most promising source for hardy stocks, since seed of pure *Pyrus baccata* is not so easily obtained.

For the most severe situations in the states of this section and Manitoba it would undoubtedly be a good plan to grow only the hybrid crabs and have them grafted on pure *Pyrus baccata*.

On account of the danger from root killing, due to the cions being grafted on tender roots, it has been customary for many years for orchardists to plant trees quite deep, and in this way to protect the roots and to encourage the sending out of roots from the cion, the roots from which are undoubtedly as hardy as the tops of the trees. Root killing, when not fatal, often manifests itself in the spring by the trees showing considerable weakness, and having a set-back for several years and finally recovering. In such cases it is very probable that the seedling root on which the tree was grafted was killed in winter, and that there were a few roots from the cion above the seedling root, which have increased in size until they have finally become able to take care of the tree.

The merits of root-grafted trees and budded trees have been discussed for many years, but whatever the merits of these trees may be in other places, it is undoubtedly true as between them that root-grafted trees are best for this section, and this is especially true where the roots are not of the hardiest.

It is customary for nurserymen to limit the term root-grafted trees to those that are grafted out of the ground in winter and to use the term crown-graft for trees that are grafted on seedling roots that are first established in the ground and grafted near the surface of the land in the spring. As used here the term root-grafting applies to both forms.

Planting.—Under ordinary circumstances the soil should be as carefully prepared for an orchard as for a first-class corn crop. The work of planting can be most easily done by furrowing out with a heavy plow one way and marking out the other way and planting the trees at the intersections. This will do away with much hand labor in digging the holes. If it is necessary to set the trees into the subsoil, and it often is, then in digging the holes the top soil should be kept separate from the subsoil and it should be put back into the bottoms of the holes, so as to be in contact with the roots. The roots should be evenly spread out and the fine top soil carefully worked in among them, so as not to leave any air spaces. If the soil is dry it can hardly be made too

solid around the roots, and in any case it should be packed reasonably firm.

Occasionally it may be desirable to set out trees in sod land as, for instance, when planting on steep bluffs. In such places it is seldom advisable to break up the sod, but holes should be dug big enough to easily take in the roots of the trees, and the sod should be spaded up for a distance of three feet from the tree on all sides and the soil about the tree mulched. This loosening of the soil should be done each year.

The best time for planting trees is in the spring, and the work should preferably be done as early as the soil can be readily worked, but it may be continued so long as the trees remain in a dormant condition. Some very successful Minnesota orchardists have practiced autumn planting of late years. In such cases, however, it is customary to plant the trees in autumn and then lay them flat on the ground and cover with earth. When this is done a stake should be set by the top of the tree so that the tree can be easily found in the spring when it should be raised up as soon as the ground has dried out. This method of planting has the advantage of permitting the work to be done in autumn, and in the hands of experienced cultivators is a reasonably safe method to follow.

It is often of some advantage to get trees in the autumn even if they are not to be planted out until spring. In such cases the trees should be cared for over winter by planting them out temporarily close together in trenches. This is termed "heeling in." (Figure 1.) To do this successfully a

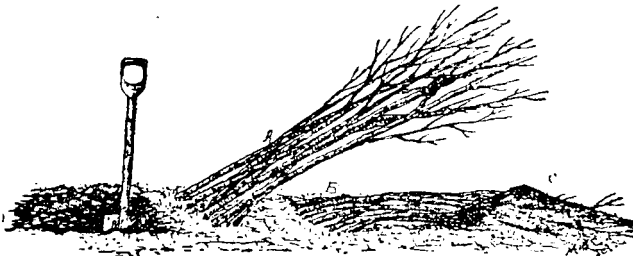


Figure 1. Various stages of "heeling in." A. Row of trees with roots covered; B, a row of trees bent down and covered with earth at C.

piece of mellow, well drained ground should be selected. A

trench should be dug about two feet deep and three feet wide; then the trees should be put in a few at a time in a sloping position, and covered so deep and firm that they cannot dry out. This method of "heeling in" is illustrated in Figure 1, which shows the various stages of the operation. After the roots are well covered it is a good plan to bend the tops to the ground and cover them all with earth which protects from winter killing and also from any injury from mice or rabbits.

Depth to Plant.—In the best locations in this section apple trees should be set about four inches deeper than they grow in the nursery. In very light, dry soil they should be planted about 12 inches deeper than they naturally grow. On steep hill sides they must be planted deeper yet, and occasionally it may be desirable to set them out 20 or more inches deep, in such places. This is for the purpose of affording protection to the roots, and has frequently proven exceedingly helpful.

The proper distance between trees will depend somewhat upon the varieties. Trees like the Hibernial, that are very vigorous and spreading in their growth, should in favorable locations be planted not nearer than 25 feet apart each way. In similar locations the Duchess of Oldenburg should be planted about 20 feet apart. It is desirable to so set the trees that they will break joints and rows run Northeast and Southwest. Planted in this way one tree will somewhat shade the trunk of that joining on the north, and will have a tendency to prevent sun scald.

Cultivation.—The best method of cultivating orchards is undoubtedly what is known as clean culture, i. e., keeping a dust blanket on the land, to protect from drouth. This will require frequent stirring of the surface soil, but has proven most successful under average conditions. The chief objection to this method is that it leaves the ground bare in winter, but this should be overcome by the use of a little mulch about the trees in winters when the ground is not covered with snow.

If it is desired to grow crops in orchards, and occasionally it may be best to do so, only hoed crops should be grown, and such as do not require the working of the soil in

September. Good crops for this purpose are corn, early potatoes and squash. Small grains should never be sown in orchards for a crop. Occasionally, however, it may be desirable to sow oats in orchards during the latter part of July so that they will make a growth of perhaps 12 inches by the time winter sets in. This growth will hold the snows and afford some protection to the soil from winds and to some extent will prevent root killing. On some hillsides constant cultivation cannot be practiced, owing to the erosion of the land by water as soon as the humus is worked out of the soil. In such locations it is often desirable to use a cover crop, and for this purpose buckwheat is excellent, and occasionally it may be desirable to seed down the orchard to clover, but in such cases the orchard should not remain in sod for more than two years, when it should be broken up. It is a good plan under average conditions to plow the orchard late in autumn. This leaves the soil loose and light and acts much as a winter mulch on the soil. In the case of very steep hillsides where it is not practical to break up the sod the trees may be cultivated by mowing the grass between them and piling it up around their trunks. If, however, there is not sufficient grass to keep the weeds down near them then this should be done by hand-hoeing.

Forming the Tree.—Whatever may be the shape of the tree when it is received from the nursery it will need careful attention in the orchard. As a rule in the best Minnesota orchards the trees branch close to the ground, but I am inclined to think that under favorable conditions, all things considered, it is best to have the branches come out about three feet from ground, as this allows of easy cultivation close to the trees, but in such cases the trunks should always have artificial protection, and in severest locations it is always desirable to have the trees branch at the surface of the ground. It is important in setting out trees to slightly incline them to the southwest, as the prevailing winds blow from that direction in summer and have a constant tendency to tip them over to a northeasternly direction.

Sun Scald.—One of the most common injuries to which Minnesota trees are subject, and which has caused much loss, is what is known as sun-scald of the trunk, (Figure 2).

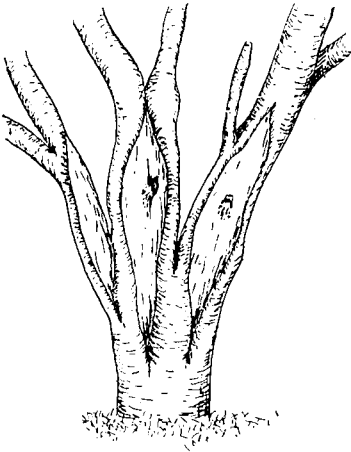


Figure 2. A tree trunk badly sun-scalded.

This occurs almost exclusively upon the southwest sides of the trees and its effect is to cause the bark to die and fall off, thus allowing the opportunity for decay to take hold of the wood. With trees badly injured with this trouble the top may be in perfect health and making a good growth, and the roots also in good condition, and yet the tree will (after a few years) break over and die simply for the lack of a healthy connection between root and top. This injury is caused partly by the warm suns of early spring, and it may be entirely prevented by anything that will somewhat shade the bark on the southwest side. Some of our best orchadists make a practice of protecting the trunks of their trees with burlap, corn stalks or even pieces of board. (Figure 3). Even newspapers wrapped around the trees will entirely prevent it. The branches of trees that incline to the southwest so break up the sunlight that they are seldom sun-scalded.

Rabbits are exceedingly injurious in some sections, and especially in occasional winters when the ground is completely covered with snow. Perhaps the best way of preventing their injuries is to spray the trees with thick lime or cement wash in early winter, so as to cover the bark completely. To this wash should be added a small amount of carbolic acid and some Paris green. Soft soap, thinned to the consistency of paint, with white-wash to which a small amount of Paris green has been added and enough carbolic acid to make it smell strong is also a good tree paint to pre-

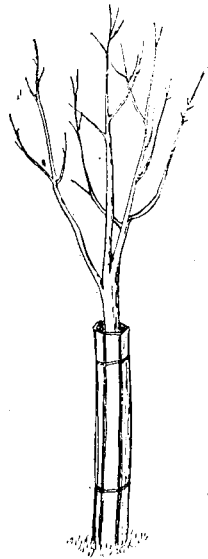


Fig. 3. Tree with trunk protected by lath screen.

vent injury from rabbits. A good way to destroy rabbits in the vicinity of an orchard is to make a protective cover where an abundance of food should be kept so that the rabbits will be encouraged to go there. After it has become a general rendezvous for rabbits, fence it in with a rabbit proof fence and destroy them.

Mice are frequently troublesome by girdling the trees close to the ground. Injury from this cause can generally be

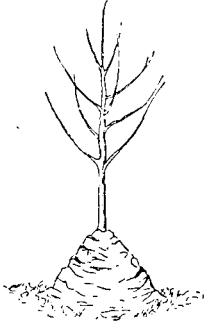


Fig. 4. Tree with bank of earth to protect against injuries by mice.

prevented by making a small mound of earth about the trees in autumn. This should be not over 12 inches high and as steep as the soil can be conveniently piled up. The trunks may also be protected with wood veneer or wire netting. In addition to this it is a good plan where mice are thick to put some mice poison occasionally through the orchard under the mulch. In order to keep this away from other animals it is a good plan to put the material in old tomato cans which are nearly jammed together.

Winter Protection.—Besides protection against sunscald, rabbits and mice it is very important to protect against root killing by seeing to it that the surface of the soil about the trees is protected against deep freezing. Late autumn plowing partly furnishes such protection, but in addition, whenever the snow cover is not over six inches deep about the trees in severe winter weather they should be mulched with coarse manure or litter for a distance of from three to six feet from the trunk and such protection will generally prevent any serious root killing.

The first autumn after the trees are set out it is a good plan to bend them to the ground and cover completely with soil, and in this way give them the best of protection. They should be raised early in the spring.

Manuring.—When trees are young it is seldom that they need manuring on the good soils of this section. After they commence to bear, however, they should receive liberal applications of manure, especially if they are close together.

If the manure is in the form of coarse litter and is applied about the trees in early autumn it will not only act as a fertilizer but will prevent root killing. Barnyard manure is perhaps as good as anything for the orchard that needs manuring.

Apples in Severe Locations.—Where one is in an exceedingly severe location and yet would like to grow some

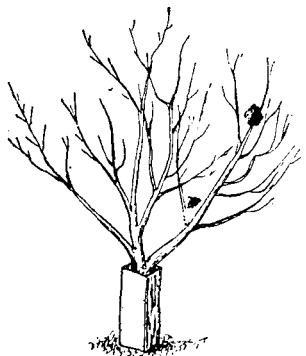


Fig. 5. Tree with trunk boxed. A treatment recommended for severe localities.

apples for home use, the best way of doing so is perhaps to select good trees, plant them rather deep, allowing them to branch about two feet above ground and then inclose the trunk in a box about six inches square made of boards, and fill the box with soil. The ground about them should also be carefully mulched on the approach of each winter. Such treatment will prevent root killing, will protect from mice and largely against injury from rabbits,

and the trunk being so well protected will not be injured by sun-scald or severe freezing, and we find that where such protection is given that although the tops of the trees may be somewhat injured in winter, yet they quickly recover since the trunk and roots are healthy. A dozen trees properly planted in this way will yield far more fruit than a much larger number planted in the ordinary shiftless way.

Top working is a term which refers to the grafting or budding of a tree after it has reached considerable size. It is used ordinarily to distinguish it from root grafting or budding close to the ground. Its purpose is to increase the hardiness of trees by overcoming certain weaknesses in the trunk to which some varieties are especially subject. The Wealthy, for instance, is very likely to be weak in the trunk, and especially in the crotches of the larger branches. If, however, the Wealthy is grafted upon some hardy variety, such as the



Fig. 6. A newly top-worked tree.

Hibernial or Virginia crab, the tree will bear fully as well as on its own trunk, and will undoubtedly be longer lived and more productive.

When it is intended to grow an orchard by top working the stocks should be set out in the spring, to be budded the following August, or to be grafted the following spring. It is generally desirable to allow the stocks to branch before they are top worked.

Fire Blight.—One of the most common diseases that injures apple trees in this section is what is known as fire blight. This causes the leaves and new growth to turn black, generally in June or July, and gives the trees the appearance of having been scorched by fire. It is due to the growth of disease germs in the tissue of the plant. The best treatment for it is to cut and burn all the infested parts. The only way to avoid it is to plant varieties that are not especially liable to its attacks. However, it is doubtful if we have any variety that is not occasionally injured by it, although there is a great difference in varieties in this respect, and some are so liable to its attacks that although they may be perfectly hardy against the colds of winter, yet on account of their liability to this disease they are worthless for planting in this section. The varieties that are here recommended are those that have shown they are reasonably resistant to this trouble.

Importance of Healthy Foliage.—It is important that apple trees have good foliage and remain in a healthful condition throughout the summer, in order to have them bear well the same or in the following years. It is exceedingly important too that trees make a good healthy wood growth if they are to produce good crops of fruit. On this account trees should be looked after carefully, and if they are attacked by foliage eating insects, lice or borers, they should be protected from injury as far as may be. For all foliage eating insects it will be found that Paris green and water is a most excellent remedy. It should be applied in about the same way as for the potato bug. For sucking insects, such as plant lice, the best remedy is probably strong tobacco water. This should be made from raw tobacco and of about the color of strong tea. In the case of young orchard trees

infested with these, the best method of applying it will probably be found to gather the branches together and dip them into a basin containing this material.

Pruning.—Some pruning of apple trees is necessary to give them a good form, but should be avoided as much as possible. By attending to this work early in the life of the trees heavy pruning may be entirely avoided. If large branches must be cut off they should be removed in the latter part of winter or early in spring, before sap starts, and the wounds covered at once. For light pruning, early in June is an excellent time.

When wounds are made on trees by pruning or in other ways, probably the best material to cover them with is grafting wax. In the absence of this, white lead will be found a good substitute. Where there is a considerable wound, as where the bark is stripped off by mice, it is a good plan to cover with grafting wax or white lead and then wrap with burlap. Where this injury is close to the ground, in addition to putting on grafting wax, it is a good plan to cover the surface with soil.

EXPLANATION OF SOME TERMS USED.

The difference between the well-known crab apples and the so-called "apples" of our markets is well known in a general way, but in some cases it is not very clear. The term "crab" is applied in England to small, inferior seedlings of the apple (*Pyrus malus*), while here the same term is used to indicate the crab apple (*Pyrus baccata*), or its hybrids.

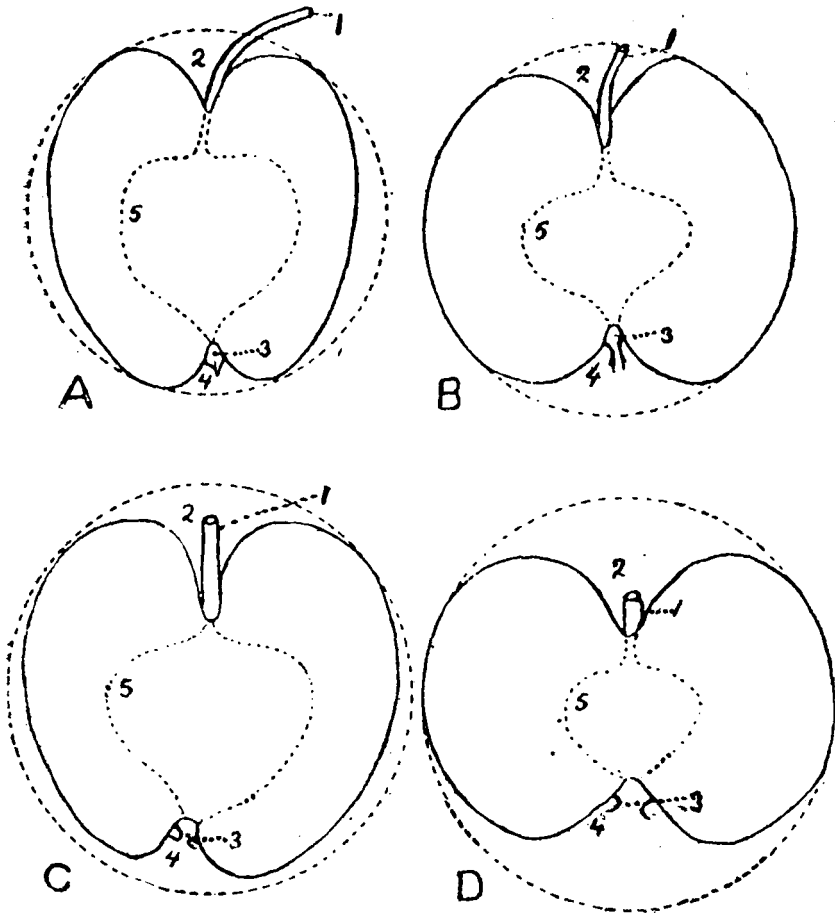
The true apple, (*Pyrus malus*), is distinguished by leaves that are woolly on the underside, woolly calyx and flower stems. Fruit various but always holding the calyx, *i. e.*, the parts of the flower on the end of the fruit, leaves thicker and broader, and the new growth thicker and more woolly than in the crab.

The true crab apple, *Pyrus baccata*, is characterized by smoother and more wiry growth than the apple. Narrower and thinner, longer stemmed leaves than the above, that are scarcely woolly, the flower clusters are more open and not woolly. The fruit is set on long, slender, wiry stems, the seed is enclosed in very hard, close fitting hulls, and the

calyx falls off or becomes loose when the fruit is mature. Hybrids between *Pyrus malus* and *Pyrus baccata* have become very numerous, and as a result of such hybridization we have many varieties that embrace more or less the qualities of each of these species, some of which bear fruit of considerable size and value, such as Transcendant, Virginia, Minnesota and Whitney No. 20.

For describing apples a certain convenient nomenclature has been accepted. It frequently happens that the color, shape and quality of fruits are changed by soil and location. The characteristic appearance of the wood and foliage, however, is less liable to change, and in the identification of fruits it is often necessary to take it into account as well as the fruit, and a good description should include the tree as well as fruit. These terms, as applied to the growth of a tree, are "strong and vigorous," as the Duchess of Oldenburg; "vigorous and slender," as Anisin; "stout and short jointed" as the Yellow Transparent. For the general form of the tree the term "upright spreading" would indicate the Duchess; "spreading" the Hibernial; "upright" Whitney No. 20; "round headed" the Anisin.

In describing the fruit, the word "base" means the part of the apple at the stem end; "apex" the portion at the blossom end; "cavity" is the depression around the stem; "basin" the depression around the flower end; "calyx" the so-called flower in the apex of the apple. The general form is referred to as being "round," "oblate," "conical" and "oblong," which terms are illustrated in figure 7. As regards size, apples are said to be small when two and one-half inches in diameter or under; from two and one-half to three and one-half inches they are termed "medium," and above this, "large."



Different forms of apples. *A*—Oblong; *B*—Round; *C*—Conical; *D*—Oblate. Numbers refer as follows: 1—Stem; 2—Cavity; 3—Calyx; 4—Basin; 5—Core.—Drawing by R. S. Mackintosh.

DESCRIPTION AND NOTES ON APPLES.

Alexander: Size, very large; form, flat, conical, angular; color, orange yellow, striped and nearly covered with deep red; cavity, broad, deep, often slightly russeted; stem, medium; basin, angular, deep; calyx, closed; flesh, yellowish white, coarse, tender; flavor quite acid, rather agreeable; core, large, open; season, November; tree of strong growth, subject to blight and a shy bearer; origin, Russia. A large, handsome red apple and one of the most beautiful when hanging on the tree; at one time quite popular, but it has been found to be lacking in hardness and productiveness.

Anisim: Synonyms Borsdorf, Zusoff, Good Peasant, Swedish Borsdorf; 14M and 18M.) Size, small; form, roundish, inclining to conical; color, greenish, ground nearly covered with very dark red with a bluish bloom and minute whitish dots; cavity, medium, slightly russeted, acute; stem, short, medium; basin, small, wrinkled, shallow; calyx, closed; flesh, white, fine grained, juicy; flavor, pleasant, sub-acid; season, November to January.

Tree a prodigious bearer, young trees upright, spreading with age; limbs long, slender, with a very strong shoulder; leaves narrow, pointed, dark green. Tree unusually free from blight, but no hardier than Wealthy. Selected specimens of the fruit are extremely beautiful and attractive, but blemishes and warty protuberances of the skin and irregularity in size, together with the very poor appearance of the uncolored specimens render it of small value for market, and as its color, quality and season is in direct competition with the Wealthy, the variety does not seem likely to take a large place in our northern pomology. Origin, Russia.

Antonovka: Synonyms, Vargul, 277; German Calville, 324; Russian Gravenstein, 105; Bergamot, 424; 16 M; No. 224; No. 236.) Size, large; form, roundish, angular, flattened at the ends; color, straw yellow, with dots that give the skin a rough appearance; cavity narrow, ridged, deep, russeted; stem, medium short; basin, medium deep, ridged; calyx, closed; flesh, yellow, nearly fine; flavor, pleasant, spicy, sharp acid; core, nearly closed; season, October and November; tree, rather upright, vigorous, hardy; origin, Russia. One of the varieties that are included to blight as young trees, but reasonably healthy as they approach maturity. A fine, large, attractive fruit; one of the best of the Russian importations, and if it was not so very perishable even in cold storage would have come into general popularity.

Avista: Size, medium; form, roundish ovate, including to oblique; color, yellowish green, striped and splashed with brownish red, with numerous dots or spots of white; cavity, regular, rather deep; stem, long, slender; basin, medium, slightly wrinkled; calyx, closed; flesh, greenish yellow, firm, fine grained; flavor, pleasant, sub-acid; core, medium, closed. The tree is inclined to blight severely; it is a very excellent winter apple where it can be grown and is generally shown at our fairs. Origin, originated from seed planted at West Salem, Wis. Introduced by A. J. Phillips of the same place.

Ben Davis: Too well known to need description. This variety is widely grown and generally productive throughout a large section of

this country. In Minnesota it has been grown very successfully in best orchard locations of late years, but is generally regarded by our best horticulturists as being altogether too tender for this section. The fruit is of fair quality when raised here.

Brett: (No. 1). Size, medium to large; form, oblate, slightly angular; color, yellowish green, stripes and splashes of dull red, clean cut, white dots; cavity, broad, regular, deep; stem, short; basin, wide, abrupt, deep; calyx, small, closed; flesh, medium, coarse, nearly white; flavor, rich, sub-acid; season, autumn; tree, vigorous, not productive, moderately hardy; origin, Minnesota. A really excellent variety that has been overshadowed by the Wealthy, which excels it in every point except in freedom from blight.

Breskovka: Size, small to medium; form, roundish to almost oblong; color, greenish yellow; cavity, regular, medium deep, slightly russeted; stem, medium long; basin, shallow; calyx, closed; flesh, white, coarse grained, crisp; flavor, sub-acid, good; season, August and September; tree, vigorous, medium upright grower, with large foliage, of first degree of hardiness; origin, Russia. A productive variety of the Yellow Transparent type, inferior to that sort of quality, but not so subject to blight. Its season is about with the Duchess and as it is much inferior to that variety in usefulness it will probably cease to be propagated.

Bode: Size, medium; form, oblate, slightly oblique, trifle angular; color, greenish white, cavity russeted often overrunning, light dots; cavity, rather small, medium deep; stem, short; basin, broad, medium deep, wrinkled, wavy; calyx, half open, erect; flesh, white, firm, medium fine; flavor, sharp acid; season, summer; tree, moderately vigorous, healthy, productive, of first degree of hardiness; origin, Russia. Tree very hardy and healthy and a good bearer. Fruit inclined to be irregular in shape. Since it ripens about with Duchess it loses much of its value for either home use or marketing, as this latter variety is more desirable.

Brier Sweet: Synonym, Van Wyck. Size, medium for a crab; form, oblate conical; color, yellow, overspread with light, mottled red; cavity, rather narrow, deep; stem, slender, medium long; basin, medium wide, regular, deep; calyx, small, closed, erect; flesh, fine grained, yellowish white; flavor, sweet; season, August and September; tree, large, vigorous, very productive, hardy; origin, Wisconsin. The tree is exceedingly hardy and long lived everywhere, with peculiar dark green twigs of rather slender growth. A heavy annual bearer, like the Longfield apple. In some seasons affected with scab on both leaf and fruit, but as nearly "blight proof" as any member of the apple family. A nice, sweet apple when just ripe, and perhaps the best of all the crabs for making sweet pickles.

Christmas: Synonym, No. 310. Size, small; form, round, conical, often oblique, slightly angular; color, yellow, with red stripes at base and deep clear red towards the eye; cavity, medium, rather narrow; stem, medium; calyx, closed on a flush wrinkled or narrow ribbed surface; flesh, white, fine grained; flavor, pleasant acid; season, December; origin, Russia. A small fruit that is in every way inferior to several of the better known kinds.

Charlamoff: Synonyms, Peterson's Charlamoff; Champanskoe; Pointed Pipka, 361; Champagne, 112 M. Size, medium to large; form, oblate to oblong, conical; color, greenish yellow, striped and splashed with red and covered with a heavy bluish bloom that easily rubs off; cavity, medium deep, often with large lobes; stem, medium slender;

basin, deep, wrinkled; calyx, nearly closed, segments large; flesh, greenish white, tender; flavor, pleasant, vinous, sub-acid; season, September; tree, strong, regular, spreading grower, thick topped, of first degree of hardiness. The whole tree has a distinct yellowish green aspect; leaves large lightish green with many red veins. This is different from Charlamoff, described by R. Schroeder of Moscow, or the variety received from Russia by A. G. Tuttle, of Baraboo, Wis., and J. B. Mitchell, Cresco, Iowa. The tree is exceedingly hardy; will blight about as much as Wealthy; a moderate annual bearer. Fruit of fine uniform size and even the uncolored specimens have the pleasant vinous flavor of the variety. Very similar to Duchess in size and coloring, but hangs better to the tree; sometimes is conical in form; has a firm flesh and a bloom that is quite distinguishing. Its habit of annual bearing makes it especially useful in the home orchard. Origin, Russia.

Cross: Synonym, No. 413. Size, medium; form, oblate conical; color, greenish yellow, nearly covered with light carmine dotted with green specks, with bloom; cavity, deep, regular, somewhat russeted; stem, medium; basin, well defined, nearly smooth; calyx, large, closed; flesh, light yellow; flavor, slightly sub-acid; season, October to December. Tree very spreading, medium grower, wood grayish, of first degree of hardiness. Origin, Russia. A good healthy, productive tree bearing uniformly large attractive fruit; would be valuable for home or market if it was not always affected by a rot at the core that begins as soon as fully mature and will frequently occupy the whole interior while the outside is still clear and beautiful.

Dartt's Hybrid: Size, large for a crab; form, round, conical; color, yellow, mostly covered with faint red stripes, yellowish dots and a whitish bloom; cavity, rather narrow; stem, long and slender; basin, shallow, deeply wrinkled; calyx, closed; flesh, yellow, medium fine; flavor, sub-acid, fair; season, September and October. Tree, vigorous, upright, exceedingly hardy and free from blight, productive. The fruit is desirable for home use but is not well adapted to commercial purposes, as it is too large for what the market demands in a crab and not good enough for dessert or sour enough for kitchen use. Originated at Owatonna, by E. H. S. Dartt, from seed of Tetofsky.

Duchess: Synonyms, Duchess of Oldenburg, Oldenburg, Arabian, 184; Borovinka, 245; White Krim Anisette, 185; Glass Green; Schroeder's Charlamoff. Size, large; form, roundish oblate; color, greenish yellow with red stripes; cavity, regular, medium deep, narrow, light russeted; stem, medium; basin, broad, corrugated; calyx, half open; flesh, light yellow, rather coarse; flavor, rather sharp acid; core, medium, closed; season, August. Tree medium, upright. The standard of hardiness in Minnesota and more generally grown than any other variety. Exceedingly productive, of large, highly colored acid fruit that is a great favorite for cooking purposes. Origin, Russia.

Early Strawberry: Size, medium for a crab; form, nearly round, somewhat angular; color, greenish yellow ground, overspread with carmine in stripes and splashes; cavity, rather narrow, medium deep; stem, long and slender; basin, very shallow or none at all, corrugated; calyx, closed; flesh, medium fine, nearly white, becoming mealy; flavor, mild, sweet, good; season, August 1 to 10. Tree, large, hardy, productive, occasionally blights severely. The fruit is liable to water core when nearly ripe. A good fruit for the home orchard, but of little value for marketing.

Estelinae: Size, medium; form, oblate; color, bright carmine,

striped with dark bright red, very pretty; cavity, medium, narrow, abrupt, deep regular; stem, medium to long slender; basin, wide, abrupt, wrinkled, medium deep; calyx, large closed, segments usually long and often reflexed; flesh, nearly white, medium fine, tender, juicy; flavor, sub-acid, good; season, September. Tree, crooked, moderate grower, spreading top, very productive. Origin, Minnesota.

A recently introduced seedling that has not been widely tested but appears to be valuable.

Fameuse or Snow: Size, small to medium; form, round, flat; color, pale greenish yellow mixed with faint stripes of red, blotches and short stripes of deeper red on shady side, fine deep red on sunshine side; cavity, funnel shaped; stem, short, slender; basin, shallow, nearly smooth; calyx, small, closed; flesh, white, tender, juicy, slightly perfumed; flavor, sub-acid, extra good with delicious after taste; season, October to January and often later; origin, Canada.

Fruit often scabby but much less here than in the Eastern states. In Minnesota it is useful only in the very best orchard locations in the Southeast portion of the state, and there only as a fancy fruit for the home table.

Florence: Size, medium for a crab; form, oblate often oblique; color, carmine, when wall colored parts of the surface shaded in stripes extending from base to apex; cavity, medium, white, and deep, russeted; stem, slender, long; basin, very shallow, corrugated; flesh, yellowish, medium fine; flavor, acid, excellent for cooking; season, last of August. Tree, moderately vigorous, hardy, spreading, exceedingly productive, commences to bear young, and inclined to overbear. Originated with Peter M. Gideon of Minnesota. A variety that should have greater attention and a larger planting than it has so far received. Valuable for early market, as well as home use; in every way a profitable variety.

Gideon: Size, medium; form, roundish, conical; color, light straw yellow, dotted with gray and brown dots; cavity, rather deep, somewhat angular; stem, long; basin, medium, wrinkled; calyx, small, closed; flesh, yellowish white, rather fine, juicy; flavor, pleasant, slightly sub-acid, good, often water cored; season, autumn; origin, Minnesota, by Peter Gideon. Has been generally propagated and before the public for a long time, but does not seem able to make a place for itself. Will probably soon drop out of notice.

Minnesota Gilbert: Synonym, Gilbert. Size, medium; form, oblate; color, greenish yellow, mostly covered with dark red stripes and splashes and thickly set with small grayish dots; cavity, medium, smooth, green; stem, short; basin, broad and shallow; calyx, open; flesh, yellow, fine; flavor, pleasant acid; season, September. Tree, as hardy as Duchess and productive, moderate grower. Tree and fruit resemble Duchess and it comes in just after this sort. Origin, unknown, but believed to be Russia.

Belongs with a long list of seedlings and excellent varieties of the same season and general character.

Hibernal: Synonyms: No. 378; Lieby; Recumbent; 240; Juicy Burr; Romneskee; Silken Leaf; Romna, 599; Ostrakoff. Size, large; form, oblate, nearly flat, often irregular; color, greenish yellow ground with stripes and splashes of red, with much russet in and around the cavity; cavity, rather narrow, abrupt, deep; stem, medium; basin, wavy corrugated, rather narrow, medium deep; calyx, rather large, closed; flesh, yellowish, coarse; flavor, sour, with some astringency; valuable for cooking; season, late autumn and early winter.

Tree, of first degree of hardiness and a vigorous, spreading grower. Origin, Russia.

It is productive and healthy and perhaps the hardiest of the large apples. Exceedingly valuable as a stock upon which to work the more tender sorts. A very useful variety in all northern sections. In the southern part of the state its usefulness is impaired by the frequent roughness or irregularity of the fruit, and the fact that it becomes covered with brown spots in a very few days after being placed in barrels. By giving the apples plenty of air they will keep for a long time, although becoming wilted and unfit for sale.

Haas: Synonyms: Fall Queen, Gros, Pomier. Size, medium to large; form, roundish oblate, conical, slightly irregular; color, greenish yellow and red, mostly becoming red when fully ripe; cavity, broad, medium, shallow with russet lines, often reaching over base; stem, short; basin, medium, irregular, wrinkled; calyx, open; flesh, yellow, rather coarse, dry; flavor, acid, fair, with a very distinct tang; season, late autumn. Tree, free growing, vigorous and productive, of second degree of hardiness. Origin, Missouri. A very old variety that seems to have no important place since the general introduction of the Wealthy, but which is doing exceptionally well in some locations in southern Minnesota.

Hyslop: Size, medium for a crab; form, nearly round, regular color, yellow ground with heavy shadings of deep crimson and some splashes of maroon, overspread with a heavy blue bloom; cavity, rather narrow, acute, medium deep; stem, long, slender; basin, shallow, corrugated and wrinkled; calyx, reflexed, half open; flesh, fine, yellow, firm; flavor, astringent, becoming mealy; season, October or December. Tree, vigorous, of second degree of hardiness. Origin, American. The red fruit grows in clusters; which gives the tree an exceedingly ornamental appearance when loaded with ripe fruit.

The tree is very capricious, frequently blighting to death in a single season after attaining maturity, and for this reason has fallen into general disrepute among orchardists, although no fruit is more sought after or commands a better price in the market and nothing has yet been introduced that fully takes its place. It might perhaps be profitably planted for market in bluff orchards, as the fruit always commands a fancy price.

Iowa Beauty: Size, large; form, oblate oblique; color, yellow, striped and splashed with carmine, a few small white dots; cavity, broad, deep, sometimes russeted; stem, short; basin, broad, abrupt, wavy corrugated; calyx, large, half open, segments reflexed; flesh yellowish white, medium fine, juicy; flavor, sub-acid, good; season, August and September, later than Duchess. Origin, Charles City, Iowa, by C. G. Patten. A handsome fruit; said to be a seedling of Golden Russett; not tried sufficiently in this section to determine its value.

Kursk Anis: Synonyms: 984, Russian Green, Blue Anis, Red Anis, Yellow Anis, Pink Anis, Striped Anis; Getman's Bean. Size, small to medium; form, oblate, angular; color, green, often white dots, striped and splashed with carmine; cavity, broad, deep, regular; stem, medium; basin, shallow, wrinkled and corrugated; calyx, small, closed; flesh, yellowish white, firm and fine; flavor, sub-acid, good; season, autumn. Tree, vigorous, rather upright, hardy. Origin, Russia. The Anis family is reasonably healthy and of the first degree of hardiness. If the fruit was larger and more regular in form it would be of great value all over the north, as its quality approaches that of the Fameuse.

Kaump: Size, small to medium; form, nearly round, slightly tapering to eye, regular; color, green, with blush of dark red, many large white dots; cavity, rather narrow, medium deep, regular; stem, rather long, slender; basin, narrow, shallow, slightly corrugated; calyx, half open, recurved; flesh, nearly white, fine; flavor, sub-acid, fine; season, September to January. Tree, quite upright, exceedingly productive, healthy and about as hardy as Longfield. Origin, Wisconsin. A variety that seems to deserve more attention than it has so far received in Minnesota, as it is nearly as early and heavy a bearer as the Longfield, and the fruit, while not so attractive in color, will keep two months longer, or until nearly mid-winter. Should be very useful in the home orchard and of some value in the market.

Long Arcade: Size, medium; form, oblate, a little angular; color, greenish yellow, overspread with dark red, numerous inconspicuous fine white dots; cavity, medium broad, acute, russeted; stem, medium long, slender; basin, shallow, broad, wrinkled; calyx, medium open; flesh, white, coarse; flavor, mild, sub-acid, good; season, August to September, later than Duchess. Tree, very upright, spreading with age. Inclined to long, smooth branchless stems. Blights but little. Begins to bear early but is slow in coming into full bearing; of second degree of hardness. Origin, Russia. A variety that might be popular for family use in some sections on account of its pleasant flavor, but it is not sufficiently productive for the commercial orchard.

Lowland Raspberry: Synonyms: Lievland Raspberry. Size, medium to large; form, round conical to round oblate; color, striped, splashed and shaded with red, showing dots through the color; cavity, medium broad, rather deep; stem, medium; basin, small, wrinkled; calyx, small closed or half open; flesh, stained with red, fine, tender, juicy; flavor, sub-acid, extra good with very pleasant after taste; core, medium open; season, August. Tree, medium upright, round topped, excellent. Origin, Russia. This variety is warmly commended by all who are fruiting it in this section and seems likely to become one of the popular standard sorts for the home orchard. The tree is of second degree of hardness but very resistant to blight. Bears early, but comes slowly into full average bearing habit. Fruit very beautiful. Begins to ripen some days before Duchess, and continues for a long season. Retains its freshness and flavor in the cellar most remarkably for an early fruit. Often confounded with the Lubsk Queen.

Lubsk Queen: Size, medium to large; form, rather round and flattened at the ends; color, polished waxy white, with bright blush on sunside and numerous fine irregular gray dots showing through skin; cavity, smooth, regular, greenish; stem, medium long; basin, broad, much wrinkled; calyx, closed, segments long; flesh, nearly white; flavor, pleasant acid; season, August. Tree, medium upright, good grower, moderately hardy. Origin, Russia. This variety has often been counfounded with the Lowland Raspberry, from which it is quite distinct; one of the chief differences is that on it the red coloring is a suffused blush, while on the former it is in splashes and stripes of red. The Lowland Raspberry is so much superior to this in quality and general usefulness that this will not find much of a place with planters. Its beauty is its only strong feature.

Longfield: Synonyms: 161, 57 M, English Pippin. Size, small to medium; form, roundish conical or oval; color, shady side yellow with greenish bloom, sunny side yellow and red, with small gray dots in skin; cavity, deep, smooth, occasionally russeted; stem, long; basin,

flat ribbed; calyx, half open, segments rather long; flesh, white, fine grained; flavor, slightly sub-acid, aromatic, excellent; seeds, numerous; core, closed; season, autumn and early winter. Tree, moderately vigorous, spreading, drooping grower, grayish leaves and shoots. Origin, Russia. Rather less hardy than the Wealthy and as much inclined to blight. A variety that stands at the extreme of early, heavy and annual bearing, and needs the best of care to keep it from exhaustion. If the fruit was benefited by cold storage, and was not inclined to rot at the core, it would be of great value for market. If sent to market immediately after it has fully colored it is very attractive and makes a fine stand fruit. It must, however, be well grown and well colored or it will take a very poor place. It should be planted in every home orchard in favorable locations.

Lyman's Prolific: Size, large for a crab; form, roundish, slightly conical; color, yellow and red, striped and splashed; cavity, narrow; stem, long and slender; basin, medium, wrinkled; calyx, closed; flesh, yellow, rather fine; core, small, closed; flavor, mild acid, slightly acid, fair (used for cooking); season, September and October. Tree, a vigorous, spreading grower. Originated by H. M. Lyman, Excelsior, Minn. The original tree has proven a heavy and regular bearer and hardy for many years. The fruit is liable to grow too large for preserving purposes.

Mary: Synonym: Gideon No. 6. Size, large for a crab; form, round; color, deep purplish red; cavity, medium; stem, medium; basin, broad, medium deep; calyx, closed; flesh, white, fine; flavor, pleasant acid; season, September. Origin, Minnesota, by Peter Gideon. A moderately productive large red crab apple. This fruit is the variety commonly known as Gideon No. 6, but is very nearly if not quite the same as Mary and the name is here changed by wish of the originator, the late Peter M. Gideon, the originator of both sorts, who thought it probably Mary.

Milwaukee: Size, medium to large; form, smooth, roundish, oblate; color, yellowish green, striped and splashed with purplish red; cavity, rather broad, deep, brown russeted; stem, short; basin, abrupt, deep; calyx, large, partly open; flesh, greenish yellow, rather fine, tender, juicy; flavor, agreeable acid; core, small, a little open; season, November and later. Tree, vigorous, spreading grower, but of doubtful hardiness. Origin, Milwaukee, Wis., by Geo. Jeffrey. Has had comparatively little trial in Minnesota.

Minnesota: Size, very large for a crab; form, round to round oblong; color, light yellow, often splashed or mottled with blush and yellow on sunside when allowed to fully ripen; cavity, smooth, medium deep, regular; stem, rather long, slender; basin, shallow, corrugated; calyx, large closed; flesh, cream white, fine grained, juicy; flavor, mild, sub-acid, slightly aromatic, good; season, October to January. Tree, a spreading grower and exceedingly hardy; does not commence fruiting as early as the hybrids generally, but bears liberally with age and is growing in favor especially on limestone soils. One of the most desirable of its class for general planting. Its size midway between the apple and crab debars it from the market, but its fine dessert and keeping qualities should commend it for planting in every home orchard. Origin, Hesper, Iowa.

Martha: Size, large for a crab; form, oblate, often slightly oblique; color, yellow with heavy blush of light red and many light dots, often nearly covered with bright light red; cavity, medium white, and medium deep, russeted; stem, rather long and slender; basin,

shallow with some wrinkles; calyx, small, half open; flesh, rather fine, yellowish, firm; flavor, acid, exceptionally fine for cooking; season, September and October. Tree, vigorous, pyramidal shaped, foliage and branches light colored. Originated by Peter M. Gideon of Minnesota. Tree generally healthy but in some places has shown a disposition to blight to death at maturity like the Hyslop. Blossoms very full when young, but does not bear till attaining some age, and does not seem to have fully established its claim as a generally productive sort. A most satisfactory fruit for either home use or market.

McMahon: Synonym: McMahon's White. Size, large to very large; form, roundish, tapering towards the eye; color, greenish pale yellow to nearly white, often with a suffused pale blush on sunside; cavity, regular deep, medium, russeted; stem, medium short; basin, rather narrow, deeply wrinkled; calyx, open; flesh, pale yellow, medium fine; flavor, fair, rather sharp acid; core, medium, half open; season, September and October. Tree, a spreading grower, does well in south-eastern Minnesota and parts of Wisconsin; of second degree or less in hardiness. A somewhat tardy bearer, blighting rather more than Wealthy. Origin, Wisconsin.

Malinda: Size, medium; form, oblong, tapering toward eye, slightly oblique; color, green, blush of reddish brown, some light dots; cavity, narrow, abrupt, deep, regular; stem, medium; basin, waved, narrow, medium deep; calyx, small, closed; flesh, hard, medium fine, greenish; flavor, sweet, fair, good; seeds, abundant; season, late winter. Tree a straggling grower, very free from blight and about as hardy as Wealthy. As a root grafted tree it is a very tardy bearer, but very prolific when about 15 years in orchard. Top worked on suitable stocks, such as Hibernial, Transcendant or Virginia it is uniformly transferred into a very early and abundant bearer. Wherever grown in Minnesota it is giving great satisfaction as a long keeping apple of popular, although not high quality. The lack of acidity limits its culinary use, but its size, beauty and smoothness are very strong points in its favor and as a top-worked tree it is perhaps the most useful of the long keeping sorts adapted to Minnesota. Moderately hardy. Origin, Vermont.

Newell: Synonym: Newell's Winter. Size, medium to large; form, oblate, tapering towards eye, somewhat angular; color, greenish yellow, with blush of carmine, numerous light dots; cavity, broad, deep, waved, corrugated; stem, short; basin, medium wide and deep, waved and corrugated; calyx, erect, half open; flesh, yellowish, medium fine, firm; flavor, rich sub-acid, approaching Grime's Golden; season, winter. Tree, a very thick and close topped, of second or third rate hardiness, and moderate productiveness. The fruit while of rich high quality and a good keeper, is usually troubled with some imperfection of skin that seriously impairs its appearance, otherwise it could be a fine market apple. Origin, Wisconsin.

Northwestern Greening: Size, large, often very large; form, round or round conical; color, green, becoming yellowish green, when ripe, it has large light colored spots; cavity, regular, medium deep, narrow, russeted at bottom; stem, medium; basin, medium, slightly wrinkled; calyx, closed; flesh, greenish yellow, rather fine, firm; flavor, sub-acid, good; season, winter. Tree, of second to third degree of hardiness and one that should be given plenty of room in the orchard in order to secure fair, well developed fruit. Rather tardy bearer, but prolific when fully mature. Fruit very smooth and attractive and taking a place

second only to the Wealthy as an all around late market apple. Origin, Wisconsin.

Rapidly coming into great popularity in this state, but has not had its hardiness as fully tested as could be desired.

Ostrekoff: Synonym: 4 M. Size, medium; form, round to slightly conical; color, yellowish green, shaded brown on sun side, many grayish spots, often covered with blackened fungus blotches; cavity, medium, often with a bunch on one side; stem, long, thin; basin, shallow, wrinkled; calyx, half open; flesh, yellowish white, fine; flavor, sub-acid; season, early winter. Tree, vigorous grower, subject to blight, does best on high limestone and clay soils, moderately hardy. Origin, Russia. Will not probably be propagated much hereafter, as the tree has been a disappointment in health and the fruit in keeping qualities.

Okabena: Size, medium; form, oblate to round, regular; color, yellow ground, striped and splashed with carmine, which is heavy on sun side; cavity, broad, regular, medium deep, russeted; stem, medium; basin, broad, rather abrupt, moderately deep, corrugated at bottom; calyx, closed; flesh, yellowish white, rather fine, crisp, juicy; flavor, sprightly, sub-acid, good; core, closed; season, September and October. Tree, a spreading grower, exceedingly hardy, productive. Origin, Nobles County, Minnesota. A very useful variety either in the home orchard or for market to fill the demand for Duchess after the true Duchess has gone. It so closely resembles that popular sort as to sell readily for it, and not disappoint the buyer. Not so sour as the Duchess and a very excellent dessert apple.

Phoenix No. 50: Size, medium large; form, oblate, oblique; color, green with stripes and splashes of red, russeted in cavity; cavity, broad, regular, deep, russeted; stem, stout, medium; basin, broad, medium deep, furrowed; calyx, large, wide open; flesh, nearly white, medium fine, firm; flavor, sub-acid, fair; season, winter. Tree, vigorous, spreading, productive, of promising hardiness. Only tried in a small way in Minnesota and chiefly at the Owatonna Experiment Station, where it has given great promise of becoming a decided addition to our list of desirable apples. Origin, Illinois.

Patten's Greening: Synonym: Duchess No. 3. Size, medium to very large; form, round or oblate, often slightly oblique, somewhat angular; color, green, often with blush of red or brown, numerous large white dots, russeted in cavity; cavity, wavy, broad, medium deep; stem, short; basin, broad, abrupt, medium deep; calyx, open; flesh, yellowish white, coarse grained, firm; flavor, pleasant acid, not rich; core, small; season, late autumn and early winter. Tree, vigorous, spreading, of first degree of hardiness. Origin, Iowa, by C. G. Patten. Perhaps the most fully satisfactory tree in health, hardiness and bearing habit for this section of any of the list. The fruit is very smooth and attractive, keeps as long or nearly as long as Wealthy, and does well in cold storage. A variety that has proved to be very profitable in the home orchard or for market, and deserves the fullest confidence of our planters.

Peerless: Size, medium to large; form, oblate to oblate round; color, yellowish green, with stripes and splashes of carmine, numerous small, whitish spots in skin; cavity, broad, deep, smooth, usually with peculiar greenish stripes radiating therefrom; stem, medium long; basin, medium wide and deep, wrinkled and corrugated; calyx, large, closed; flesh, yellowish white, fine grained, becomes tough as it ripens; flavor, sub-acid, agreeable but not rich; core, small; season, early winter. Tree, vigorous, upright, leaves large and hang on until late

autumn or early winter, twigs woolly, very hardy. Originated by J. G. Miller, Minnesota. Comes very slowly into bearing and but few trees beside the original seedling have as yet shown ample productiveness. The fruit lacks the beauty and smoothness of the Wealthy as well as its fine flavor, and the variety does not at this time give promise of finding any important place in our horticulture. Some growers have succeeded in fruiting it by girdling it.

Peter: Resembles Wealthy so closely in fruit that it is difficult if not impossible to distinguish it from that variety. The tree, however, is somewhat more upright in growth and the foliage is perhaps lighter in color. Practically of the same season as the Wealthy in the experience of the author, but thought by some to be later in ripening.

Pewaukee: Size, large; form, oblate or round, angular; color, yellowish green, striped and shaded with dull red, very thickly covered with whitish dots toward the eye, overlaid with a bluish bloom; cavity, rather small, russeted, often half filled with a fleshy bunch on the stem; stem, short; basin, medium, slightly corrugated; calyx, rather large, open; flesh, yellowish, rather coarse, firm, juicy; flavor, sub-acid, fair; season, winter. Tree, spreading, round-topped, vigorous. Doing well in eastern Wisconsin, but has not proved especially desirable in Minnesota, although it is occasionally found here in good condition in very favorable locations. Of third degree of hardiness. Origin, Wisconsin, by Geo. P. Pfeffer.

Pride of Minneapolis: Size, medium for a crab apple; form; angular conical; color, when ripe, lemon yellow, becoming rusty when over-ripe; cavity, medium; stem, very long, slender; basin, broad, shallow, wrinkled; calyx, closed; flesh, deep yellow, fine, firm, juicy; flavor, quite acid and slightly acrid; season, October. Tree, hardy, very free from blight; heavy bearer. The fruit is excellent for jellies or canning, and when mixed with sweet apples it makes a fine cider. Unfortunately its color prevents its becoming a popular market sort. Origin, Minnesota, by Wyman Elliot.

Plumb's Cider: Size, medium or larger; form, round conical or ovate, often oblique; color, greenish yellow, with red stripes, highly colored specimens, show many white or gray dots; cavity, smooth, narrow, deep; stem, short; basin, small, shallow; calyx, small closed; flesh, greenish yellow, loose, tender; flavor, sub-acid, good; season, October to January. Tree, vigorous, spreading, standing well in many places in southern Minnesota. Origin, Wisconsin, by J. C. Plumb. One of the best varieties of the old list, but not worthy of general planting.

Red Siberian Crab: Size, small, one inch in diameter; form round; color, yellow with one side scarlet; flavor, sour, acrid. Tree, free growing and handsome, fruit excellent for cooking, though too small for marketing purposes. One of our hardiest trees and it often succeeds where other sorts fail. Seedlings of it will probably be found valuable as stocks for some varieties at least, to prevent root killing. Origin, France.

Repka Malenka: Size, small; form, round oblate or conical, tapering towards the eye; color, green with stripes and splashes of dull red, some fine white dots; cavity, rather broad, medium deep, regular; stem, medium; basin, shallow, waved and wrinkled; calyx, medium, nearly erect, closed; flesh, medium fine, greenish white, firm; flavor, sub-acid, mild, inferior; season, winter, keeps into the summer. Tree, upright, symmetrical and of slow growth. Doing well in southern Minnesota. While of second degree of hardiness this variety is perhaps as hardy

as any long keeping sort, and comes into bearing early. A prodigious bearer, much improved by thinning and good care, fruit not large enough for market and of inferior quality but very useful in late winter and spring. Origin, Russia.

St. Lawrence: Size, large; form, oblate to oblate conical; color, green with stripes and splashes of dull red, somewhat ribbed, gray patches and dots; cavity, broad, deep, wavy; stem, medium long; basin, rather deep, regular, nearly smooth; calyx, closed; flesh, white, fine, juicy, tender, good; flavor, sprightly, sub-acid; season, autumn. Tree, vigorous, upright and when mature productive. Of second degree of hardiness but was popular until 1885. Origin, America.

Scott's Winter: Size, small to medium; form, oblate, slightly conical; color, deep red over yellow ground, russet in cavity, some light dots; cavity, narrow, abrupt, deep; stem, short; basin, medium wide, abrupt, deep, wrinkled; calyx, small, closed; flesh, yellowish white, coarse, juicy; flavor pleasant acid, good; core, small, closed; season, winter. Tree, a very spreading grower and with age productive. By some orchardists thought very hardy, but not fully tested in Minnesota. Origin, Vermont.

Sweet Russet: Size, medium for a crab; form, varies from nearly round to oblong; color, yellow or greenish with peculiar markings of russet overspreading; cavity, rather narrow, abrupt, medium deep, angular; stem, medium long, slender; basin, shallow, medium wide, wrinkled; calyx, rather small, half open, reflexed; flesh, yellowish; flavor, sweet, very pleasant; season, summer. Tree, vigorous, hardy, regular bearer, seldom blights badly. Origin, unknown. A fruit that gives uniform satisfaction in the home orchard and deserves more general planting.

Soulard Scab: Size, medium for a crab; form, smooth, oblate; color, yellowish green, becoming yellow by keeping; cavity, narrow, abrupt; stem, short; basin, broad, shallow, wrinkled; calyx, closed; flesh, firm, fine grained, nearly white; flavor, acid, acrid, somewhat better than native crab of the *Pyrus ioensis*; season, late winter. Tree, a vigorous grower when young, productive, hardy, a regular bearer. The fruit is highly esteemed for preserves. It is doubtful if we have any cultivated apple that is hardier and a more regular bearer. Its green color makes it unpopular for marketing. Origin, Illinois, from seed of native wild crab apple. No plate, but closely resembles Wild Seedling crab, plate number 44.

Tetofski: Size, small to medium; form, generally slightly conical but often round; color, light yellow, frequently striped and splashed with light blush red, has a whitish bloom; cavity, broad deep, irregular; stem, usually short, medium stout; basin, broad, abrupt, much furrowed; calyx, medium, closed; flesh, white, tender, juicy; flavor, sharp sub-acid, aromatic, extra good; season, about August 1st. Tree, stout, upright, very slow grower. Of second degree of hardiness. Origin, Russia. One of the earliest if not the very earliest apple to ripen in Minnesota, and should have a place in every home orchard. Would be very profitable for market if the fruit would hang on the tree till fully mature, but when nearly ripe is often loosened from the tree.

Transparent: Synonyms: Yellow Transparent; No. 60; White Transparent; Charlottenther; Enthaler; Thaler; Erdbeere; Streifling; Nitchner's Erdbeere. This is a family of apples which may vary in hardiness and other minor qualities but are so near alike that they are classed together. Size, medium; form, nearly round, tapering toward

eye, slightly angular; color, light green, with light dots; cavity, medium wide, angular, medium deep, abrupt; stem, medium long; basin, medium wide, shallow, wrinkled and corrugated; calyx, half open; flesh, rather coarse, white; flavor, extra good quality, pleasant, sharp acid; season, summer. Tree, moderately vigorous and hardy, productive, often blights. This tree blights nearly every season in most locations, but if it escapes death by this disease as a young tree, it usually becomes productive and useful at maturity. Like the Transcendent Crab it should not be planted in an orchard with other varieties. A very beautiful and extremely early fruit, that when carefully handled sells very readily on the market, and should be profitable. Origin, Russia.

Transcendent Crab: Size, medium for a crab; form, nearly round, ribbed; color, brownish yellow with blush of carmine; cavity, abrupt, narrow, medium deep; stem, long, slender; basin, shallow, wavy or corrugated; calyx, closed, reflexed; flesh, yellowish, hard, fine grained; flavor, acid; season, September. Tree, vigorous, large, hardy, productive, liable to blight. Origin, Russia. The best type of a market crab, and if planted in an orchard by itself where its tendency to blight would not injure other varieties, would doubtless be exceedingly profitable to grow for market.

University: Synonym: Duchess No. 102. Size, medium to large; form, oblate, slightly angular; color, light green with blush of reddish brown, minute red dots; cavity, broad, deep, russeted; stem, medium, slender; basin, wide, abrupt, deep; calyx, open and recurved; flesh, yellowish white, coarse; flavor, sub-acid, fair; season, late autumn and early winter. Tree, vigorous, spreading, productive, promising, not sufficiently tried to determine its hardiness. Origin, Iowa, by C. G. Patten.

Utter: Size, medium to large; form, oblique oblate, often nearly round, variable; color, greenish yellow and generally with stripes and splashes of carmine, some russet running from cavity; cavity, broad and deep, regular; stem, short; basin, rather broad, medium, deep, slightly wrinkled; calyx, open; flesh, heavy, medium fine, white, crisp, juicy; flavor, pleasant sub-acid; season, late autumn. Tree, moderately upright, round top, good tree. Origin, Wisconsin. The Utter does not seem to recover readily after bearing a heavy crop, and is entirely unworthy of planting in this section.

Virginia Crab: Size, medium for a crab; form, round; color, yellow and blush red, somewhat striped, rather thickly covered with gray dots toward the eye; cavity, medium; stem, rather long, slender; basin, shallow; calyx, closed, reflexed; flesh, yellow, crisp; flavor, acid, sometimes bitter; season, September. Tree, vigorous, large, spreading, hardy, moderately productive, seldom blights badly. This tree is decidedly different from Hewe's Virginia crab and should not be confounded with it. The principal fault with this otherwise excellent variety is a disposition to scab, which frequently injures the quality of the fruit and occasionally it blights on the trunks. Origin, doubtful, but probably Iowa.

Walbridge: Synonym: Edgar Red Streak. Size, small to medium; form, round, oblate, tapering towards eye; color, yellowish green, striped and splashed with red, few whitish dots, skin smooth and glossy; cavity, regular, medium, slightly russeted at bottom; stem, medium slender; basin, shallow, plain; calyx, small, closed; flesh, greenish white, fine, juicy; flavor, sprightly sub-acid; core, medium, half open; season, January to March. Tree, when young is a vigorous

grower; foliage and fruit are frequently subject to scab; with age it becomes an enormous bearer on alternate years. The fruit is of best quality for home use, but too small for market. The tree is not of sufficient hardiness for profitable growing in Minnesota except in most favorable locations. Origin, Illinois.

Wealthy: Size, medium to large; form, smooth, roundish conical, flattened at the ends; color, greenish yellow, nearly covered with bright red when grown in good soils; cavity, medium deep, russeted at bottom; stem, short to medium, slender, elastic; basin, well defined, slightly wrinkled; calyx, closed; flesh, white, often stained red, fine grained, fruit quite light in weight; flavor, sub-acid, refreshing; core, small, closed; season, October to January. Tree, vigorous, of second degree of hardiness, very heavy and regular bearer. Origin, Hennepin Co., Minnesota, by Peter Gideon. Generally recognized as the most profitable market variety for northern planting, and in its season has no equal for home use. It is quite subject to a sort of canker that attacks the crotches of the main branches in some locations, but if the trunks and especially the larger crotches are kept protected from the sun it generally holds on well, even in rather unfavorable locations.

Whitney: Synonym: Whitney No. 20. Size, very large for a crab; form, varying from round to conical; color, yellow striped with red, mostly covered with red on sunside; cavity, medium; stem, medium to long; basin, shallow or flush, corrugated; calyx, nearly closed; flesh, yellow, medium fine; flavor, pleasant sub-acid, almost sweet, good; season, August. Tree, hardy and an exceedingly upright symmetrical grower, which does best on high limestone and clay soils. Origin, Illinois. A fine flavored easily perishable fruit, useful in the home orchard but of little value for market.

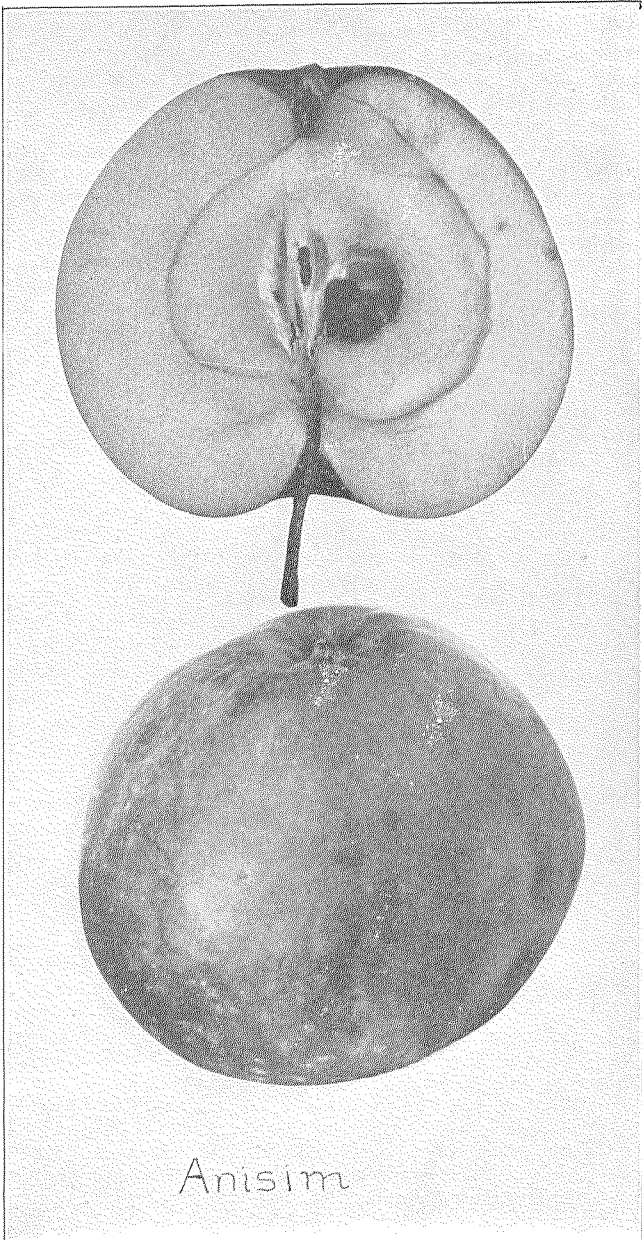
Wild Crab Seeding: Size, medium to large for a crab; form, oblique oblate; color, green with light dots; cavity, narrow, shallow; stem, slender, medium; basin, broad, shallow, corrugated; calyx, small, half open; flesh, greenish, fine, hard; flavor, very bitter; core, small; season, winter. Tree, vigorous, hardy, very free from blight. Origin, Iowa, by N. K. Fluke, who has raised many similar seedlings. This variety resembles the Soulard and like that variety is especially valuable for its great hardiness and productiveness. Of special interest as showing the improvement made in our native crab apple.

Wolf River: Size, large to very large; form, oblate, somewhat oblique, slightly angular; color, yellowish green with stripes and splashes of carmine, distinct white dots, russet in cavity, very beautiful; cavity, rather wide, somewhat angular, deep; stem, short, stout; basin, narrow, rather abrupt, waved, medium deep; calyx, small, half open; flesh, nearly white, firm, coarse; flavor, sub-acid, fair to good; core, medium; season, late autumn and winter. Tree, vigorous, spreading, large, very productive under best conditions, but not generally successful. The large fruit holds on to the tree remarkably well. Of second degree of hardiness. Tree a very tardy bearer even when top-worked. While giving good satisfaction in some orchards it is generally unprofitable and would probably go out of notice if it were not for its magnificent size and coloring, which render it the most showy variety grown in the north. Origin, Wisconsin.

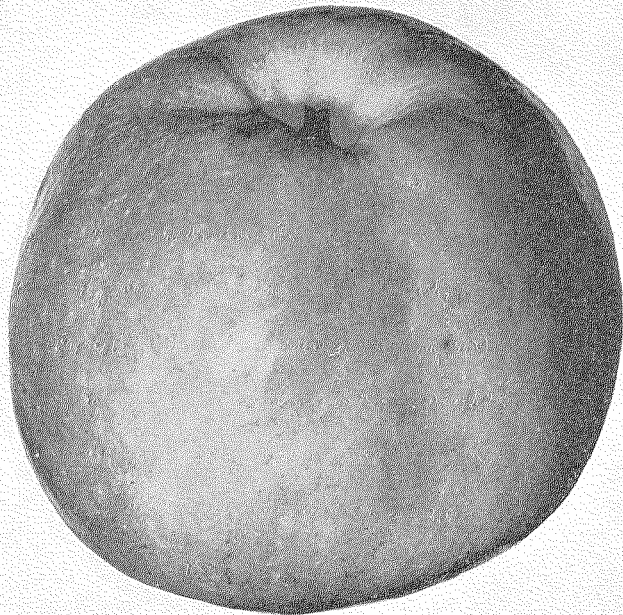
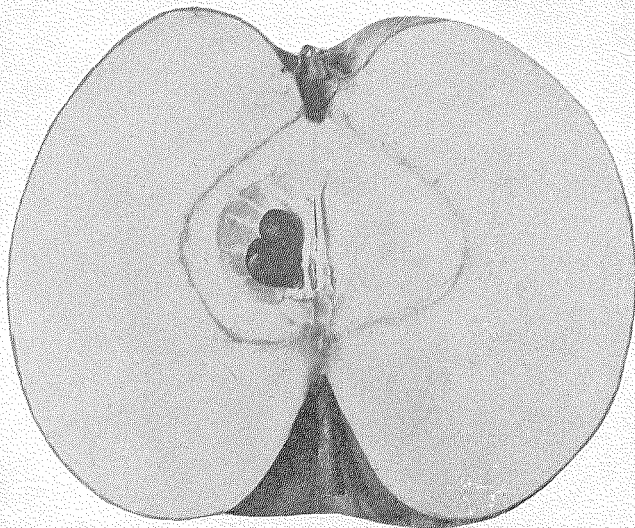
Yellow Siberian: Size, small, one inch or less in diameter; form, round; color, yellow; flavor, acid, acrid. Tree, stout, free growing, handsome, hardy, productive. Fruit excellent for cooking but too small for marketing purposes. The seed of this extremely hardy sort is now

recommended for the growing of stocks that shall reduce injury from root-killing.

Yellow Sweet: Synonyms: Green Sweet, No. 321. Size, medium; form, oblate, nearly round; color, light green, bronze blush, light dots; cavity, narrow, regular, rather deep; stem, short, medium; basin, shallow, nearly regular, rather broad; calyx, rather small, recurved, partly open; flesh, greenish white, rather fine; flavor, sweet, free from bitterness; core, rather large; season, August. Tree a slow, medium, upright grower, free from blight, moderately hardy. Origin, Russia. There is scarcely a hardier or healthier variety in cultivation, and the quality of the fruit is almost all that could be desired in an early sweet apple, but its fruitage is scanty, although it blossoms very freely, even as a young tree, and the small apples set in great profusion, but they keep dropping until but a small setting is left to mature. Valuable only as a very choice sweet apple for dessert.

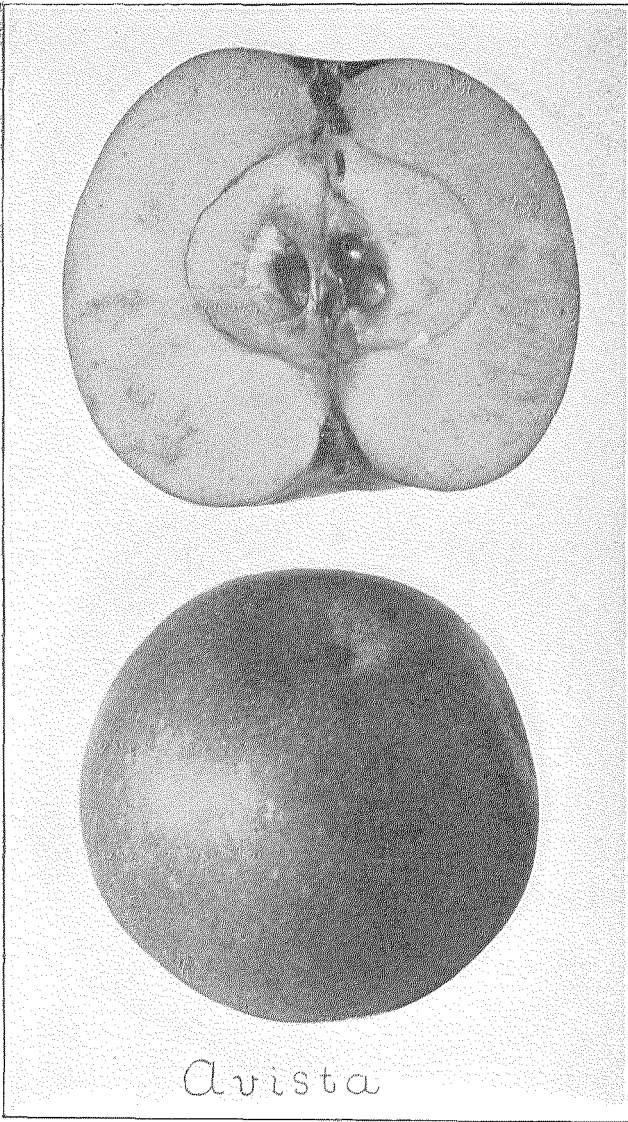


For Description, see Page 18.



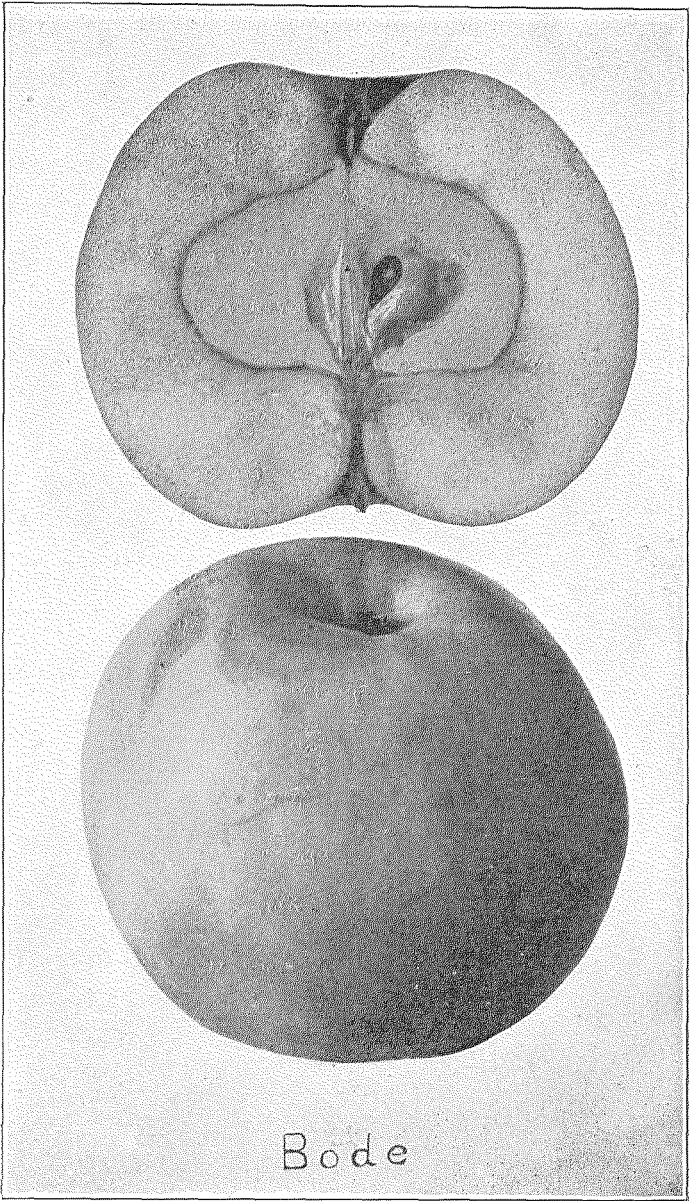
Antonovka

For Description, see Page 18.

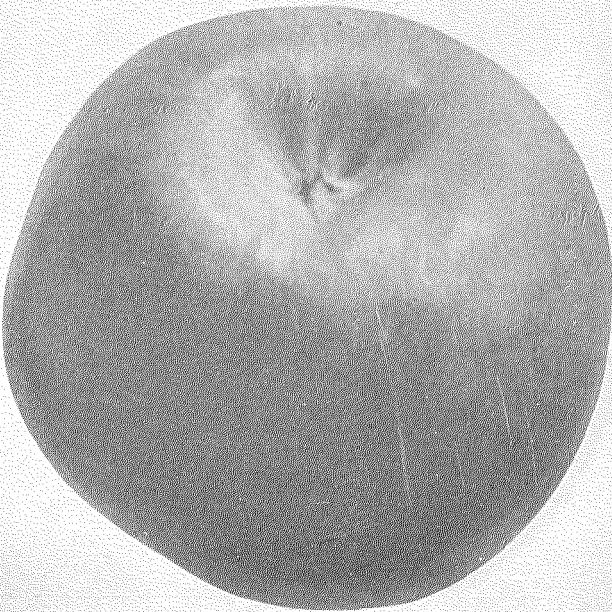
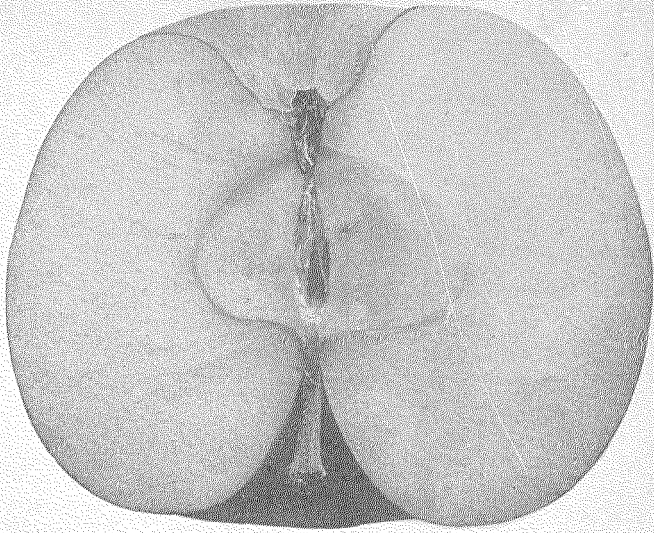


Avista

For Description, see Page 18.

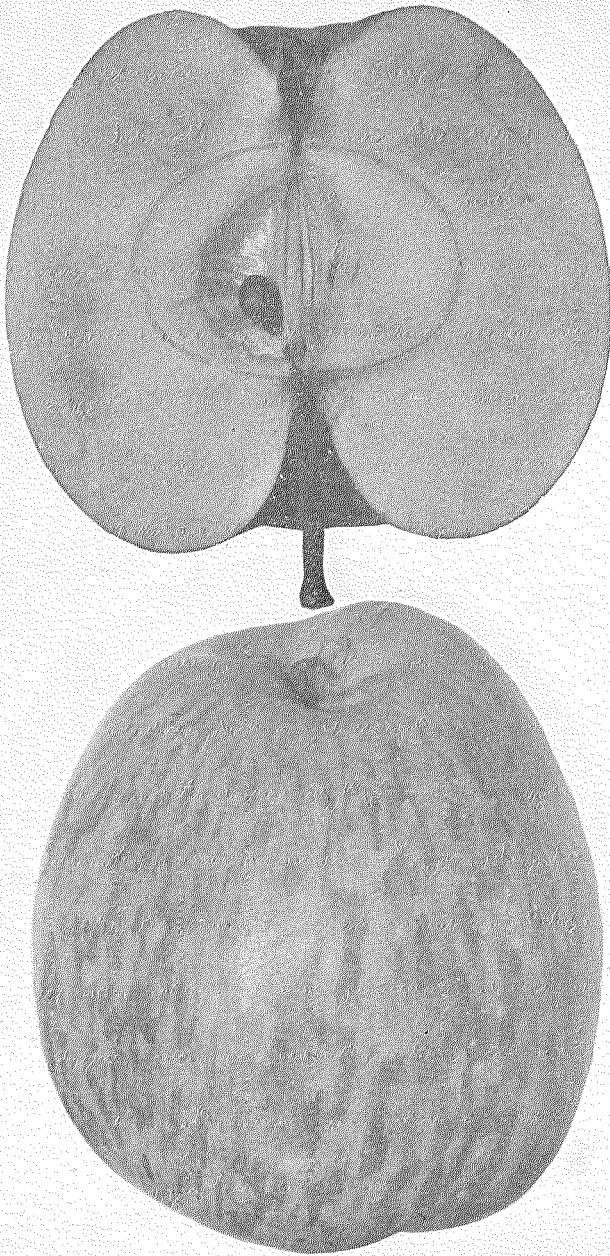


For Description, see Page 19.

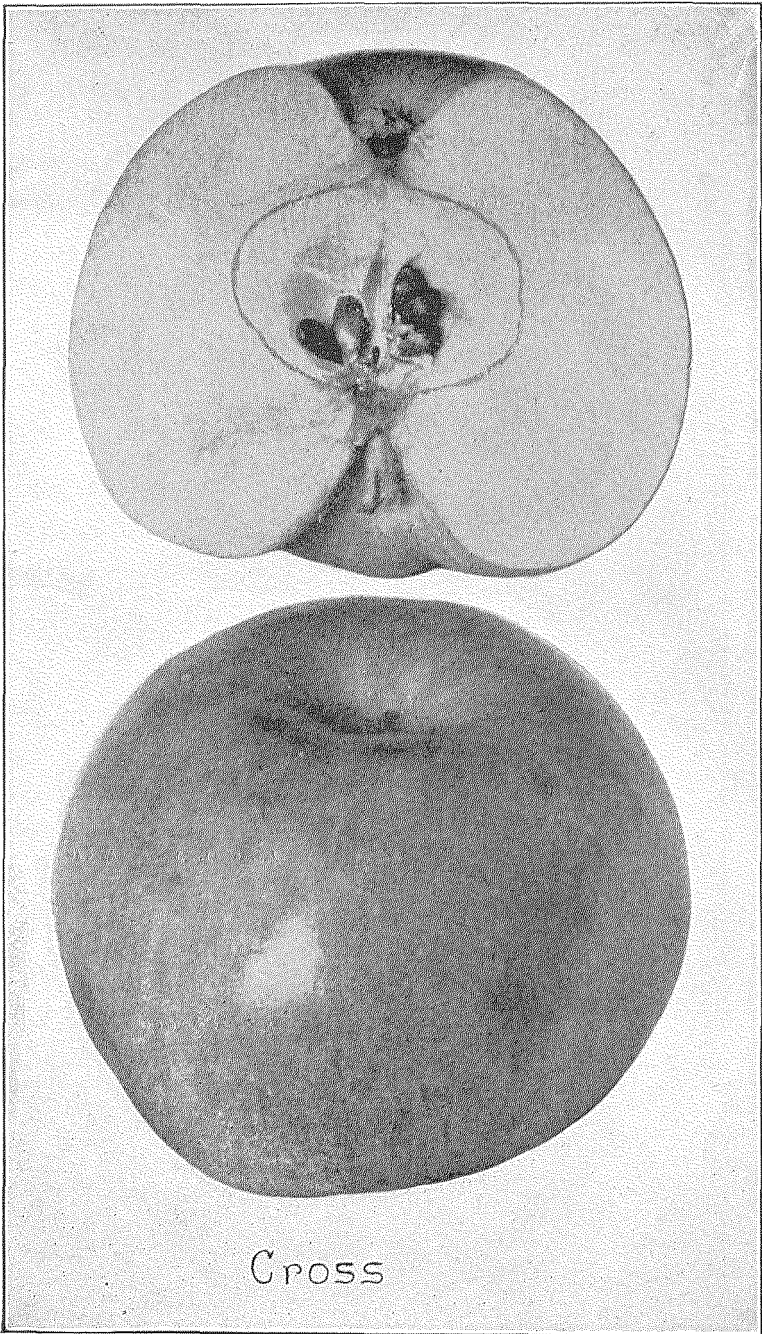


Brett

For Description, see Page 19

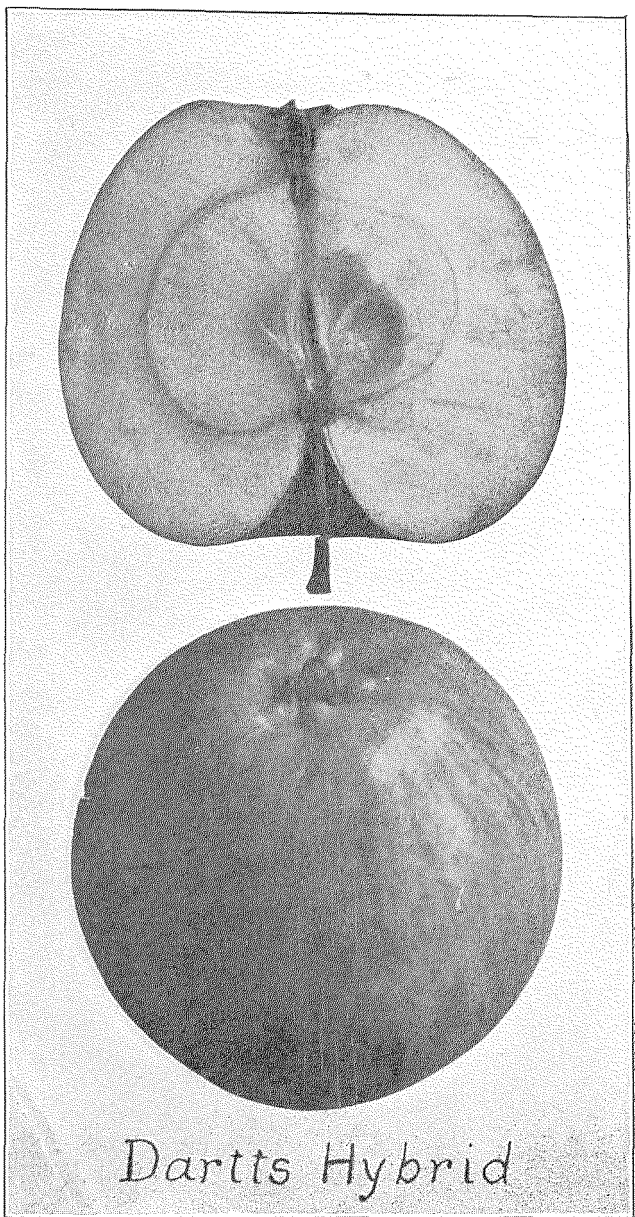


Charlamoff



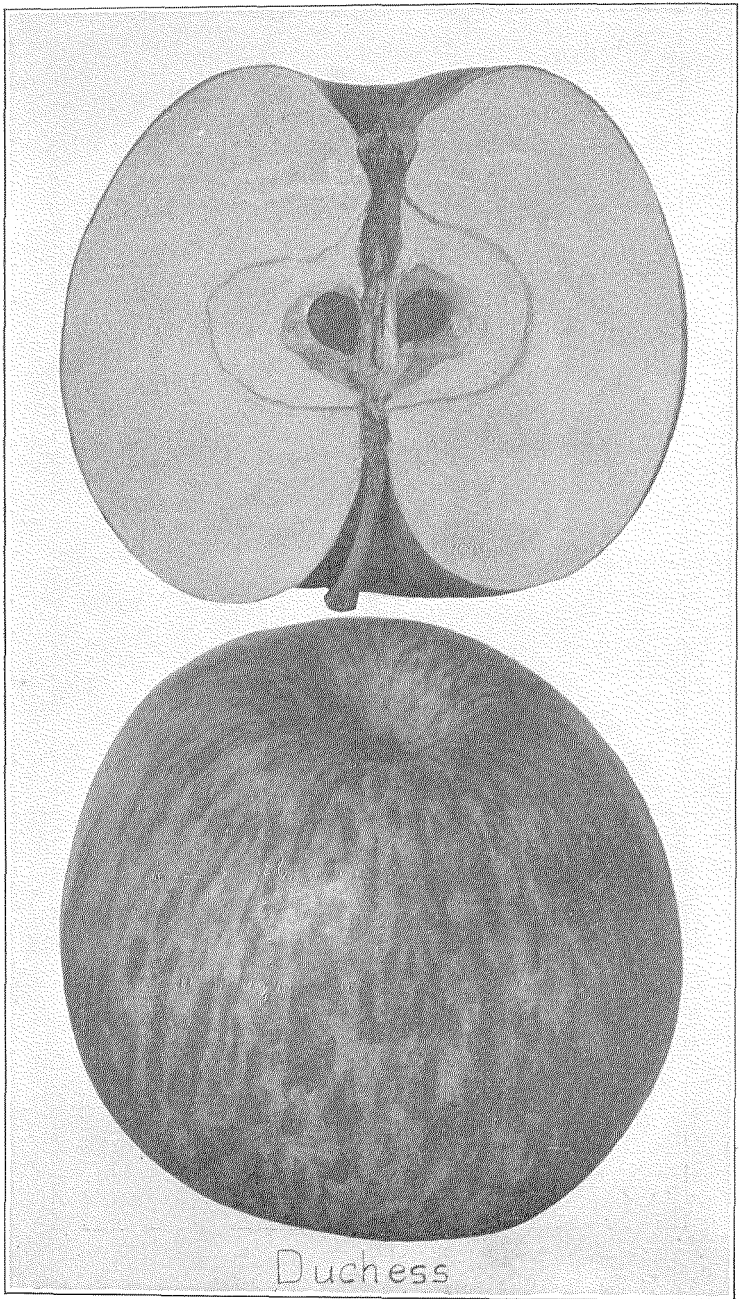
CROSS

For Description, see Page 20.



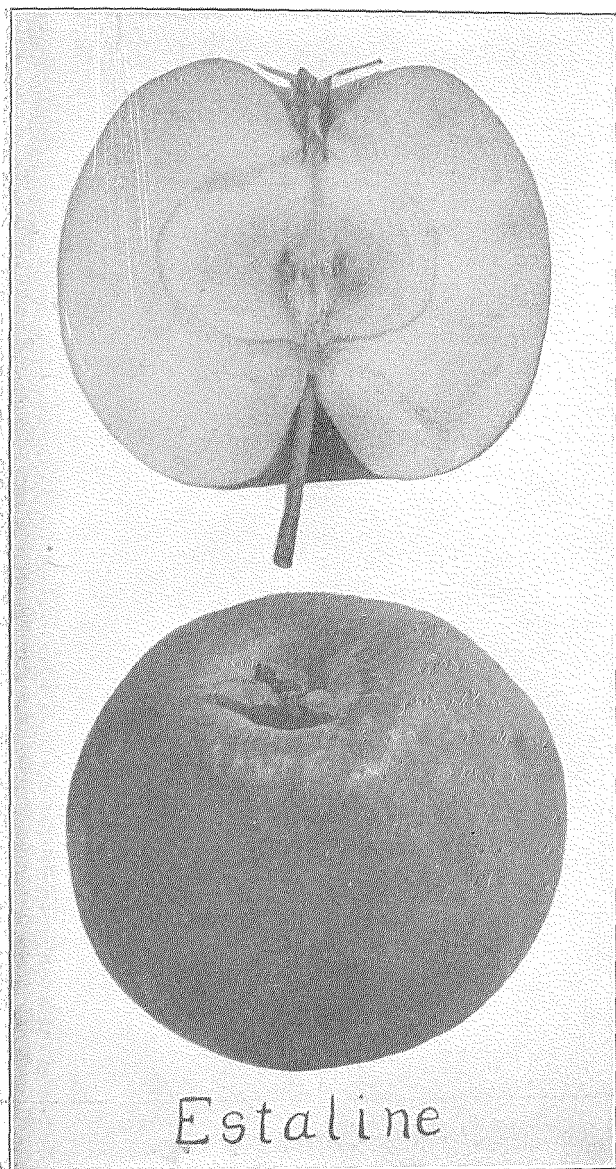
Dartts Hybrid

For Description, see Page 20.



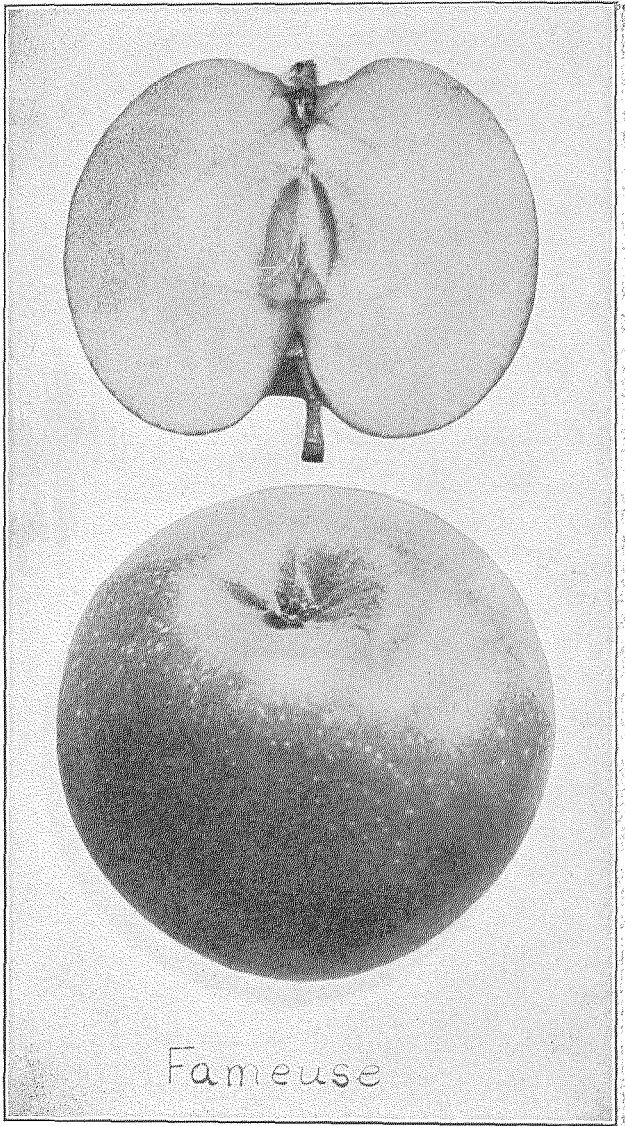
Duchess

For Description, see Page 20



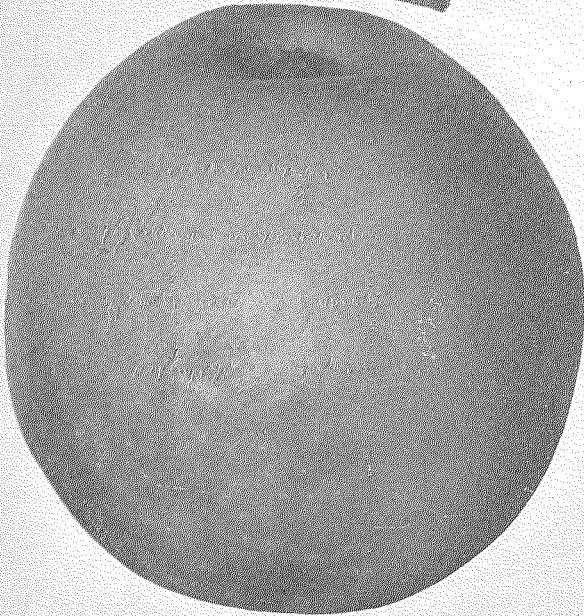
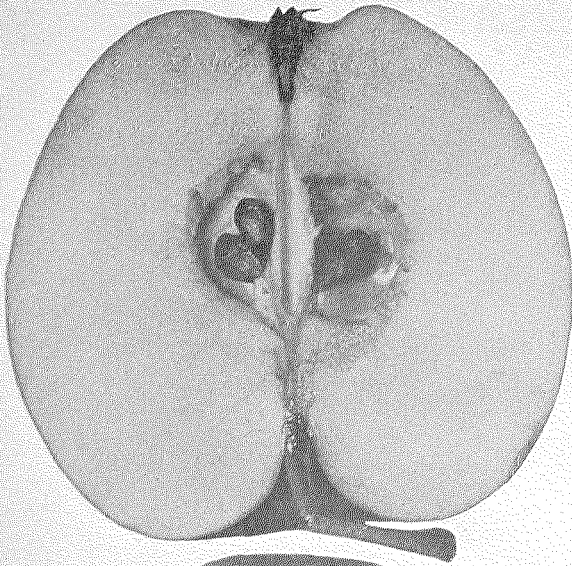
Estaline

For Description, see Page 20.



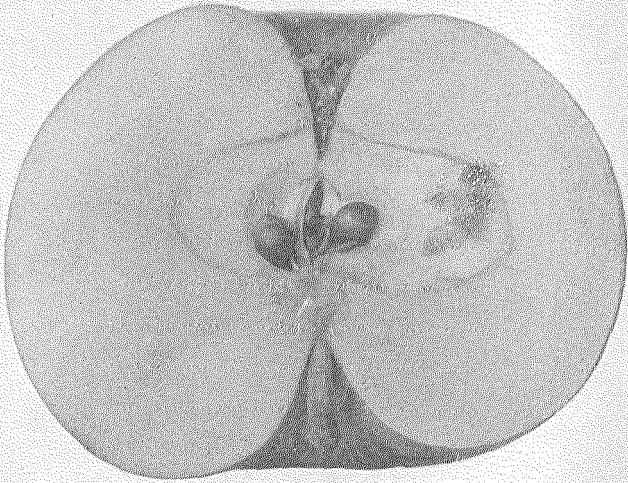
Fameuse

For Description, see Page 21.



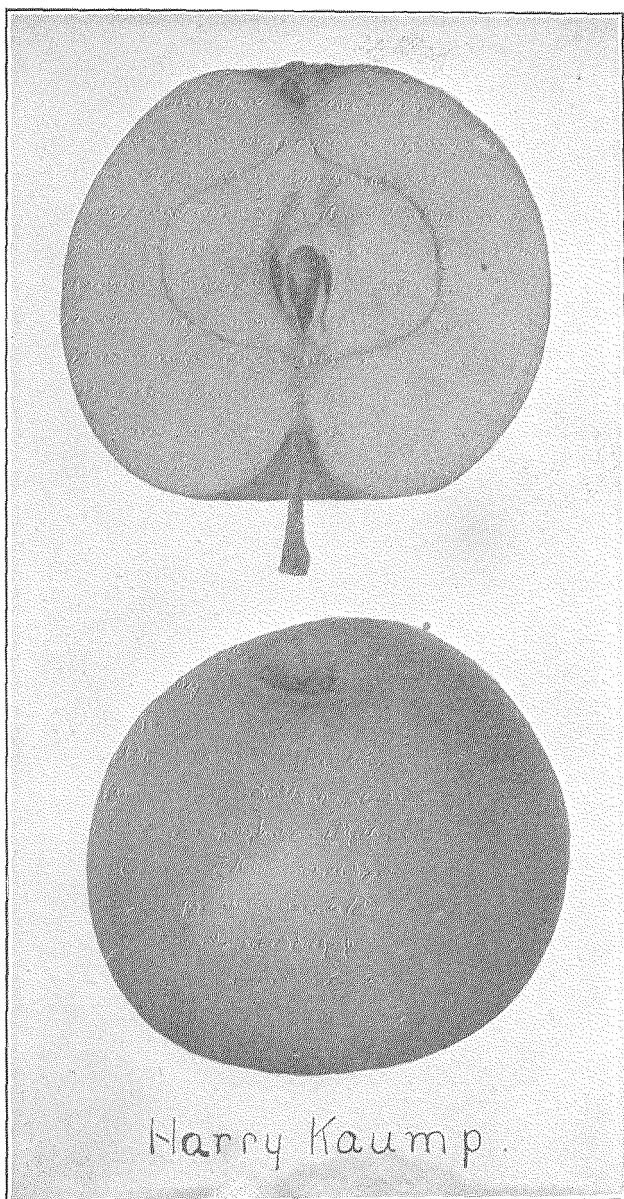
Gideon

For Description, see Page 21.



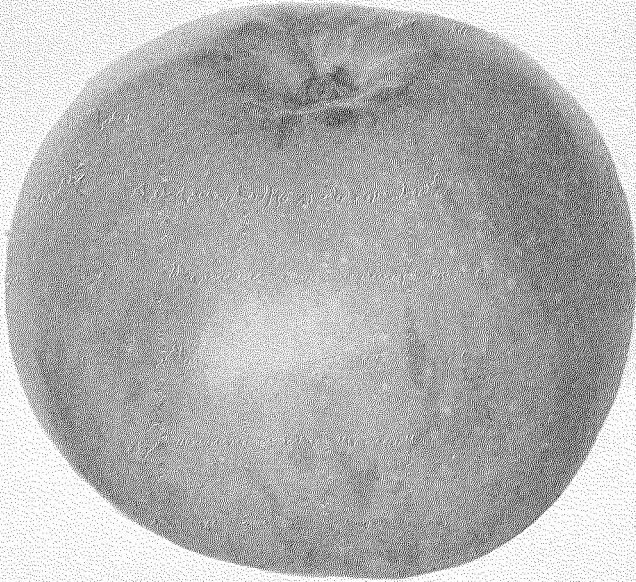
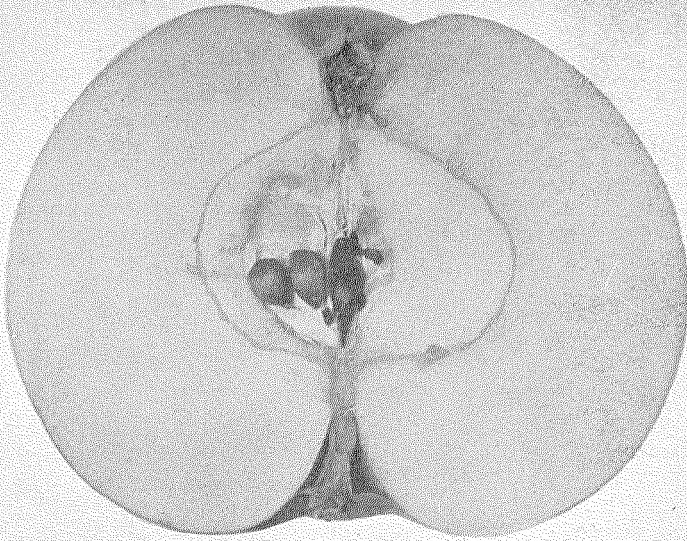
Haas

For Description, see Page 22.



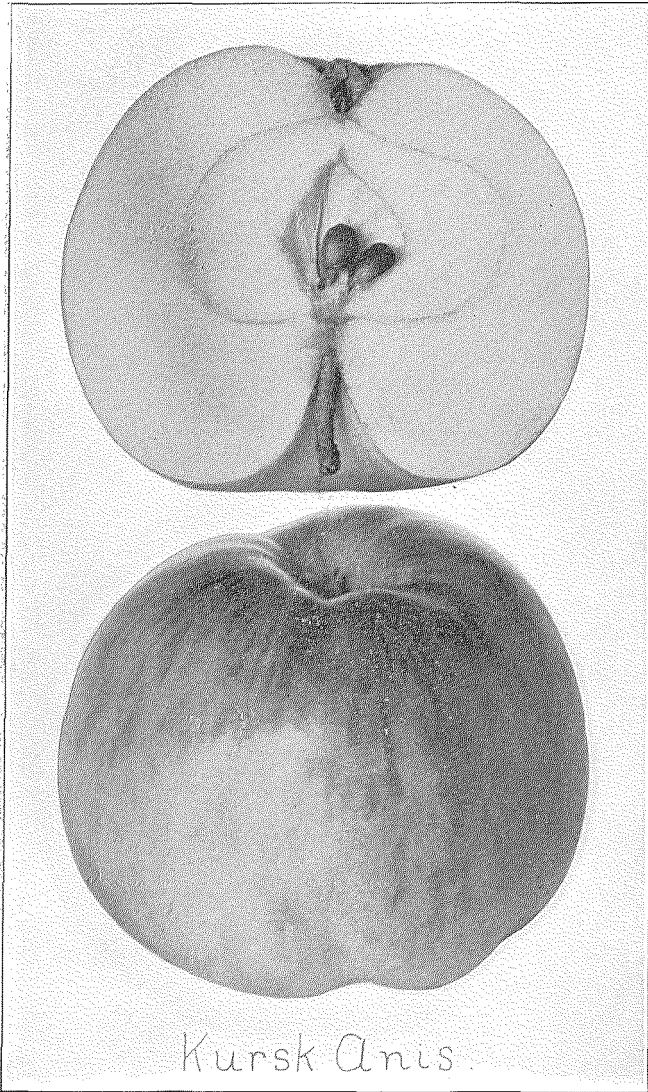
Harry Kaump.

For Description, see Page 23.



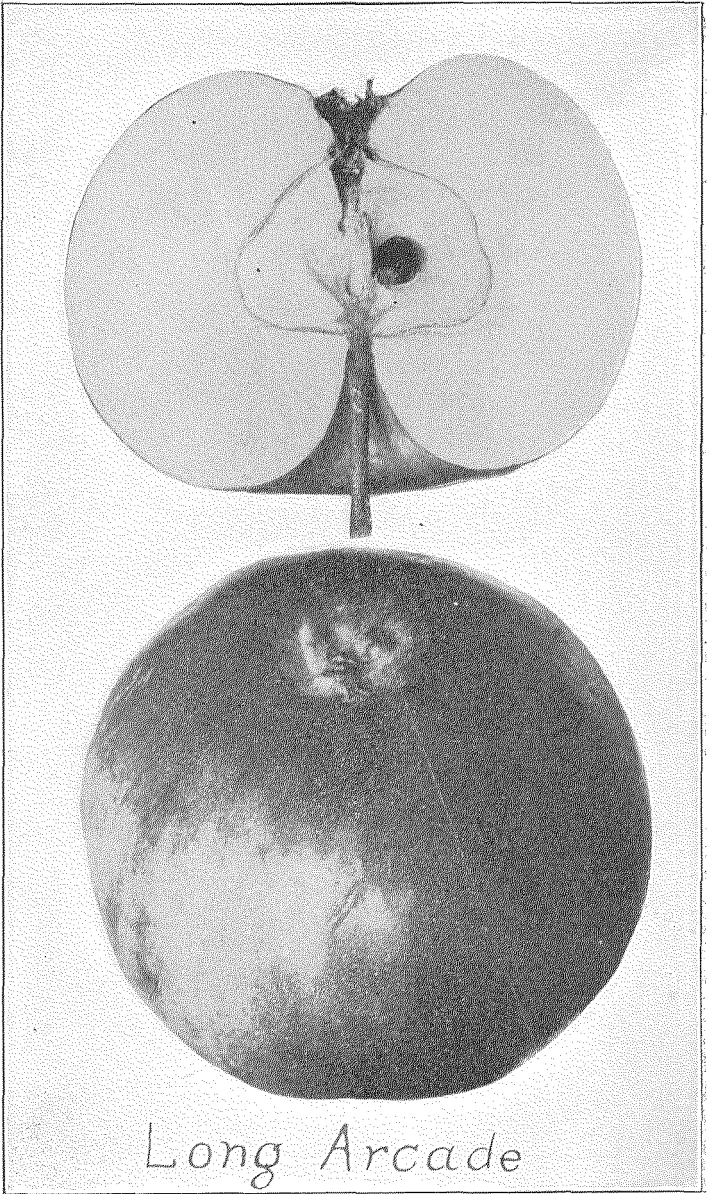
Hiberna.

For Description, see Page 21.



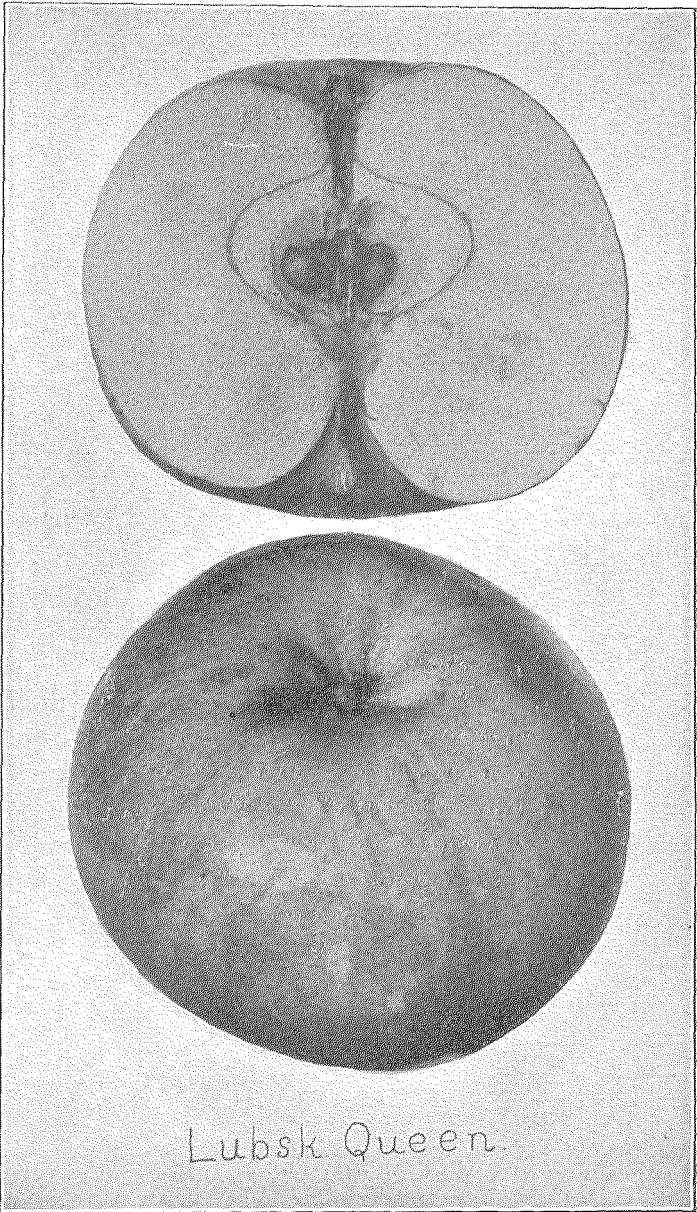
Kursk Anis.

For Description, see Page 22.

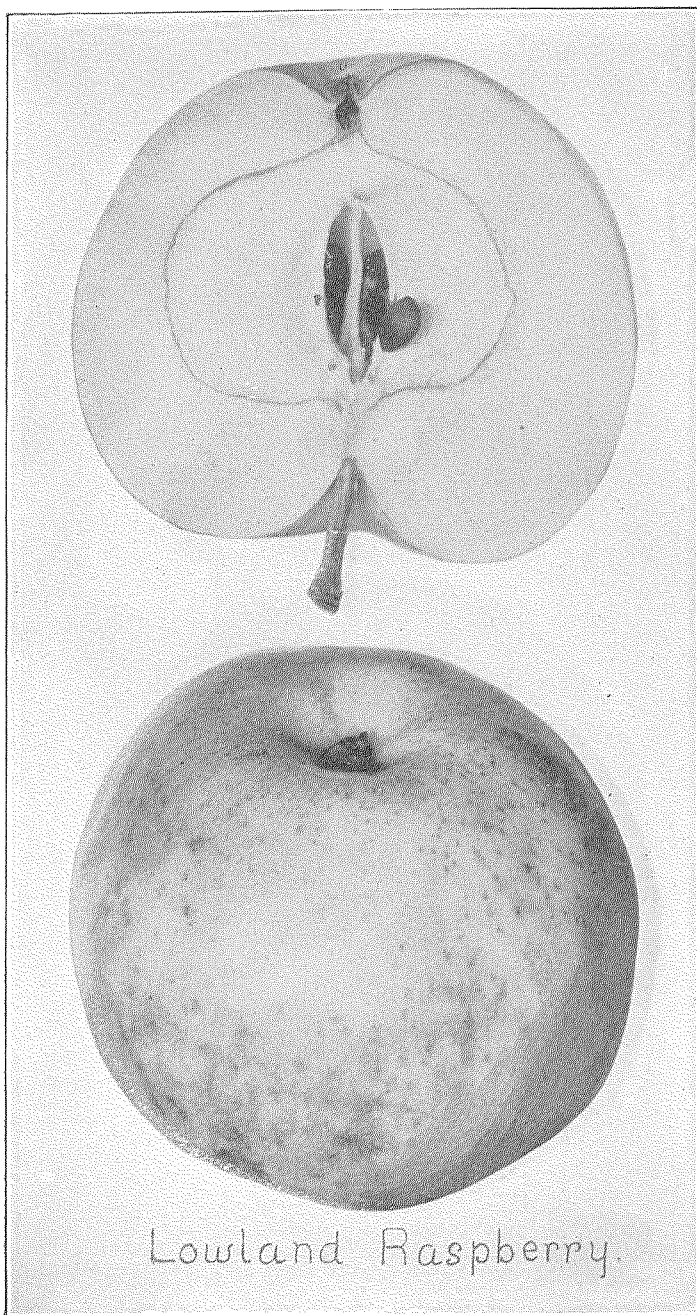


Long Arcade

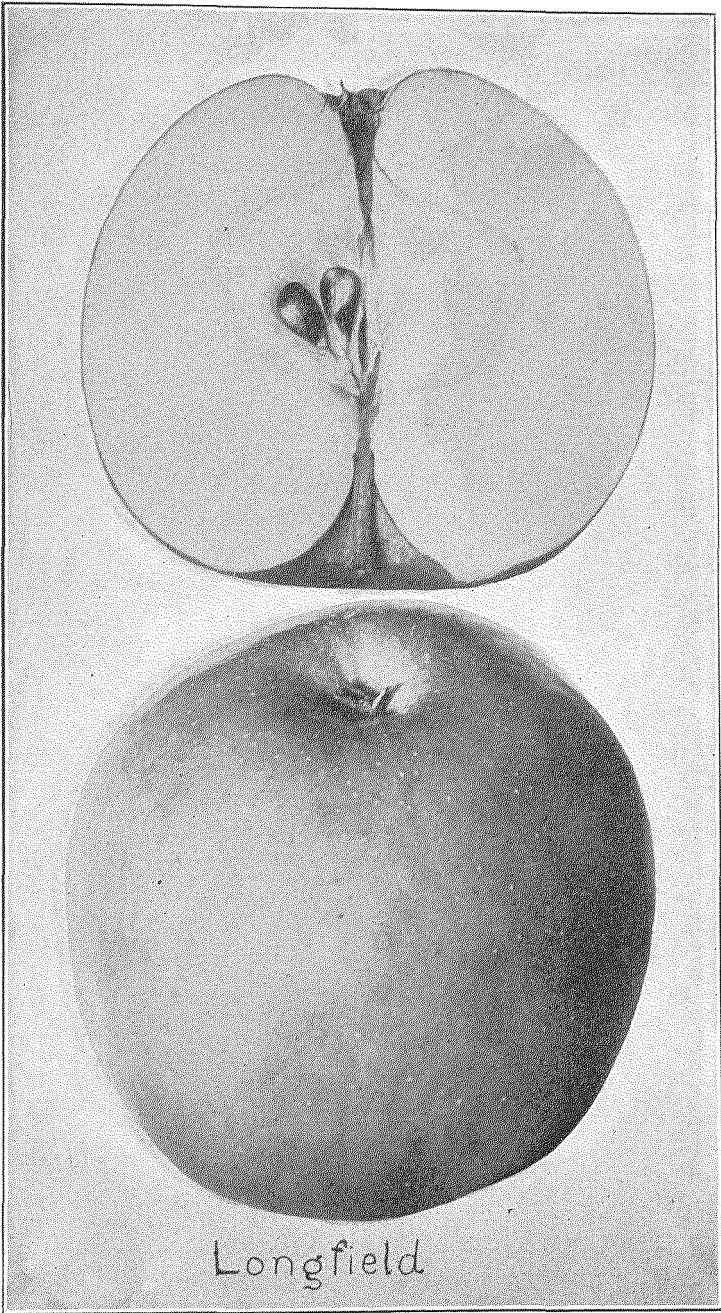
For Description, see Page 23.



For Description, see Page 23.

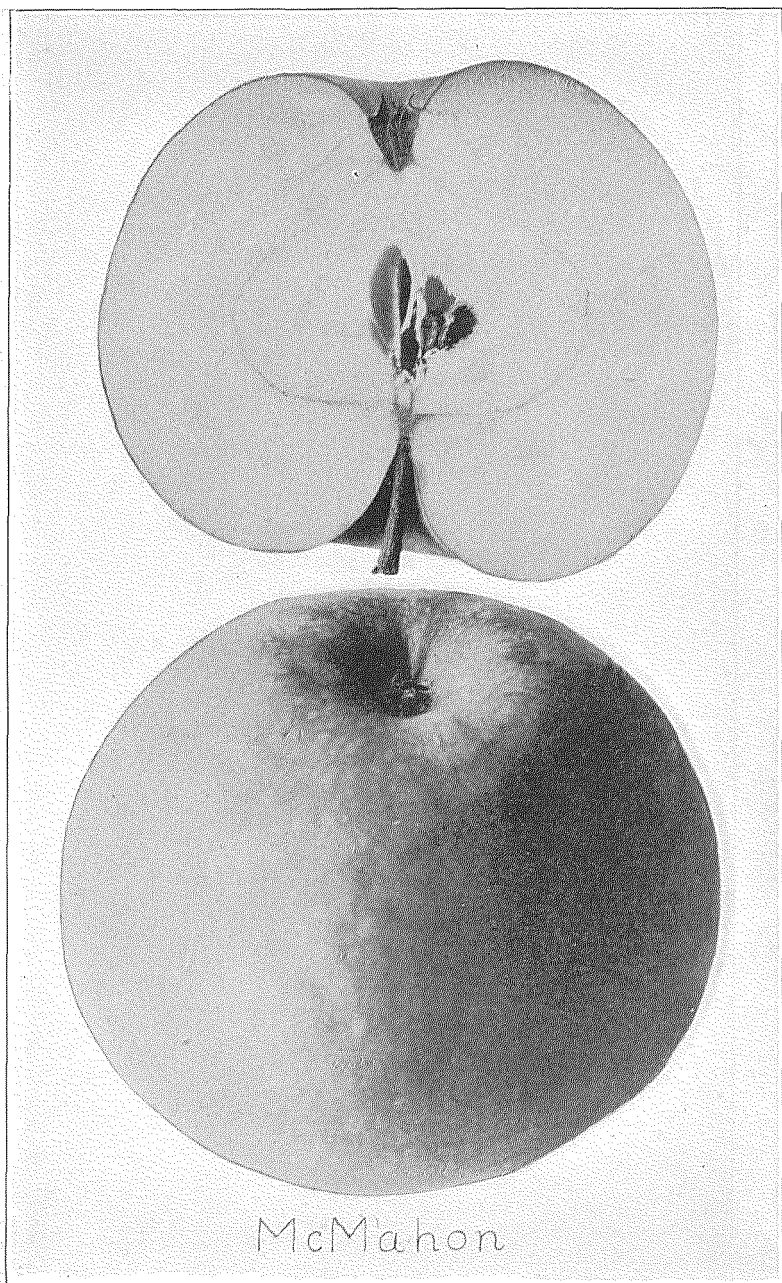


Lowland Raspberry.



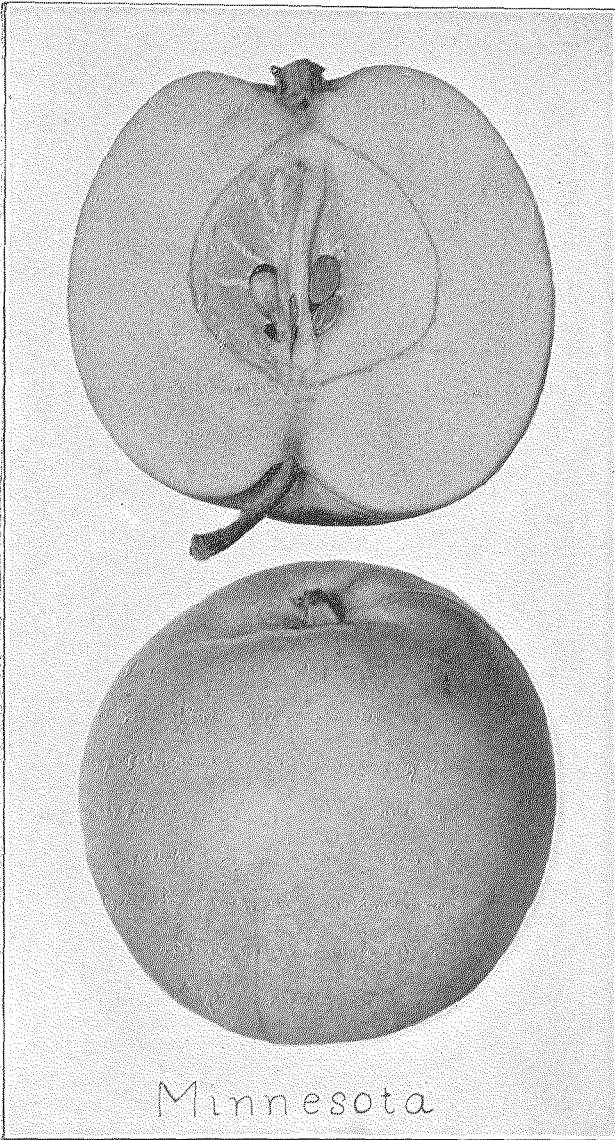
Longfield

For Description, see Page 23.



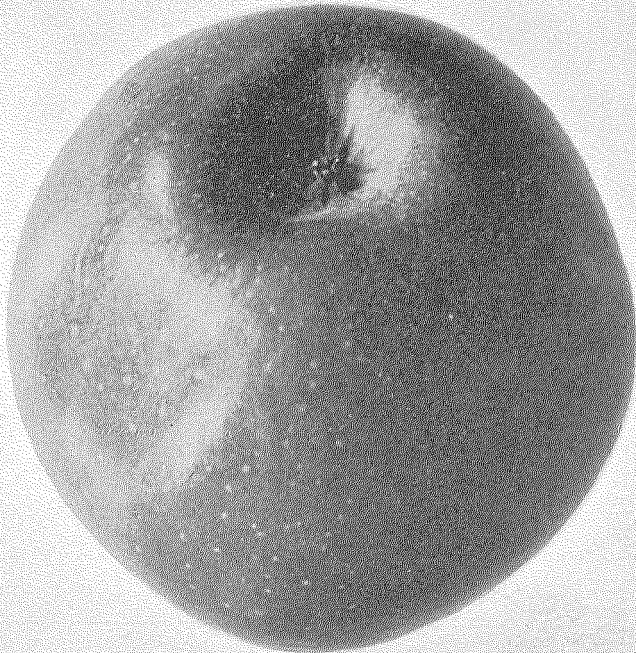
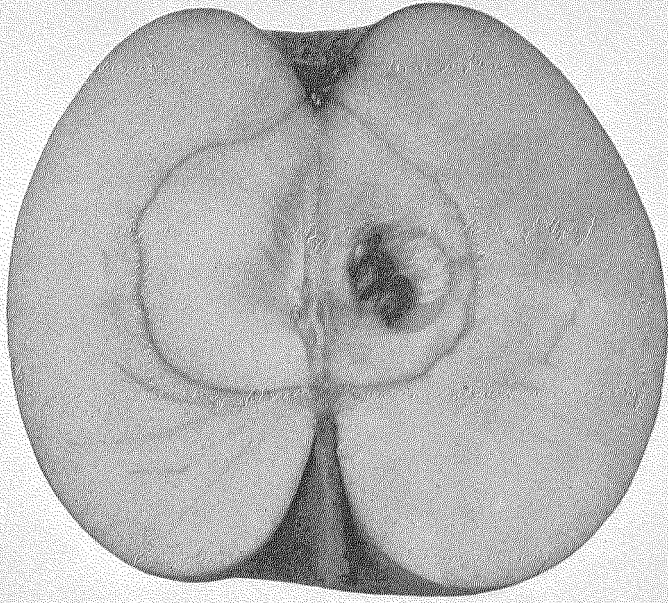
McMahon

For Description, see Page 25.



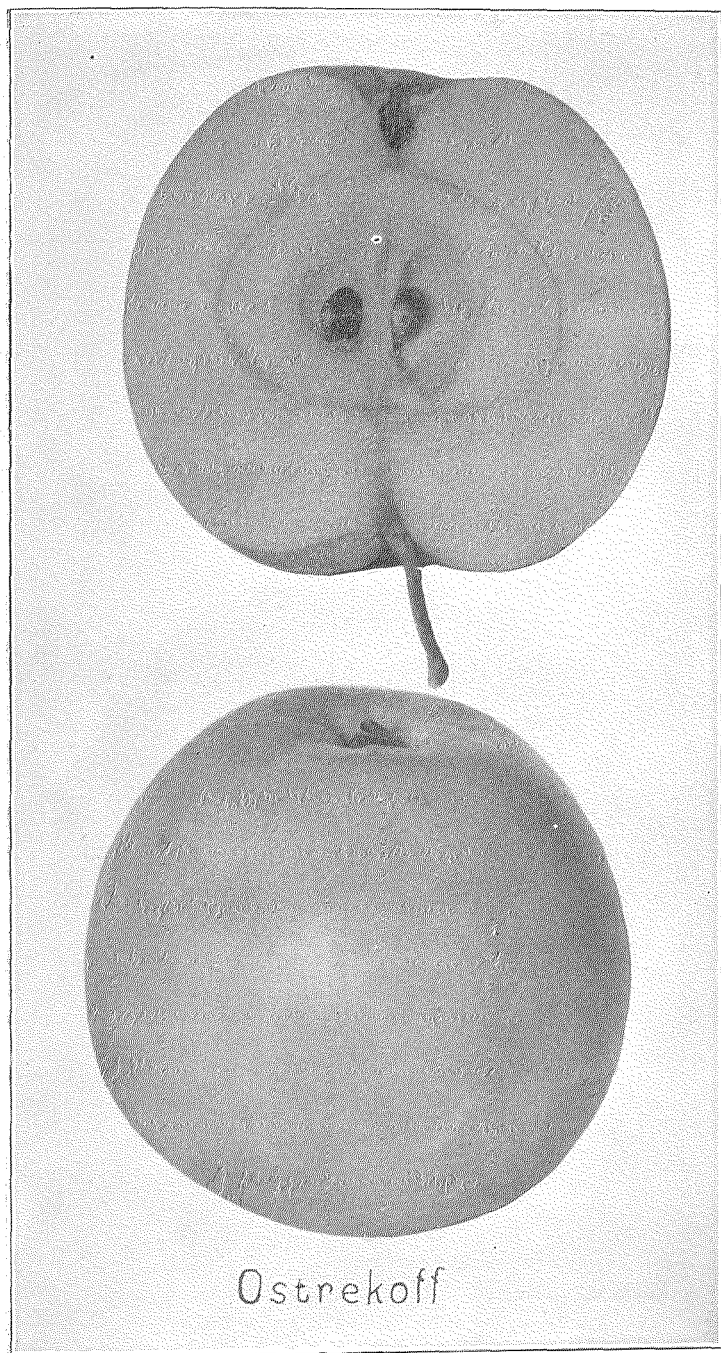
Minnesota

For Description, see Page 24.



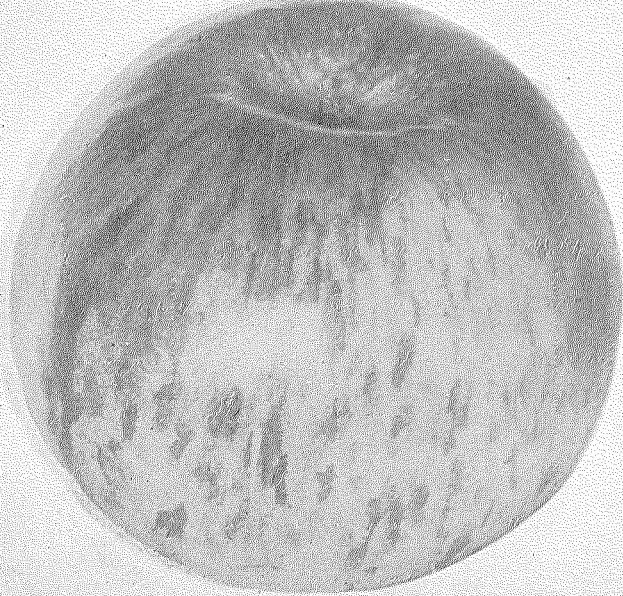
Northwestern Greening

For Description, see Page 25.



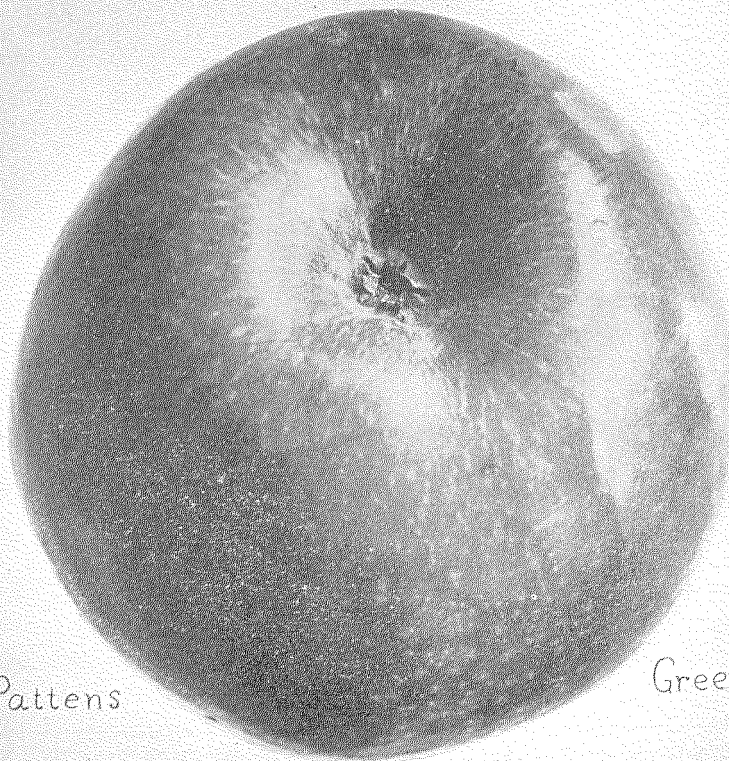
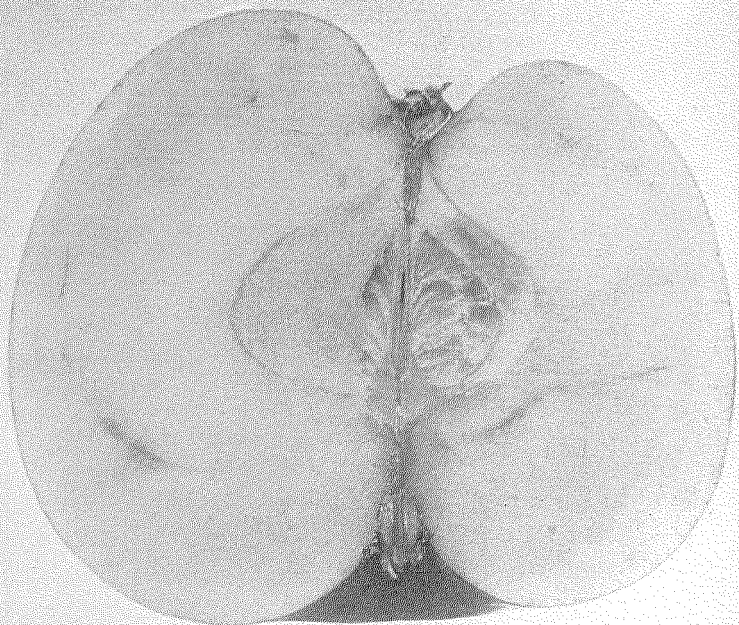
Ostrekoff

For Description, see Page 26.



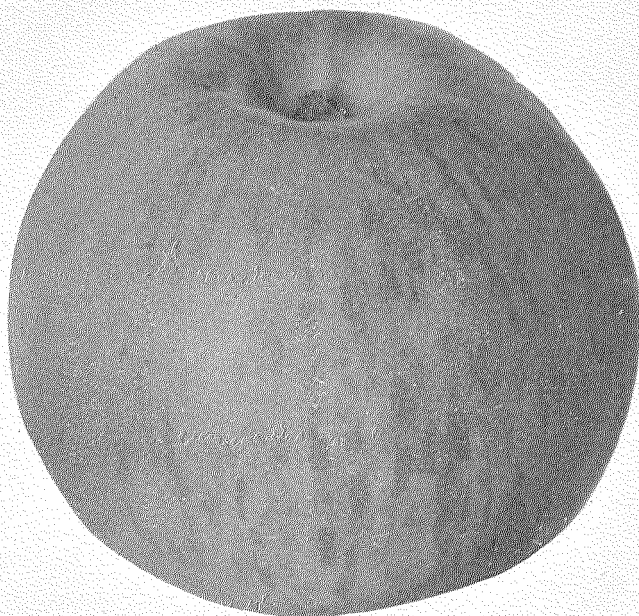
Okabena

For Description, see Page 26.



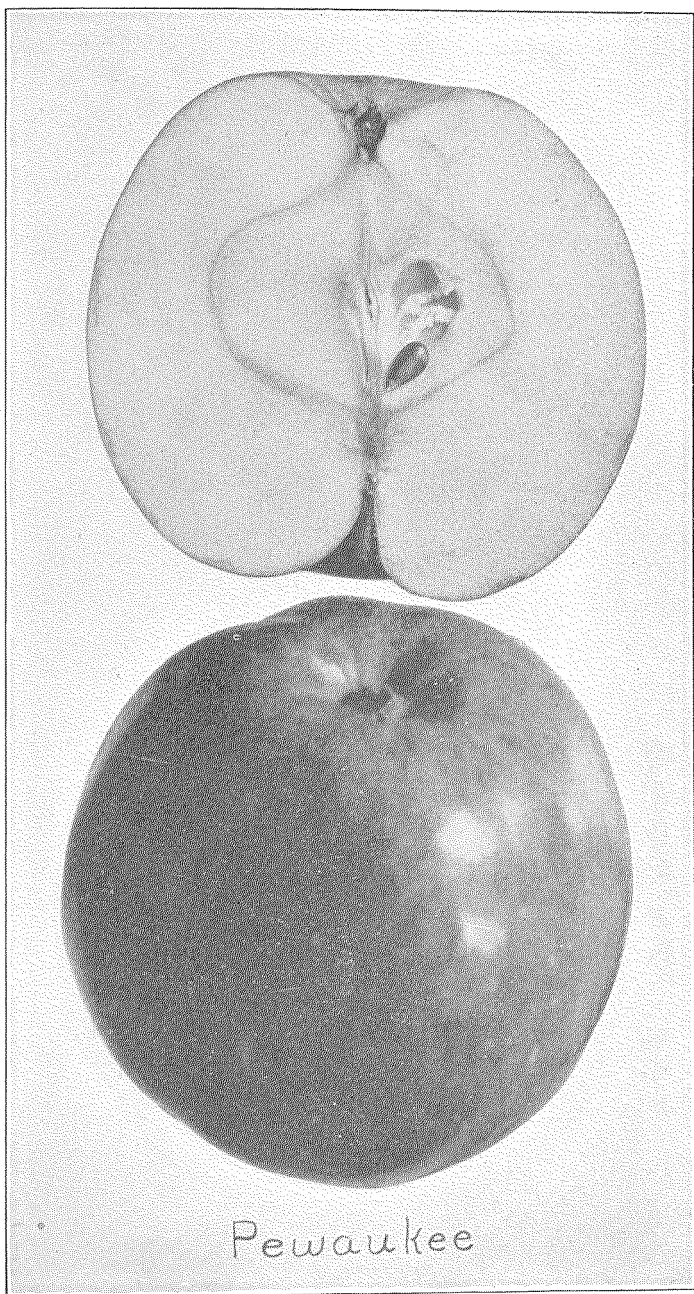
Pattens

Greening



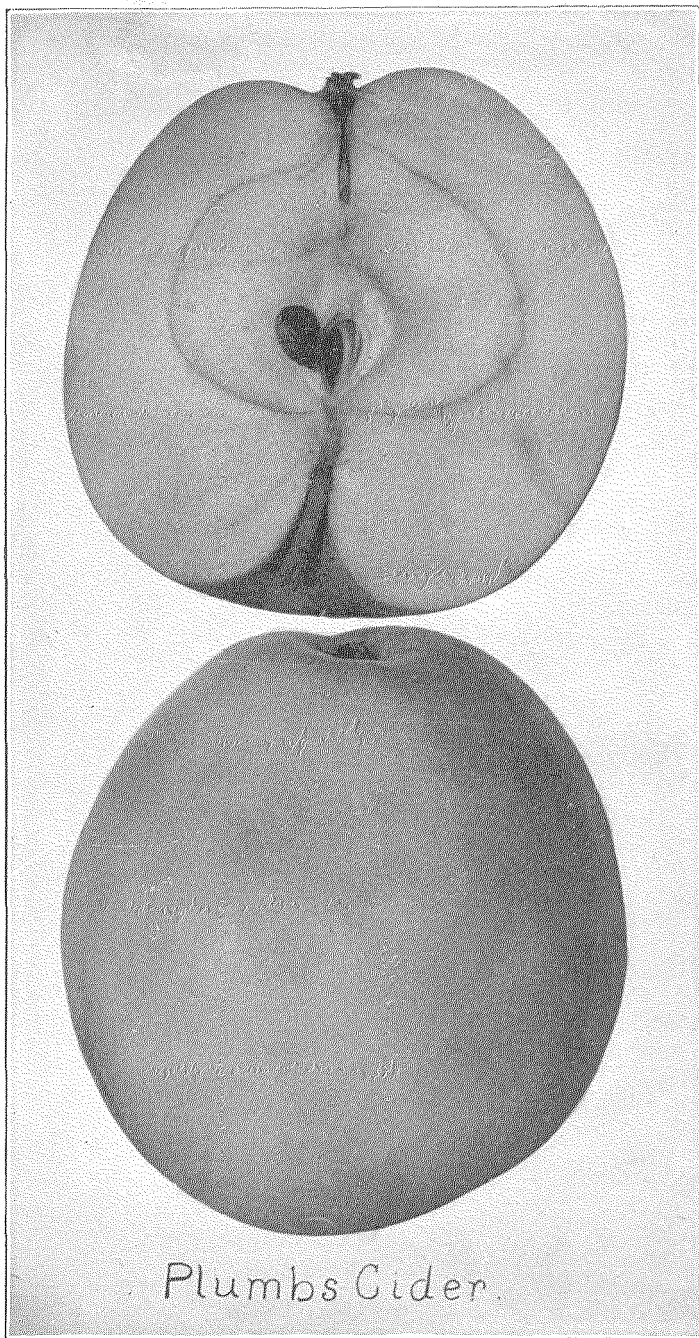
Peerless

For Description, see Page 26.

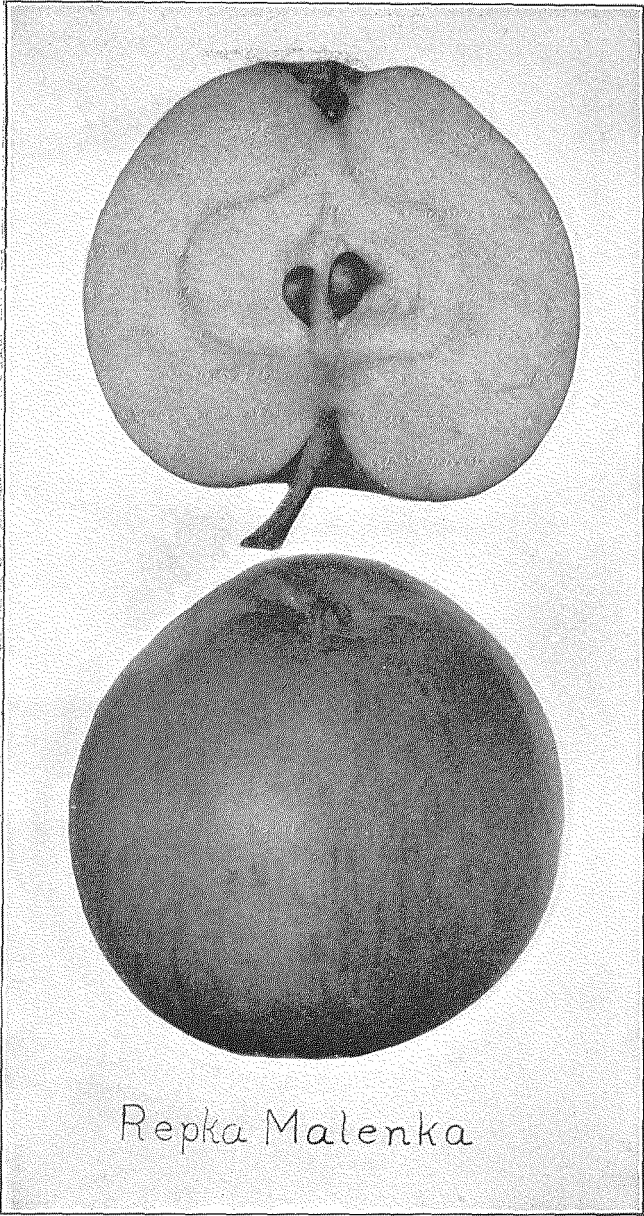


Pewaukee

For Description, see Page 27.

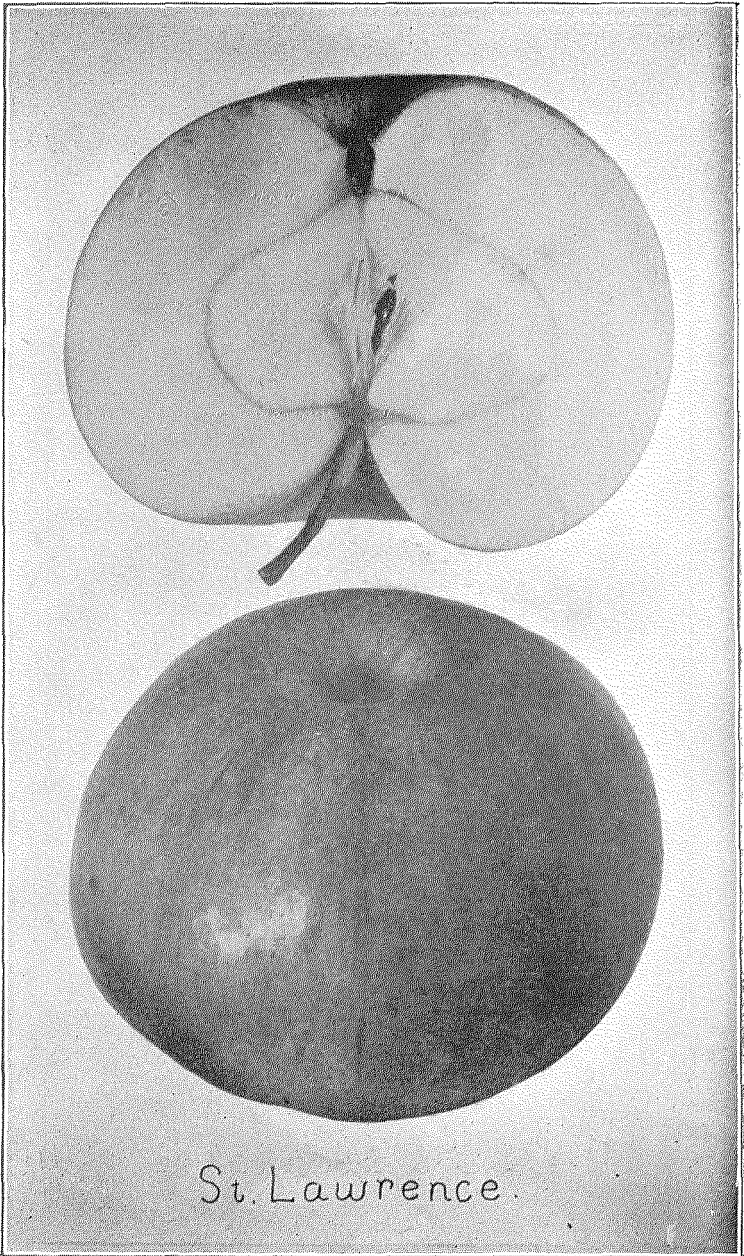


For Description, see Page 27



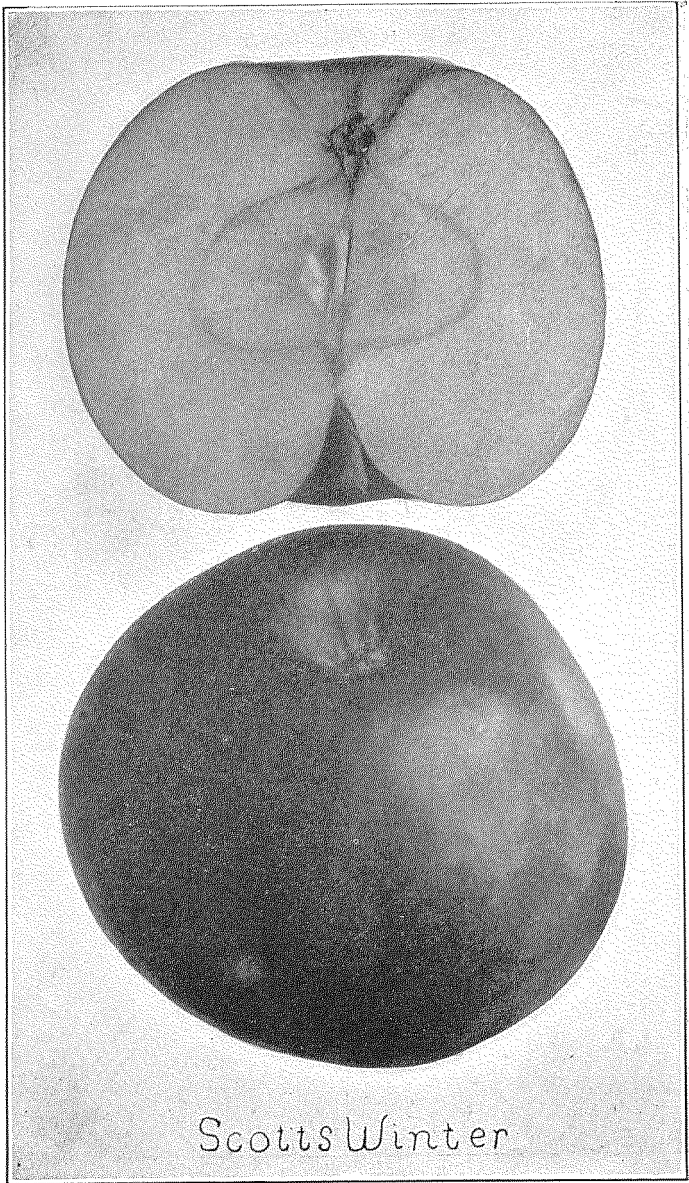
Repka Malenka

For Description, see Page 27



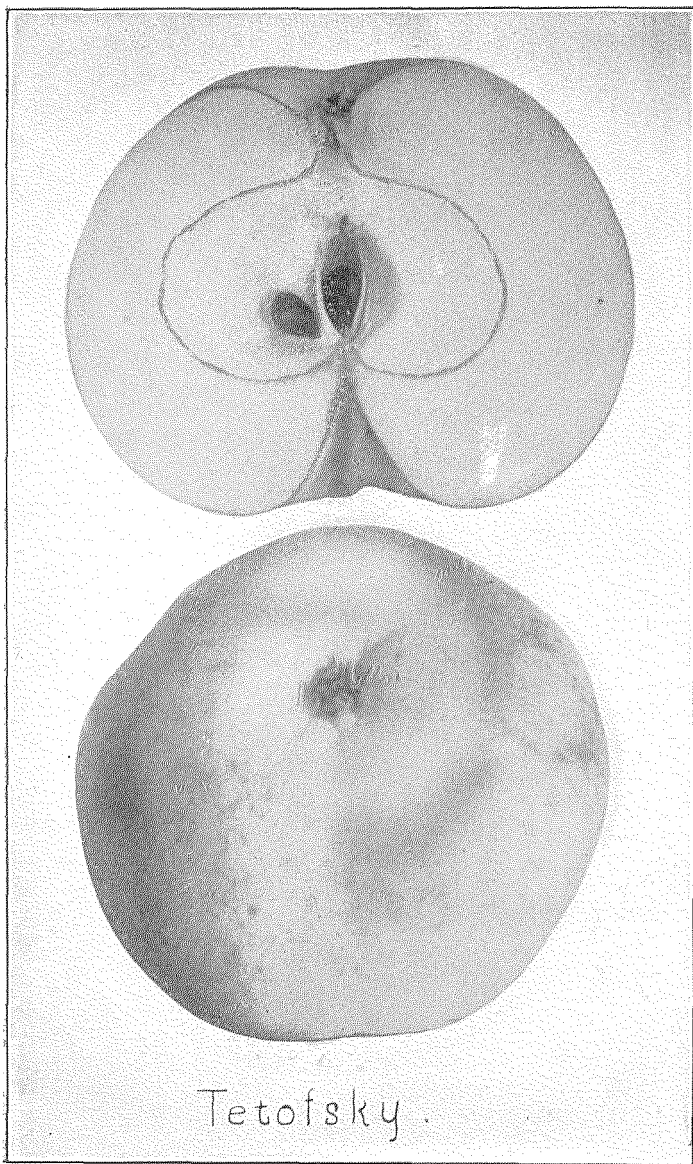
St. Lawrence.

For Description, see Page 28.



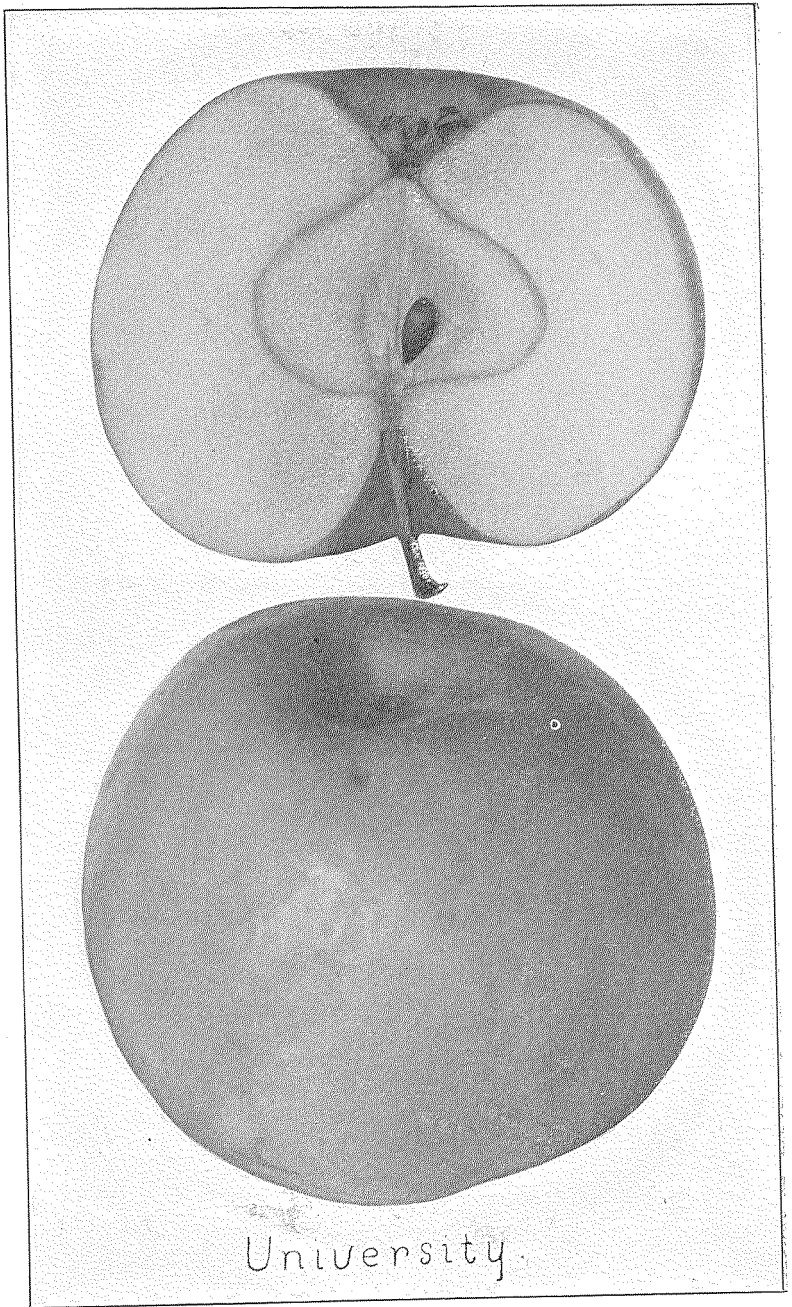
Scotts Winter

For Description, see Page 28.

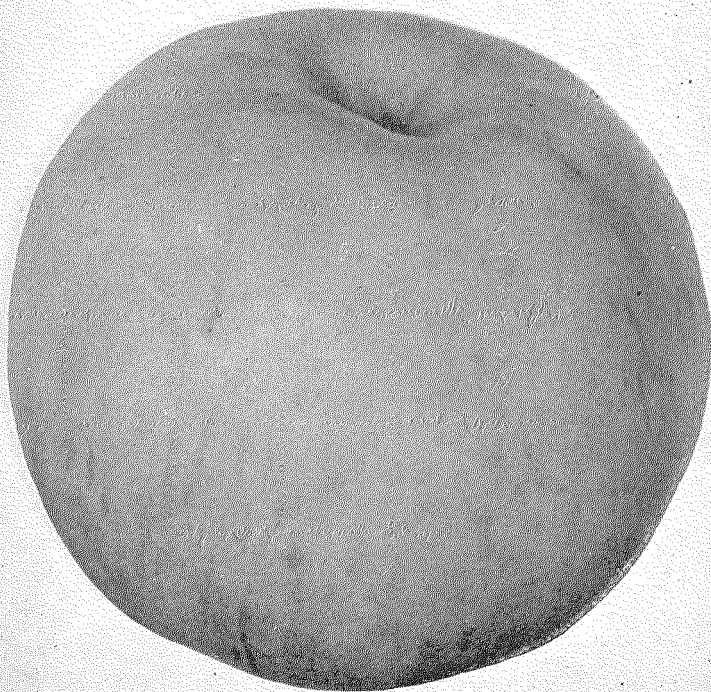
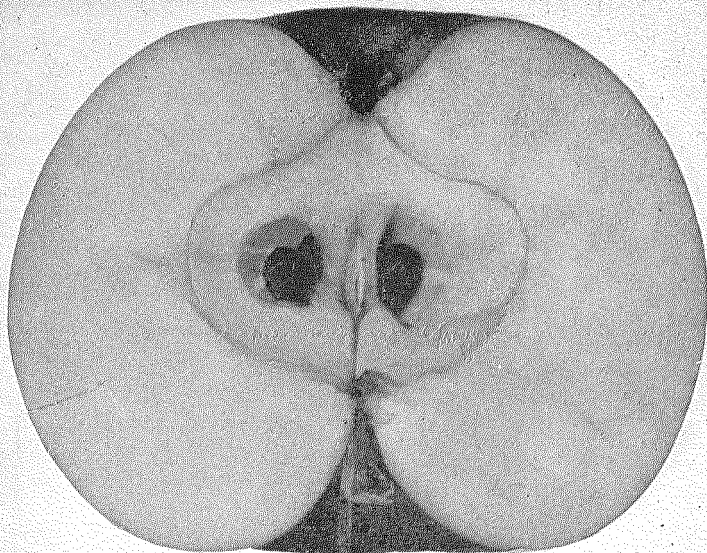


Tetofsky .

For Description, see Page 28.

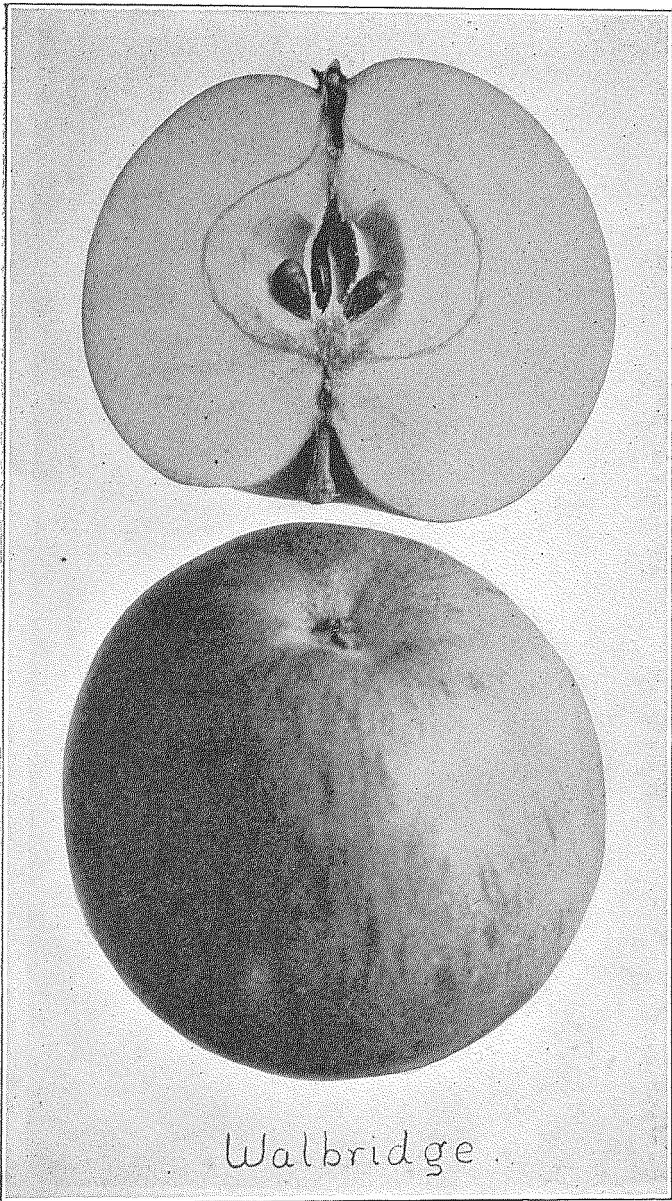


For Description, see Page 29.



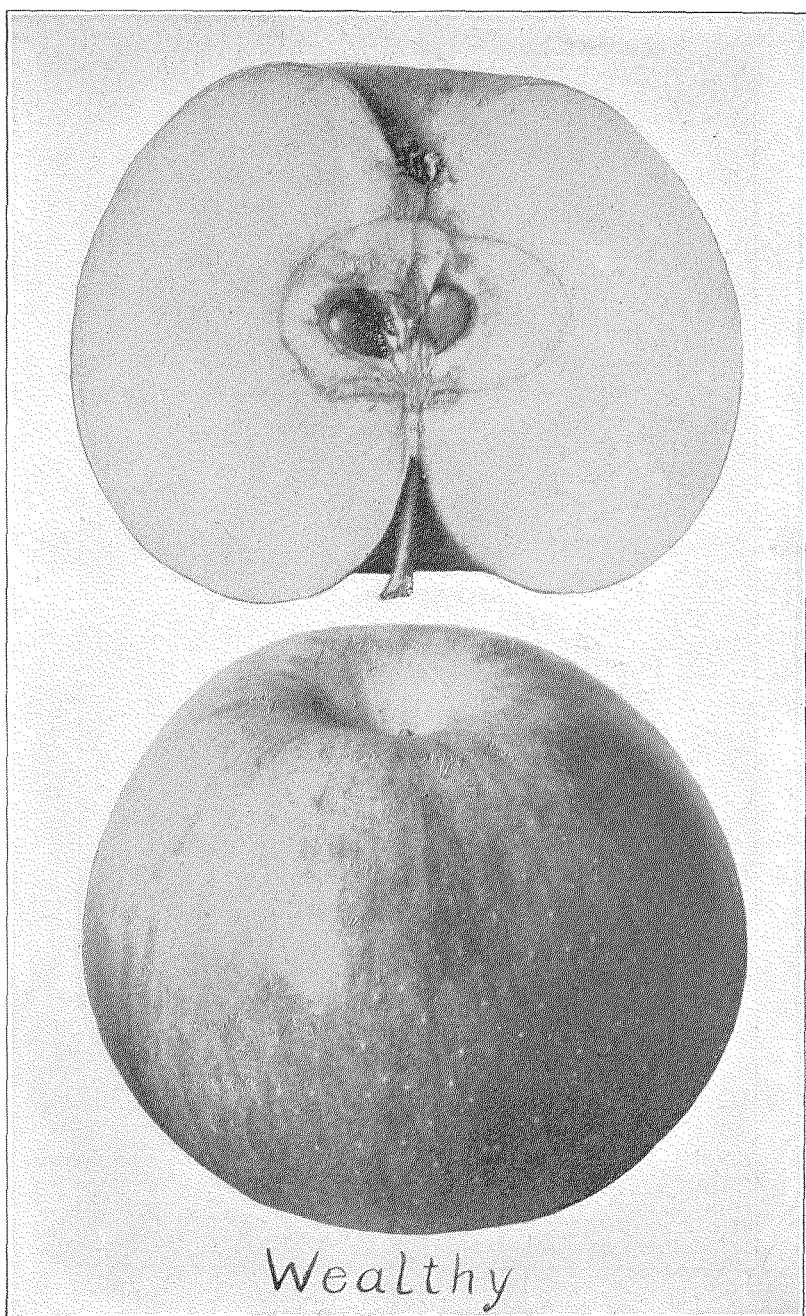
Utter

For Description, see Page 29.



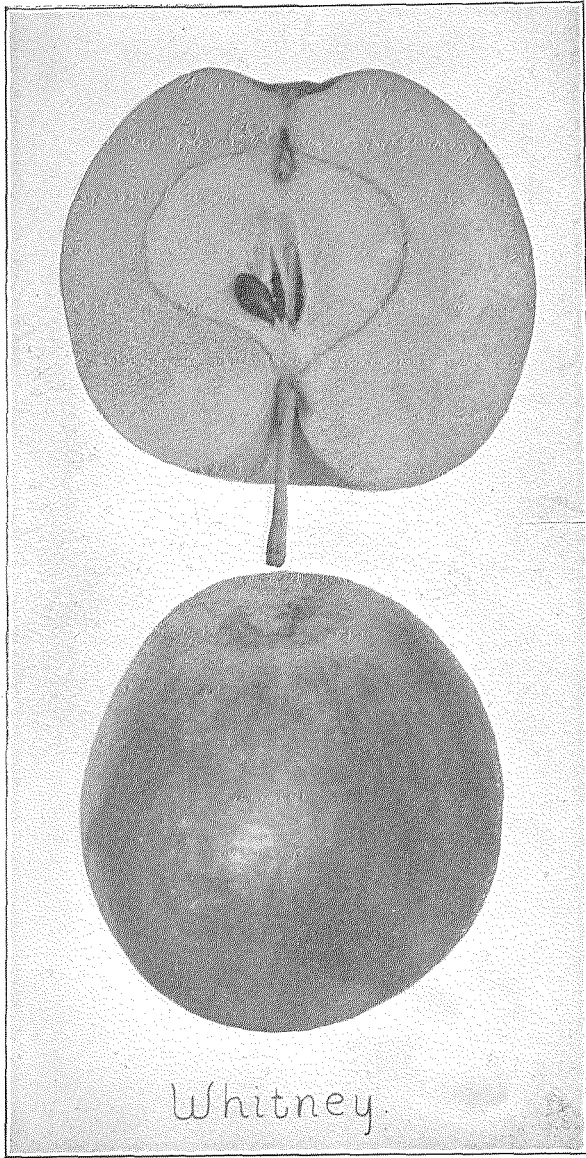
Walbridge

For Description, see Page 29.

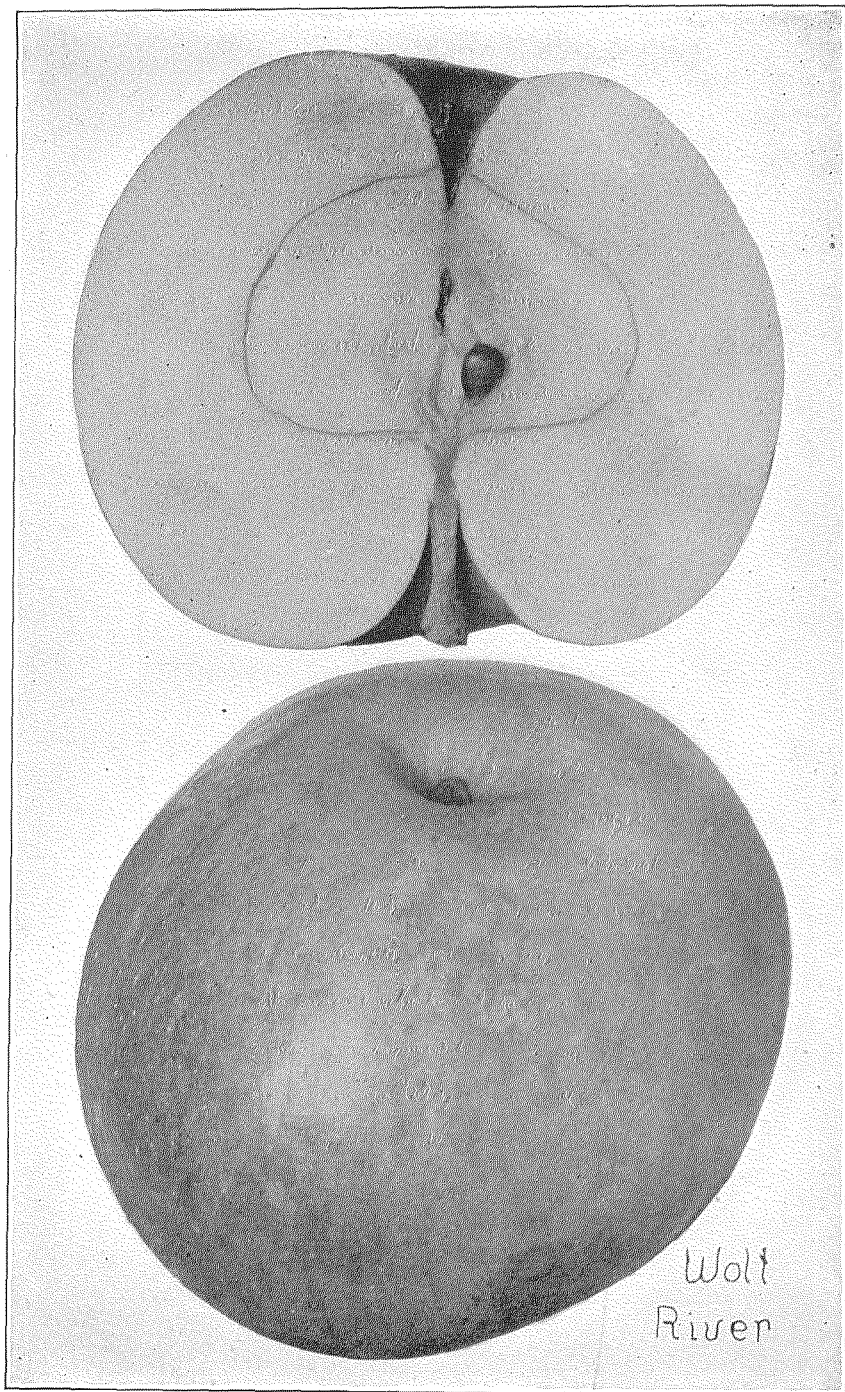


Wealthy

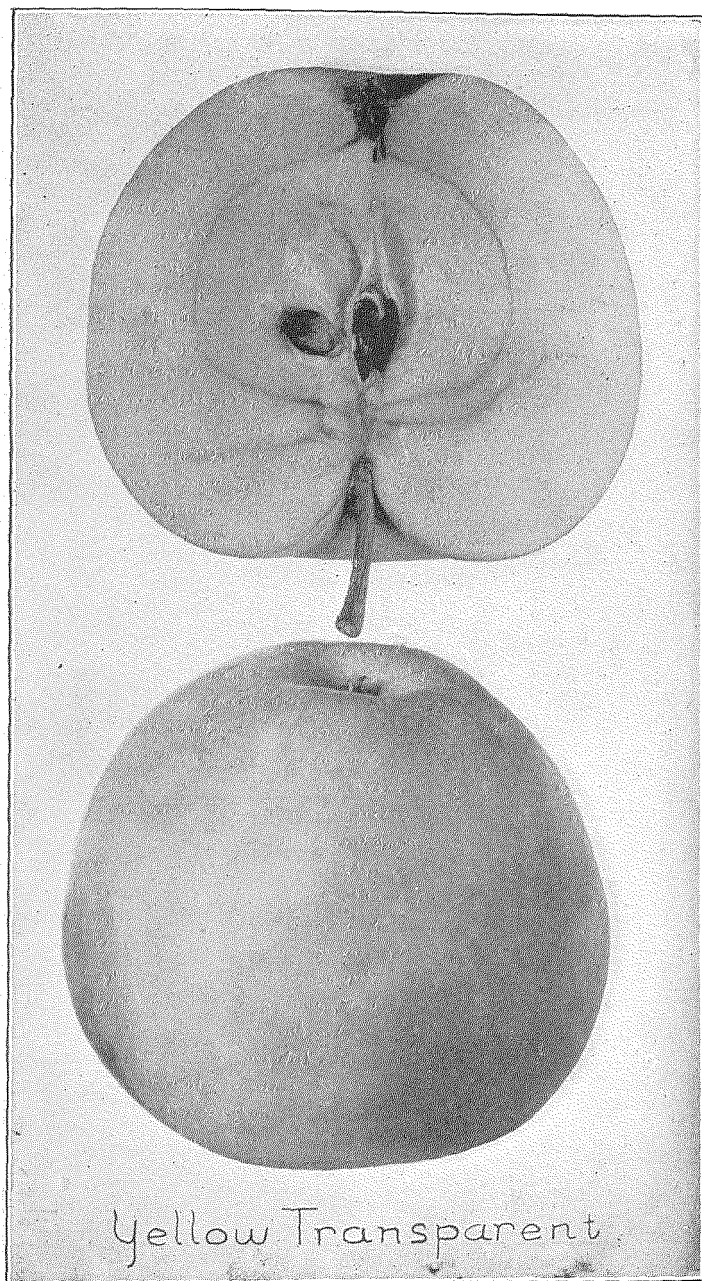
For Description, see Page 30.



For Description, see Page 30

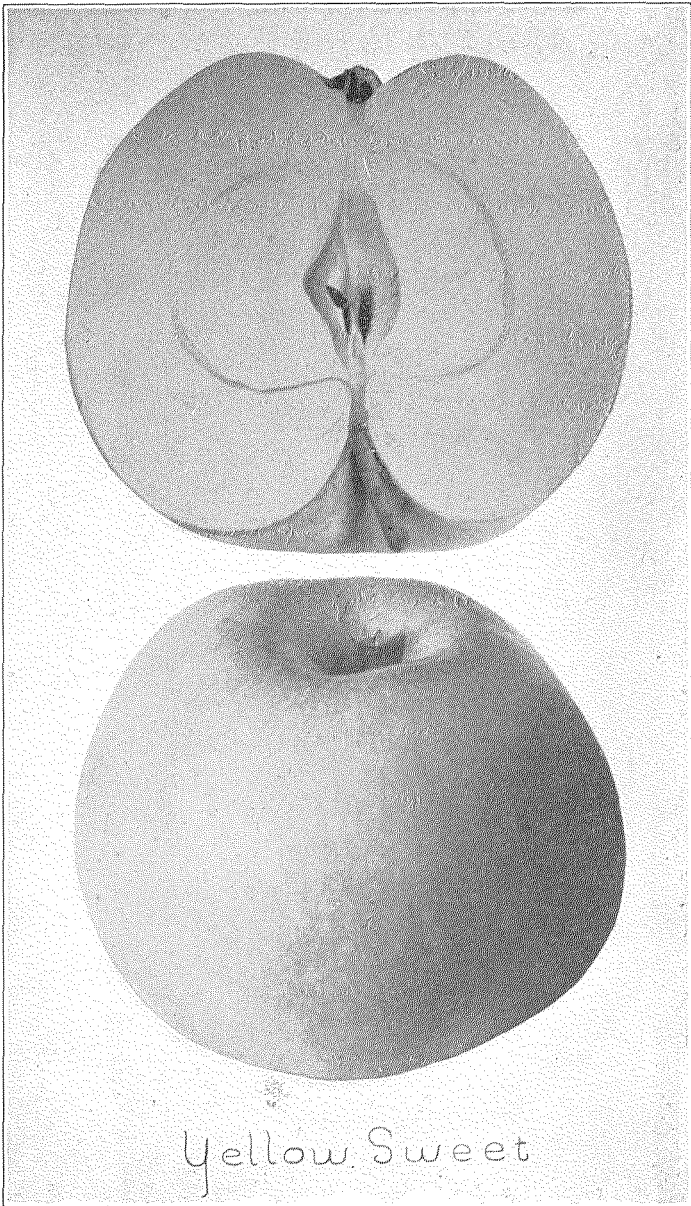


For Description, see Page 30.



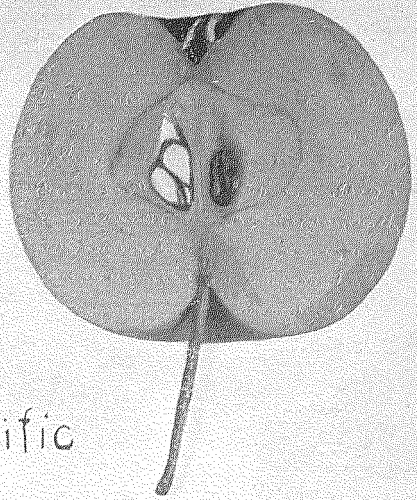
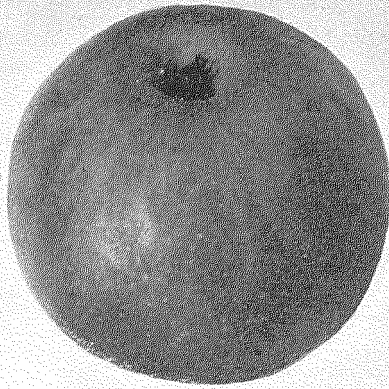
Yellow Transparent.

For Description, see Page 28.

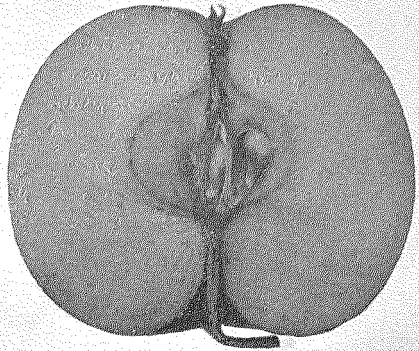
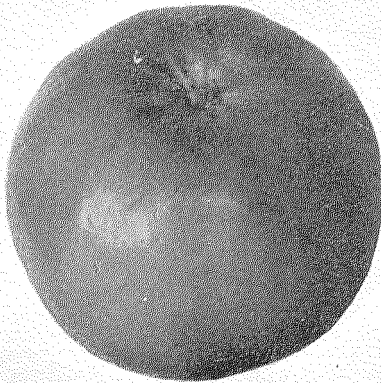


Yellow Sweet

For Description, see Page 31.



Lyman's Prolific



Seedling Wild Crab.

Lyman's Prolific.—For Description, see Page 24.
Seedling Wild Crab.—For Description, see Page 30.



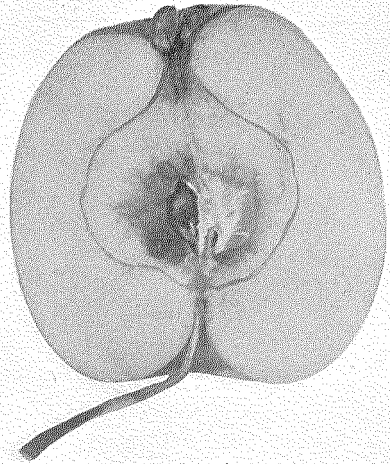
Mary (Gideon No.6.)



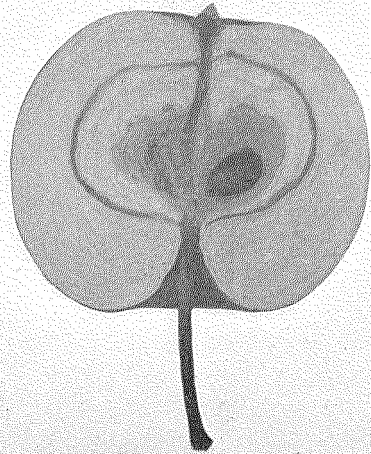
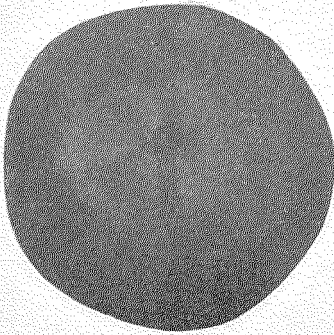
Martha.

Mary: Gideon No. 6.—For Description, see Page 24

Martha.—For Description, see Page 4.



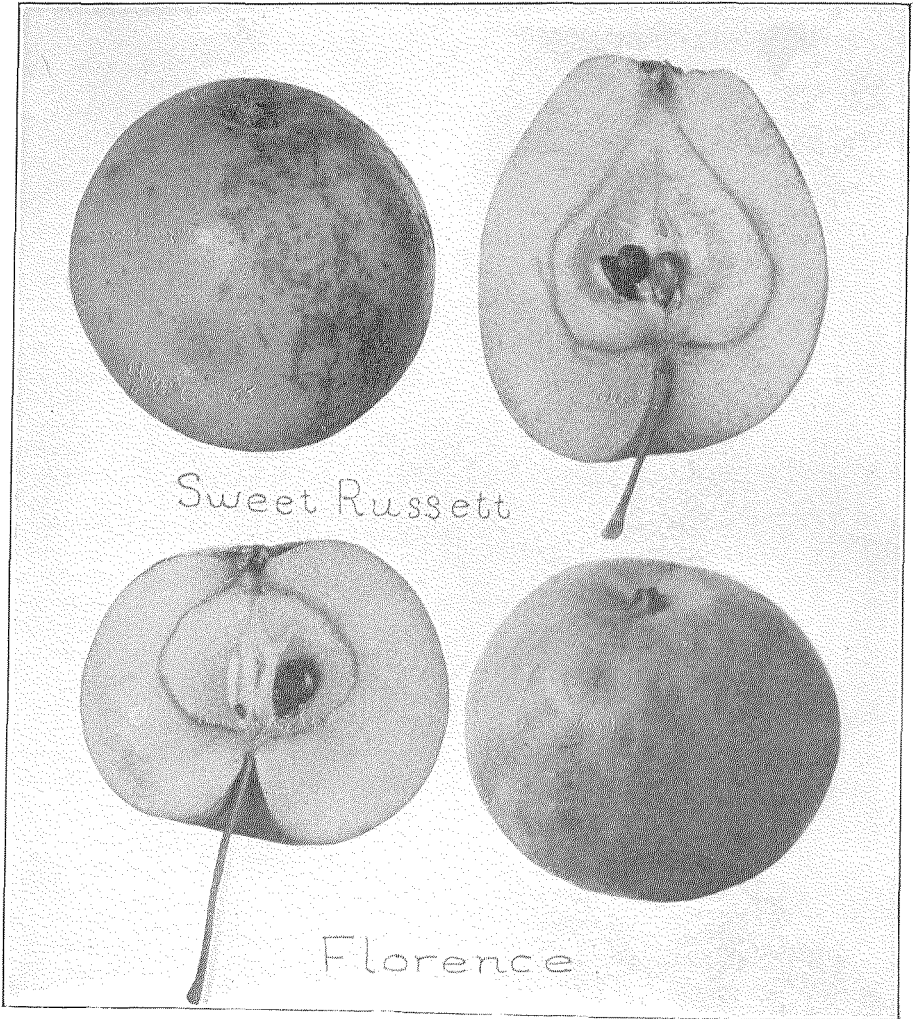
Pride of Minneapolis



Strawberry

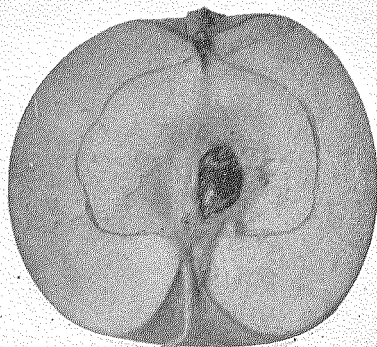
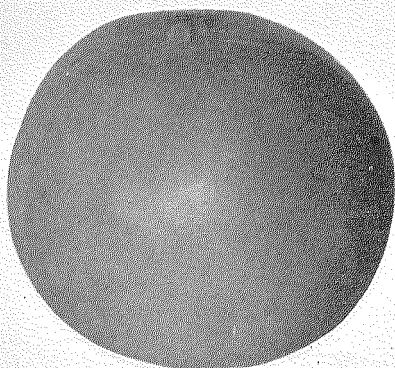
Pride of Minneapolis. For Description, see Page 27.

Early Strawberry.—For Description, see Page 20

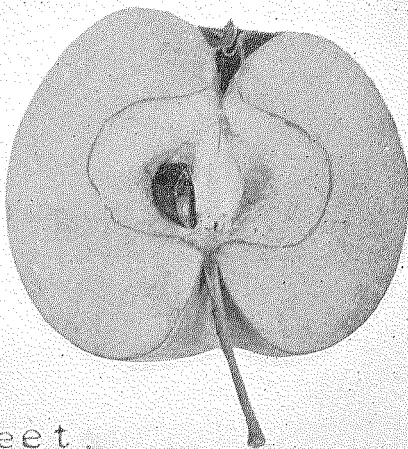
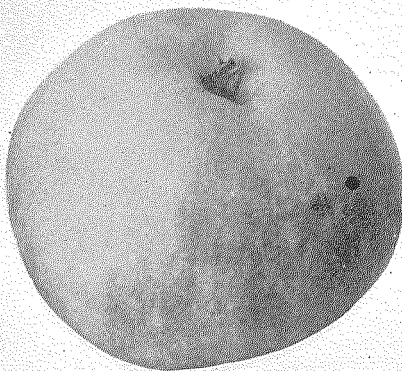


Sweet Russett.—For Description, see Page 28.

Florence.—For Description, see Page 21.



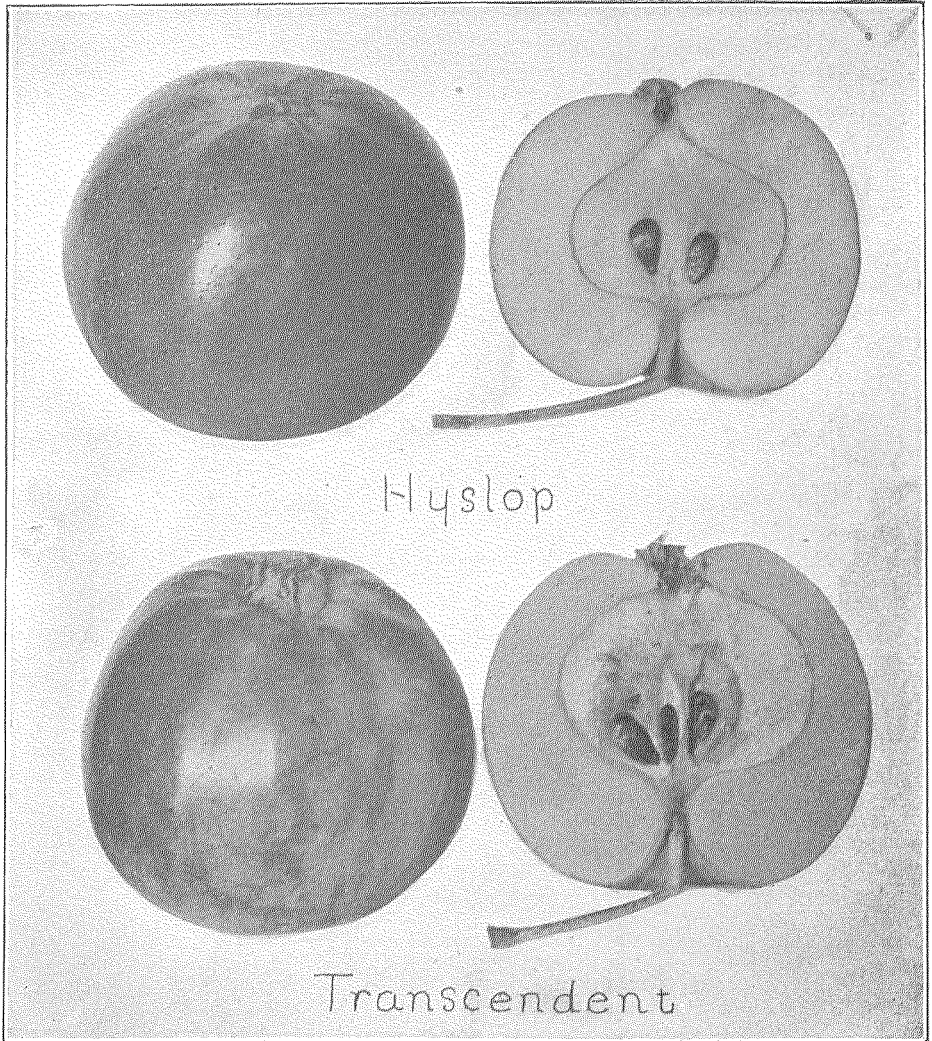
Virginia



Brier Sweet.

Virginia.—For Description, see Page 29.

Brier Sweet.—For Description, see Page 19.



Hyslop.—For Description, see Page 22.

Transcendent.—For Description, see Page 29.