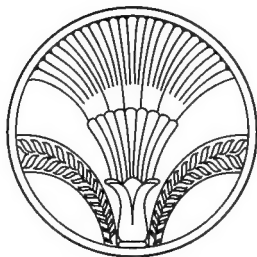
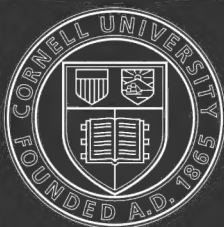


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# A LABORATORY MANUAL

## IN SYSTEMATIC POMOLOGY

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AN EFFORT TO PLACE BEFORE THE STUDENTS OF POMOLOGY IN  
THE MICHIGAN AGRICULTURAL COLLEGE A MEANS BY WHICH  
AN INTIMATE AND ACCURATE KNOWLEDGE OF POMOL-  
OGY MAY BE ACQUIRED

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By U. P. HEDRICK

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# A LABORATORY MANUAL IN SYSTEMATIC POMOLOGY.

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## TO THE STUDENT.

You are now beginning the study of pomology. There are several things that you must consider at the outset as it is very important that you begin in the right way. First, you will need to have the subject you are to study well defined in your mind.

*Pomology* is the science which deals with fruits. For our purposes it is divided into two parts: *fruit growing* and *systematic pomology*. The term fruit-growing explains itself. In this work we shall have nothing further to do with this branch of the subject. *Systematic pomology* deals with the describing, naming and classifying of fruits. It is seen to have three subdivisions and these we shall take up in turn as main divisions of study.

Having thus briefly defined the subject under consideration, let us glance at the methods and objects of study.

Pomology is to be studied by you as a science. Sciences are properly studied either wholly in the laboratory or in the laboratory supplemented by text-books and lectures. Systematic pomology will be taught wholly in the laboratory with this hand-book as a guide and a supplement.

The direct contact with fruits and trees called for in the plan outlined above is absolutely essential to a proper understanding of the subject. The work should be taken hold of

and carried out in the spirit of research if the desired knowledge is to be gained. You should try to carry it on in such a way that you will learn to observe, discover, and record things for yourselves.

The subject is such that you will be able to accumulate many facts. These are valuable but not of prime importance. Far more valuable is the ability that you may acquire of noting differences and resemblances, of drawing comparisons and of learning to classify. In the points just noted, pomology is the equal of any other science and you are therefore urged to make the most of the training in these respects.

Express your conceptions as plainly, accurately and concisely as you can. Much of your work will offer a splendid opportunity for a choice of exact terms and of concise expressions. It should afford the best of training in using good English and in using scientific language with precision. Such drawings as you are required to make should be neat and should represent the object in hand perfectly.

The trees and fruits you are to study are all treated of in books which are to be at your command. But you are to first study the objects themselves thereby cultivating self reliance and the ability to investigate. The books furnished you are to be used in making comparisons. Compare your own observations with what is said in the books. The books are often wrong—more often you will be.

The books and encyclopedias, as well as the trade catalogs, are the best authorities obtainable and represent the work of the master minds in pomological science. You will gain much if you can become acquainted with this pomological literature, both for its intrinsic value and because it will insensibly give you a knowledge of the habits and methods of the authors and enable you to catch something of their spirit.

Try to realize that pomology is a science comparable to other branches of natural science, though it may not be as fully developed. Ascertain for yourself whether a fruit or an orchard tree is not of as much scientific interest—and of infinitely more practical value—than a wild-flower, a weed, a bug, a fish, or other objects in other sciences. Apply yourself diligently and see if you may not acquire in systematic pomology a large amount of practical knowledge along with the same amount of culture, training, skill and other elements of pedagogic value which the pure sciences give.

various fruits, especially  
 the histological & morphological  
 characters of the fruit.

**DESCRIPTION.**

R. W. H.

A horticultural description is primarily a delineation of the differences by which horticultural groups are distinguished. By *group* is meant an assemblage of organisms related in a definite way, as orders, species and varieties. The term, however, is often used to designate intermediate or not regularly recognized divisions. Technically a description must be a matter of printed, or possibly written, record. A description should also include, if full and formal, a history and a bibliography, or at least such parts of these as have been indicated in authoritative writings.

In most horticultural works, in pomology in particular, a description mainly attempts to set forth differences and to portray a variety, species, or other group, in their relations to co-ordinate forms. It should give the distinctive characters by which one assemblage of organisms is distinguished from another with which it is compared. Such a description is called a *differential* one. A less common method of description is one which comprises all that is known of the plant or group under consideration and entirely independent of relationship. This *full* or *general* description is less needful and less used in horticulture than is the differential one.

**CHARACTERS.**—In other biological sciences, *i. e.*, botany and zoology, the term character is much used. It signifies the combination of properties and qualities by which a group of

organisms may be recognized, described and classified. The term is one seldom used in horticulture but should come into common use and will be found frequently in this manual. In botany, the characters are marks which distinguish varieties, species, genera, etc., from related assemblages of the same grade. The meaning should be the same in horticulture extended to all horticultural groups. We should thus speak of the character of the Fameuse group of apples or of the Baldwin variety of apples. Usually descriptions should designate only those characters which distinguish a group in order to avoid repetitions as far as possible. That is, generic characters should show the morphology of genera; specific, of species; and so on with forms within the species, only what is needful for each and excluding everything which belongs to another. Thus in describing an apple it is not necessary to give the characters of Order ROSACEAE, Genus *Pyrus*, species *P. malus*, but simply those of the particular variety.

WHO MAY WRITE AUTHORITATIVE DESCRIPTIONS.—There are recognized authorities having to do with nearly all of the cultivated plants, who ought to be consulted in naming new plants and in making formal descriptions of them. Thus Munson might properly be consulted in regard to grapes; Waugh, in regard to plums; Card, small fruits; and so on with the other fruits, flowers and vegetables. No one should consider himself competent to name and formally describe a new fruit or plant without much study and observation and a clear conception of the exact position of his new variety. This is far from present practice, and doubtless endless confusion could be avoided if horticulturists not well informed would delegate the naming and describing of their wares to some one who is rightly considered an authority.

GLOSSOLOGY.—By *glossology*, in distinction from nomenclature with which it is often confused, is meant the names applied to organs of plants and their modifications. While there are comparatively few special technical terms used in describing horticultural plants, botanical terms serving for most part, yet horticultural glossology is in a deplorable state.

Specialists and laymen use terms loosely and interchangeably to the great confusion of horticultural descriptions. The several uses of the common words, fruit, berry, flower and leaf are good examples of a poor glossology. The general rules observed in the glossology of botany are very applicable to horticulture and should be followed as closely as possible by horticulturists. These, condensed, are as follows:—

Each organ or part should have a substantive name and all modifications of organs should be called by adjective terms. Each organ or modification ought to be known by but one name, though in practice it is found that synonyms cannot be avoided in all cases. A term should not be used with two different meanings, thus: fruit should not be used to mean the ripened pericarp which is the botanical meaning of the word—and the edible product of a tree or bush which is the pomological meaning. Double uses of words, as above, are often unavoidable in general writings but in formal descriptions terms can be held to their one special meaning. All modifying names should be as precise as possible and should be used as originally intended. It is only by experience, and the use of a high degree of judgment, that a good descriptive vocabulary may be acquired.

PUNCTUATION.—Practices in punctuating descriptions are very diverse, greatly to the detriment of this phase of pomology.



There are no established rules as to punctuation and even our best pomological writers do not follow a uniform method.

The following suggestions are in accord with the best practices in punctuating descriptions: The account of each organ or quality should form a separate sentence, unless two organs or qualities be very intimately related, as stalk and cavity, and calyx and basin, in the apple, when the accounts may be united. Adjective terms are separated by commas as in common usage. In a long sentence diverse qualities may be separated by a semicolon or colon as in common usage.

The following description of the Bartlett Pear, taken from Downing, and omitting the history and qualities of the tree, shows good practice in punctuation:—

“Fruit of large size, oblong, obtuse pyriform. Surface uneven. Skin very thin and smooth, clear yellow (with a soft blush on the sunny side in exposed specimens), rarely marked with faint russet. Stalk one to one and a half inches long, stout, inserted in a shallow cavity. Calyx open with segments short, erect, set in a very shallow, obscurely plaited basin. Flesh white, and exceedingly fine-grained and buttery; it is full of juice, sweet, with a highly perfumed vinous flavor. (In damp or unfavorable soils it is sometimes slightly acid.) Ripens from last of August to middle and last of September.”

CITATIONS.—The rule for citations in the Cornell Code of Nomenclature, published elsewhere, may be repeated here and its use is commended.

“2. In the full and formal citation of a variety name, the name of the author who first published it shall also be given.

“(a) Names would then take such forms as the following: Summer Queen, Coxe, or Sophie (J. W. Kerr, *Cat.*, 1894); or America, Burbank, *New Creations*, 1898, p. 5.

“(b) It is expected that such citations of names will be used only in elaborate works on pomology, in scientific publications, or in cases where they are necessary for clear discrimination of synonyms.”

The author would suggest that, in addition to the requirements of the above rule, there is frequently great value in citing the works in which a variety was first described and also the one in which it is best described. Attention might also be called, in a rule of this kind, to the value of published figures either from drawings or photographs or in colors.

**SYNONYMY.**—The synonymy is an essential part of any full description of a variety. Synonyms are in a sense a measure of merit and yet the making of them must be decried because of the confusion they create. Once established, however, they must be kept track of and be kept distinct from admitted names. Synonyms include all other than the admitted name as established by the rules of nomenclature. Practice varies as to where and how synonyms are recorded in a description. Without doubt the best practice is to place them in parentheses following the citations of authors. If possible the synonyms should be given in order of their publication.

**ORIGIN, RANGE, SEASONS AND ADAPTATION.**—In a sentence or paragraph following the synonyms the origin, range, and adaptation should be given. Some writers leave this for the end of the description. By origin is meant as near as possible the exact place where the variety was discovered or originated. It is proper that any valuable historical facts be inserted here, depending upon the plan of the work. The range is the geographical distribution of the variety; usually the territory in which a variety does preeminently well. The adaptation is the

environment a variety affects, as; exposure, soil, moisture, climate, etc. The season at which the fruit matures should always be recorded as well as the length of its keeping time.

ABBREVIATIONS AND SIGNS.—Abbreviations and signs are not generally employed in horticultural descriptions, though it seems to the writer that their use could be more general with advantage. In the main the well known botanical signs should be employed, such as those used to indicate the sex of blossoms, the duration of life of a plant, and the subordination of groups. In the latter case it seems important that the exact signs used in botany in subdividing should be employed. These are: § \* +- ++ = ; with the addition of small and capital letters and figures to indicate further subdivisions. The use of the interrogation point to express doubt and the exclamation mark to indicate certainty, as followed in botany, would seem a good practice for horticultural descriptions.

Some of the abbreviations of the names of organs which are common in botanical writings might be employed to advantage in horticulture. These need no explanation even to the most elementary student.

ESSENTIAL CHARACTERS.—The characters drawn from the fruits themselves are the only absolutely necessary ones in a pomological description. The parts and qualities of the fruit are mostly taken up in order beginning with form, size, color, stalk, cavity, calyx, basin, flesh, flavor, etc., for the pomes, and varied to meet the several requirements of other fruits. Besides the characters of the fruits those of the tree, the shoot, the leaf, and the flowers are usually, and of necessity in a full description, described. As far as possible only such characters as are permanent and not liable to extreme variation with changes in

environment, should be considered, and with all characters some allowance must be made for such variations.

**RULES AND TERMS ARE NOT ARBITRARY.**—The above suggestions regarding the describing of fruits must not be construed into arbitrary rules. The qualities and parts considered in a description are so interwoven and so variously distributed with the different fruits that rules cannot be followed to the letter. The terms used to describe fruits are not more absolute than the rules, more important qualities being that they should be within the comprehension of all and as simple, accurate, uniform and scientific as the plan of the work in hand will permit.

**KINDS OF FRUITS.**—For our purposes we need to consider but three kinds of fruit; the *pome*, the *drupe* and the *berry*.

A *pome* is a fleshy fruit composed of a hollowed receptacle into which are sunk the one or more carpels composing the ovary. Examples are: the apple, pear, quince, medlar, etc.

Formerly a pome was supposed to be the thickened walls of an adnate calyx embracing one or more carpels but the first definition is now generally accepted by botanists.

A *drupe* is a fruit in which the outer part of the pericarp becomes fleshy while the inner hardens like a nut forming a stone with a kernel. Examples: the apricot, cherry, peach, plum, etc.

The true drupe consists of a single one-celled, and usually one-seeded carpel, but the term is sometimes applied to similar fruits arising from a compound pistil in which there may be several separate kernels. Some small drupes, as the huckleberry, are classed with berries. A *drupelet* is a small drupe such as the individual parts which together form a blackberry.

A *berry* is a simple fruit in which the entire pericarp is fleshy, excepting the skin; as the grape, currant, banana, tomato, etc. In ordinary usage any small pulpy fruit is a berry; as the strawberry, huckleberry, raspberry, blackberry, etc. In pomology we follow the latter meaning though the other would be better.

PARTS AND QUALITIES OF FRUITS.—The *flesh* of a fruit is the edible pericarp. The *core*, of pomes, is the parchment like carpels enclosing the seed. The seed of drupes is called the *pit* or *stone*. The *basin* is the depression which contains the remains of the blossom; sometimes, but in poor usage, called the eye. The *cavity* is the depression in which the stalk or stem is inserted. The *stalk* or *stem* is the pedicel or peduncle of the botanist. The *base* is the end toward the tree in which the stem is inserted. The *apex* is the end opposite the base and contains the remains of the blossom. The *point* is the end opposite the stem in some stone fruits. The *suture*, in the drupes, is the furrow running from the base to the point. The *axis* is a line connecting the base and apex. The *length* is the distance from base to apex. The *breadth* is the transverse diameter. *Body* and *neck*, used with pears, are terms the meanings of which are obvious.

Besides the points just named descriptions take into consideration the following qualities:—*form, size, texture, flavor, and season of ripening.*

HOW TO STUDY A FRUIT.—In studying or describing a fruit, the external characters, logically, first receive attention. As the fruit, which should be mature and a typical specimen, is taken in hand, note its weight; in a careful study determine its specific gravity, a quality of much value as a distinguishing

mark though usually not taken into account; then in order, note the form, size, color, and qualities of the surface in general. The base or cavity, as the case may be, should next be studied noting all markings after which the stem and its peculiarities are disposed of. Proceed now to the opposite end, the apex, and explore it, observing the peculiarities of basin and calyx with the space enclosed in the calyx.

To study the interior, make a longitudinal section in such a manner as to show the flesh, the core, seeds or pit, texture, the form of the fruit, the manner in which the carpels unite, open or closed core, etc. The color, texture, and juiciness of the flesh are of prime importance as well as the flavor, degree of sweetness or acidity, the richness, etc., the latter qualities being decided by taste. Note should be made of the aromas which in many varieties are sufficient for determination, but which are often difficult to describe. The seeds or pits are often distinctive, especially in the stone fruits. After such an examination you should be able to judge whether the specimen is fit for culinary or dessert purposes and to some extent to decide whether the variety is one for the amateur or the commercial grower.

RECORDING DESCRIPTIONS.—Without doubt the best practice for a student is to write out descriptions in full, avoiding abbreviations, headings and all devices for the sole use of saving time. Such a procedure would encourage accuracy, precision, the use of scientific language, and would give a greater command of English. Much good would come from the frequent expression of conceptions by drawings, so that between the written description and the drawings, no fruit nor other object would be left until a complete expression of it has been made, indicating a complete observation.

But descriptions of fruit are almost universally recorded by fruit growers, nursery men, experiment station workers and others on blanks prepared for the purpose. The student must become familiar with these blanks and their use and for this reason, and because of the necessity of covering a certain number of fruits, the blanks will be used for most part; but not until practice has been had in writing out descriptions in full and with the understanding that the very greatest care must be taken in recording the descriptions.

Full notes on the following points not mentioned on the blanks must accompany laboratory descriptions: The name of the *grower* with location and address, if the fruit does not come from the college orchard. This is of importance because all fruits are greatly influenced by environment. The *condition* of the fruit; whether *green, ripe, over-ripe, fresh* or *cold storage*; the nature of *insect* or *fungus* injuries, if any, etc. The number of specimens used in making the description should be given. The greater the number of specimens examined the better and the more accurate the description should be. A specimen for each student, selected as good types by the instructor, will furnish a reasonable number for the class if a general exchange of specimens is made with each variety. The *date* of writing the description is valuable but not essential.

Points of difference between the description made by the student and some standard authority should be noted and commented upon. All information which the student thinks worth recording should be put down even though no heading is provided for it on the blanks furnished.

**DRAWINGS.**—Free-hand drawings with pen or pencil are much to be preferred and are required of all students to some extent. Such students as are not ready draughtsmen, with permission

from the instructor, may make outline drawings by placing the object on the paper and tracing with pencil. In the latter case remove dampness from the specimen with blotting paper to prevent soiling the paper. The outline tracing should be very light to be filled in free-hand when the object is removed.

The writer is indebted to Professor A. T. Erwin of the Iowa Agricultural College for the following method of securing an outline of pome fruits. Cut the fruit in halves, lengthwise or transversely as desired, using a very sharp knife that the outline may be sharp. Remove the surplus dampness with blotting paper. Now touch the edge-outline, the end of the stem, the core-outline and the calyx tube with a moistened, soft indelible lead pencil. The fruit is then firmly pressed on the paper. Quickly remove the fruit and complete the drawing, if necessary, with a hard pencil. With a little practice very accurate and artistic drawings can be made in this way.

We are now ready to take up the several parts and qualities of the various fruits, giving the terms in common use in writing descriptions. In studying these terms the student should have before him illustrative specimens of fruit which are far better than cuts or half tones in the text. In fact specimens are indispensable for the remainder of this chapter.

**FORM.**—The form is probably the most important character of a fruit and demands first consideration. It varies considerably with environment. It may be said that fruits have six standard forms:

1. A fruit is *round* when length and breadth are nearly equal, as the Fameuse apple. The term *roundish*, expressing a variation from roundness, is more often used than round.

2. A fruit is *oblate* when the length is much less than the



breadth, as the Maiden Blush apple. *Flat* and *flattened* are nearly equivalent terms used when fruits are very oblate.

3. A fruit is *conical* when it tapers from the base to the apex as the Alexander apple.

4. A fruit is *ovate* when the length exceeds the breadth and the fruit tapers like an egg from center to base and apex, as Pond Seedling plum.

5. A fruit is *obovate* when the smaller end of an egg-shaped fruit is at the base: the reverse of *ovate*, as the Buffum pear.

6. A fruit is *oblong* when the length is greater than the breadth and the sides are parallel, as the Bellflower apple in some regions. Fruits are seldom truly oblong.

SPECIAL FORMS—PEARS.—Some fruits have special forms which need to be set forth. Thus, many pears have a narrow part toward the stalk called the *neck* and a larger part toward the crown, the *body*. When the body and neck are concave, as in the Bartlett, it is said to be *pyriform*. When the body is nearly round with a short, abrupt neck the pear is *turbinate* or *top-shaped*, as in the Bloodgood.

Common modifying terms for the above parts, are, for the neck; *narrow* or *broad*, *short* or *long*, *obtuse* or *acute*, and *distinct* or *obscure*. For the body; *oblate*, *round*, *ovate*, *conical*, *heavy* or *large*, and *light* or *small*.

Possibly varieties of pears vary more in form according to environment and treatment than any other fruit and this must always be a matter of consideration in descriptions.

SPECIAL FORMS—DRUPES.—The drupes have but few definitions of forms peculiar to them. The forms *round*, *ovate*, and *cordate*, the latter meaning heart-shaped, are particularly ap-

plicable. The word *elliptical* is frequently used for ovate. A drupe with a very deep and well pronounced suture is said to be *sulcate*. Plums, and sometimes peaches, are often flattened sidewise and are then said to be compressed. Cherries are frequently oblate.

SPECIAL FORMS—SMALL FRUITS.—The terms given for use in describing the tree fruits are amply sufficient for the small fruits with a few exceptions. These may be briefly noted:

The strawberry may nearly always be described by the terms given above, but it, more than any other fruit, is likely to be abnormal or normally to assume some unusual shape to which special terms must be given. The words *oval*, *conical*, *spherical*, *regular* and *irregular* are most often used in describing the forms of strawberries.

The general terms given amply cover the forms of raspberries and blackberries and individual fruits of currants and gooseberries. The shape of the clusters of the latter two fruits often requires special terms; as *much branched* or *sparsely branched*, or *shouldered*, a term to be defined under the grape to which it more properly belongs.

The grape requires several terms not previously mentioned. The form of the individual grapes is nearly always *round*: though occasionally *oval* or *oblate*. The form of the bunch is a matter of much more importance than that of the berry. The bunch is said to be *shouldered* when branches arise from the main stem near the base. Rarely there are two branches or a *double shoulder*. The words commonly used to indicate form should be applied to the shoulder as well as the bunch; as *round ovate*, *slender*, *regular*, etc. *Loose*, and *compact* are terms used to indicate the nature of the insertion of the grapes on the stem. The *length* and *breadth* of a bunch are also important qualities

and may be given in comparative terms as *long* or *short*, or in actual measurement.

COMBINATION OF FORMS.—Many of the forms given above may be combined; as *round-oblate* for many crab apples; *round-conical* for the Canada Red apple; *ovate-conical*, Wolf River apple; or *oblong-pyriform* for the Bartlett pear; *obovate-turbinate* for the Bloodgood pear, etc., etc.

MODIFYING TERMS.—The forms given above are further modified by several standard terms as, *depressed* meaning much flattened, shortened or sunken, applied chiefly to the apex of small fruits and peaches. *Compressed* when the sides are pressed in or much flattened, as in some drupes. *Flattened at the end* is an expression frequently used in regard to the base and apex of various fruits. *Truncate* is a term applied when a flattened end is very abrupt. Parts are said to be *obtuse* when rounded or blunt, and *acute* or *accuminate*, as in the neck of a pear, when they taper to a point. When the development at the surface is irregular a fruit is said to be *uneven*. When the *unevenness* is very marked the fruit is *angular*; if in the nature of grooves the fruit is *furrowed*; and if the furrows are abrupt a fruit is *ribbed*. When any of the primary forms are described evenly about a horizontal or vertical axis a fruit is said to be *regular* or *uniform*; if the opposite be true a fruit may be *unequal*, *irregular*, *oblique* or *lop-sided*.

CHARACTERS OF THE BASIN.—The basin found in the pomes, and the point or apex corresponding to it in the drupes, frequently have characters which are valuable distinguishing marks in describing fruits. As a usual thing the markings of the basin and apex are fairly permanent and reliable.

As to size a basin may be *broad* or *narrow*, *deep* or *shallow*; these terms are frequently qualified with *very* and *medium*, as *very broad*, *medium deep*. A basin or apex is *distinct* when well defined and *obscure* when scarcely to be seen. It is *abrupt* when the depression breaks off suddenly from the apex. The following words express peculiarities which a basin may have; *regular*, *smooth*, *waved*, *angular*, *plaited*, *furrowed*, *ribbed*, *wrinkled*, *even*, *folded*, and *knobbed* when the five ribs of an apple end in as many knobs about the basin.

Lastly some fruits are *russeted* on this part only, as the Rhode Island Greening. This russetting is a somewhat variable character depending upon season and latitude, yet in many apples, and pears as well, it is a fairly permanent character.

Akin to the russetting of the basin is the *cracking* which characterizes several sorts. Some fruits have their basins much cracked through the action of the elements or spraying solutions. This marking is not permanent, nor characteristic and can serve but little use in descriptions unless there be a strongly marked tendency to such behavior. But when the basin is marked with slight cracks which do not rupture the skin, and are of a normal character, the cracking is a valuable mark.

In the drupes the apex, corresponding to the basin in the pomes, may be *pointed*, *prolonged*, *rounded*, *blunt*, *depressed*, *sunken*, and some varieties may have special peculiarities of much importance in classifying and therefore not to be neglected in descriptions.

CHARACTERS OF THE CALYX.—The persistent calyx within the basin of the pomes sometimes furnishes distinguishing marks of value. It can be studied best by making longitudinal sections through the fruit and calyx. A number of terms may be used in its description. It may be *large*, or *small*, *long* or

*short, open or closed.* The calyx tube may be *conical* or *urn-shaped* or *funnel shaped* and its segments may be *divergent* or *connivent* or *convergent*, *persistent* or *deciduous*. All of the above characters must, of course, be studied in the ripe fruit. With some fruits the calyx is *marcescent*, *i. e.*, falls off as the fruit reaches maturity.

The calyx of the strawberry must always be taken into account, its chief characters being: *size, form* of segments, *color*, and readiness with which it parts from the fruit. The calyx of currants and gooseberries should be noted though not of great importance.

THE CAVITY.—The cavity may have many of the qualities assigned to the basin and is like it in having permanent and valuable distinguishing marks. The terms used in describing the basin are applicable, for most part to the cavity, and the following, while chiefly used in describing the cavity, may also serve in descriptions of the basin:—

The cavity is *acute* when it ends in a sharp point and *accuminated* when the point is long drawn out. It is *obtuse* when blunt or rounded at the bottom. It is *lipped* when a portion of the flesh protrudes from or against the stem. Like the basin it may be russeted or cracked and now and then it is *green* or *brown* in both apples and pears to a degree and so permanently that the colors become valuable distinguishing marks. Like the basin the cavity is variable in depth and breadth, in manner of breaking, and in surface. The cavity is relatively unimportant in describing the drupe fruits but should not be neglected.

THE STEM.—The *stem*, or *pedicel*, or *peduncle* gives us important characters in some fruits. In the following fruits the stem remains attached and separates from the twigs: apple, pear,

quince, cherry, plum, strawberry, currant, gooseberry, and grape. While the stems separate from the fruits in the raspberry, blackberry, dewberry, peach, apricot and cranberry. The shape, length, thickness and in some fruits the mode of attachment should be considered, though all are somewhat variable.

The terms commonly used are *long*, *short*, or *medium* in length; they may be *curved* or *straight* or *inclined*, according to their direction from the axis of the fruit; *slender*, *medium*, *thick*, *fleshy*, *knobby* or *clubbed* depending upon the amount and arrangement of their substance. In pears and plums the base of the stem is often more or less fleshy, or, in both the flesh may be arranged in rings surrounding the stem.

Statements in regard to the length of the stem expressed in exact measurement are of small value as the variations in different varieties are great, and even in any one variety averages of many stems must be taken; therefore, as far as possible statements regarding length should be comparative using the longitudinal axis of the apple for comparison. The stem is possibly of greater value in describing plums and cherries than other fruits.

SIZE.—Size must always be considered as a relative quality, and even so no great amount of dependence can be placed upon it as a distinguishing character. Expressions of size in weights on linear measurements are almost worthless and seldom need be given in laboratory work at least. The terms used to indicate size express five grades, as follows: *small*, *very small*, *medium*, *large*, and *very large*.

It is well to take into account the circumstances which modify size, bearing in mind the natural difference that exists between varieties, as between the Northern Spy and Lady apples. Fruits vary much in size according to season, being smaller in

adverse seasons. The number of fruits on the tree affects the size—the fewer the fruits the larger. A change of stock influences the size. Thus pears are larger on quince stocks, and apples larger on Paradise stocks than on their own roots, though the trees are dwarfed. Cultivation, as would be expected, greatly modifies fruits—the better and more frequent the cultivation the larger the fruit. Lastly, soil has an important effect. Some fruits grow largest on clay, others on loams, others on sandy soils, etc. In nearly all cases, the richer and the more nearly virgin the soil, the larger the fruit.

**THE COLOR.**—The colors of fruits range from white through shades and tints of yellow, orange, red and purple, the latter sometimes approaching blue in plums and black in grapes. The various colors are designated by the names in common use, but the manner in which the colors are arranged or laid on suggests a number of terms peculiar to the several fruits. Thus the colors of a fruit are said to be *uniform* or *solid* or *self-colored* when one color prevails; *striped* when stripes of color alternate; *streaked* when the stripes are long and narrow; *blushed* or *bronzed* when the color is broken through without stripes; *splashed* when the stripes are short and abruptly broken; *blotched* when there are several colors without order; *clouded* when the colors shade into each other; *stained* when the tints are very light; *mottled* when marked with irregular spots; *spotted* when spots are somewhat uniform; *dotted* when spots are very small.

It is usually difficult to give the exact colors of small fruits. The colors are nearly always solid and in tints and shades hard to distinguish. *Light*, *medium* and *dark*, qualifying *tints* and *shades* must frequently be used.

Dots are valuable distinguishing characters because of their

uniformity. In studying most varieties, they should receive special attention, note being made of their *size, shape, color, number, whether light or dark; scattered or crowded; prominent or indented*. In some cases dots are surrounded by distinct rings of a different color and they then become *areolar* or *ocelated*. The dots caused by certain parasitic fungi must not be confounded with the distinctive natural markings we are discussing. Dots are of great value in distinguishing varieties of some groups of plums.

In considering color the condition under which the fruit grew is an important factor. Colors are heightened by exposure to the sun, and may scarcely appear at all in the shade. Climate has a similar effect—brighter colors in the north, in high altitudes, and in clear climates—duller color in the South in low altitudes, and in foggy climates. Soils exercise a most decided influence on color but quite too varied a one to be discussed here.

THE BLOOM.—The *bloom* is the delicate powdery or waxy coating found upon plums, grapes and sometimes apples. It is of small value as a character of pome fruits but is often of great importance in distinguishing varieties of the stone fruits. Sometimes it is of an *oily* or *unctuous* nature as in the Pippin apples. The usual terms used in describing the bloom are: *thin* or *heavy; conspicuous* or *scant; powdery, oily* or *waxy*. The quantity can be determined by scraping it off with the blade of a pen-knife. The bloom when removed is always found to be *white, grayish* or *colorless* and is never blue or purplish as the description of plums and grapes not infrequently read. The latter colors are given by the fruit alone and show through the bloom. The character of the bloom on gooseberries is often



worth nothing though not of very great importance. With the grape, bloom is often of considerable importance.

The delicacy of the bloom is worth noting. In securing specimens for descriptions care must be taken to preserve it. The delicacy of bloom is well indicated by Thoreau's oft quoted expression: "The finest qualities of our nature, like the bloom of fruits, can be preserved only by the most delicate handling."

**THE FUZZ.**—On peaches and some apricots and nectarines, the fuzz is often highly characteristic. About all that can be said in regard to it is to mention the amount using the terms *very fuzzy*, *medium fuzzy*, *slightly fuzzy*, or such comparative terms as *long*, *short*, *coarse*, *heavy*, *scant*, *thin*, etc., etc.

**THE SKIN.**—The last part of the exterior of fruits to be considered is the skin which has several characters of first importance. The skin may be *thick* or *thin*, *tough* or *tender*, *rough* or *smooth*, *polished*, *waxy*, or *greased*; it may be wholly or partly *russeted*; or it may be covered with a light or heavy bloom. In fruits of a uniform color the skin is sometimes marked with a line which runs from eye to stem; in the drupes this is most often a nearly obsolete suture; in the pomes, as in Talman Sweet apple, it is a character quite distinct from any other. Gooseberries are frequently marked on their surface with lines, the characters of which should be noted.

**THE STAMENS.**—In classifying the apple some writers have thought the persistent stamens to be reliable characters. These are seldom taken into account by American pomologists but nevertheless are of interest and should receive the attention of students. The stamens are said to be *marginal* when they are

near the inner or outer end of the calyx tube and *median* when near the middle of the tube. The apple must be cut very carefully to make a study of the stamens.

THE FLESH.—In the flesh of fruits we have several very reliable characters, the flesh being nearly always the same in a variety if the fruit be in good condition. The colors of the flesh of fruits vary much less than those of the exterior and yet differ much. In the pomes the flesh is always white or some tint of yellow though often stained with red. In the drupes the common colors are white, yellow, amber, and occasionally red. The flesh of peaches is frequently stained with red especially at the stone. Different varieties of strawberries exhibit decidedly marked colors of flesh which should always be recorded.

In its consistency the flesh may be *hard* or *spongy*; *melting* when the flesh becomes liquid by the pressure of the mouth, as in some plums and peaches; *buttery* when the flesh forms a soft mass in the mouth as in many pears; *breaking* when it will not yield to the pressure of the mouth as in some pears and nearly all apples. Strawberries are usually said to be *hard* or *soft* fleshed, and their flesh should be critically examined as to consistency as shipping and dessert qualities depend largely upon this quality.

In texture the flesh is *fine grained* when the cells are very small; *granular* when very coarse; *gritty* when hard; and *fibrous* when tenacious. The terms *tough*, *crisp* and *tender*, *woody* and *stringy* also express qualities of the texture. Slightly different qualities, which belong here are *dryness* and *juiciness*. The last two terms are especially valuable in describing the drupes and grapes.

THE FLAVOR.—Flavor depends so much upon climate, soil,

season, and degree of maturity that it is of comparatively small value as a distinguishing character except in the very pronounced characters of sweetness and acidity. These are of prime importance and furnish characters upon which groups of several of the fruits are founded.

The flavor may be *sweet, sugary, neutral, sub-acid, acid, very acid, austere, aromatic* or *spicy* or *perfumed*; it may be *insipid* or *flat, rich* or *thin, highly flavored, mild* or *astringent*. *Astringency* or *bitterness* in peaches, as in the Elberta, is a well marked characteristic. *Vinous* is a valuable term indicating richness and high flavor with some acidity. Smell and taste are so intimately associated that the two are difficult to separate. The fragrance frequently calls to mind other odors as *musk, balsam, or spice* but the usual terms are, *perfumed* or *aromatic*, not taking into consideration the nature of the fragrance.

QUALITY.—Quality is an arbitrary matter depending upon the likes and dislikes of the individual and is therefore of small value in classification. Usually but three grades of quality are mentioned; *first, second* and *third*, but several other expressive terms are used, as: *good, very good, best, fine, excellent* and *inferior*. The student should distinguish well between flavors and quality. Any two persons ought to agree as to the flavor of a fruit but scarcely any two agree as to the quality.

THE CORE.—The core in the pomes has some characters that are permanent and reliable. Thus it is always either *opened* or *closed*; it may be *small, medium* or *large*; its outline as formed by the group of carpels is *long, short, wide, compressed, or cordate*, etc.; it may reach to and *clasp* the calyx tube or it may *meet* it. In the apple the core often attains the condition known as *watercore* in which the surrounding flesh is very firm

and saturated with juice. In the pear the core is not infrequently *gritty*—surrounded with hard granular cells. The core is *sessile* when near the stem and *distant* when near the calyx. The axis passing through the core from stem to eye may be *inclined* or *vertical*, *long* or *short*. When the walls of the core extend quite to the axis the cells formed are said to be *axile*; when the walls do not reach the axis, the cells are *abaxile*.

SEEDS AND PIT.—The characters of seeds are often distinctive and enable one to decide upon a variety when all other attributes fail. In the pomes, color is a valuable marking and while the seeds are always *brown*, they may be *pale*, or *yellowish*, or *greenish*, *dark* and *almost black*. In the apple and pear *imperfect* seeds may be a constant character. In pomes, berries, and grapes, seeds may be *few* or *numerous*. Seeds of the pomes are often *loose* and *rattle* when the fruits are shaken. In seeds of all fruits form and size are worthy of note. Thus, they may be *long* or *short*, *round*, *angular*, *flat*, *plump*, etc.; in size they are *large*, *small* or *medium*. In the drupes in addition to the above qualities the pits may be *smooth* or *furrowed*, *pointed* or *blunt*, *pitted*, *grooved*, or *winged*. The consistency of the shell, *hard* or *soft*, is in some of the drupes a matter of importance. Possibly the most valuable of all the characters connected with the pit in the drupes is whether the flesh parts freely from the stone or clings to it; when the pit is free from the flesh a fruit is a *freestone*; when the flesh clings, it is a *clingstone*, or a *semi-clingstone*.

Seeds of strawberries should always receive some attention though they are relatively unimportant. They may be *raised* or *sunken*, *many* or *few*, *large* or *small*, and of varying colors. In some varieties they are *clustered* about the tip rather than dotted evenly over the surface. The pomologist seldom takes

much account of the seeds of grapes, but the student should find them of much interest. No doubt a careful study of the seeds of different varieties would show them to possess considerable taxonomic value. They differ chiefly as to *form*, *size* and *number*—qualities readily described. Some are *notched* at the blunt end and in some varieties the small end is drawn out into a *beak*. The *chalaza* of the seed varies in size, shape and *position* and the *funicule* is more or less prominent depending upon the variety. The attention of the student is especially called to the seeds of grapes as being well worth careful study.

THE TREE OR PLANT.—The tree or plant in manner of growth, in the characters of shoots, foliage, buds, and flowers are of vital importance in distinguishing the higher groups, species, genera, etc., but are secondary to the fruit in characterizing the horticultural groups. Nevertheless they are of considerable importance and should always be carefully studied in describing varieties.

MANNER OF GROWTH.—The manner of growth of trees, bushes and vines often serves to identify a variety. Young plants just coming into bearing serve the purpose best as fruit bearing tends to destroy the natural habit of growth. The following terms are in common use in describing the growth of trees:

The growth is *erect* when the branches arise nearly perpendicularly, as in the Bartlett pear. *Pyramidal*, having the form of a pyramid, as in many pears. *Ascending* when the branches curve upward, as in the Gravenstein apple. *Diverging* when they leave the tree at an angle of about forty-five degrees, as the Dominie apple. *Spreading* when parallel with the ground, as in the Rhode Island Greening apple. *Drooping* when they

assume a downward curve. *Straggling* or *irregular* when there is a mixture of the preceding forms as in the Winter Nelis pear. The habit of growth may also be said to be *loose* or *compact*, to be *strong* or *weak*.

The tendency to form *runners* in strawberries and to *sprout* in the bush fruits should be taken into account. The character of bushes and vines can be very well expressed with the vocabulary given for tree fruits.

Again the point must be emphasized that the manner of growth of a young tree is not like that of an old one. A tree that is erect in growth when young will probably be ascending when old; and if diverging when young will be spreading when old.

THE SHOOT.—Until the growth completes its first year, it is known as the *shoot*. With different varieties shoots vary much and often give distinguishing characters. They may be *straight* as in the Northern Spy apple. *Flexuous* as in the Roxberry Russet. *Stout* as in the Red Astrachan. *Slender* as in the Jonathan. *Short-jointed* when the buds are close together and *long-jointed* when the contrary.

The above characters of the shoot cannot always be depended upon as, for instance, the shoots of a fast growing tree are quite sure to grow much slenderer than those of a slow growing one; those of a slow growing tree are sure to be stouter. Good conditions for growth will in most cases, make shoots more flexuous. In general the manner of growth of shoots is much affected by the amount of food available for the use of a plant.

The colors of shoots are often strikingly different and form a means of classification. When very young all are greenish but as the season advances they may assume various tints and shades of *green, yellow, olive, brown, red* and *purple*. While

many varieties are told at once and with certainty by the color of their shoots, yet color terms should be given relatively, as the color varies more or less in the same variety with age, soil, climate and season.

The shoots of many varieties of apples, pears and plums, the latter in particular are distinguished by varying degrees of pubescence. In some cases the down is barely discernible and in others is almost prickly because of its coarseness. Nearly all shoots are pubescent at first but with many varieties the down tends to disappear with age.

BUDS.—A study of the chapter on classification will show that scarcely any two species of our fruits bear their leaf and fruit buds in the same way and that the manner of bearing buds is one of the chief characters in differentiating species. For some reason pomologists have used buds but little in characterizing varieties, though the size, form, prominence and degree of pubescence vary most strikingly in different varieties of the same species and peculiarities of the bud often serve to identify a variety.

Thus, buds may be *large* as in the Bartlett pear or *small* as in the Talman Sweet apple; they may be *loose* or *compact*; they may be *long* and *pointed* or *short*, *full* and *plump*; they may be *compressed* to the shoot or stand *erect* from it; some are *shouldered* making prominent projections on the shoot. Often they vary in color, as those of the Seckel pear are *drab* and those of the Bartlett are *reddish*. Buds of some varieties are *pubescent* and of others *smooth*.

THE LEAVES.—The shape, size, texture, color, the absence or presence of glands, and the divisions of the edges of leaves are all of considerable importance in the description of varieties.

There is much individual variation in the foliage of trees of all varieties. The relative amounts of the food constituents of plants, as well as the total amount in a soil greatly influence the size, color and texture of leaves. Season, and varying degrees of temperature and humidity, exercise considerable influence on leaves, the size in particular.

The terms used to designate shapes of leaves in botany are applicable here, as; *oval*, *oblong*, *ovate*, *lanceolate*, *obovate*, *round*, etc., etc. A botanical glossary will be found very helpful in the study of all the characters of leaves. As to size, leaves may be *large* as in the Red Astrachan apple; *small* as in the Jonathan; *narrow* as in the Dyer; or they may be *long*, *short* or *broad*. As to texture they may be *smooth* as in the Baldwin apple; *waved* as in the Talman Sweet; *flat* as in the Madeline pear; *folded* as in the Easter pear; *reflexed* when the apex curves backward; *conduplicate* when trough-shaped; *wrinkled*, *rough*, etc., all terms well enough understood.

The color often helps in describing varieties. The usual colors are; *light green*, *deep green*, or *bluish green*, though young leaves are frequently *drab* or *reddish*.

Leaves may be *erect* or *drooping* like the shoot but these terms must be carefully used as leaves are usually erect on young shoots and become drooping as they grow older.

The absence or presence of glands and the form and number of glands serve in all classificatory schemes of the peach. These are on the leaf-stalks close to the base and are organs of secretion; they may be *globular*, *reniform* or *kidney-shaped*. The leaf-stalks themselves may be peculiar in certain varieties, as; *long*, *short*, *stout*, *slender*, *flat*, etc.

The division of the edges of the leaves are of prime importance in describing many varieties, more particularly in the peach where it serves as a character separating groups. The



usual botanical terms are used, as; *serrate* or *doubly serrate*; *finely serrate* or *coarsely serrate*; *crenate*, *obtusely crenate* or *finely crenate*; *toothed*, *lobed*, etc.; or there may be compounds of the above terms.

THE FLOWER.—A full description of a variety should take into account the flower as well as the fruit and the other parts of the tree. But few pomological works do this however because the flowers are not obtainable when fruits are ready to be described—the time that descriptions are usually written. In the peach, however, the distinctions between flowers of different varieties are so obvious that one of the principal classifications of that fruit with some writers is founded on them. Thus one group of varieties has large showy flowers with petals nearly white or with light margins and a second group embraces those with small flowers which are usually pink or reddish. A few varieties of the peach have flowers which are wholly white, as the old Snow.

In all of the other fruits the flowers vary to a greater or less degree in size, form and color. Possibly the pear varies least of all and yet in one variety, the Jargonelle, the flowers are at least twice as large as in other sorts. Fully developed pear flowers are invariably white and a creamy white in bud. The organs of the flower differ in size and shape when closely examined but not enough so to be of great value in descriptions.

The flowers of the apple vary in many particulars and so much so that it is probable that varieties of apples could be distinguished by a careful study of the flowers. Such a study was made by Dr. W. J. Beal of 100 varieties and reported upon at the American Pomological Society in 1879. The points particularly noted by Dr. Beal were colors, shape of petals, length and width of sepals, length of claw, length of

styles, length of pedicel, number of flowers in an inflorescence, number of stamens in a flower and the texture of the stamens.

The flowers of different varieties of all the small fruits differ with respect to color, size, vigor in bearing pollen, etc. The flowers of strawberries and grapes in particular will bear careful study. In both there are great variations in the number of stamens and the amount of pollen borne. The "sex" of strawberries is the commonest distinguishing character. Varieties bearing both essential organs are said to be *hermaphroditic*, *bisexual* or *perfect*; those bearing only the pistils are *female*, *pistillate* or *imperfect*.

Without doubt the flower should become a greater factor than it now is in the classificatory systems of the different fruits, and without doubt as the science of pomology advances with the consequent refinements it will.

**BLOSSOMING PERIOD.**—Now that we know that cross-pollination is all-important in growing fruit, the blossoming period should be a matter of careful record. This would vary much in different localities but not much more so than other characters commonly given; such records might be given in comparative terms. Few descriptions now contain records of the blossoming period. Beginning of bloom, full bloom, and dropping of bloom should be specified; if but one date is given it should be full bloom.

**THE SEASON.**—The *season* is the date at which fruit is ready for use. The common divisions of the fruit season are *summer*, *autumn*, and *winter*. These are often qualified with the terms *early* and *late*. With small fruits the latter terms are used almost exclusively with the addition of *midseason*. The laboratory student should give approximately the exact date at which

the fruit ripens. A variety of any fruit will vary in the season depending upon the latitude and the altitude. The region in which a sample was grown must be known, then, to accurately determine its season. Some sorts will keep much longer than others even under the same conditions. Different varieties may, therefore, have a *long* or a *short* season. Some varieties of the different fruits, as the apple, currant, and gooseberry are used before ripe; in such cases the term *ready for use* is applicable. Fruit is often shipped when green and this time must not be confused with the true season.

It is often a difficult matter to tell when a fruit is ripe, as there are no well marked lines between greenness and maturity; they grade insensibly into each other. For our purpose *ripeness* may be defined as the period when a fruit has attained greatest size, highest color, and fullest development of flavor in its succulent tissues. A fruit is at its best but for a short time after which deterioration and decay begin.

ECONOMIC STATUS.—Under this head should be stated the uses which a variety best serves. Fruits are most often divided into *culinary* or *dessert* sorts. Or they may be classified under the headings *market* and *dessert*. Grapes are divided into *table* and *wine* varieties, though many sorts answer both purposes equally well. Other uses to which fruits are put should be specified as necessity demands. Thus there are special varieties for *export*, for *canning*, *evaporating*, *cider* and *jelly* making, etc. All adaptabilities of this nature should be recorded.

It is well to state in this connection the standing of a fruit as to market value or for home use in particular regions. Some sorts find favor in one market or locality for seemingly no accountable reason. Such preference represents real value in a variety, however, and should be noted.

## II.

## NOMENCLATURE.

All departments of human knowledge have a multitude of expressions and names peculiar to them. The great necessity for general agreement in the choice of expressions and names to designate certain things has brought about in all the sciences, and in many other divisions of knowledge as well, a *system* of names. Such a system of names constitutes the *nomenclature* of a subject. In pomology the nomenclature includes the names of varieties and groups of varieties. It should be distinguished from glossology, a term, which properly used, refers to the names of organs and their modifications.

From the above definition it will be seen that nomenclature is a broad subject. In the sense in which it is commonly used by pomologists, that of determining the correct names of fruits, it is an unlimited subject. It is not the purpose here to touch upon the phase of nomenclature just mentioned in any way, important though it is, but to limit the discussion to a very brief consideration of principles and rules for the systematic naming of plants.

THE NAME.—The *name* of a variety of any fruit is a means of distinguishing a definite, homogeneous group within the species. Names of varieties of fruits are of comparatively recent origin and indicate a growth in fruit growing which would be interesting to trace if space permitted. The practical use of a name, as defined above, is obvious,—it designates

a particular variation in any fruit. This variation may be in regard to size, or flavor, or color, or season, or some quality of the tree, or of any well marked character. The essential point in pomological nomenclature is to make such use of names that error, confusion and ambiguity may not through them creep into science.

LIMITATIONS OF A NOMENCLATURE.—A system of names imposes restraint and this to some is burdensome and unendurable. There is and will be no want of pomologists who will not follow any system of naming fruits. This will always mean more or less confusion. Again, it is more than likely that pomologists will never wholly agree upon all the rules in any system. This means that there must be concessions, incongruities and faults in whatever set of rules are in use. There will always be those too, who will indulge themselves in a nomenclature of their own, regardless of any generally accepted system, merely for the novelty of so doing.

The conduct of those who willfully violate the rules of nomenclature, or who in ignorance do so, is highly reprehensible. It can afford no advantage whatever and creates unnecessary difficulties in the science, and in the practice as well, of fruit-growing. If all will conform to some set of laws much uncertainty of knowledge will be avoided, and the progress of the science and art will be materially greater.

UNIVERSAL RULES IN THE NOMENCLATURE OF SCIENCE.—There are some universally recognized rules, written and unwritten, governing nomenclature in all sciences that scarcely find place in a code and yet should be in force. For example it is well recognized by all that no set of rules should be arbitrary nor imposed by absolute authority. Again, rules must

be reasonable and such that everyone can comprehend them and be inclined to accept them. In nearly all sciences names must be in Latin or be Latinized—not so in horticulture. A universal rule is that “For each plant or group there can be only one valid name and that always the most ancient, if it be tenable.” Another is; “No new name should be given to an old plant or group, except for necessity. That a name may be bettered is no reason for changing it.”

Accessory considerations, though of the utmost importance, are; that names be absolutely grammatically correct; that regularity, euphony and prevailing custom be observed as far as possible; and that fitting respect be shown for the names given by other persons though not in accordance with acknowledged rules.

**RULES FOR NAMING FRUITS.**—Rules are indispensable in any serviceable system of nomenclature. In the established sciences there are sets of rules for each and conformity to the recognized code is the manifest duty of a worker in any science. Horticulture is now recognized as a science but it falls far short of other sciences in the matter of its nomenclature. Because of the lack of a stable nomenclature, it is exceedingly difficult to readily identify varieties in the current fruit literature; to find out what is known and recorded of them; or even to discuss them without some confusion.

The great necessity of rules of nomenclature in pomology is more apparent if one studies our fruit books. Almost every variety long known has several synonyms—some as many as a score. For about 10,000 known varieties of fruits there are not fewer than 25,000 published names. The orthography, punctuation and pronunciation are diverse and names are often meaningless, lengthy and wholly lacking in uniformity. But

little headway can be made in the comparative study of fruits with such a burdensome and confusing nomenclature.

AMERICAN POMOLOGICAL SOCIETY RULES.—The only rules in the United States at the present time bearing the semblance of authority are those of the American Pomological Society. These are far from satisfactory, and yet, were they generally enforced, our nomenclature would be in far better condition than it now is. The following are the rules:—

RULES OF THE AMERICAN POMOLOGICAL SOCIETY.

1. The originator or introducer (in the order named) has the prior right to bestow a name upon a new or unnamed fruit.

2. The society reserves the right, in case of long, inappropriate, or otherwise objectionable names, to shorten, modify, or wholly change the same when they shall occur in its discussions or reports, and also to recommend such names for general adoption.

3. The name of a fruit should preferably express, as far as practicable by a single word, the characteristics of the variety, the name of the originator, or the place of its origin. Under no ordinary circumstances should more than a single word be employed.

4. Should the question of priority arise between different names for the same variety of fruit, other circumstances being equal, the name first publicly bestowed will be given preference.

CORNELL CODE OF RULES.—A few years ago a horticulturists' club at Cornell University worked over all existing rules, added to them and formulated a code far more complete than any we have yet had. These, without doubt, will at some future time,

which we may hope will be soon, be the basis of a code generally recognized by American horticulturists. The following is the code:—

#### THE CORNELL CODE.

##### Form of Names.

1. The names of a variety of fruit shall consist of one word, or at most two words.

(a) In selecting names, simplicity, distinctiveness and convenience are of paramount importance. Pitmaston Green Gage and Louise Bonne de Jersey are neither simple nor convenient. Gold, Golden, Golden Drop, Golden Beauty and Golden Prune, all given to different varieties of plums, are not distinctive.

(b) The use of such general terms as seedling, hybrid, pippin, buerre, damson, etc., is not admissible.

(c) Nouns must not be used in the possessive form. McIntosh's Red, Crawford's Early, Bubach's No. 5, must be written McIntosh Red, Crawford Early and Bubach.

The name of no living horticulturist should be applied to a variety without his consent.

(d) Numbers are to be considered only as temporary expedients, to be used while the variety is under trial.

(e) An author publishing a new variety should use the name given by the originator, or by the introducer, or else should choose the oldest discoverable local name, providing such name may be conformed to these rules without loss of identity.

2. In the full and formal citation of a variety name, the name of the author who first published it shall also be given.

(a) Names would then take such forms as the following: Summer Queen, Coxe, or Sophie (J. W. Kerr, Cat., 1894); or America, Burbank, New Creations, 1898, p. 5.

(b) It is expected that such citations of names will be used



only in elaborate works on pomology, in scientific publications, or in cases where they are necessary for clear discrimination of synonyms.

#### Priority.

3. No two varieties in the same group shall have the same name, and the name first published for a variety must always be used to designate it. All names subsequently published must stand as synonyms.

(a) The term "group" as here used shall be held to designate the large general groups specified by words in common language, such as raspberry, plum, apricot.

#### Publication.

4. Publication consists in the public distribution of a printed name and description, the latter giving distinguishing characters of fruit, tree, etc., or in the publication of a new name for a variety properly described elsewhere.

(a) Such a publication may be made in any book, bulletin, report, trade catalogue or periodical, providing the issue bears the date of its publication, and is generally distributed among nurserymen, fruit-growers and horticulturists.

#### Revision.

5. No one is authorized to change a name for any reason except when it conflicts with these rules.

While this code has not been officially adopted by any body of horticulturists, so far as the writer knows, it has been given considerable publicity and has impressed all favorably. Without doubt it is the best foundation upon which a set of rules for American pomology can be built up. Moreover, it is not far from the present practices of our best pomologists. From

this on we shall take the Cornell code as a basis of our discussion.

FORM OF NAMES.—In addition to the statements under this head in the Cornell Code, there are several minor considerations of importance. Chief of these is that so far as possible a name should be significant and appropriate. It is often well to designate the particular variation which gave rise to the variety, as; Red Russet, Limber Twig, Early Harvest, Winter Nelis, Purple Cane, etc. Again a name may often give clue to the place of origin, as; the Concord grape, the Kalamazoo peach, the Ontario apple. Or it may commemorate the name of the originator or introducer, as; the Burbank plum, Logan berry, Bartlett pear. It is true that a name is only a label and that it need not have significance but how much better are the above significant names than the meaningless terms Eldorado for a blackberry or World's Fair for a strawberry. It must be remarked, however, that meaningless names are seldom misleading and if euphonic and not too long, their use should be permissible and is sometimes desirable.

Another quality of a good name is, and this is mentioned in the code, that it be distinctive and give individuality to a variety. No person can ever convey to another a distinct idea of a variety if he uses a name that is not absolutely distinctive. A lack of this quality in a name permits of fraudulent practices by nurserymen, and is a source of great inconvenience to the fruit grower.

The use of numbers to indicate a variety should be permissible only by the plant originator, nurseryman and the experimenter in testing varieties. For this purpose numbers are a great convenience and almost indispensable but for the public they are not sufficiently distinctive and lead to confusion.

Another point as to form of names is that they should be cleared of titles and of accessory participles. Such titles as *General*, *Major*, *President*, *Lord* or even *Miss* or *Mrs.* should not be permissible. French names, very noticeable in our pears, often have the participles *de* as *Bon de Jersey* and there is a tendency to use the corresponding participle *of* in English and American names. This should not be permissible excepting now and then as a concession for the sake of euphony.

Names from adjectives are frequently in good form, especially if the describing word be apt, and euphonious, thus; *Yellow Transparent*, *Wine Sap* and *Limbewig* for apples are not bad. No form of name, however, is more abused than the descriptive adjective. Such names are often too lengthy, or border on the bombastic, and more than any other form are likely to be synonymous.

Latin or Latinized names are not in good form and should not be permissible. Pomologists err but little in this direction, but florists and vegetable growers show a tendency to do so.

ORTHOGRAPHY.—In any code of rules something should be said in regard to orthography. Much confusion now exists as to the spelling of many names in horticulture. This is particularly true of the French, Russian and Japanese names and even many English names, as the *Kieffer* and *Seckel* pears, have several ways of spelling. When a name is drawn from a proper noun, the orthography of such proper noun should be preserved. Yet a name having been misspelled by several authorities and for some length of time should not be changed, fixity being of more importance than correct spelling.

PRONUNCIATION.—Mention should be made also of pronunciation in any set of rules. Much confusion now exists in the pronunciation of names especially those given in honor of indi-

viduals and places. Such names should be given the original pronunciation. This is common usage in other sciences and is in accord with the commemorative object of the name. Foreign names should retain their foreign pronunciation so far as euphony will permit.

**PRIORITY.**—Neither of the two sets of rules given above pay sufficient attention to priority. One of the fundamental principles of any system of nomenclature is priority of publication, inasmuch as the chief object of rules is to restore and retain old and true names. The adoption of a most rigid rule as to priority is the only practicable way of securing a current and stable nomenclature.

The rule governing priority ought to set a date to fix the limits within which priority shall be reckoned. In botanical nomenclature such a date is set and is 1753, the year of the publication of Linnaeus' "Species Plantarum." A good date for pomological literature would be 1845 which marks the advent of our greatest pomological work, Downing's "Fruits and Fruit Trees of America."

**PUBLICATION.**—The Cornell Code covers the ground of publication very well. It would seem desirable, however, that a little more latitude be given in defining publication. Distribution by sale or otherwise among plant growers or improvers ought to be tantamount to publication if specimens be accompanied by autograph letters, inasmuch as such distribution is constantly being carried on, especially by plant improvers, before publication as it is defined in the Cornell Code.

It is understood, and possibly the rule should so state, that a printed description without a name no more constitutes publication than does a printed name without a description.

While publication has primarily to do with the fixation of names, yet the proper identification of names makes it very necessary that the time and the means of publication be given, as well as the name of the author. This belongs, however, more properly to description and has been taken up there under the head of citation.

NAMES OF HYBRIDS.—Rules of nomenclature should specify some form for the naming of hybrids. It is becoming more and more important, especially in formal works in horticulture, that we have given the parents of hybrids and crosses. Nothing can be better than botanical usage in this respect. In botany hybrids with known parents are designated by combining the names of the two parents, thus; Gregg x Cuthbert (*Rubus occidentalis* x *R. strigosus*) for a cross between the Gregg and Cuthbert raspberries of which the first supplied the pollen and the second bore the fruit. When either of the parents is unknown, but the hybridity is undoubted, the name should be distinguished by the sign x prefixed, thus; x Purple Cane (*Rubus occidentalis* x *R. Strigosus*).

REVISION.—The subject of revision is well covered in the Cornell Code and the writer only wishes to urge the necessity of the utmost conservatism in the matter of revising names. Names of cultivated plants become established in the trade and are thus of money value. On the other hand, when named varieties are accidentally or willfully introduced under a new name all possible should be done to restore the old name; and, in the case of a willful change, to expose for the condemnation of fellow horticulturists the person making the change. Unfortunately for the honor of horticulturists, and for the science of horticulture, cultivated plants are too frequently reintroduced under new names.

**AUTHORITY IN POMOLOGICAL NOMENCLATURE.**—Who constitutes the final authority in settling questions of pomological nomenclature? There is no constituted authority and pomologists have never agreed as to whom it should be given or how it should be given. Probably most pomologists recognize the American Pomological Society as having chief jurisdiction. Others find in the Division of Pomology of the United States Department of Agriculture a source for reference. Certain individuals are tacitly recognized by nearly all pomologists as the authority for certain fruits or groups of fruits, thus; Budd and Hansen are the best informed on Russian fruits; Warder's work is still the best on apples; Waugh is consulted in regard to plums and Card's excellent book on small fruits entitles him to some jurisdiction in that branch of pomology. All things considered our greatest pomological adjudicator was, in his lifetime, Charles Downing, and his "Fruits and Fruit Trees of America" is still a high authority.

At present there is a growing feeling that no one man, institution or book, can be looked upon as having exclusive dominion in the matter of names, as to any one fruit, and that pomologists must come to rely upon some system with well defined rules. The sooner these are adopted and recognized by all the better for the science of pomology.

**THE STUDY OF NOMENCLATURE.**—Not much can be done in the laboratory in the study of nomenclature. The student is urged to make himself familiar with the foregoing discussion, and to read carefully the rules covering the nomenclature of other sciences, especially those of botany and zoology. The following exercises should be carried out by the student at his convenience if they are not assigned to him in the laboratory:—

Many well known fruits are described under two or more

names in different standard pomological works. Discover, if possible, by the use of all accessible horticultural literature, which of these names is correct, according to the Cornell Code of rules. Ascertain if the nomenclature in various nurserymen's catalogues is correct as regards the varieties of some fruit. Simplify and adopt the names in various fruit lists to the rules of nomenclature. Study the French names of pears and make them conform to proper usage. It will be worth while to devote some time to the orthography and pronunciation of names of fruits. The student should use every opportunity to make himself perfectly familiar with the nomenclature of the science he is studying.

## III.

## CLASSIFICATION.

Good authorities estimate that there are more than ten thousand varieties of our commonly cultivated fruits in America. In the study of this vast number of forms we must have some means of setting them in order and of showing their relations to each other. An assembling of kinds, and of special kinds under the more general, is common to all sciences, and in fact to all subjects of study. In natural history this assembling of forms in groups and grades is called Taxonomy, from the Greek meaning arrangement and law, and this term may be used in horticulture; but the simpler term, classification, having the same general meaning, is more common and therefore we use it.

THE FOUNDATION FOR CLASSIFICATION.—The foundation for Classification in horticulture is the same as in biological natural history; *i. e.*, botany and zoology. It comes, primarily, from the property possessed by animals and plants of propagating their kind from generation to generation in a series, and from the circumstance that there are many kinds of these series of individuals with greatly varied and unequal degrees of resemblance. The fact that the gradations are in nowise equal, and that there are many, many missing grades is fundamental, and we may say that this recognition of the unequal degrees of likeness among individuals is the foundation of classification.

In a slightly different sense it may be said that the theory of evolution or the descent of forms from a common ancestor



with variations in the lapse of time, is the foundation for classification. That plants vary, some in one direction, others in another, is now known to all with the causes therefor. Thus an early type became diversified into varieties, then species, genera, etc. Now classification should express, so far as can be, the real relationships that must exist because of such a descent of forms.

DEGREES OF LIKENESS.—Classification would not be possible if all fruits were alike, or if they differed by exactly the same characters and to the same degree. But it is a matter of fact that they exhibit very different degrees of likeness, theoretically all degrees of likeness possible within the limits of their kind. These degrees, we know, are the result of modifications in the descent from a common ancestry. Now to systematically arrange fruits, and groups of fruits, according to their degrees of likeness, or unlikeness, is to classify. If, as we have said before, these degrees are founded upon nearness or remoteness of relationship in the process of evolution, classification becomes a formulation of fruits into groups according to their natural relationships. It is the problem first of botanical classification, and then of pomological classification, to search out the relationships which the structure of fruits and fruit plants indicate and express them by dividing plants into groups, and sub-dividing these into groups according to the characters shared in common; or in conformity to degrees of likeness; or, again, according to genealogical relationship.

HORTICULTURAL GROUPS.—Long ago botanists found it necessary to group plants whereby the like came together and were separated from the unlike. These groups were given names, as; *class, order, genus, species, etc.*, and each was assigned a relative

rank in the scale of plant life. The student must understand that these divisions are arbitrary and are not fixed and have no actual existence in Nature. Bounds are not made by Nature but by man. But the botanists have not subdivided far enough for the horticulturist and pomologist. Genera, species and the botanists varieties are farther sub-divided into purely horticultural groups, for the same reasons that the botanist found it necessary to group plants. Horticulture and botany are so intimately connected that it is not possible to say that this or that group is a purely horticultural one, but, in a general way, the following are horticultural groups rather than botanical ones, though all are used in botany with slightly different meanings:

A *race* is any variety, sub-species, or species, whose characters are continued by seed through successive generations.

A *variety* is a group of individuals which differs from the rest of its species in certain recognizable particulars which are transmitted from generation to generation and are constant to a high degree.

A horticultural variety carries with it the quality of cultural value and the suggestion of being artificially propagated and perpetuated.

A *strain* is the least recognizable variation or group. The strain is the starting point for the making of greater differences.

As yet the strain is not sufficiently well recognized by the horticulturist and especially the pomologist. As competition becomes keener in all branches of horticulture, the strain will become more and more important.

THE VARIETY.—The unit of classification in botany is the species. Now a system for classifying horticultural plants must be based on a botanical system and in that sense the

species, in a large way, is the unit in horticultural classification. But the real unit has come to be and now is, in horticultural systems, the variety.

At this time we are not concerned with the question as to the exact constitution of a variety. As our powers of analysis increase we establish varieties along closer and closer lines and the tendency is to make more varieties so that it is increasingly more difficult to give a concise definition of the term.

When the domestication of plants began, interests centered around the species. There were no varieties nor groups within the species. People but little advanced in horticulture still give attention to the species and largely ignore the variety. But as cultivation of plants has advanced and we have come to know them better, groups within the species are more and more recognized. Smaller and smaller groups are now designated by names. While at present the variety is the commonest subdivision of the species yet as our ideas become more refined we shall make more use of other groups, both superior to and within the variety.

In concluding, and repeating, it must be made perfectly clear that, notwithstanding our changing ideas of the variety, it is yet the unit for the classificatory systems of horticulture. The aim of a system of classification in horticulture is to express the relations of varieties to each other.

WHY CLASSIFY?—The chief practical benefits to be derived from the proper assembling of forms into groups are: First, That the names of varieties may be more readily determined. Second, That synonyms may be avoided. Third, That similar kinds may be better compared. Fourth, That we may better give form and substance to our ideas concerning the various plants.

Fifth, That we may place the facts we acquire regarding the various forms in positions where we can more easily find and make use of them.

Warder, one of our great pomologists of a half century ago, declared that "Classification is the great need of American Pomology." But little has been done since Warder's time and the need has become increasingly urgent since then as our fruit lists have become more extended.

HOW SHALL WE CLASSIFY?—There are still two methods of classification in use in the sciences—the *natural* and the *artificial*. For most part these are quite distinct and are especially so in their working machinery, though their chief end, that of arrangement, is the same, and they are combined somewhat in their minor working devices. The whole trend of the preceding discussion has been to show the nature and the high value of the natural system of classification. The alternative to a natural system is a purely formal, artificial and arbitrary classification such as is found in the old botanies and fruit books.

ARTIFICIAL CLASSIFICATIONS.—Artificial classifications select one, or a few, points of resemblance or difference and assemble the forms according to these without reference to other characters, the chief end being convenience and facility. The commonest of the artificial systems in horticulture is the alphabetical arrangement of varieties. In botany the sexual system of Linnaeus, in which plants are assembled in classes according to number of stamens and in orders according to number of pistils, is the best example. In horticulture we have classifications founded upon season, or size, or flavor, or color, or shape, etc., or combinations of several of these. Any of these are too uncertain and variable taken alone or in less number than all to

be of sufficient value in classifying. In no case can an artificial system fail to be natural in some degree. Groups of plants which will resemble each other in one character likely to be used in classifying will surely agree in other characters.

A good example of an artificial classification, which is natural in many particulars, is Dr. Warder's system for apples given on page 79, which is the best, natural or artificial, that we now have.

**NATURAL CLASSIFICATION.**—A natural classification aims to assemble all known forms into groups, and these into more comprehensive groups, according to their degrees of likeness in all characters so that each group shall stand next to the one which it resembles closest in its whole structure. Such a classification should be an epitome of our knowledge of the plants under consideration. With this definition in mind it must occur to all that the ideal horticultural classification must be an extension of the now universally accepted botanical classification. Note should be made of the fact and value of indefinite extension in a natural system of classification. In pomology, and horticulture, the number of forms to be arranged is constantly increasing, and new degrees of relationship are always coming in view and thus extension becomes a prime requisite.

It must be borne in mind that every natural classification must be artificial to some degree; nor is it thus possible to express all of the relationships of forms even if they were known and had been placed in lineal order. The task is to make the classification as natural as possible.

**POMOLOGICAL CLASSIFICATION.**—It must be said that so far as pomology is concerned not much has been done, though little

by little something is being accomplished. The old systems are almost wholly unsatisfactory so far as plan goes though some of them have many meritorious details. By old systems is meant those found in the works of Downing, Thomas, Warder, Barry and others belonging to the school of pomologists which flourished about the middle of the last century. In Germany and England a number of writers have attempted the classification of various fruits particularly of the apple and pear. Some of these are worthy of careful consideration and should be made objects of study. The old classification schemes, both American and foreign, are for the most part artificial. If we look for new, natural systems, we find them scant, fragmentary, just beginning, and in a transitional state. Possibly the best of the recent work is to be found in monographs on the various fruits and over the signatures of different authors in Bailey's "Cyclopedia of Horticulture."

In the brief classification of our common fruits which follows, meritorious parts of some of the old systems have been adapted to a purely botanical classification. It is far from satisfactory in its present state. Opportunity has not offered for the writer to thoroughly interweave the horticulture with the botany, and to bring forth anything like a smoothly working system. It is an expression, however, of the writer's firm belief that a serviceable, scientific, horticultural or pomological system of classification must be a natural system, and in large measure an extension of the current botanical classification. In the main the botany has come from Gray's "School and Field Book of Botany."

THE STUDY OF CLASSIFICATION.—In the study of classification the laboratory offers a splendid field. The student should make himself perfectly familiar with the foregoing discussion

and with the system, such as it is, here set forth. A knowledge of the botany of fruits is a prime essential and should be reviewed both in this text and in laboratory work. Fruits and herbarium specimens will be furnished in abundance for indoor exercises and ample opportunity will be given to study the plants in the field. Make the most of classifying the varieties presented to you for that purpose. Suggest ways in which systems in use can be simplified, made more natural, more convenient and more scientific. There is room for many such suggestions. Under the direction of the instructor in charge you will be expected to devote considerable time to the work in classification and you should come to look upon it as the chief branch of systematic pomology.

## A CLASSIFICATION OF OUR COMMONLY CULTIVATED FRUITS.

The commonly cultivated fruits of the North Temperate Zone fall into four great botanical families; namely, Rosaceæ, Vitaceæ, Saxifragaceæ and Ericaceæ.

### ORDER ROSACEÆ.

Trees, shrubs, or herbs with alternate stipulate leaves and regular flowers, with usually indefinite unconnected stamens inserted on the calyx, few, or many simple separate pistils (except in the division to which the pear belongs), and few, or numerous seeds. Calyx usually of five sepals, but sometimes reinforced by a row of sepal-like bracts beneath. Petals as many as the sepals.

This Order furnishes the most important fruits of temperate climates. It offers examples of several widely different types

of fruit, as the drupe, pome and akene, as well as several kinds of fruiting bodies of which the most remarkable are the raspberry and blackberry, composed of collections of drupes and the strawberry with its fleshy receptacle. The true berry is seldom found in this Order. There are three principal great divisions with which the pomologist is concerned.

I. PLUM SUBFAMILY.—Consists of trees or shrubs, with simple leaves, stipules free from the petiole, a calyx which is deciduous after flowering, and a single pistil, its ovary superior and tipped with a slender style, containing a pair of ovules, and becoming a simple drupe or stone-fruit.

1. PRUNUS. Calyx with a bell-shaped tube and 5 spreading lobes. Petals 5, and stamens 3-5 times as many, or numerous, inserted on the throat of the calyx. Flowers white or rose-color.

II. ROSE SUBFAMILY.—Consists of herbs or shrubs, with stipules either free from or united with the base of the petiole, calyx persisting below or around the fruit, which is composed of sometimes one, but commonly several or many distinct pistils.

*\*Ovaries few or many, single ovuled, becoming dry akens in fruit above the open and mostly spreading calyx; stamens numerous. Pistils numerous and heaped in a head; calyx augmented with additional outer lobes or bractlets alternating with the 5 proper lobes; leaves mostly compound.*

2. FRAGARIA. Perennial, small, and stemless herbs, producing runners after flowering. Leaves compound, of 3 leaflets. Calyx open, flat. Styles short and lateral. Akens, naked, small, on the surface of an enlarged pulpy edible receptacle.

*\*\* Ovaries several or many, 2 ovuled in fruit becoming fleshy or pulpy and 1-seeded, forming a head or cluster above the flat or widely open, simply 5-cleft calyx; stamens numerous; styles short, naked, at length falling off.*

3. RUBUS. Perennial herbs or shrubby plants. Ovaries numerous, in fruit pulpy (berry-like, or more properly drupe-like, the inner hard part answering to the stone of a cherry or peach on a small scale), crowded on the dry or fleshy receptacle.



III. PEAR SUBFAMILY.—Consists of shrubs or trees; with stipules free from the petiole; the thick-walled calyx-tube becoming fleshy or pulpy and consolidated with the 2-5 ovaries to form a compound pistil and the kind of fruit called a pome. Lobes of the calyx and petals 5. Stamens numerous, or rarely only 10-15.

4. PYRUS. Trees or shrubs, sometimes rather thorny, with various foliage, and flowers in cymes, corymbs, or rarely solitary. Styles 2-5. Ovary of 2-5 two-ovuled (or in cultivated species, and in *Cydonia*, several-ovuled) cells, which are thin and papery or cartilaginous in fruit in the fleshy or pulpy calyx tube.

#### THE DRUPES.

#### GENUS PRUNUS.

(The ancient Latin name of the Plum.)

Shrubs or trees, mostly with early and showy flowers.

The genus contains about 75 species of shrubs and trees widely distributed in the north temperate zone. It includes several well marked groups—peaches, plums, cherries, almonds, nectarines and apricots—some of which are regarded as distinct genera by many botanists. The best authorities are now pretty well agreed that because of the great number of inter-gradient forms it is best to include the above fruits in one genus. The horticulturists are rapidly obliterating existing differences by means of hybridization. Horticulturally, *Prunus* is one of the most important of all genera. It contains many valuable ornamentals besides the fruits discussed here. For our purposes we may divide the genus into four main groups as follows:

- |                         |              |
|-------------------------|--------------|
| 1. Peaches and almonds. | 3. Plums.    |
| 2. Apricots.            | 4. Cherries. |

## PEACHES AND ALMONDS.

*Flowers solitary or in twos or threes, usually very early, sessile, or short-stalked; leaves folded together lengthwise (conduplicate) in the bud; fruit pubescent (or rarely smooth) at maturity the stone compressed and thick-walled, more or less deeply wrinkled and pitted.*

## THE ALMOND.

*P. Amygdalus*, Baill.—From the Orient; tree 10° to 20° high, with large sessile solitary flowers, which appear before the leaves and persist for many days; leaves lanceolate, firm; shining, and very closely serrate; fruit with a dry flesh, which finally splits away, freeing the large softish-pitted stone, which is the Almond of commerce.

Cultivated from time immemorial. There are two tribes—the bitter and the sweet. The former is used in making flavoring extracts and prussic acid. The latter is the almond of commerce. Of the sweet there are two kinds—the hard shell and the soft shell, the first of which is now but little grown. Thin-shelled almonds are known as Paper-shells.

## THE PEACH.

*P. Pérsica*, Sieb & Zucc.—From China; differs from the almond in its thinner, broader, and more coarsely serrate leaves and thick-fleshed, edible fruit, and mostly smaller, harder, and more deeply marked stone. Thought by some to be derived from the same species. Much grown in America where it thrives under a great variety of conditions. Price, of Texas, divides peaches into five groups as follows:

I. The Peento or flat peaches best represented by the variety Peento and grown for most part in the south.

II. The South China peaches having fruits long-pointed and oval with a deep suture near the base. Example; the Honey.

III. The Spanish or Indian Race. Very late with yellow, firm and often streaked fruits. Grown in the South. Typical sort are; Lulu, Texas, Galveston.

IV. The North China Race. Fruit very large and mostly cling and with large leaves. Represented by Elberta, Smock and many others.

V. The Persian peaches including most of the common peaches of the north as the Crawfords, Salway, Oldmixons and so on.

The peach lends itself more readily than almost any other fruit to artificial classification, and there are several very serviceable systems in common use. That of John J. Thomas, which we give below, is the best of any, and has attained wide publicity through its having been published in many editions of Thomas' "The American Fruit Culturist." The student will do well to study the characters upon which this classification is founded from actual specimens.

#### DIVISION I.—FREESTONES OR MELTERS.

Class I.—Flesh Pale or Light-Colored.

Section I.—Leaves serrated, without glands.

Section II.—Leaves crenate, with globose glands.

Section III.—Leaves with reniform glands.

Class II.—Flesh Deep Yellow.

Section I.—Leaves crenated, with globose glands.

Section II.—Leaves with reniform glands.

## DIVISION II.—CLINGSTONES OR PAVIES.

Class I.—Flesh Pale or Light-Colored.

Section I.—Leaves serrated, without glands.

Section II.—Leaves crenate, with globose glands.

Section III.—Leaves with reniform glands.

Class II.—Flesh Deep Yellow.

Section I.—Leaves serrate, without glands.

Section II.—Leaves with reniform glands.

Class III.—Flesh Purplish Crimson.

Section I.—Glands reniform.

## THE NECTARINE.

*P. Pérsica*, var. *Nectarina*.—The nectarine is a smooth skinned peach. It originated from the peach by seed or bud variation. It is interesting to know that nectarines often come from seeds of peaches and that peaches come from the seeds of nectarines. The name refers to its supposed nectar-like qualities, but the fruit is usually inferior in quality to the peach, and far inferior in size and appearance. Not much cultivated in America.

## THE APRICOT PLUM.

*P. Simónii*, Carr.—Small, fastigate tree from China, cultivated for its large, depressed, handsome, maroon-red smooth fruits; flowers pink-white, very short-stalked, borne singly or in pairs before the leaves appear; leaves lance-oblong or lance obovate, thick and firm, dull, conduplicate, closely serrate; flesh of the very firm fruit yellow, and clinging to the small spongy-

roughened pit. A very handsome fruit but not much cultivated on account of its poor quality.

## APRICOTS.

*Flowers much as in the peaches and almonds; leaves convolute or rolled up in the bud; fruit pubescent or smooth, the stone compressed, bearing one prominent margin, and either smoothed or slightly roughened.*

*P. Armeniaca*, Linn. COMMON APRICOT.—Native of China; flowers pink-white, sessile and appearing singly before the leaves; the latter varying from ovate to round ovate, prominently pointed and toothed, and long-stalked; fruit ripening in July and August, smooth; the large, flat, smooth stone nearly or quite free. The Russian Apricot is a hardy race of this. A fruit somewhat intermediate between the peach and the plum. Contrary to the usual opinion, it is as hardy as the peach.

*P. dasycarpa*, Ehrh. BLACK OR PURPLE APRICOT.—Small tree, much like the last, but the flowers prominently stalked; the leaves thinner and narrower, with small serratures; fruit dull purple and fuzzy; the flesh clinging to the thick, scarcely margined, pubescent stone. Nativity unknown. Of little value as compared with the above.

*P. mume*, Sieb & Zucc. JAPANESE APRICOT.—Tree similar to the common apricot but the bark grayish and the foliage duller in color; leaves smaller and more nearly round; fruit smaller, yellow or green and the dry flesh adhering to the pitted stone.

## PLUMS.

*Flowers stalked in umbel-like fascicles, appearing either before or with the leaves; leaves either conduplicate or convolute in the bud; fruit more or less globular and covered with a bloom, smooth, with a compressed mostly smooth stone.*

The splendid work of Bailey, Waugh and others in studying our cultivated plums has given us a more satisfactory classification of them than of any other fruit. The student will notice that the plum contains more botanical groups than any other tree-fruits, thus indicating that the classification is an extension of the botanical one and that it is natural. The botanical classification has been carried so far that there is really little more for the pomologist to do than to arrange the varieties under their proper species. For a full study of this subject the student is referred to several bulletins by Bailey from the Cornell Experiment Station, and Waugh's "Plums and Plum Culture."

*P. domestica*, Linn. COMMON PLUM.—Probably Asian; flowers showy (white), more or less fascicled; leaves large, ovate, or obovate usually, firm and thick in texture, very rugose, usually pubescent beneath, coarsely serrate; shoots usually downy; fruit very various, of many shapes and flavors, but mostly globular-pointed or oblong, the stone large and slightly roughened or pitted. Our finest plums, and until recently all of our cultivated varieties, belong here. They may be arranged into six groups though the dividing lines are not at all distinct at some points.

I. The Damsons; small, round hard plum of various colors, usually blue, borne in clusters, and of poor quality except for

preserving. The trees are dwarf, inclined to be thorny, with wood short jointed and leaves small and very dark colored.

II. The Green Gages; fruit small or medium, roundish, green or greenish yellow; flesh firm, greenish and of very superior quality. The best representatives are Green Gage, Reine Claude and Jefferson.

III. The Yellow Egg plums; fruit large, yellow, oval, necked; flesh yellow and of medium quality. The group is best represented by Yellow Egg and Golden Drop.

IV. The Blue Plums; comprising sorts of blue color, heavy bloom; large size, and oval shape; flesh mostly yellow, clinging and very firm. Here belong such standard varieties as Quackenboss, Gueii and Diamond.

V. The Red Plums; fruits large, obovate, reddish; flesh yellow, juicy, soft and of high quality. In this group are the Bradshaw, Pond Seedling and their like.

VI. The Purple Plums; having much the same shape as the Red Plums but a distinct purple color, medium size, fair quality. Lombard is the type variety.

Another group is frequently proposed of which the German Prune is the type under the group name Prunes. The above classification according to color is quite too loose to be satisfactory but to ascribe similar characters to the plums used in making prunes, if that be the reason for so grouping, is far from satisfactory. A prune is any plum with flesh solid enough to be successfully cured, without removing the pit, into a firm long-keeping product. Many plums from several of the above groups will make first-class prunes.

## THE MYROBALAN AND MARIANNA PLUMS.

*P. cerasifera*, Ehrh.—Differs from the last in a more slender habit, often thorny; flowers mostly smaller; leaves smaller, thin, smooth, and finely and closely serrate; fruit globular and cherry-like, ranging from the size of a large cherry to over an inch in diameter, with a depression about the stem, in various shades of red or yellow. Much used for stocks, and rarely grown for its fruit. It has numerous advantages as a stock, chief of which are: Ease with which it may be propagated; readiness with which most plums “take” on it; and its hardiness. The Marianna, also much used for stocks, is likely a hybrid with this species and *P. hortulana*.

## THE JAPANESE PLUMS.

*P. triflora*, Roxb.—Recently imported from Japan in several varieties; trees strong growing; flowers usually densely fascicled; leaves and shoots smooth and hard, the former obovate or oblong-obovate, prominently pointed, and finely and evenly serrate; fruit usually conspicuously pointed, red, yellow, or purple, with a very firm flesh and commonly a small stone. Of value because of its great productiveness, the beauty of the fruit, good keeping qualities and its immunity from black knot. Not as good in quality as the European plums.

Many seedlings and hybrids are being introduced yearly and as there were several groups originally the classification is in a somewhat transitory state. Hitherto they have been roughly divided into Freestones and Clingstones; or, again, by Thomas into two groups: the Red, Purple, or Blue and the Green, White or Yellow. Such classifications are in no degree satisfactory and after the work done by Bailey and Waugh with this fruit



has been rounded out by them or others, we may expect a full and useful natural classification of Japanese plums.

## THE AMERICAN PLUMS.

The botanical status of our native plums has scarcely been settled, much less so the horticultural status. We have, however, a good start toward a natural classification in the botanical work that has been done. If all the species and botanical varieties now recognized hold, we shall need few horticultural groups. Divisions into horticultural groups would be difficult as there are hundreds of varieties many of which are very similar in the characters upon which pomological groups are usually founded.

*P. Americana*, Marsh. COMMON WILD PLUM.—A spreading, ragged, often thorny, small tree, growing along streams and in copses from New England and Texas; flowers large and white on slender pedicels, appearing before or with the leaves; the latter large, obovate, abruptly pointed and coarsely toothed or even jagged above, very coarsely veined, never glossy or shining; fruit more or less flattened upon the sides, firm and meaty, the skin tough and glaucous and never glossy, dull yellow variously splashed or overlaid with dull red; stone large and usually flattened, mostly nearly smooth and distinctly margined. Many varieties in cultivation chief of which are: Desoto, Weaver and Hawkeye.

Waugh has called a northern type of this species *P. Americana* var. *nigra*. The chief differences between the species and its variety are in the growth of the tree, the fruits not being characteristically distinct. Cheney is the best representative.

Another botanical variety of this species is *P. Americana* var. *mollis* distinguished from the parent species largely by the

pubescence of the leaves which has given it the name of Woolly-leaf plum. Wolf and Van Buren are the chief varieties.

*P. hortulàna*, Bailey. WILD GOOSE PLUM.—Strong, wide-spreading, small trees with smooth straight twigs and a peach-like habit, wild in the Mississippi Valley; flowers rather small, often very short-stalked; leaves narrow-ovate or ovate-lanceolate, thin and firm, flat, more or less peach-like, smooth and usually shining, closely and obtusely glandular-serrate; fruit spherical, bright colored and glossy (lemon-yellow or brilliant red), the bloom very thin, juicy, with a clinging, turgid, and roughish, small, pointed stone. Many varieties in cultivation of which Wild Goose best represents the species.

The above species is a group of hybrids between *P. Americana* and *P. angustifolia* occurring in the wild from Maryland to Texas. There are at least two distinct branches of the species group as follows:

*P. hortulàna* var. *Mineri* is the northward extension of the group and is chiefly characterized by its thick, dull leaves and firm, late fruit. Miner, Clinton and Forest Rose are the best known varieties belonging here.

The second branch is *P. hortulàna* var. *Waylandi* characterized by strong growth, straight twigs, broad, coarse shining leaves, and thin-skinned fruit of good flavor. Wayland, Moreland and Garfield are typical varieties.

*P. angustifolia*, Marsh. CHICKASAW PLUM, MOUNTAIN CHERRY.—Small tree, with slender, zigzag, red twigs and small lanceolate or oblong-lanceolate leaves which are very closely and finely serrate, shining and conduplicate or trough-like in habit; fruit small and very early, red or rarely yellow, the skin thin and shining, and covered with many small light dots and a very

thin bloom; the flesh soft and juicy, often stringy, closely adherent to the small, broad, roughish stone. Well represented by Newman and Lone Star.

The species has one comparatively unimportant sub-species, *P. angustifolia* var. *Watsoni*, Waugh, the Sand plum, a bushy spiny plant with zigzag twigs. Not much cultivated.

#### THE CHERRIES.

*Flowers usually fasciated or umbellate, stalked, usually appearing with the leaves, the latter conduplicate in the bud; fruit small and mostly globular, and nearly always smooth and destitute of bloom; the stone nearly or quite spherical and mostly smooth.*

The cultivated cherries belong to two species, each of which are divided into several very distinct groups. The classification of cherries is comparatively simple, the varieties falling readily into the natural groups which for most part are readily recognized by even the tyro. Of the several very good classificatory outlines that of Bailey and Powell from Bulletin 98 of the Cornell Experiment Station is most satisfactory and follows the species next described.

*P. Avium*, Linn. MAZZARD, SWEET, HEART AND BIGARREAU CHERRIES, GUIGNES OR GEANS.—Taller, with a more erect growth, and reddish brown, more or less glossy bark; flowers usually borne in dense clusters on lateral spurs, and appearing with the hairy conduplicate young leaves, the persistent bud-scales large; leaves mostly oblong-ovate and gradually taper-pointed, dull and soft, hanging limp upon the young growths; fruit sweet (or sometimes sour, as in May Duke), yellow or red, often pointed. Europe. Divided into four well marked groups as follows:

I. The Mazzards of various shapes and colors in which the species has escaped from cultivation. Much used for stocks.

II. The Hearts, soft, sweet, heart shaped cherries, light or dark in color, represented by Black Tartarian and Governor Wood.

III. The Bigarreaus, firm fleshed, heart-shaped, sweet cherries like Napoleon and Windsor.

IV. The Dukés, large, sour, light-colored cherries represented by May Duke and Reine Hortense.

*P. Cérasus*, Linn. SOUR, PIE, MORELLO AND EARLY RICHMOND CHERRIES. GRIOTTES.—A low-headed tree, with spreading grayish branches; flowers in small clusters from lateral buds, mostly in advance of the leaves, the persistent bud-scales small; leaves hard and stiff, short-ovate or oval-obovate, the point rather abrupt, smooth, and more or less glossy, light or grayish green; fruit roundish, red, in various shades, tart. Europe. There are two well marked groups in the species.

I. The Amarelles, light-colored sour cherries having uncolored juice represented by Early Richmond and Montmorency.

II. The Morellos, dark-colored sour cherries, having dark-colored juice represented by English Morello and Louis Philippe.

*P. Mahaleb*, Linn. MAHALEB CHERRY.—Slender small tree, with small, fragrant flowers in terminal, umbel-like clusters; leaves bright green, broadly ovate or round-ovate and more or less heart-shaped, the point short, smooth and veiny, the margins finely and obtusely serrate; fruits very small, dark red, austere. Used for stocks upon which to propagate cherries. S. Europe.

## THE STRAWBERRY.

## GENUS FRAGARIA.

(Name referring to the fragrance.)

*Petals white; receptacle of the fruit high-flavored; scapes several-flowered; runners naked. Flowers in spring and early summer; inclined more or less to be dioecious.*

An exceedingly variable genus in which over 100 species have been formed but in which there are probably not over a dozen distinct ones. Only four are of interest to the horticulturist.

## THE GARDEN STRAWBERRY.

*F. Chiloensis*, Duchesne.—From Chile, but also native all along the Pacific coast, has a low habit and thick, dark colored leaves which are bluish-white below, and is clothed with long, shaggy hairs; scapes and runners strong; fruit large and usually dark colored, with a very large "hull" or calyx. The var. *Ananassa*, or PINE STRAWBERRY, is a horticulturally modified form, comprising the common garden strawberries which run into many hundreds of kinds. Izaak Walton said in his "Complete Angler," "Doubtless God might have made a better berry, but doubtless God never did."

## THE WILD STRAWBERRY.

*F. Virginiana*, Duchesne.—Leaflets of firm texture, their smooth and often shining upper surface with sunken veins, flowers usually below the leaves, calyx becoming erect after flowering and closing over the hairy receptacle when unfructified; fruit with a narrow neck, mostly globular, its surface with

deep pits in which the akenes are sunken, nodding on slender pedicels. Represented by a few early varieties as Crystal City.

#### EUROPEAN STRAWBERRIES.

*F. vesca*, Linn.—Yields the ALPINE, and PERPETUAL strawberries. Slender, with thin, dull leaflets, strongly marked by the veins, calyx remaining open or reflexed after flowering, small ovoid-conical or elongated fruit, high-scented, and the akenes superficial. The flowers usually stand above the leaves. Not much cultivated in America.

*F. moschata*, Duchesne, HAUTOBOIS STRAWBERRY, of Europe sometimes cultivated, is taller and quite dioecious, more pubescent, with the calyx strongly reflexed away from the fruit, which is dull, reddish, and musky-scented. Rarely cultivated in America.

#### THE BRAMBLES.

##### GENUS RUBUS.

(From the Latin *ruber*, red.)

A large and difficult genus comprising Raspberries, Blackberries and Dewberries of which there are about 200 species and many intermediate forms. The botanical classification still serves in pomology though doubtless it could be extended to purely horticultural groups with great advantage.

##### RASPBERRIES.

3-5 leaflets, the fruit falling when ripe from the then dry, narrow receptacle; flowers with small, white, erect petals, in

early summer, on leafy shoots of the season which (in all but the first) spring from prickly more or less woody stems of the preceding year.

*R. occidentalis*, Linn. BLACK RASPBERRY, BLACKCAP, OR THIMBLEBERRY.—Glaucous-whitened, the long, recurving stems, stalks, etc., armed with hooked prickles, but no bristles; leaflets mostly 3, ovate, pointed, white-downy beneath, coarsely doubly toothed, the lateral ones stalked; flowers in close umbel-like clusters, or some of them somewhat scattered, the petals shorter than the sepals; fruit purple-black (or an amber-colored variety), flattish, ripe at midsummer. Parent of the Black Raspberries of the garden. Many varieties of which Gregg and Ohio are good types. The most important raspberry of America.

*R. strigosus*, Michx.—Wild Red RASPBERRY; the upright stems, stalks, etc., beset with copious bristles, and some of them becoming weak prickles, also glandular; leaflets, oblong-ovate, pointed, cut-serrate, white-downy beneath, the lateral ones (either 1 or 2 pairs) not stalked; flowers in more or less raceme-like clusters, the petals as long as the sepals, the latter more or less glandular; fruit light red, tender and watery, but high flavored, ripening all summer. Parent of some of the Red Raspberries of the garden. Cuthbert is a good representative.

*R. neglectus*, Peck. A hybrid between the last two, has given rise to the Shaffer, Philadelphia, and other garden varieties of the PURPLE CANE class. The fruit ranges from purple to yellow; the clusters are open and straggling; the canes are stout and purple; and the species propagates either by tips or suckers.

*R. Idæus*, Linn. EUROPEAN RASPBERRY.—Tall and nearly erect, beset with straight, slender prickles, or many of them mere bristles, the canes whitish; leaves thicker, and fruit firmer and larger than in *R. strigosus*, red or yellowish, ripening through the summer; calyx glandless. Parent of the Antwerp and other garden Raspberries; once much grown, but now mostly out of cultivation in this country—driven out by the hardier American species.

*R. phoenicolasius*, Maxim. WINEBERRY.—Strong bush with the habit of a raspberry, the branches covered with a copious red hair; the dull and sparsely hairy, wedge-ovate or wedge-cordate, toothed, and jagged leaflets very white-tomentose below; flowers in fascicled clusters; the soft reddish fruits at length inclosed in the great hairy calyx. Japan. Not hardy in the North.

#### BLACKBERRIES AND DEWBERRIES.

*The pulpy grains of the fruit remaining attached to the pulpy receptacle, which at length falls away from the calyx; stems prickly; leaves of 3 or pedately 5-7 leaflets; flowers on leafy shoots from stems of the preceding year, in spring and early summer, with white spreading petals; stems more or less woody; fruit black (rarely amber) when ripe, edible, ripening in summer and autumn.*

#### BLACKBERRIES.

*Stems more or less erect, not propagating from the tip.*

*R. nigrobaccus*, Bailey. HIGH BLACKBERRIES.—Stems 1-6 feet high, furrowed recurving at ends; prickles strong and



hooked; leaflets 3-5, ovate or lance-ovate, pointed, their lower surface and stalks hairy and glandular, the middle one long-stalked and sometimes heart-shaped; flowers rather large, with short bracts, in long, open distinct leafless racemes; fruit oblong or cylindrical, black, sweet and aromatic. The common Blackberry of gardens, running into many forms. Known in cultivation as the LONG CLUSTER BLACKBERRIES of which Taylor is a good example. A sub-species var. *sativus* furnishes the so-called SHORT CLUSTER BLACKBERRIES of which Kittatinny and Snyder are good types.

*R. laciniatus*, Willd. CUT-LEAVED OR EVERGREEN BLACKBERRIES.—Leaflets 3, each pinnately divided into lobed and cut portions; flower clusters small, whitish-pubescent; stems with recurved prickles. Probably a form of the EUROPEAN BLACKBERRY *R. fruticosus*. Of value on the Pacific coast where it remains green through the winter. Very prolific.

## DEWBERRIES.

*Stems trailing, decumbent, or ascending, mostly rooting at the tips.*

*R. villosus*, Ait. LOW BUSH BLACKBERRY OR DEWBERRY.—Long-trailing, slightly prickly, smooth or smoothish, and with 3-7 small, doubly-toothed leaflets; the racemes erect and 1-3-flowered, with leaf-like bracts, the fruit of fewer grains and ripening earlier than the Blackberries. Several varieties are cultivated.

Var. *roribaccus*, Bailey, native of W. Va., is the Lucretia Dewberry, distinguished by strong growth, wedge-obovate, jagged leaflets, long flower stalks, and large flowers with leafy sepals.

*R. invisus*, Bailey.—Parent of Bartel and other cultivated Dewberries; has somewhat ascending round stems, and leaflets which are coarsely and always simply toothed.

## APPLES AND PEARS.

### GENUS PYRUS.

(Classical name of the Pear.)

The genus is a very important one comprising the apple and the pear. These have in common cartilaginous, parchment-like, thin-walled cells that contain the seeds. The fruit which is known as a pome consists of a hollow receptacle in which the ovary is imbedded. The edible part of an apple is, therefore, the receptacle while the core is the ovary. The species are small trees having hard tough wood and bearing clusters of white or reddish flowers with the leaves or in advance of them.

### THE PEAR.

*Leaves simple; flowers in a simple corymb or cluster; fruit generally with its base tapering down to the stalk; and the flesh bearing grit cells; styles usually not united at the base. Leaves smooth and shining. Trees usually pyramidal in shape and very long-lived often growing 200 years. Pears have been greatly improved in recent years and the number of varieties increased from a few to over 1,000.*

There is no satisfactory classificatory system for pears in American pomology. Not much has been done toward classifying pears in our country, chiefly because the fruit has received comparatively little attention since its great popularity in the

time of the Downings, when artificial systems, alphabetical and seasonal classifications, were considered adequate. Varieties of pears are probably more distinct than sorts of any other of our common fruits and the need of arranging them systematically has not been strongly felt.

In Europe where the pear is much more commonly grown than here, several attempts have been made to classify them. Probably that of Lucas, a German pomologist, is the most thorough and the most pretentious of the several foreign systems. It is, however, as are all the others, practically worthless to Americans, the varieties, groups, types, and terms being foreign to us even when translated. All such systems have value for us of course, in that they are suggestive.

We can at present suggest no better classification for pears than the wholly artificial expedient used in all our present fruit books of dividing them first according to season and then in accordance with their forms. The simple scheme generally used follows the species.

*P. communis*, Linn. COMMON PEAR.—A smooth tree, with branches inclined to be thorny, strong upright growth, living to great age; ovate leaves with small, obtuse teeth, with a prominent point, veiny, hard in texture; pure white flowers, the anthers purple, borne in umbel-like clusters; calyx persistent; fruit quite various under cultivation; native of southern Europe and Asia where it has been cultivated from earliest times.

*P. Sinénsis*, Lindl. JAPAN OR SAND PEAR.—A stronger grower than the last, with larger dark leaves which are very sharply toothed; strong thick shoots, white or grayish when young; flower large white, appearing before leaves; tough,

gritty fruits which are often depressed about the stem, and apple-like; calyx falls before maturity; native of China.

Kieffer, Le Conte, and others, are hybrids with the last. Of little value for its fruit but of great promise for hybridizing. The introduction of this species in America and the hybrids that have followed have given our pear culture a great and permanent impetus. Pears derived from *P. Sinensis* are so distinct, and are yet so few in number, that a classification of them other than to put them in the so-called hybrid group or Kieffer group is not necessary.

#### AN ARTIFICIAL CLASSIFICATION OF PEARS.

##### DIVISION I.—SUMMER PEARS.

Class I.—Distinct Pyriform.

Class II.—Obscure Pyriform, Obovate or Turbinate.

Class III.—Roundish or Oblate.

##### DIVISION II.—AUTUMN PEARS.

Class I.—Distinct Pyriform.

Class II.—Obscure Pyriform, Obovate or Turbinate.

Class III.—Roundish or Oblate.

##### DIVISION III.—WINTER PEARS.

Class I.—Distinct Pyriform.

Class II.—Obscure Pyriform, Obovate or Turbinate.

Class III.—Roundish or Oblate.

## THE APPLE.

*Leaves simple; flowers showy, in a simple cluster or simple umbel; fruit sunken at both ends, especially at the base; usually without grit cells; styles usually united at the base. Apple growers in America are concerned with the following species:*

\* *Exotic; leaves simply and evenly serrate, ovate or oblong.*

*P. Málus*, Linn. COMMON APPLE.—Cultivated from Europe; tree with buds, lower face of the leaves (when young) and calyx woolly; flowers white and tinged with pink, on short, woolly peduncles; fruit various, but always holding the calyx lobes upon its apex.

*P. baccàta*, Linn. SIBERIAN CRAB APPLE.—From Europe. Small tree, spreading, with hard, wiry, smooth shoots, long and smooth petioles and pedicels, narrower smooth leaves, and a small, hard, translucent fruit from which the calyx falls before maturity. Transcendent, Hyslop, and various other improved Crabs are probably hybrids with *P. Malus*. It has many forms, particularly as to fruit. The term crab apple in America is applied to any small, hard, sour apple. It is properly applied, however, only to those sorts having clearly marked qualities of *P. baccata*. Not all crab apples are tart, astringent and devoid of dessert qualities. Even Shakespeare slanders this fruit when he says in King Lear "She's as like as a crab's like an apple."

\* \* *Wild species, with some of the leaves irregularly cut-toothed, or even lobed; flowers bright rose-colored, and the fruit greenish. Calyx persistent.*

*P. coronària*, Linn. AMERICAN OR GARLAND CRAB APPLE.—Small tree, soon smooth, with the mostly triangular ovate leaves

rounded or obscurely heart-shaped at base and inclined to be 3-lobed, on slender-smooth petioles; flowers on long, smooth pedicels; fruit bright green, flattened lengthwise. Useful for cider, jelly, etc. Of value for hybridizing.

*P. Ioënsis*, Bailey. WESTERN CRAB APPLE.—Leaves oblong or obovate-oval, variously notched and toothed, the lower surface as well as the petioles, short pedicels and young growth, white-pubescent; fruit spherical or oblong; dull green with minute light dots. Hybridizes naturally with *P. Malus*. Several promising varieties have resulted from such crosses.

The classification of the apple is attended with many difficulties. The fruit has long been cultivated and there are now a multitude of varieties—2,000 named varieties in America at the very least. It would be an enormous task, indeed, to study and classify all of these. Another difficulty, and a great one, is that the custom has been to arrange varieties of apples and pears according to characters of the fruit quite regardless of the tree—a wholly artificial method. But little information has been accumulated, then, looking toward a natural classification. Again, the fact that the fruit must be studied at a time when for the most part it is impossible to consider the blossoms and foliage, is a real difficulty. No American pomologist has sought to overcome these difficulties though several foreigners have attempted natural classifications. For practical work these are worthless for us and we must rely on one of the several artificial classifications, the best of which is, all things considered, Warder's.

## WARDER'S CLASSIFICATION OF APPLES.

Class I.—Flat Apples.

Order I.—Regular in Form.

Section I.—Sweet.

Sub-Section I.—Self-colored, not striped.

Class I.—Flat Apples.

Order I.—Regular.

Section I.—Sweet.

Sub-Section II.—Striped.

Class I.—Flat Apples.

Order I.—Regular.

Section I.—Sweet.

Sub-Section III.—Russet.

Class I.—Flat Apples.

Order I.—Regular.

Section II.—Sour.

Sub-Section I.—Self-colored.

Class I.—Flat Apples.

Order I.—Regular.

Section II.—Sour.

Sub-Section II.—Striped.

Class I.—Flat Apples.

Order I.—Regular.

Section II.—Sour.

Sub-Section III.—Russet.

Class I.—Flat Apples.

Order II.—Regular in Form.

Section I.—Sweet.

Sub-Section I.—Self-colored.

- Class I.—Flat Apples.  
Order II.—Irregular.  
Section I.—Sweet.  
Sub-Section II.—Striped.
- Class I.—Flat Apples.  
Order II.—Irregular.  
Section II.—Acid.  
Sub-Section I.—Self-colored.
- Class I.—Flat Apples.  
Order II.—Irregular.  
Section II.—Acid.  
Sub-Section II.—Striped.
- Class I.—Flat Apples.  
Order II.—Irregular.  
Section II.—Acid.  
Sub-Section III.—Russet.
- Class II.—Conical Apples.  
Order I.—Regular.  
Section I.—Sweet.  
Sub-Section I.—Self-colored.
- Class II.—Conical Apples.  
Order I.—Regular.  
Section I.—Sweet.  
Sub-Section II.—Striped.
- Class II.—Conical Apples.  
Order I.—Regular.  
Section I.—Sweet.  
Sub-Section III.—Russet.
- Class II.—Conical Apples.  
Order I.—Regular.  
Section II.—Sour.  
Sub-Section I.—Self-colored.



- Class II.—Conical Apples.  
 Order I.—Regular.  
 Section II.—Sour.  
 Sub-Section II.—Striped.
- Class II.—Conical Apples.  
 Order I.—Regular.  
 Section II.—Sour.  
 Sub-Section III.—Russet.
- Class II.—Conical Apples.  
 Order II.—Irregular.  
 Section I.—Sweet.  
 Sub-Section II.—Striped.
- Class II.—Conical Apples.  
 Order II.—Irregular.  
 Section I.—Sweet.  
 Sub-Section III.—Russet.
- Class II.—Conical Apples.  
 Order II.—Irregular.  
 Section II.—Sour.  
 Sub-Section I.—Self-colored or Blushed.
- Class II.—Conical Apples.  
 Order II.—Angular.  
 Section II.—Sour.  
 Sub-Section II.—Striped.
- Class II.—Conical Apples.  
 Order II.—Angular.  
 Section II.—Sour.  
 Sub-Section III.—Russet.
- Class III.—Round Apples.  
 Order I.—Regular.  
 Section I.—Sweet.  
 Sub-Section II.—Striped.

Class III.—Round Apples.

Order I.—Regular.

Section I.—Sweet.

Sub-Section III.—Russet.

Class III.—Round Apples.

Order I.—Regular.

Section II.—Sour.

Sub-Section I.—Self-colored or Blushed.

Class III.—Round Apples.

Order I.—Regular.

Section II.—Sour.

Sub-Section II.—Striped.

Class III.—Round Apples.

Order I.—Regular.

Section II.—Sour.

Sub-Section III.—Russet.

Class III.—Round Apples.

Order II.—Irregular.

Section I.—Sweet.

Sub-Section I.—Self-colored or Blushed.

Class III.—Round Apples.

Order II.—Irregular.

Section I.—Sweet.

Sub-Section II.—Striped.

Class III.—Round Apples.

Order II.—Irregular.

Section I.—Sweet.

Sub-Section III.—Russet.

Class III.—Round Apples.

Order II.—Irregular.

Section II.—Sour.

Sub-Section I.—Self-colored.

Class III.—Round Apples.  
Order II.—Irregular.  
Section II.—Sour.  
Sub-Section II.—Striped.

Class III.—Round Apples.  
Order II.—Irregular.  
Section II.—Sour.  
Sub-Section III.—Russet.

Class IV.—Oblong Apples.  
Order I.—Russet.  
Section II.—Sour.  
Sub-Section I.—Self-colored.

Class IV.—Oblong Apples.  
Order I.—Regular.  
Section I.—Sweet.  
Sub-Section II.—Striped.

Class IV.—Oblong Apples.  
Order I.—Regular.  
Section I.—Sweet.  
Sub-Section III.—Russet.

Class IV.—Oblong Apples.  
Order I.—Regular.  
Section II.—Sour.  
Sub-Section I.—Self-colored.

Class IV.—Oblong Apples.  
Order I.—Regular.  
Section II.—Sour.  
Sub-Section III.—Russet.

Class IV.—Oblong Apples.  
Order II.—Irregular.  
Section I.—Sweet.  
Sub-Section I.—Self-colored.

Class IV.—Oblong Apples.

Order II.—Irregular.

Section I.—Sweet.

Sub-Section II.—Striped.

Class IV.—Oblong Apples.

Order II.—Irregular.

Section I.—Sweet.

Sub-Section III.—Russet.

Class IV.—Oblong Apples.

Order II.—Irregular.

Section II.—Sour.

Sub-Section I.—Self-colored.

Class IV.—Oblong Apples.

Order II.—Irregular.

Section II.—Sour.

Sub-Section II.—Striped.

Class IV.—Oblong Apples.

Order II.—Irregular.

Section II.—Sour.

Sub-Section III.—Russet.

#### THE QUINCE.

*Leaves simple; flowers either single upon the ends of leafy shoots, or in small, sessile clusters, white or red; fruit more or less pyriform, the 5 cells normally several or many-seeded. Small trees or bushes.*

P. *Cydònia*, Linn. (or *Cydònia vulgaris*, L.).—COMMON QUINCE. From Europe, a small bushy tree with soft, oval, entire leaves which are tomentose below, and very large flowers terminating short leafy shoots, and woolly fruits. The golden

apples of the Hesperides were probably quinces. The seeds are used in medicine and the plants as a stock for dwarfing pears.

There are so few varieties of quinces that they are easily grouped for the present under the species.

#### ORDER VITACEÆ.

Woody plants, climbing by tendrils, with watery and often acid juice, alternate leaves, deciduous stipules, and small greenish flowers in a cyme; with a minutely 4-5-toothed or almost obsolete calyx; petals valvate in the bud and very deciduous; the stamens as many as the petals and opposite them; a 2-celled ovary with a pair of ovules rising from the base of each cell, becoming a berry containing 1-4 bony seeds. Tendrils and flower-clusters opposite the leaves.

#### THE GRAPES.

The only attempt to classify grapes will be to give a brief botanical arrangement of the species commonly cultivated. For further study the student will be referred to Bailey's "The Evolution of Native Fruits."

The fruit of the grape is a pulpy berry which normally is two-celled with from two to four seeds to which the pulp adheres tenaciously in our native species.

#### GENUS VITIS.

(Classical Latin name.)

Flowers in late spring. Petals and stamens 5, the former lightly cohering at the top and thrown off without expanding; the base of the very short and truncate calyx filled with the

disk, which rises into 5 thick lobes or glands between the stamens; leaves simple, rounded, and heart-shaped, usually 3-5 lobed. Fruit a pulpy berry. North America is very rich in number of species, in widespread distribution and in abundance of plants. From our native species come all the cultivated grapes of America except those of California.

§ 1. *Bark loose, shreddy; tendrils forked; nodes solid.*

\* *A tendril (or inflorescence) opposite every leaf.*

*V. Labrusca*, Linn.—NORTHERN FOX GRAPE, furnishing most of the American table and wine grapes; leaves and young shoots very cottony, even the adult leaves retaining the cottony wool underneath, the lobes separated by roundish sinuses; fruit large, with a tough musky pulp when wild, dark purple or amber-color in compact clusters. The original of the Concord, Hartford, and many others.

\* \* *Tendrils intermittent (none opposite each third leaf).*

+ *Leaves pubescent and floccose, especially beneath when young.*

*V. aestivalis*, Michx. SUMMER GRAPE.—Branches terete; leaves green above, and with loose, cobwebby, rusty down underneath, the lobes with roundish open sinuses; clusters slender; fruit smaller and earlier than in the foregoing, black with a bloom, pleasant. Common from Va., S. Original of the Herbemont, Norton's Virginia and others.

+ + *Leaves glabrous and mostly shining, or short-hairy beneath, cut-lobed or undivided.*

+ + *Flowers more or less polygamous (some plants inclined to produce only staminate flowers), exhaling a fragrance like that of Mignonette; native species.*

*V. riparia*, Michx. (or *V. culpina*). RIVER GRAPE.—Leaves usually 3-lobed, sinus broad, rounded or truncate; stipules large

(2"-3"); fruit 4"-5" diameter, acid, often juicy, ripening July to Sept. Stream banks N. and W. Original, in part, of Clinton and others.

++ ++ *Flowers all perfect, somewhat fragrant; exotic.*

*V. vinifera*, Linn. EUROPEAN GRAPE.—Leaves circular and usually green and shining, thin, the teeth deep and sharp or rounded, when young 5-7-lobed. Cultivated from time immemorial; from the East, furnishing the principal grapes of our greenhouses.

§ 2. *Bark of stem close and smooth, pale; pith continuous through the nodes; tendrils simple, intermittent.*

*V. rotundifolia*, Michx. MUSCADINE, BULLACE, or SOUTHERN FOX GRAPE.—Leaves rather small, round, seldom slightly lobed, glossy, and mostly smooth both sides, margin coarsely toothed; clusters small; fruit  $\frac{1}{2}$ "- $\frac{3}{4}$ " diameter, purple, thick-skinned, ripe in early autumn; original of the Scuppernong Grape. River banks from Md., Ky. and Kans., S.

#### ORDER SAXIFRAGACEAE.

A large family not readily defined by any single characters: distinguished generally from Rosaceæ by having albumen in the seeds, ovaries partly or wholly united, and seldom any stipules; the herbs and most of the shrubs of the family have only as many or twice as many stamens, and fewer styles or stigmas than there are petals or sepals. Flowers mostly perfect. Stamens and petals generally borne on the calyx, the latter usually withering and persistent. Leaves alternate or opposite. The only genus with which we are concerned is *Ribes* which has the following characteristics.

## GENUS RIBES.

(Name of uncertain origin.)

Low shrubs; flowers in spring; fruit mostly edible.

Leaves palmately veined and lobed; sometimes with narrow stipules united with the base of the petiole. Calyx with its tube cohering with the ovary, and often extended beyond it, the 5 lobes usually colored like the petals. Petals and stamens each 5, on the throat of the calyx, the former small and mostly erect. Styles 2 or partly united into one; ovary 1-celled with 2 parietal placentæ, in fruit becoming a juicy berry, crowned with the shriveled remains of the rest of the flower.

## GOOSEBERRIES.

*Stems commonly with 1 or 2 thorns below the leaf-stalks or the clusters of leaves, often with numerous scattered prickles besides, these sometimes on the berry also. Flowers one to three in a cluster; small and greenish; calyx lobes longer than the tube.*

*R. Grossulária*, Linn.—EUROPEAN GOOSEBERRY, but more or less cultivated here in several varieties, as Industry, Crown Bob, etc., is a stocky bush with thickish leaves, a pubescent ovary and calyx, and a large, usually finely pubescent fruit.

*R. oxycanthoides*, Linn. Parent of the American Gooseberries, like Houghton and Downing, is seldown downy, with thinner leaves, very short thorns or none; very short peduncles; stamens and 2-cleft style scarcely longer than the bell-shaped, smooth calyx; ovary and berry smooth, the latter medium-sized, either green or reddish when ripe. New Eng. to N. J., W.

The varieties of the native species are few and fall readily



under the specific group. We are not much concerned with the European sorts and the specific classification is quite sufficient for them.

## THE CURRANTS.

*No thorns or prickles, and the flowers numerous in the racemes.*

\* *Flowers greenish or whitish, small.*

+ *Leaves without resinous dots; calyx flat and open; berries red (or white).*

*R. rubrum*, Linn. GARDEN CURRANT.—Cultivated from Europe, with straggling or reclining stems, somewhat heart-shaped moderately 3-5-lobed leaves; the lobes roundish, and drooping racemes from lateral buds distinct from the leaf-buds; edible berries red, or white; also a striped variety.

+ + *Leaves sprinkled with resinous dots; flowers larger, with oblong bell-shaped calyx; berries larger, black, aromatic and spicy, glandular-dotted.*

*R. nigrum*, Linn. GARDEN BLACK CURRANT.—Cultivated from Europe; much like the preceding, but has greener and fewer flowers in the raceme, minute bracts, and a shorter calyx.

\* \* *Flowers highly colored (red or yellow), much larger.*

*R. aureum*, Pursh. GOLDEN, BUFFALO, MISSOURI or CRANDALL CURRANT.—From Mo. to Ore.; abundantly cultivated for its spicy-scented bright yellow flowers in early spring; smooth, with rounded 3-lobed and cut-toothed leaves (which are rolled up in the bud), short racemes with leafy bracts, and tube of the yellow calyx very much longer than the spreading lobes; the berries blackish, usually insipid.

## ORDER ERRICEÆ.

A large family, of shrubs, herbs, or even small trees, difficult to define as a whole; the leaves are simple and mostly alternate; the flowers almost all regular, and with as many or twice as many stamens as there are petals or lobes of the corolla; their anthers 2-celled, each cell more commonly opening by a pore or hole at the end; ovary mostly with as many cells as there are lobes to the corolla; style only one, and seeds small. The only fruits of merit are the whortleberries and cranberries which are known by having the tube of the calyx adherent to the ovary, on which the monopetalous corolla and the stamens are therefore mounted. All of these are shrubs, with scaly buds. Fruit a berry or berry-like. Only the cranberry is cultivated.

## THE CRANBERRY.

(Ancient Latin name, of obscure meaning.)

Stamens 10 or 8; anthers tapering up into a tube with a hole at the top. Ovary with several or many ovules in each cell, forming a pulpy many-seeded (rarely rather few-seeded) berry.

CRANBERRY.—*Creeping or trailing, very slender, hardy woody plants, with small evergreen leaves whitish beneath, single flowers in summer, borne on slender erect pedicels, pale rose corolla, deeply parted into 4 narrow reflexed divisions, 8 anthers with very long tubes, but no awns on the back, and acid red berry 4 celled, ripe in autumn.*

*V. macrocarpon*, Ait. LARGE OF AMERICAN CRANBERRY.—  
Stems 1 to 3 feet long, growing on so that the flowers become lateral, oblong obtuse leaves sometimes  $\frac{1}{2}$ ' long, and with less revolute margins, and berries  $\frac{1}{2}$ ' or more long; largely cultivated for the market. The few varieties are easily grouped under the species.

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