SYSTEMATIC POMOLOGY

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TREATING OF THE DESCRIPTION, NOMENCLATURE, AND CLASSIFICATION OF FRUITS : : : : : :

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DEDICATION

One of my teachers, above all the others, is responsible for my love of taxonomic science. And, as for that, the same one laid the whole foundation for my love of general horticulture. This man has never received the praise rightly due him for his efforts in behalf of his students —of whom I am but one among hundreds. I know I have been no special credit to him; and, like many of the others, I have seemed unappreciative. Now, however, as I am about to publish a book, the inspiration for which came long ago from him, I wish to acknowledge my sense of indebtedness to him and my high personal esteem for

EDWIN A. POPENOE

Formerly Professor of Horticulture and Entomology, now Professor of Entomology, in the Kansas Agricultural College.

F. A. W.

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— OF —
Plant Pathology

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SYSTEMATIC POMOLOGY

I

POMOLOGY IN GENERAL

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POMOLOGY is the science of fruits. The definition is sometimes made to read thus: "Pomology is the knowledge of fruits"; or even as follows: "Pomology is the study of fruits." But study must result in knowledge if it have any result at all, and knowledge must be classified if it have any purpose or use, and classified knowledge is science. Therefore, when we study fruits in any way so as to get some knowledge of them we have the materials of pomology, and whenever we classify the knowledge gained by our study we have the science of pomology.

The science of pomology separates naturally into two subdivisions, viz., *systematic pomology* and *practical pomology*. The former deals with our knowledge of the fruits themselves, and the trees, bushes, or vines on which they grow; the latter deals with our knowledge of the practice of fruit growing.

This classification does not assume that practical pomology is any more "practical," in the vulgar usage of that adjective, than systematic pomology. Practical pomology is practical simply because it deals with the *practice* of growing fruits without concerning itself about the history, characters, names, or classifications of the fruits themselves.

The modern evolution of business has made this natural subdivision of pomology into two branches somewhat inadequate to the circumstances, especially in North America. Fruit growers have found more and more that the fullest knowledge of the fruits themselves, combined with the utmost proficiency in the practice of fruit growing, was insufficient to their needs. To these they have been compelled to add an extensive and complicated knowledge of fruit marketing. This makes a third department of pomological science. This knowledge of how to market fruit may properly be called *commercial pomology*.

These three branches are very intimately related. In order to grow fruit successfully one ought to know all the characters and relationships of the varieties which he cultivates. In order to sell fruit at a profit it is

always necessary, first, to have it well grown and correctly named.

Yet the three branches are easily separated. It is no uncommon thing to find a man who knows at a glance all the leading varieties of apples or plums, with their correct names, and who is yet not capable of growing any of the varieties successfully. That man would be a good systematic pomologist, but a poor practical one. The next man may be able to grow the finest grades of fruit, and yet be unable to market it at a profit. Such a man would be strong on practical pomology, but weak on the commercial side.

Pomology, it should be observed, is a branch of horticulture. Other nearly coordinate branches are *olericulture* (dealing with vegetables), *floriculture* (dealing with flowers), and *arboriculture* (dealing with trees).

In order to locate the subject more precisely we ought to bear in mind that horticulture, in its turn, is a branch of agriculture. More strictly speaking, horticulture is a branch of agronomy, and agronomy is a branch of agriculture. Agriculture is separated into two subdivisions: *zoötechny* (the

knowledge and care of animals) and *agronomy* (the science of crops and crop production). This whole classification of subjects will appear more clear by reference to the following outline:

- AGRICULTURE
  - Zoötechny
  - Agronomy
    - Cereal culture, etc.
    - Pomology
      - Systematic
      - Practical
      - Commercial

The word "pomology" means literally the science of fruits. It has a mongrel etymology, being a combination of the latin word *pomum* (fruit) and the Greek word *logy* or *logos* (discourse, treatise, or science). The former root is seen also in the word "pome," designating specifically such fruits as the apple, pear, and quince. The latter root is seen in such words as "geology," "theology," and "anthropology."

It may be remarked in passing that the science of systematic pomology has been seriously neglected in North America during the last three or four decades. It would be easy to show that this is a fact, and to give

some of the reasons why such a condition of affairs should have come upon us; but that is too far aside from the present design. During the last few years there has been a manifest revival of interest in systematic pomology. More really scientific work is being done now in the study of fruits than ever was done before in this country, and more persons are interested in knowing the best methods for the study of *systematic pomology*.

Systematic pomology, when analyzed in turn, is found to comprise three distinct subjects. These are (1) *description*, (2) *nomenclature*, and (3) *classification*.

The first step in getting acquainted with any variety of fruit, be it Ben Davis apple, Clyde strawberry, or something entirely new, is to form an accurate and detailed notion of all its different characters. This involves the making of a description. The description may be merely mental, or it may be fully written out, which is much the better way. In either case, when we examine a specimen closely, or a number of specimens of one variety, making mental or written note of size, form, color, markings, and other distinguish-

ing characters, we are engaged in *descriptive pomology.*

Nomenclature is the science of names. In a slightly different sense the same word applies to the problem of determining the correct names for given varieties. This latter sense is the one in which the term nomenclature is more frequently used by pomologists. (By the way, this word "nomenclature" is accented on the first and third syllables, and not on the second syllable, as one often hears it.)

As soon as we have made a description of a specimen or sample of fruit, we inquire for the name. But the description, written or mental, must come first. We must have some knowledge of the characters of the fruit as a basis for further work. Expert pomologists are often able to name fruits at a glance; but this is because the characters are already well pictured in their minds, and they are able to call up these mental descriptions instantly. In many other cases the discovery of the correct name for a variety is a difficult, laborious, and uncertain undertaking.

When a variety is known and named in some way we may proceed to its *classification.* It is true that this order of procedure seems

to be inverted at times; for a man familiar with fruits will often classify a variety before he knows the name of it. This is because he is acquainted with several other varieties of generally similar characters. But the logical order of systematic study is not disturbed by this apparent exception. In order to classify fruits the pomologist must have several different varieties to work with, and these must be properly described and named before he can proceed with his classification.

In classifying varieties in systematic pomology, as in classifying any other materials in any other objective science, we simply place together those which have the closest resemblances. Sometimes we assume a limited basis of classification, however, putting together those varieties which agree in certain specified characters, though they may disagree in others quite as important. Thus, most nurserymen in their catalogs classify apples according to season, putting them into three groups—summer, fall, and winter varieties. In this case two varieties may be almost exactly alike in all their visible characters; but if one ripens a month later than the other, they may go into separate groups.

II

MAKING AND FILING DESCRIPTIONS

THE first step in the study of a given sample of fruit is to make a suitable description. The description may be fully written out in proper form, or it may be merely a brief mental inventory of the characters of the fruit. In any case, however, the characters of the fruit must be recognized before the sample can be named or classified.

The beginner will find the preparation of full, accurate formal descriptions a most valuable exercise, if, indeed, he do not find it indispensable to further study. Any one who is ambitious to become a fruit expert must take long and thorough training in descriptive pomology.

This work of description will be much facilitated and the results will be greatly improved if some proper outline is followed. Doubtless the best and most convenient way is to have a printed blank for the purpose. Those shown in the following chapters (considerably reduced in size) have been found by

experience to answer the requirements under most circumstances. Any one beginning a new set of descriptions for himself, however, ought to consider these designs carefully from all points of view to see if particular modifications may not improve these outlines for his special purposes.

Aside from the desirability of making these particular adaptations of descriptive forms to special needs, it should be borne in mind by every working pomologist that there is, on the contrary, a certain advantage in uniformity. If the various pomologists in different parts of the country all use practically the same descriptive form for apples, for instance, then the descriptions made by each one may circulate readily with the others. Different descriptions of the same varieties may be compared with ease and to some result. Descriptions published by one man are readily intelligible to another, because they are rendered in the same terms. The advantages which belong so conspicuously to a uniform system of nomenclature are to be found also in a uniform method of description. It is a noteworthy mark of our pomological advance and a gratifying promise for the future that

many of the leading American pomologists are using practically the same descriptive forms.

The descriptive blanks now most in use measure either 5 x 8 or 5½ x 8½ inches. A few men are using sheets 7 x 9 inches. The larger sizes have the important advantage of greater space. One frequently finds himself crowded for room when using one of the smaller sizes. The smaller sheets are easier to handle, however, particularly when it comes to filing; and when the pomologist finds one sheet too small to hold a description, it is an easy matter to continue the notes on a second sheet.

When the description blanks are made up into book form to be carried into the field, it is especially handy to have them small enough so that the note-book may be managed easily in an ordinary coat pocket. It is desirable, at the same time, to have these blank pages in the note-book exact duplicates in size and style of the forms used in the permanent file —providing any file is used aside from the books.

This method of handling fruit descriptions is greatly to be recommended. Almost anywhere that the pomological student may go—

Variety.

HABIT OF GROWTH.	
Height of Plant	
Length of Fruit-stalks	
Length of Leaf-stalks	
Color of Foliage	
FRUITS —How Produced.	
Form	
Color	
Dimensions.	
Seeds	
FLESH—Color	
Texture.	
Quality.	

FIG. I—DESCRIPTION BLANK, GENERAL FORM. (DELAWARE EXPERIMENT STATION)

in his own garden, in his neighbor's orchard, to a county fair or to a horticultural meeting —he is sure to see some interesting specimens of fruit. If he has his note-book with him he can quickly make a memorandum of important characteristics, or he may fill out a complete description. The ordinary fruit grower, who does not expect to write nursery catalogs, books, or experiment station bulletins, will usually prefer the note-book method of keeping descriptions. The book offers the most convenient means of preservation, and as long as there are not so many descriptions but that the owner of the book can readily turn up the one he wants, it is the best means.

For the working pomologist, the experimentalist, the secretary of the horticultural society, or the nurseryman who has his catalog descriptions to prepare, it will usually be best to keep the descriptions on loose sheets. These can be arranged alphabetically and filed in almost any way. In default of anything more elaborate, it is best to place them in large envelopes of just the right size to receive them. Ten cents will buy a bunch of twenty-five strong manila envelopes, one

for each letter of the alphabet, barring X. These may be lettered from A to Z, and may be fastened together with a rubber band and kept in the writing-desk, on the book-shelf, in the madame's mending-basket, or in any other convenient spot where they are safe and easily found. Into these envelopes the variety descriptions can be distributed alphabetically.

Altogether the best device for filing descriptions, however, is the card catalog cabinet now used in so many different ways. These cabinets are made with drawers, into which the cards fit smoothly, where they may be removed and replaced at need. Alphabetical guides keep the descriptions arranged according to name, or, with other guides, one may follow systematic or numerical arrangements if preferred (Fig. 2).

These card cabinets are made and kept in stock by several manufacturers in the United States. They may be had in various sizes, but the largest standard size drawer kept in stock receives a card 5 x 8 inches. Since there are many advantages in using a standard card and drawer, the writer uses and recommends this size.

For laboratory or classroom use the writer prefers loose sheets of the standard size and form. Where a great many are to be used, it is a matter of economy to have them printed on news or poster paper, railroad manila, or other cheap stock. It is often desirable, for

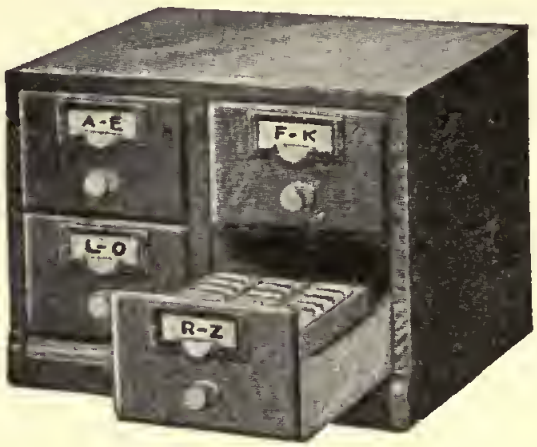


FIG. 2—CARD CABINET FOR FILING DESCRIPTIONS

other reasons, to have these cheap paper blanks. They can be used in the field for lead-pencil notes, or for making temporary descriptions, which can be copied later on to the permanent cards. The present writer, when he has a large number of samples for description, finds it a great saving of time to dictate the descriptions to a stenographer, who takes them down on these temporary sheets, afterward transferring them with the typewriter to the regular filing cards.

Another plan for laboratory work is that devised by Professor U. P. Hedrick. He has designed a laboratory note-book which contains, first, some printed matter (definitions, explanations, classificatory schemes, etc.) and, second, a number of pages of printed forms for the description of varieties. The style of these blank forms will be better understood by reference to Fig. 3, which is engraved directly from one of the pages. It is considerably reduced in size, however, the original page measuring 6 x 9¼ inches. Such a laboratory note-book has certain advantages as well as several disadvantages.

It should be noted that the making of accurate descriptions is much a matter of experience. The beginner will find it slow work, and many of his entries will be made with considerable doubt. One must be thoroughly familiar with the vocabulary to select always the most appropriate and illuminating adjective. What is more, many of the statements made in such a description are rather expressions of personal judgment than records of exact fact. Should a certain stem be called long or very long? Is the basin moderately irregular, considerably irregular, decidedly

VARIETY.

Synonyms.

General Appearance.

Form.

Color.

Size. *Stem.*

Cavity. *Basin.*

Calyx. *Suture.*

Skin *Bloom.*

Flesh.

Color. *Texture.*

Juice. *Seed.*

Flavor.

Tree.

Habit. *Foliage.*

Color of Bark. *Color of Twigs.*

Vigor. *Hardiness.*

Productiveness. *Season.*

Botany.

History.

Economic Status.

FIG. 3—LABORATORY NOTE-BOOK. (HEDRICK)

irregular, or very irregular? Is the quality very good or best? These are all matters of opinion, and a man must be trained by long experience in such things to make his opinion the most valuable.

III

GENERAL CONSIDERATIONS

The fruit is of paramount importance in nearly every case in the description of any pomological variety. It receives, properly, the chief attention. We shall be obliged to go more into detail regarding the methods and the terms for describing the various classes of fruits, but first it may be convenient to dispose of sundry matters of a general nature relating to the entire subject.

The tree or vine or bush or plant on which the fruit grows, though less important from the standpoint of systematic pomology, is evidently not to be disregarded. Occasionally, though not usually, the characters of the tree or plant are more striking and easily recognizable than those of the fruit. Whether the characters are peculiar or not, something should be said of the tree.

In speaking of a tree, its *form* should be described first. This varies so much with different kinds of trees that no convenient set of descriptive terms can be suggested cover-

ing all cases. Trees are often said to be *upright, spreading, open, close-headed, round-topped,* or *irregular.* Beyond this, one has to depend largely on his own ingenuity to invent apt terms of description for particular cases.

The productivity of the variety is usually mentioned as a characteristic of the tree. Convenience is the best justification for this custom. Thus, under this head, one would say that Elberta peach is *prolific, coming early into bearing;* that General Hand plum is *a very light and late cropper;* that Baldwin apple *bears abundantly in alternate years,* etc.

The hardiness of a tree and the degree in which it is subject to disease ought to be entered here. Hardiness is generally understood to mean the ability to withstand winter damage, but it may mean a variety of things. The man who uses the term ought to be "fully persuaded in his own mind," as Paul said of the meats offered to idols. The susceptibility of trees to disease is often difficult to arrive at, but it is a very important practical observation, and ought not to be omitted if it can be ascertained. So we would say of Roseau apple, *very hardy;* of the Peen-to

peach, *hardy only in Florida* (which might not be true); of the Spitzenberg apple, *much subject to canker;* of Milton plum, *severely attacked by pockets;* of Martha grape, *subject to mildew*, etc.

Vigor of growth should be recorded here. Some trees are *strong growing*, some *weak growing.*

The color of the bark, or *the color of the young wood*, is often characteristic, and such peculiarities should be included in this part of the description.

The foliage as a whole should be described. It is of value to know whether it is *abundant*, *sparse*, *healthy*, *dark green*, or some other color, *subject to disease*, or marked by other characteristics.

The individual leaf requires more critical attention in certain cases. Among ordinary varieties of apples and pears leaf distinctions are seldom of enough importance to be worth record; but in certain groups of plums, and in some peaches, the leaf characters are strongly differentiated. There are a great many different technical terms used in describing leaf characters, but these have been so often repeated in the text-books of botany

that we may assume that every one knows at least the most common and useful of them. Special attention should be directed, however, to the fact that the surface of the leaf—whether it be *smooth*, *rough*, *rugose*, *tomentose*, *lanate*, *wooly*, *hairy*, or of some other quality—is often of considerable value in identifying varieties. The glands, which are often found on the petioles, or leaf stalks, particularly in stone fruits, are frequently of critical consequence in description. Peach leaves may be *glandless*, or set with *orbicular* or *reniform* (kidney-shaped) glands. In describing plums, the approximate number of glands at the base of the leaf, or along the petiole, is to be chiefly considered.

General notes will usually accompany any full description. It will be seen that most of the description blanks in use offer comparatively ample space for this entry. These notes may cover such a wide range that it is hardly possible to give any general directions for making them. Peculiarities of soil or location, which might have influenced the specimens described; facts with regard to the storage of the specimens; notes on insect or fungus injuries; general remarks on the value or uses

of the variety; notes with respect to its origin, introduction, or history; discussion of nomenclature and synonymy; and dozens of other matters all come up for review. Any information worth preserving should be put down, and if there is no other place provided, the entry can be made under the head of "General Notes."

The grower of a sample of fruit should always be remembered in the description, with his location and post-office address. The locality where a sample is grown is of great importance, for the reason that the same variety often develops very differently in different localities. The name and address of the grower are valuable in identifying or verifying the sample, and in tracing the matter up in case any doubt arises subsequently as to the authenticity of the variety. This information, while not strictly descriptive, is essential.

The one who describes a sample of fruit should always certify the description with his own name. This enables the person who uses the description to judge its value, and sometimes to secure additional details. Accuracy in description is, to a considerable

extent, a matter of training and experience. One man's descriptions are apt to be considerably better than another man's, and the one who consults the written description has a right to know its value as nearly as possible. Certain points in description, moreover, as elsewhere explained, are always matters of purely personal judgment, and the person who renders the judgment should therefore be held responsible in the record.

The date at which the description is made is also a matter of some interest (sometimes of real consequence), though its value is more bibliographical than descriptive. It should always be given.

Before we pass now to the description of the fruits themselves, we may stop for a single observation regarding the nature of the sample to be chosen. It goes without saying that the specimens chosen for description should be representative—typical. It is desirable in many cases, of course, to preserve notes of abnormal samples, but the fact of their abnormality should be conspicuously advertised in the description. In all ordinary cases great pains will be taken to select only

those specimens which fairly and fully present the characters of the whole lot.

Within reasonable limits, the larger the sample the better the notion which one can form of the variety, and the more accurate the description which one can render. An entire bushel basketful of apples or peaches is not too many. Yet even from these one will naturally choose a few specially well-formed and typical specimens for critical examination while making up his notes. Usually five to eight such specimens, carefully selected, will form the most convenient and satisfactory basis of a description.

The simplest and easiest way to make a description is to draw it from a single specimen. If special care is taken to secure one fruit which represents the variety fairly in all points, such a method is not particularly objectionable. Beginners may be allowed to follow this plan for a time, but it should by no means be permitted to come into customary use.

The descriptive value of a good picture is very great indeed. This is recognized everywhere. Even the daily papers use pictures to enforce their description of places and their

records of events. Anyone who is accustomed to use such books as Downing's "Fruits and Fruit Trees of America," Dr. Warder's "American Pomology," or Thomas' "Fruit Culturist," has certainly learned that the figures of fruits therein given are often more useful than the descriptive text.

In making descriptions, therefore, the value of a good figure should be duly recognized. No description can fairly be allowed to be complete without some sort of drawing or photograph of the fruit in question.

A good pen or pencil drawing of the fruit is excellent for record, but it is difficult to make. Only a few persons, usually such as have had some training in drawing, can draw such sketches with sufficient lifelikeness to make them very serviceable.

The outline of a fruit may be taken much more easily, and this is the method adopted by the ordinary man whose fingers are all thumbs and whose thumbs are all stiff and sore. Such a fruit as an apple can be readily cut in half and laid upon a sheet of paper. Its outline is then traced with a pencil, and the tracing may be subsequently reinforced with ink. Plums, peaches, and softer fruits must

be handled with more care, but outlines may be made from them also without great trouble. Such drawings are very satisfactory if carefully made from typical specimens.

Water-color paintings are indulged in by a few American pomologists who are themselves expert with the brush, or who have the necessary funds for employing an artist. Good water-color sketches are an obvious improvement on the uncolored drawings, and they form about as complete a record as one can have in connection with a good written description. Very few persons, however, can avail themselves of this method.

Models in plaster of Paris, or in wax, are sometimes undertaken. These are usually colored by hand, in imitation of the fruits from which they are made. When such models are well done they make remarkably satisfactory records, but they are not always well done. The difficulties in the way of securing models are the same as those in the way of the water-colors. There are probably not more than three or four good collections of fruit models in America at the present time—perhaps not so many as that.

The photograph is one of the most practi-

FIG. 4—THE PHOTOGRAPHIC RECORD. (COCKLINE PEACH)

cable and serviceable of picture records. Almost any one nowadays can make photographs if he have only moderate patience in learning. It is not just so easy as it might seem to be to make good photographs of fruits. It is considerably harder than it is to make push-button pictures of the girls in their bathing suits. Nevertheless, it is a good deal easier than some other things.

For making photographs of fruits it is requisite to have a camera at least 5 x 7 inches in size. A 6½ x 8½ camera is better, and even an 8 x 10 is desirable for indoor use. The so-called "view cameras" are suitable for indoor work; but since the hand cameras are so popular and so convenient for other purposes, most people will prefer this latter model. The writer prefers what is known as a long-bellows (or "tele-photo") camera, with a reversible back. Both these adjustments are essential. Other conveniences are desirable, but not imperatively necessary.

In photographing fruits one can get large satisfaction out of a good lens. There is hardly any other line of photography—aside from professional portrait-making—in which an expensive lens really seems to pay so well

for itself. Almost any of the modern anastigmats can be used for such work. The Goerz, Voigtlaender, Cooke, Zeiss, and other makes are all known to be good. If one is selecting a lens for this special purpose, and if price is a great consideration, he will naturally choose one of comparatively short focus, since such a lens will give photographs of fruits at natural size without the use of the long bellows extension. These short-focus lenses, often spoken of rather erroneously as wide-angle lenses, are not suitable for general outdoor work, however, and are to be regarded always as special purpose tools. Too short a focus should not be adopted under any circumstances. A 6-inch focus may be regarded as the minimum for a 5 x 7 plate, 7¼-inch for a 6½ x 8½ plate, and 8½-inch for an 8 x 10 plate.

For myself, I greatly prefer a lens of considerably longer focus, such as is used for general landscape work. These lenses will run about as follows: Focus of 8–9 inches for 5 x 7 plates, 9–12 inches for 6½ x 8½ plates, and 11–14 inches for 8 x 10 plates. As a general rule, subject to some qualifications, it may be said that the longer the focus of the lens the

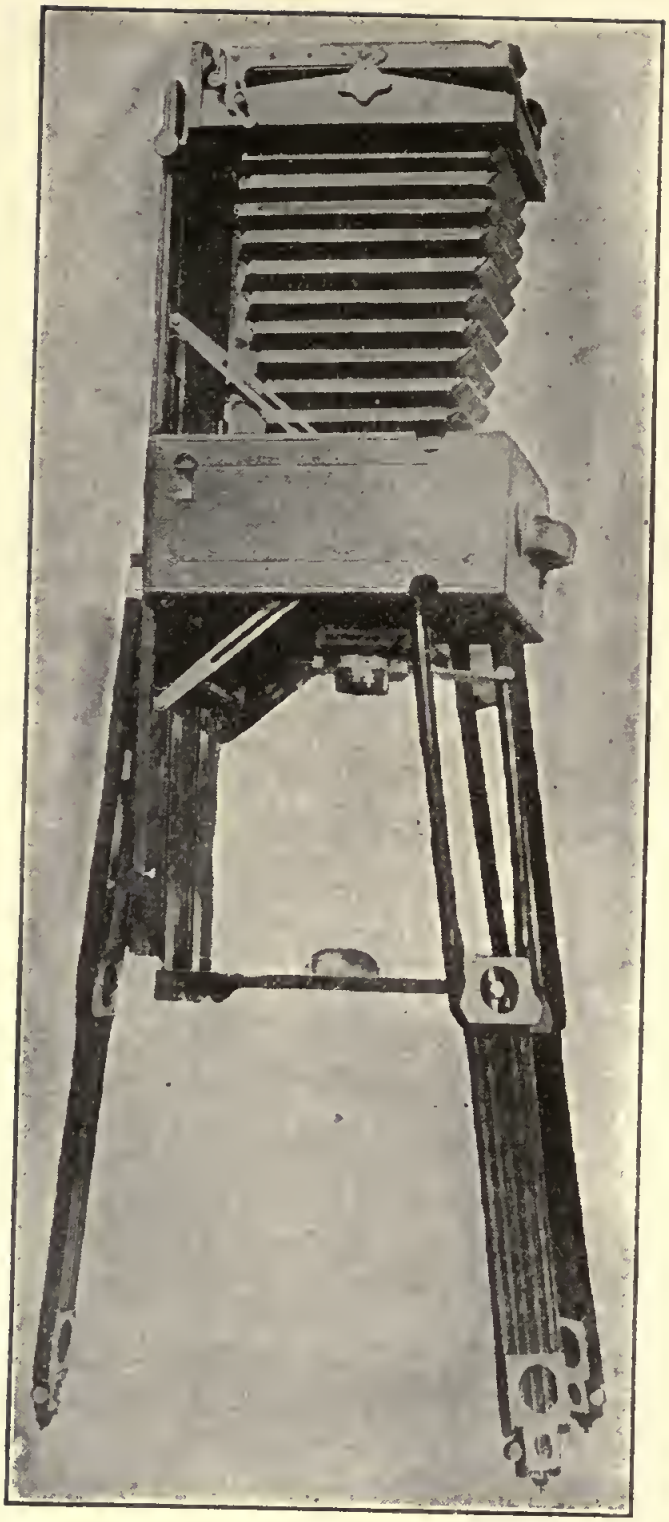


FIG. 5—FOLMER & SCHWING TRIPOD ARRANGEMENT FOR VERTICAL PHOTOGRAPHY

more correctly it will render the object photographed, but the longer will be the required exposure.

Any of the better lenses, either anastigmats or the cheaper rapid rectilinear models, commonly used in hand cameras, will give pictures of fruits at natural size if the camera bellows is long enough. To use a lens having an equivalent focus of 8½ inches, such as one usually finds in a 5 x 7 camera, a bellows extension of 16 to 18 inches is required.

The notion of photographing fruits and flowers has become so popular and common in this country that many useful special devices have been developed for the work. The best single idea is that which places the camera in a vertical position, photographing downward upon the specimens, which are posed on a glass staging below. The arrangement will be understood better by reference to the accompanying illustrations (Figs. 5 and 6), showing two different types of fruit photographing stands. There are many important advantages furnished by these pieces of apparatus—advantages which can hardly be understood without experience. This whole subject, however, has so many compli-

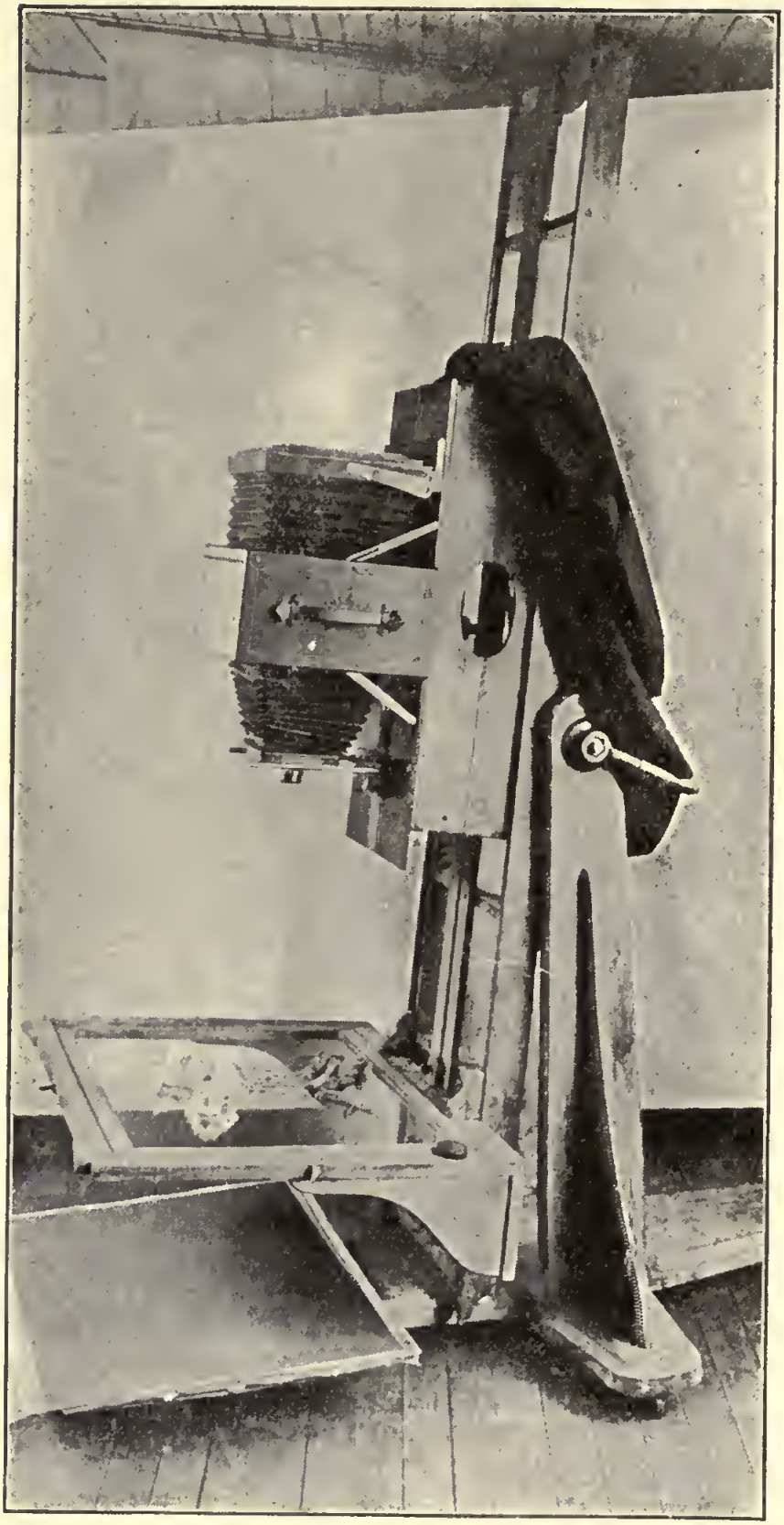


FIG. 6—APPARATUS FOR VERTICAL PHOTOGRAPHY (McFARLAND)

cations, and there is so much to be said on it, that any one interested in photographing fruits would better consult some special work on the subject. Mr. J. Horace McFarland's little pamphlet, "Photographing Fruits and Flowers" (Photo-Miniature Series, New York), is especially recommended.

IV

DESCRIBING POME FRUITS

SUPPOSE we undertake to make a description of an apple, or of a sample of a given variety numbering a half dozen specimens. Let us take the blank form shown in Fig. 7, on page 35, and follow the outline there provided.

The fruit is first considered. Possibly it would be more logical to examine the tree first, with its foliage and flowers and other distinctive characters. But in most cases the pomologist relies chiefly on the fruit for his information—he regards it always as the most important—and frequently he has nothing else before him when he makes the description. On account of its relatively great importance, therefore, it is quite proper to take up the description of the variety in this order.

The form is the first characteristic of the fruit to be considered, and one of the most important, especially in pome fruits. To be sure, a given variety may vary considerably in

FRUIT: Form *size*

cavity *stem*

basin *calyx*

colour

dots *bloom*

skin *flesh*

core *flavour*

quality *season*

TREE:

GENERAL NOTES:

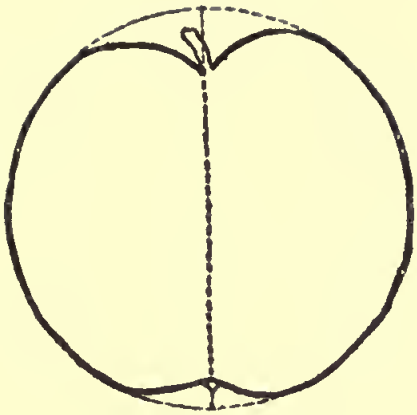
Specimens received from *Described by* *Date*

APPLE

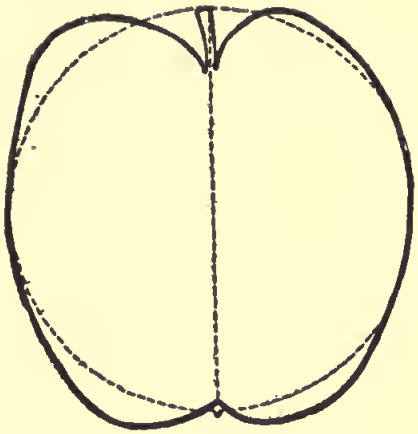
CENTRAL EXPERIMENTAL FARM, OTTAWA, CANADA.
Horticultural Department.

FIG. 7—APPLE DESCRIPTION BLANK. (MACOUN)

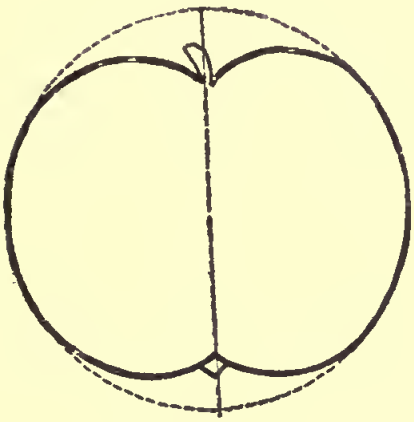
form, especially when grown in different localities; yet it is true that the expert depends very largely on this character for the identification of varieties. The local variations, due to climatic or soil influences, are very interesting, too, and should be noted with special care. Apples are round when the two diameters are approximately equal. An apple appears round, however, when the main axis, running from stem to calyx, is considerably less than the horizontal diameter, and some allowance may be made for this fact. That is, it is better to make the definition of round depend more on the judgment of the eye than on the measurement of the calipers. This remark applies also to the other forms. Apples are said to be *oblong* when the vertical diameter is greater than the horizontal diameter, but this rarely occurs—at least, among American apples. An apple may appear to the eye to be oblong, however, even when the main axis is less than the equatorial diameter; and, as already pointed out, it is better to rely on a trained eye rather than on measurements made with a rule. An apple is *oblate* when its main axis is distinctly shorter than the horizontal diameter. When we were



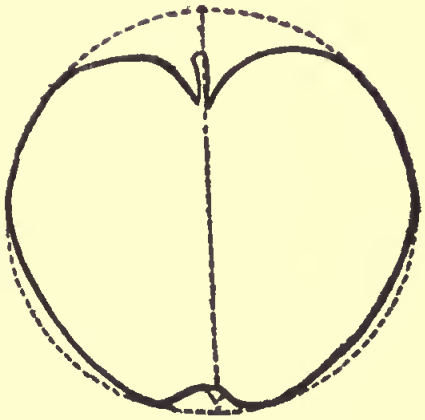
Round



Oblong



Oblate

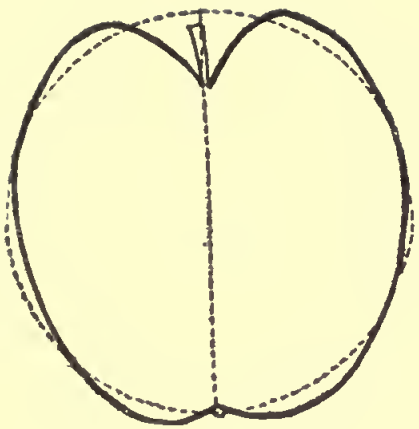


Conic

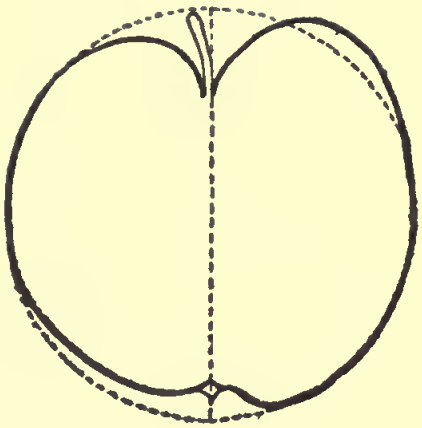
FIG. 8—FORMS OF APPLES

boys in school and studied geography we learned that the earth is an oblate sphere, "slightly flattened at the poles." The oblate apple is much more definitely flattened at the poles. Oblate apples are sometimes said to be *flat*, but this term may be better reserved for such specimens as are very strikingly flattened. An apple is said to be *conic* when it tapers more or less toward the eye, or calyx, end. Combinations of these adjectives are often convenient, such as *oblate-conic*, *round-oblate*, *round-conic*, etc.

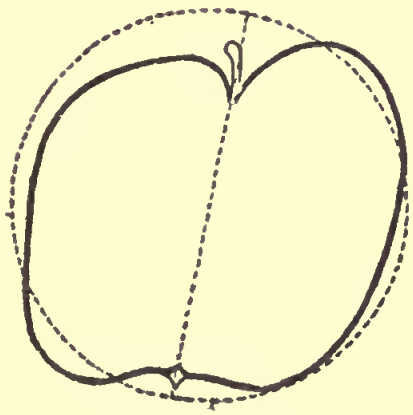
All these terms consider the fruit as it appears in its vertical section. If the fruit is cut exactly in halves, right through the stem and along the axis of the core, it becomes easier to determine whether it is round, oblate, or conic. But there are some other points to be determined from this section. It not infrequently happens that, when a section is made in this way, the two sides of the appple are *unequal*. One "half" is larger than the other. The descriptive term applied to this form is the one already mentioned—*unequal*. Occasionally a fruit will be found which is *oblique* or *lopsided*. It is oblique if, when lying flat on the base, the axis of the



Oblong-conic



Unequal



Lopsided

FIG. 9—FORMS OF APPLES

core does not point directly upward. York Imperial is a striking illustration of this oblique form.

In studying the form of an apple or pear the horizontal section should next be considered. An apple is *regular* if the horizontal section shows a circle, or practically a circle. Conversely it is *irregular* if the horizontal section departs materially from the circular form. In certain varieties this departure is very definite, usually toward a more or less distinctly five-angled form. Such an apple is said to be *ribbed* or *five-angled* (Fig. 10). The pomologist must use his judgment as to which of these terms best fits the specimens in hand.

The size of the fruit is next considered. Evidently no very fine distinctions can be made in this matter. Some apples or pears are comparatively large, others usually rather small, and such common terms as *small*, *medium*, *large*, or *very large* must be depended on in nearly all cases. Nevertheless, it is usually best, in spite of the great variations in size which occur in any given variety, to enter in the descriptive blank exact measurements of the specimen which is under description. In doing this it is the practice of the writer to

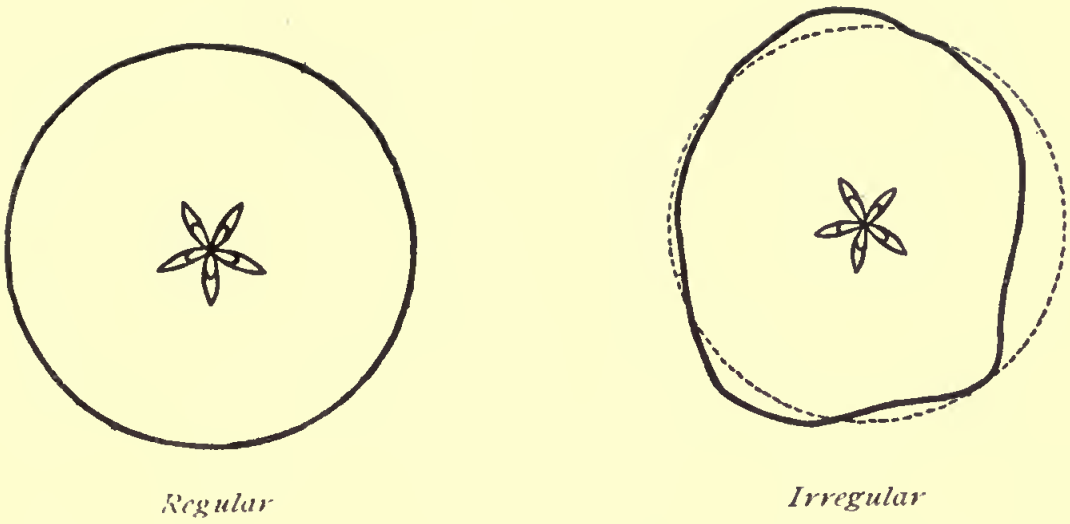


FIG. 10—CROSS-SECTIONS OF APPLES AND PEARS

record always the vertical or principal diameter first, and the horizontal diameter second. It is the practice of the writer, moreover, to make all measurements in centimeters or millimeters—usually the latter—according to the metric system. This avoids many annoying fractions, and recognizes a scientific principle of measurements which would have been adopted long ago in this country were our people as intelligent and progressive as they give themselves the reputation of being. It is very easy to enter such figures as these: "55 x 60," and this entry would mean, in the stenography of the present writer, that the fruit in question was 2 3-16 inches high by 2 3-8 inches in horizontal diameter.

The different diameters of any apple or pear can usually be measured most easily and most exactly on the vertical section; that is, after the fruit has been cut in halves along the axis of the core, one may apply the rule directly to the cut face. Sometimes, however, it is impracticable to cut a fruit, as when one is making a description of some rare exhibition specimen. In the case of ripe peaches or plums this method of measuring the diameter is, of course, plainly out of the question. On

this account it is a good plan to have on hand some sort of fruit calipers. The common six-inch or foot rule with a draw-caliper at the end, such as can be bought of any good hardware dealer, is very satisfactory for this same purpose, especially in the measurement of small fruits. In case all these conveniences are unavailable, one may make shift of a fairly accurate measurement with an ordinary rule. It will be best in this case to lay the fruit on some flat surface, as a table, and place a sheet of stiff paper, or cardboard, or a small pane of glass on top of it. This glass or cardboard may then be held level with one hand while the measurement is taken with the rule held in the other hand and applied against the edge of the cardboard, with its end resting on the table. The illustration (Fig. 11) will make this explanation clearer.

The cavity should next be studied. The cavity is the depression about the stem, and in which the stem grows. This is one of the most characteristic features of the apple, and is equally distinct and interesting in many pears. Special and careful attention should always be given to it.

The depth of the cavity should be noticed

first. Next the breadth. Then the inclination of the sides. The sides may be *abrupt*, *rounded*, *sloping*, or *broadly flaring*, as seen in Fig. 12. Occasionally one will find some exceptional form for which a special adjective

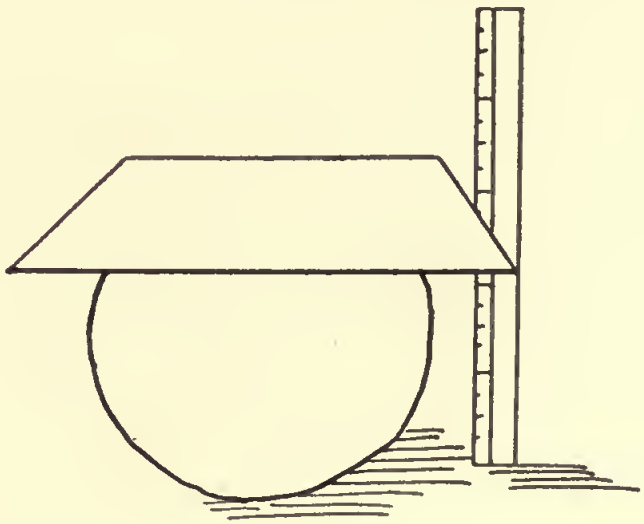


FIG. 11—MEASURING DIAMETER OF FRUIT

must be employed, but those here mentioned are by far the most common.

Next it should be remarked whether the cavity is *regular* or *irregular*. These adjectives have the same signification in this connection that they have in the description of the general horizontal section of the fruit. Sometimes the cavity is irregular in a definite manner, so that it may fairly be called *wavy*, or even *plaited;* but these cases are rare, especially the latter one.

The cavity frequently shows special markings or colorings. The most common one is of russet. The cavity may be marked with *russet*, even though the remainder of the fruit be perfectly smooth and shining. Similarly the cavity may be marked with *green*, though

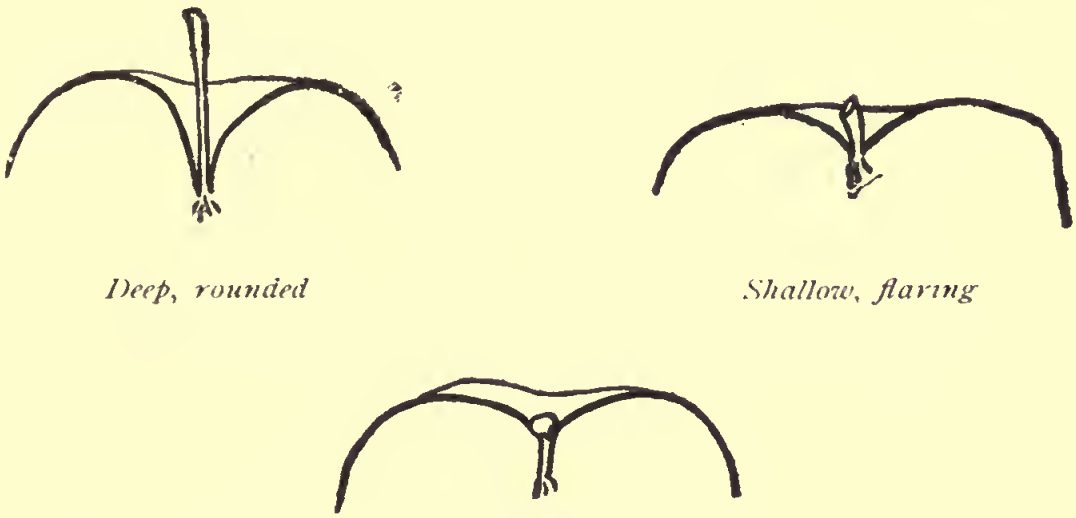


FIG. 12—DIFFERENT CAVITY FORMATIONS

the body color of the fruit is distinctly of a different shade. Very often the green and russet are mixed in such a way as to make the compound adjective *green-russet* most appropriate. Once in a great while fruits are found with special stripings in the cavity, and in all such instances these must be carefully described.

The stem naturally comes to attention

while the cavity is being described. It is *long* or *short*, *slender* or *stout*. In rather rare cases it is *clubbed* by the presence of a swelling or protuberence on the side. Such stem forms are rare, but are strikingly characteristic of certain varieties. Once in a great while

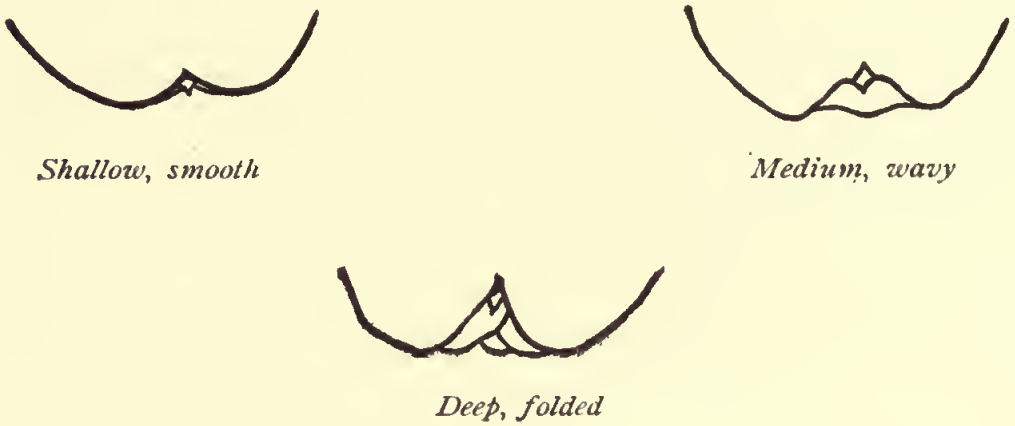


FIG. 13—DIFFERENT BASIN FORMATIONS

other unusual forms are discovered, but when they are the pomologist must depend on his own ingenuity to fit them with happy descriptive terms.

The basin is the depression at the apical end of the fruit, or at the end opposite the stem—the "blossom end," it is sometimes called. This is only less characteristic and important than the cavity, and requires critical study and painstaking description. The description follows very much the same lines

as in the matter of the cavity. The basin is first *shallow*, *medium deep*, or *deep* (Fig. 13); next *narrow*, *medium broad*, or *broad;* then *abrupt*, *rounded*, *sloping*, or *flaring;* and lastly it is *smooth*, *regular*, *irregular*, *wavy*, *plaited*, or even *crowned*. This last term of description is applicable when the five ribs along the sides of the apple come to five separate knobs about the basin, forming a little crown. The crowned basin is not specially rare. It is more common among apples grown on the Pacific coast in North America, but is most of all characteristic of the apples grown in the maritime countries of Europe. The common Yellow Bellflower furnishes the best example of it for the average American fruit grower.

The basin is very rarely marked with *russet*, or with some color other than the one covering the rest of the fruit. Of course, all such peculiarities of coloring or marking will be carefully mentioned in the description.

The basin, with the calyx, constitutes the *eye*. Many pomologists, however, have been in the habit of using the term "eye" in all circumstances, substituting it entirely for the term "basin." Thus in many descriptions one

Apple Description

SKETCH

HORTICULTURAL DEPARTMENT

IOWA STATE COLLEGE

Described by.....

.....*190*.....

Variety .....

Form .....

Size .....

Color .....

Skin .....

Dots:—obscure, distinct numerous, few.

Cavity .....

Stem: .....

Basin .....

Calyx .....

Tube:—I, conical. II, funnel-shaped.

Segments:—1, divergent. 2, convergent.

Core { 1, open. 2, closed. } { 1, axile. 2, abaxile.

Cells:—1, round. 2, ovate. 3, obovate. 4, elliptical.

Seeds: .....

Flesh .....

Flavor .....

Quality .....

Season .....

Remarks

FIG. 14—DESCRIPTION BLANK. (IOWA STATE COLLEGE)
(Original, 8 x 10½ inches)

may read "Eye so and so," which would be much better expressed "Basin so and so." The term "eye" can thus be dispensed with to advantage.

The calyx, which is also sometimes ambiguously spoken of as the eye, rests in the middle of the basin. It is sometimes spoken of as the blossom, and though it is, in fact, a part of the original blossom, it is hardly more properly so than the apple itself, or the stem, or the seeds. The calyx may be *large* or *small;* it may be composed of long or short segments, and any peculiarity of this sort should be mentioned; it may be *open*, *half open*, or *closed;* and in many cases it is *deciduous*, when the leafy segments fall off altogether.

The color of the fruit is always a prime character in the recognition of varieties in the mind of the experienced pomologist, but it is peculiarly difficult to describe in words. One should properly do what he can to distinguish in words the various tints of green, yellow, and red which he meets in apples and pears, but no great satisfaction is to be anticipated in this part of the work. The manner in which the color is distributed over the surface may be described with somewhat greater

accuracy. It may appear as a mere *blush* on one cheek, or it may be *washed* all over the side. It may be *splashed* or *striped* upon the ground color, and the stripings may be *bold* and *irreuglar*, or they may be *fine* and *regular*. It is no uncommon occurrence to find two shades of red combined in the coloring of an apple, both being superposed on a ground color of green or yellow. Such a coloring should be specially mentioned. A fruit which is all of one solid color is said to be *self-colored*.

The dots are very characteristic on some fruits, particularly on many apples. They vary in *number*, in *size*, and in *color*. In color they may be *white*, *gray*, or *russet*, or seldom of some other color. In form they may be *round*, *irregular*, or *areolar*. Areolar dots are such as usually have a small dot of russet in the center, surrounded by a more or less regular circle of white or gray. In certain cases the dots appear to be *sunken*, as in the Baldwin apple, and rarely they appear to be slightly *raised* above the surface. Finally they may be *scattered* miscellaneously over the surface of the fruit, they may be *crowded*, or they may be most numerous about the eye.

Baldwin

APPLE

FRUIT. Form round, oblate conic — size medium large 2 1/4 X 2 5/8 inches

cavity shallow flaring — stem short, stout

basin medium, deep and shallow — calyx medium, closed

color nearly overspread with red on yellowish background, obscurely striped

dots brown, numerous — bloom slight

skin medium, thick — flesh very fine, greenish white

core medium, closed — flavor crisp, juicy, sub-acid

quality good, 7 on scale of 10 — season late Winter

TREE spreading

GENERAL NOTES This apple was grown in sod on a high elevated eastern slope with good atmosphere drainage soil strong loam with clay subsoil 2 to 2½ ft. from surface. Apples are best noted for firm texture and late keeping qualities

Specimens received from F. Smith, Ashfield, Mass — Described by G. A. Drew — Date Jan. 1, '03

Massachusetts Agricultural College. Hatch Experiment Station. Department of Horticulture

FIG. 15—APPLE DESCRIPTION COMPLETE

The bloom is the waxy, whitish substance covering the outside of the fruit. It is of very doubtful value in distinguishing varieties, being, apparently, more characteristic of the climate in which the fruit is grown. About all that can be said about the bloom in a fruit description is to mention its amount, saying whether it be *scant*, *moderate*, or *abundant*. In order to determine this matter quickly it is usually sufficient to scrape the surface of the fruit lightly with the knife blade. Whatever bloom there may be will be caught up on the steel, and may be estimated at a glance. In certain cases this bloom is peculiarly oily, and this quality is to some degree a mark of the variety. Such observations will be mentioned, of course, in the description.

The skin may be *thin* or *thick*, *tough* or *brittle*. Rarely it has some taste of its own. There is seldom anything more to be said about it.

The flesh is always to be critically described. Its color should first be mentioned. Next its texture is described. This may be *hard* or *soft*, *coarse* or *fine grained*, *crisp*, *spongy*, *granular*, or *woody*. The flesh may be *dry* or *juicy*. It is customary to speak of pears as *melting* or sometimes as *buttery*.

The core may be *large* or *small*, and may be *open* or *closed*. Dr. Warder, in his descriptions, speaks of cores as "*clasping*," or as "*meeting the eye*," depending on their relation to the sunken tube of the calyx; but the writer has been unable to make any practical use of this distinction in fruit descriptions.

The flavor of an apple is one of the qualities by which an experienced pomologist most readily recognizes a variety, but here again he has extreme difficulty to render his expert judgment in intelligible words. For the most part, apples are either *sour* or *sweet*, and pears are sweet in various degrees. However, most sour apples are not really very sour, but are more accurately described by the term *subacid*. The range of flavor would then run something like this: *sour*, *subacid*, *mild subacid*, *flat*, *slightly sweet*, *sweet*. In some varieties there is a certain aromatic quality to the fruit which is very agreeable, interesting, and characteristic. This is very hard to describe, also, but should be mentioned under the general head of flavor. It should be noted that flavor is not a matter of personal judgment. All men ought to agree as to whether a certain fruit is sour, subacid, or sweet. It is not

VARIETY K I E F F E R

FRUIT: Form tapering toward both ends size medium to large

cavity rather shallow, regular stem medium short, stout,

basin med deep, abruptly rounded, regular calyx closed

color bright red cheek on yellow-green ground

dots many, dull russet, scattered bloom scant

skin thick and tough flesh coarse, firm, med juicy

flavor mild, sugary, not pronounced quality fair to good

core rather small Season early winter Altitude about 1800

TREE: Rank grower, vigorous upright, coming early into bearing, prolific

GENERAL NOTES: Extensively planted in this neighborhood and doing well

Where grown Martinsburg Soil and formation gravelly

Specimen sent by P. B. Elliot Described by N. I. T. Date 31-9-99

PEAR Japanese hybrid class

West Virginia Experiment Station, Horticultural Department.

FIG. 16—PEAR DESCRIPTION COMPLETE. (TYPEWRITTEN TRANSCRIPT)

proper to say that the flavor is good or bad. Good and bad relate to quality, which see.

The quality may be *very poor*, *poor*, *fair*, *fair to good*, *good*, *very good*, or *extra*. These terms are all relative, and all express a personal judgment. Men may honestly disagree as to quality. Some persons say that Kieffer pear is good, while others rate Howell as only fair to good.

The season stands for that period when the fruit is really ready for table. Of course, a Roxbury Russet or a Willow Twig is mature (ripe) when it is picked from the tree in October, but it is not in season until it is at its best condition for use—along in April or May following. It is often very difficult, with a sample of fruit in hand, to determine what its proper season is. Usually it is necessary to have considerable experience with the variety —grown and ripened under varying conditions, and kept in different kinds of storage—before one can decide just what its proper classification is. Of course, with summer fruits there is little or no trouble of this sort.

V

DESCRIPTION OF DRUPE FRUITS

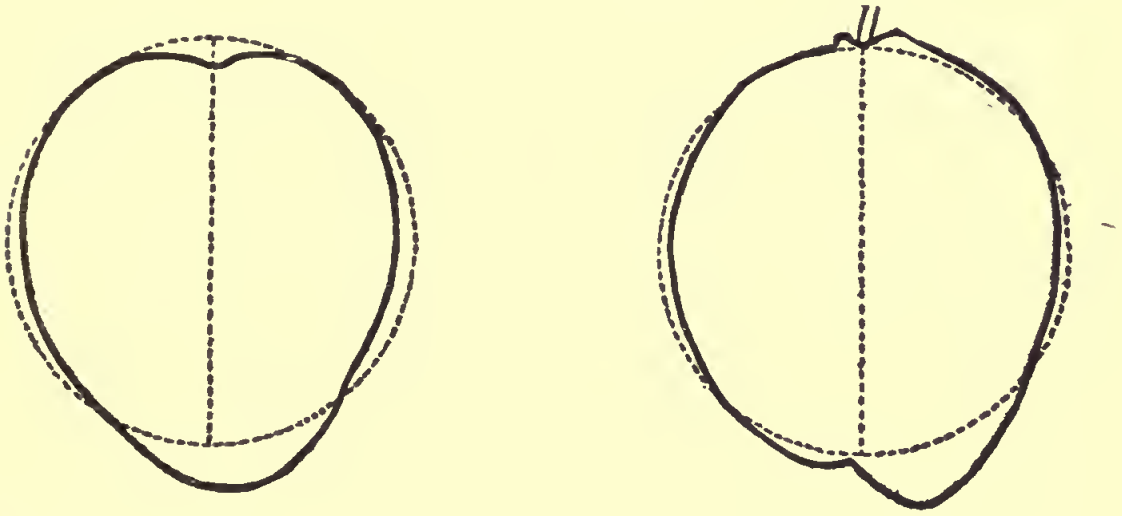
THOUGH there are some differences, many of the points of description are the same for drupaceous fruits as for pomaceous fruits, and many of the same descriptive terms are employed. In order to make the whole subject perfectly plain, however, it will be best to go through the formula for the description of drupaceous fruits point by point, and make such explanations as seem necessary.

Form is considered first. Many plums and a few peaches are *compressed* (that is, flattened sidewise), and this is perhaps the most important matter of difference in form between pome fruits and stone fruits. It will be noticed that many cherries are strongly *oblate*, and that a few are *heart-shaped* or *cordate*. Peaches and plums are often *oval* or *round-oval*. Occasionally the term *elliptical* or *ellipsoid* seems more distinctive, but rarely so. The simpler term is always to be chosen if it is equally significant (see Fig. 17).

Size is to be determined and described in

the manner already explained in Chapter IV., except that, as there noted, some form of fruit calipers is a practical necessity in measuring soft-fleshed peaches, nectarines, plums, and cherries.

The cavity is, in general, less important and characteristic among the stone fruits



Cordate *Elliptical, unequal*

FIG. 17.—DIFFERENT FORMS OF PLUMS

than among the pome fruits, but it can by no means be disregarded. As in the former case, it is described as to its depth, width, form, and markings.

The stem is of more value in the description of plums and cherries than with other fruits, and should accordingly be mentioned with special care. Many describers habitually give the exact length of the stem; and in

case the size of the fruit is mentioned in absolute inches or millimeters, the length of the stem certainly ought to be recorded in the same units.

The suture is a character peculiar to the drupe fruits. This term applies to the fold or crease running from the stem toward the apex of the fruit. In some cases it is continuous and even from stem to apex; in other cases it runs only the third, one-half, or two-thirds the distance, and these details should be fully noted in the description. In many plums there is no suture at all, but there is nearly always a distinct line of darker color marking the place where the suture would naturally be. It is best, with such a variety in hand, to enter in the description the statement "Suture, a line."

The apex of a peach, plum, or cherry may be *pointed*, *rounded*, or *depressed*, and occasionally it has some peculiar marking, as a dot or a distinctly prolonged tip.

The dots on plums are of great value in separating varieties. Their number, size, color, and distribution should be noted. In peaches and nectarines the dots are very obscure and seldom of any differentiating value.

Variety ..... *group* ..... *fruit*

grower ..... *locality* ..... *date*

Form ..... *size* .....

cavity ..... *stem* .....

suture ..... *apex* ..... *calyx* .....

color ..... *skin* ..... *dots* .....

bloom ..... *down* ..... *core* .....

flesh ..... *seed* .....

quality ..... *flavor* ..... *season* .....

Tree ..... *fruit habit* .....

flower ..... *foliage* ..... *glands* .....

Notes: .....

.....

.....

Observer .....

FIG. 18—BLANK USED FOR FIELD NOTES. (U. S. D. A.)

(Original, 4½ x 6 inches)

In cherries they are wholly absent or are not worth considering.

The *bloom* on stone fruits is nearly always conspicuous and often highly characteristic. Under this head one would describe the "fuzz" on peaches, which may be *coarse and heavy*, or *light*, or *thin*, or *scant*. Other descriptive terms will occur to any one who has a sample of peaches in hand. On plums the bloom is of entirely a different sort. It is usually best to describe it as *thin* or *heavy*, though occasionally it is characteristically *waxy*. It is the time-honored custom to describe the bloom of plums as to color, calling it white, or purplish, or blue. Such terms, however, are quite misapplied in this connection, for the bloom really has no color at all, or is merely waxy-gray. Any one can readily satisfy himself on this point by scraping off a quantity of this bloom with a knife blade and examining it by itself. It will then be seen at once that the blue or purplish color attributed to the bloom really belongs to the fruit alone, and that it is the color of the fruit showing through the waxy covering which gives it its chromatic look.

The skin may be *thick* or *thin*, *tender*,

FRUIT: Received from

Form size

cavity stem

suture apex

colour

dots bloom

skin flesh

stone

Flavour quality

General Notes

Described by Date

PLUM Group.

CENTRAL EXPERIMENTAL FARM,
OTTAWA, CANADA,
HORTICULTURAL DEPARTMENT

FIG. 19—DESCRIPTION BLANK FOR PLUMS. (MACOUN)

tough or *brittle*, and in the case of plums it may be peculiarly *astringent*.

The flesh may be of divers colors. In peaches it is *yellow*, *white*, or *red*, and these differences are of great weight in the classification of varieties. The color of the flesh in cherries, though it shows less conspicuous differences than it does in peaches or plums, is not of less importance, and should be specially noted. The texture of the flesh may be next described. It will be *coarse*, *fine-grained*, *stringy*, *dry*, or *juicy*.

The stone, or pit, has many distinguishing characters which have to be set down in the description. Its size and form are first to be mentioned, after which the nature of the surface should be described. This may be *smooth*, *rough*, or *pitted*. It is usual in this connection also to speak of the important matter of the adhesion of the flesh to the stone. This is relied on particularly in peaches and plums, which may be either *free*, *half-free*, or *cling*.

The flavor of a peach, plum, or cherry may be *sweet*, *subacid*, *sour*, *bitterish*, or *flat*. Sometimes there is a striking aroma to a fruit which can not well be described, but which

WRAGG

FRUIT: Form nearly round, a trifle pointed size medium

cavity medium stem medium long

skin rather tough apex round peinted

color very dark clear dull red

flesh dark red, firm juice dark colored

stone medium to small flavor sour, rich

quality good to very good season late

TREE: Rather dwarfish, prolific

GENERAL NOTES: Hardly distinguishable from Morello

Specimens received from Vt. Exp. Sta. Described by Waugh Date 15-7-90

CHERRY

Vermont Experiment Station, Horticultural Department.

FIG. 20—CHERRY DESCRIPTION COMPLETE. (TYPEWRITTEN TRANSCRIPT)

may be better mentioned in connection with flavor than elsewhere. It will be well to repeat here what has already been said in Chapter IV.: that flavor should not be a matter of personal judgment. Everybody ought to agree as to whether a certain fruit is sweet or sour. Such adjectives as "poor" or "good" ought never to be applied to flavor. They belong to quality, and represent the personal judgment of the one who writes the description.

The quality may be *poor*, *medium*, *good*, *very good*, or *extra*. It will be seen from the nature of these adjectives that they stand for personal opinions of quality, and not for any absolute standards. Persons often differ in their judgments of quality. Some persons honestly prefer a Late Crawford peach to a Waddel, but other persons, like the writer, think the Waddel is much the better peach. This should always be borne in mind: Under the head of quality the describer is always rendering his own personal judgment purely and simply, while under the head of flavor personal opinion must be entirely excluded.

The season at which a fruit ripens is of great practical importance, and should be put

UNITED STATES DEPARTMENT OF AGRICULTURE.

DIVISION OF POMOLOGY.

POMOLOGICAL NOTES.

SECTION B. Drupes.

PEACH, PLUM, CHERRY, ETC.

Date of receipt. Aug. 25. 1902

Date of description. " 26. 1902

No. of receipt. 25000 Journal page. 960 Volume. 17

Name and address of sender. Charles Wright. Seaford, Delaware

Kind. Peach Name, Elberta Purpose. model

Condition at time of receipt, Eating ripe, good

Season. Midseason Classification. Chinese Cling Group

Form General. oblong, flattened vert sect. oval cross sect elliptical

Size. large dimensions. 2½ in. Vertical 2¼ in. Cross.

Cavity Form. regular size. large depth. deep slope. Gradual markings. pubescent

Stem: Length. ¾ inch form. round, truncate

Suture Depth. medium, deeper at apex length. cavity to apex

Apex. Flat, broad, depressed at point

Surface. Velvety pubescent

Color. Bright dark lemon yellow, red in Sun

Dots. red Bloom. none, Down. medium thin

Skin. Thick Velvety, tenacious.

Fungous or insect damage. none

Flesh Color. Yellow, red at stone texture. meaty, juicy, tender

Stone Form. oval, broad, flat, size. large.

Dimensions Length. 1¾ breadth. 1 thickness. 7/8

Kernel Form oval, comp. size. medium flavor. bitter

Flavor. Sub acid, mild,

Quality. Fair to good

How illustrated. Painting, model and description

Notes. Quality of Elberta on Delaware and Maryland Peninsula unusually good in 1902.

G. Harold Powell

TREE.

Herb arrange.

Form. Broad, spreading.

Growth { Vigor. Very Vigorous; Character. open.

Shoots. stocky

Flowers. medium size, dark pink;

Date of bloom. 4/12 to 4/16

Leaf { Form. Gone Size. color. received Margin. petiole. Glands.

Productiveness. 10

Hardiness. 7 to 8

FIG. 21—PEACH DESCRIPTION COMPLETE

down in every instance. It is usual in the descriptions given in books and in nurserymen's catalogs to cover this point with relative terms, such as *early*, *midseason*, or *late*. This is necessary in such cases; but when a given sample of fruit is under description, it is better to specify the exact date at which it is found to be ripe. The same description will also show the locality from which the specimens come, and all the data will be given, therefore, for determining whether a variety is really early or late. It is often desirable to know what the season of a variety is more exactly than can be expressed in these loose relative terms. It is often desirable to know the exact succession of varieties within a day or two, and this information can be gained only from the most complete records.

There is always a question, of course, as to when a fruit is really ripe, and plums and peaches are often commercially mature long before they are ready to be taken direct to the table for the dessert course at dinner. It ought to be assumed, however, that season in the description refers to the time when the fruit is dead ripe and ready to eat, and not to the time when it can be shipped to market.

If the variety is one capable of being picked long before it is ripe, and held in storage or shipped long distances, such valuable and interesting facts should be included under the head of general notes.

These matters will all appear more clear on reference to the accompanying examples of descriptions and description blanks (Figs. 18, 19, 20, and 21).

VI

DESCRIBING STRAWBERRIES

Not much really good systematic work has been done with strawberries in this country. One might have expected something first-rate in this line, considering the commercial and domestic importance of the strawberry in America, and the very general distribution of the plant from Florida to northern Canada. Many descriptions of varieties have been made and may be consulted in books, bulletins, and catalogs, yet all of them leave much to be desired. No definite and comprehensive form of description seems ever to have come into use, and most of the descriptions which one finds are fragmentary as to qualities named and vague in characterization. From every point of view the strawberry deserves better study at the hands of American pomologists, and it is greatly to be hoped that the present revival of interest in systematic pomology will soon turn attention to this need.

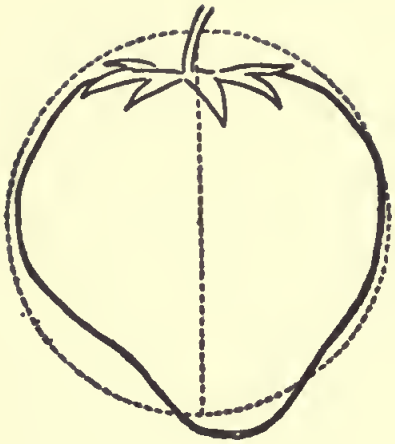
The fruit itself may properly be described first, beginning with the *form*. The form may be *regular* or *irregular*. At the same time it may be *conical*, *oval*, *spherical*, *pyriform*, or may have some more unusual shape for which some special descriptive term may be found (see Fig. 22).

The size of the berry should next be given, either relatively, as *large*, *medium*, or *small*, or absolutely, in inches or millimeters.

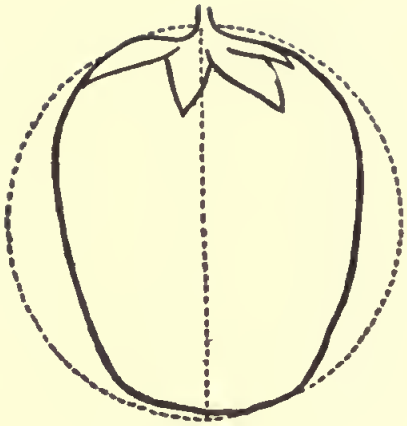
The calyx may be *large* or *small*, and it may separate easily or with difficulty from the fruit. Its segments may be long or short, broad or narrow, or may possibly have other distinctive characters which should be mentioned whenever, in the judgment of the describer, their importance warrants it.

The core of the berry may be *hollow*, or it may be *hard* or *soft*, or it may be characterized simply by being of a color somewhat different from the surrounding flesh.

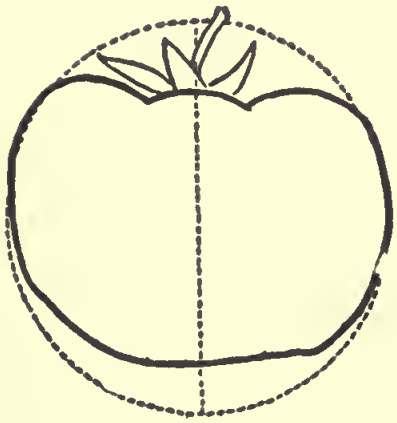
The texture of a strawberry is a matter of considerable consequence, affecting, as it does, the dessert quality of the fruit, and also the shipping quality. It is hard, however, to describe texture in precise terms. The flesh may be *hard* or *soft*, it may be *fine-grained*



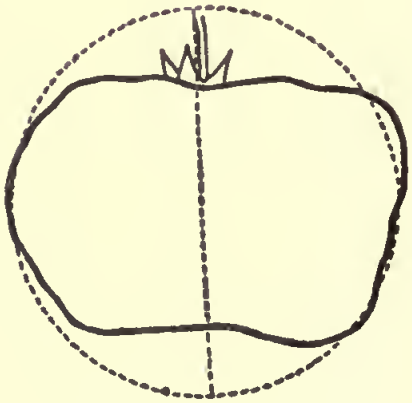
Conic. (*Gandy*)



Oblong. (*Haverland*)



Oblate. (*Manwell*)



Angular flattened. (*Bubach*)

FIG. 22—FORMS OF STRAWBERRIES

or *coarse;* but these adjectives do not quite cover the whole idea of texture. In certain cases there may be peculiarities of texture for which the describer can find some adequate term, but often he must feel that he has left his observation only half recorded.

The external color of a strawberry is peculiarly hard to describe. Color descriptions are always unsatisfactory, and in this case they are doubly so from the fact that different varieties differ only by very slight shades. It is hard to say whether a berry is *red*, *scarlet*, or *crimson*, but usually we may safely say that it is *light*, *dark*, or *medium* colored.

The flesh color is frequently, or nearly always, different from the external color, but is described in the same way, subject to the same limitations.

The seeds, which are dotted all over the surface of a strawberry, sometimes offer very characteristic marks of varieties. They may be *large* or *small*, *prominent* or *inconspicuous*, *protruding* or *depressed*, and they may vary in color.

Flavor and *quality* are to be described in the same manner as in the case of other fruits. For a full discussion of this matter,

FRUIT: Form

size	calyx
core	texture
external color	
color of flesh	seeds
flavor	quality
season	shipping quality

BLOSSOM: general character — sex

PLANT: vigor	runners
foliage	rust

GENERAL NOTES:

Specimens received from — Described by — Date

Massachusetts Agricultural College — Hatch Experiment Station — Department of Horticulture

FIG. 23—DESCRIPTION BLANK FOR STRAWBERRIES

see the chapter on describing pome fruits, page 34.

The season may be specified exactly by giving the actual date at which the variety is ready for the table, or it may be given in relative terms, as *early*, *medium*, or *late*. In general the former method is to be preferred. In determining the date of ripening, one should have regard to the time when the variety is actually ready for use, not to the time when it may be picked for shipment. In order to indicate whether a variety covers a long or a short season, it is desirable to give not only the date when the first picking can be made, but also the date of the last picking.

Shipping quality constitutes one of the most important commercial qualities of any strawberry, yet it is hard to determine it without actual experience in shipping the fruit to market. The texture of the berry furnishes some clue, but is by no means an infallible guide. Whenever the shipping quality of a variety is actually known, however, it ought to be entered with especial solicitude in the description.

The blossoms of different varieties differ

with respect to size and general appearance, in the size of the petals, etc. The chief point of difference, however, relates to the number of stamens present and the amount of pollen borne. This quality is usually, though somewhat incorrectly, spoken of as *sex*. Flow-

FIG. 24—PERFECT AND IMPERFECT BLOSSOMS

ers which have only pistils and no stamens are said to be *female*, and those which have both pistils and stamens are said to be *bisexual* or *hermaphrodite*. It is doubtless better to call the former *imperfect* and the latter *perfect* (Fig. 24). These terms, also, are in common use. Flowers bearing pistils only are also often called *pistillate*.

The plant should be described, as suggested in the accompanying description blank, as to

vigor, the number and strength of *runners* which they make, the size, form, and color of the *foliage*, and the amount of *rust* which they show. Other matters can best be mentioned with the *general notes*.

VII

DESCRIBING RASPBERRIES AND BLACKBERRIES

After what has been said concerning the methods of describing other fruits, it is hardly necessary to particularize regarding the description of raspberries and blackberries. A few words may be given the subject, however, in recognition of the diversity and importance of these fruits.

The design for a description form (Fig. 25) gives an outline of the principal points required. The outline presented in Fig. 26 is engraved from the much more elaborate description form in use in the Division of Pomology, United States Department of Agriculture. Fig. 27 is a photographic reproduction of a description of the Cuthbert raspberry by the West Virginia Experiment Station.

The only new point brought into these descriptions of blackberries and raspberries is the mention of the individual drupes. This calls attention to the morphology of the fruits in question. Each blackberry, dewberry, or

BLACKBERRY

FRUIT: Form

size *color*

texture *calyx*

individual drupes

seeds *flavor*

quality *season*

BLOSSOM:

PLANT: vigor *suckers*

foliage *disease*

GENERAL NOTES:

Specimens received from *Described by* *Date*

Massachusetts Agricultural College *Department of Horticulture*
Hatch Experiment Station

FIG. 25—DESIGN FOR DESCRIPTION BLANK FOR BLACKBERRIES

United States Department of Agriculture.

DIVISION OF POMOLOGY.

Pomological Notes.

SECTION C. BRAMBLES

Blackberries, Raspberries, etc.

Date of Receipt,

" " Description,

No. of receipt, Journal page, Volume,

Name and address of sender,

Species, Name, Purpose,

Condition at time of receipt,

Season, classification,

Form; general, vert. sect. cross sect.

Size, dimensions,

Arrangement of blossoms and fruit,

Stem; length, character,

Receptacle; adhesion, character,

Calyx; size, number of sepals,

adherence, color,

Surface, regularity, gloss, etc.

Color, permanence,

Drupes; arrangement, character,

Comp. number, size, color,

Seeds: comparative size, hardness,

Fungous or insect damage,

Flesh; color, texture,

solidity, firmness,

juiciness, shipping quality,

Flavor,

Aroma,

Quality,

How illustrated,

Notes,

Sketch.

Plant.

Herb. arrange.,

How grown,

Vigor

Habit,

Canes

Flowers,

Date of bloom,

Leaf; { form, leaflets,
size, color,
margin, petiole,

Productiveness,

Hardiness,

Susceptibility to disease,

FIG. 26—DESCRIPTION BLANK FOR BLACKBERRIES, RASPBERRIES, ETC.

VARIETY Cuthbert

FRUIT: Form round to conic size medium to large

styles clinging cavity deep & smooth

color red of medium shade varying to bright red.

seeds small bloom medium to large

flesh firm if not too ripe juice mild, not very abundant

flavor rich, aromatic, not acid quality Much above the average

use Market. - Fruit attractive & stands shipment well.

origin N. Y. State Season medium. Altitude about 1050 ft.

PLANT: Slender with open habit

GENERAL NOTES: Very suitable for planting in Wisconsin and other northern states

Where grown Menomonie, Wis Soil and formation Glacial Sand drift

Specimen sent by N. J. MacArthur Described by K. C. Davis Date 7/1/02

RASPBERRY. Rubus Strigosus ~~Species~~ West Virginia Experiment Station, Horticultural Department.

FIG. 27—DESCRIPTION OF RASPBERRY COMPLETE

raspberry is, in fact, a bundle of individual fruits held close together. Each one of these individual fruits is a little drupe, having its own single seed surrounded by a soft pericarp, or flesh. It is, in effect, a very small plum. In some varieties these individual drupes are comparatively very large, and stand out from one another almost separately. In other varieties they are small and closely pressed together.

VIII

DESCRIPTION OF CURRANTS AND GOOSEBERRIES

CURRANTS and gooseberries have not often been the subjects of careful and formal descriptions in this country. Even in Card's "Bush Fruits" no special form of description seems to have been followed. It would be easy, however, to arrange a description blank after the general pattern of those in use for other fruits, and shown in the engravings in preceding chapters. An outline for a blank for the description of currants (Fig. 28) is suggested herewith.

The cluster is first described, its form and size being given. In form the clusters may be *long* or *short*, *much branched* or *sparsely branched*. In size they may be *large*, *medium*, or *small*, or in many cases it will be best to compare the size of clusters according to the number of individual fruits. Some varieties have very few berries in a cluster, others have many. The *main stem* of the cluster should be described with respect to its length, and

CURRANT

CLUSTER: Form *size*

main stem *peduncles*

BERRIES: size *color*

flesh *seeds*

flavor *quality*

use *season*

PLANT: height *form*

vigor *disease*

FOLIAGE:

GENERAL NOTES:

Specimens received from *Described by* *Date*

Massachusetts Agricultural College *Department of Horticulture*
Hatch Experiment Station

FIG 28—DESIGN FOR DESCRIPTION BLANK FOR CURRANTS

any incidental characteristics should be mentioned, such as a very thick stem, or one of some unusual color, or one showing a tendency to be leafy. The *peduncles*, or little stems on which the individual fruits grow, vary in size and length, and these differences are to be recorded.

The berries are next taken up. The size is first disposed of, either by the use of some relative term like *large* or *small*, or by recording the actual diameter, preferably in millimeters. Next the *color* is given, remembering that this is one of the most important characters, either from the standpoint of classification or of the practical marketing of the fruit. The *flesh* is described as to its *color*, *texture*, and relative *juiciness*. The *seeds* are sometimes *prominent* and occasionally *few*, but always to be mentioned as to size and number. The *flavor* of currants is hardly to be distinguished in any other terms except as to degrees of sourness, yet varieties differ materially in this respect. In *quality* varieties also differ materially, though no two men might agree as to which one was best. These matters of flavor and quality are liable to serious confusion, and the reader should keep in mind

the distinctions drawn in another chapter, pages 53 and 55.

The use to which currants may be put may vary somewhat, though not often materially, according to the qualities of the variety. Some varieties are better for jelly than others, some varieties are best for spicing or preserving, some are good for dessert, and some, no doubt, are especially suitable for the manufacture of currant wine. Such adaptabilities, when they are known, make very proper entries on a description sheet.

The season at which the fruit ripens should be given either relatively or absolutely. In some cases it seems best to classify varieties merely as *early*, *midseason*, and *late;* but, as a general rule, it is better to mention the actual date on which the fruit is ripe and ready for the table. To be sure, the practical currant grower will bear in mind that currants are often picked and marketed before they are ripe, this being necessarily the procedure with those destined for jelly. It may be desirable, therefore, in certain cases to mention the time at which a variety can be picked for jelly.

The plant is described as to its *height*,

form, *vigor of growth*, and *susceptibility to disease*. The height can be determined quite closely, though the same variety grows taller or shorter in different soils and under different treatment. In form some plants are much more *bushy*, *spreading*, or *inclined to sprout*, than others. Vigor of growth can best be estimated by observing the new wood which the plant makes annually. Nearly all our currant bushes are peculiarly susceptible to disease, though a few varieties are comparatively immune.

The foliage should be described as regards the *form*, *size*, *thickness*, *color*, and *covering* of the individual leaves. The terms commonly used in botanical and horticultural description are applicable here. There are no special descriptive terms.

Gooseberries

The outline for the description of gooseberries would naturally be very much like that for currants. As no one seems to have adopted any definite form for regular use, the accompanying suggestion (Fig. 29) is offered.

The only noteworthy points of difference between this form and the one already out-

GOOSEBERRY

FRUIT: Form *size*

stem *calyx*

color

markings

seeds *bloom*

skin *flesh*

flavor *quality*

season *use*

PLANT: height *form*

vigor *disease*

FOLIAGE:

GENERAL NOTES:

Specimens received from *Described by* *Date*

Oklahoma Agricultural and Mechanical College *Department of Horticulture*

FIG. 29—DESIGN FOR DESCRIPTION BLANK FOR GOOSEBERRIES

lined for currants are the entry here of *calyx*, *markings*, and *bloom*, for description. The calyx is more prominent on gooseberries than on currants, and occasionally offers points of distinction of some value. The surface of the gooseberry, too, is usually marked with more or less distinct meridian lines; and these ought always to be carefully noted, and, where expedient, entered in the description. The bloom on the gooseberry is often important and characteristic. Furthermore, certain varieties, especially natives derived from *Ribes cynosbati*, are apt to be thorny on the surface. Since this takes the place of bloom in such instances, it will be convenient, though illogical, to enter the description of the surface generally under the head of bloom.

IX

DESCRIBING GRAPES

The grape, being considerably different from other fruits, requires a special descriptive form. Various styles of blanks used by different pomologists are reproduced herewith in Figs. 30, 32, and 33.

The bunch should be described first with respect to *length*. This entry may be made in comparative terms merely, as *long*, *medium long*, or *short*, or it may be given in absolute inches or centimeters. Perhaps it is as good a plan as any to use both methods side by side, giving the general relative size of the bunches, and then adding the exact measurement of some typical bunch. The *breadth* of the bunch may be treated in the same way.

The form of the bunch requires more careful study. This may be *round*, *elliptical*, *ovate*, *long*, *regular*, or *irregular*, or it may occasionally take some other form.

The shoulder of a bunch is that portion which branches out from the main axis of the bunch near the base (in this case, near the

Woodruff Red — GRAPE

BUNCH: length 3½ inches — breadth 2 – 2½ inches

form short tapering — shoulder med heavy

BERRY. size med. large — form round

color red — skin tough and thick

flesh firm — seeds 3. med. size

flavor med. sweet — quality good

season Sept 25. — use

VINE. Healthy, vigorous; Foliage good.

Specimens received from M. A. C. — Described by Barrus — Date 9-30-'02

Massachusetts Agricultural College — Hatch Experiment Station — Department of Horticulture

FIG. 30—GRAPE DESCRIPTION COMPLETE

upper part of the bunch, as it hangs on the vine). The stem on which the individual berries grow is not always branched in this way, in which case the branch is not shouldered. In rare instances there are two branches or shoulders, and then the shoulder is said to be double. In the ordinary case of the single shoulder it is usually competent to describe it as *small*, *medium*, or *large*.

The berry, or individual fruit, of the grape is next described, first as to *size* and next as to *form*. The form is nearly always *round*, but is occasionally either *oblate* or *elongated*.

The color of grapes is largely depended on for classification, and the different varieties are usually summarily distinguished as *black*, *red*, and *white*. A little closer examination, however, will show that varieties differ among themselves by much finer gradations of color. The reds are not all alike, and not even the blacks are of the same shade. Colors are notoriously difficult of description, but whenever these distinctions can be put into words it is well worth while to do so.

The skin of the berry may be *thin* or *thick*, *tough* or *brittle*, and in certain cases it has a more or less sour or bitter taste, which

affects somewhat the quality of the grape as a whole.

The flesh should be described with respect to *color* and *texture*. In texture it may be *soft* and *melting*, *stringy*, *tough*, or *granular*. If

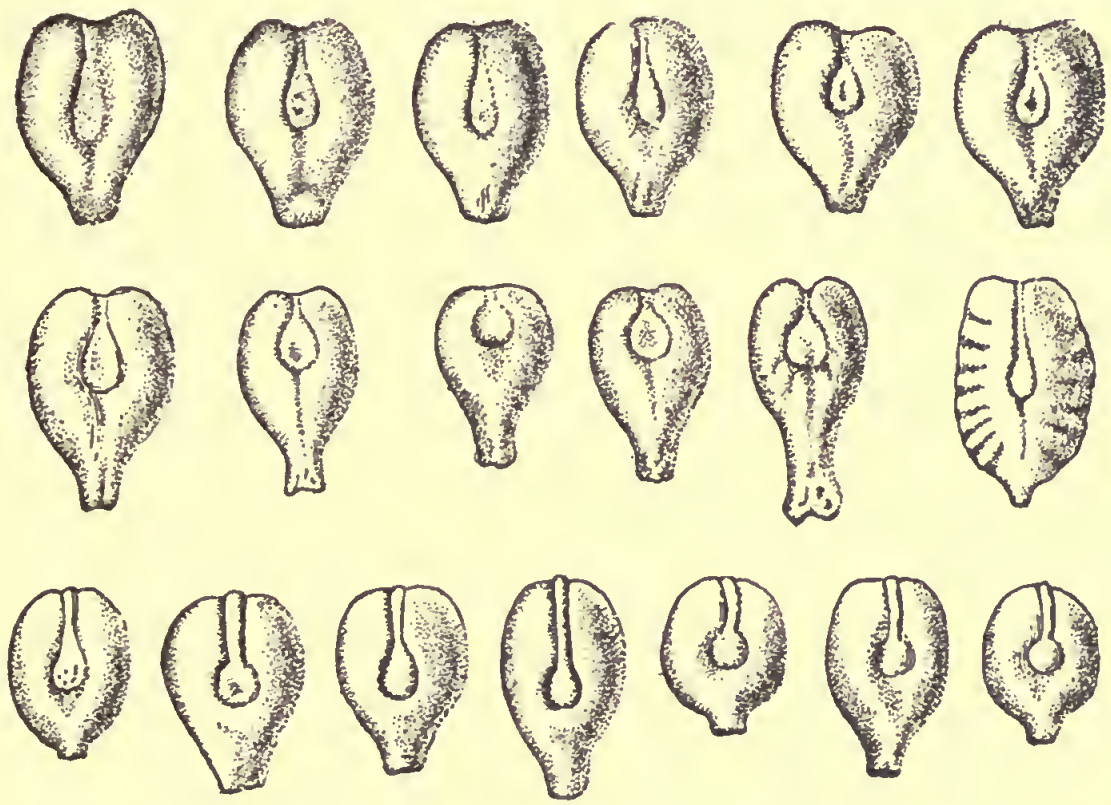


FIG. 31—DIFFERENT FORMS OF GRAPE SEEDS

the berries are very juicy, or strikingly deficient in this quality, it will be best to mention the fact here.

The seeds of grapes offer very important characters for the purpose of classification. These differences will be seen in the accompanying illustration (Fig. 31), but it requires some

familiarity with grapes in order to point these out tersely and accurately in a description. It will be seen at once that the seeds vary as to *size*, but these differences are often due to local circumstances, and are influenced particularly by the number of seeds in the berry and by pollination. Differences of *form* are much more constant and characteristic. Some varities have the seeds very *broad*, others comparatively *long*. Many of them are *cordate*, or heart-shaped, while others are more nearly *ovate*, or egg-shaped, and still others are almost *obovate*, or reverse egg-shaped. Some seeds are *notched* at the top, while others are smoothly *rounded*. Some have a long *beak* at the bottom, in others the beak is *short* and *blunt*. On the back of every grape seed is a little mark or boss, known as the *chalaza*, which may also vary considerably in different varieties. In all, or nearly all, our native American grapes it is found near the center of the back of the seed, or even somewhat below the center. In most European varieties, on the other hand, it lies above the middle, somewhere near the top. It also varies in size and shape. This chalaza is connected with the ventral side of the seed by a *raphe*, funiculus, or cord, which runs up-

ward over the top of the seed. This raphe, or cord, is much larger and more prominent in some varieties than in others.

The flavor of a grape, as of any other fruit, should not be a matter of individual opinion, but should be recorded as a plain fact. Flavor depends on the degree of acidity of the fruit. Some grapes may be called *sweet*, perhaps, and all varieties undoubtedly contain considerable quantities of saccharine matter. Nevertheless, the acids nearly always predominate over the sugars to such an extent as to furnish the real basis of the flavor. Most grapes, therefore, are *mild acid*, *sour*, or *very sour*.

The quality may be *poor*, *fair*, *good*, or *very good*. As in the case of other fruits, these terms represent a personal judgment on the part of the one who writes the description. (This point is fully discussed in Chapter IV., page 55.)

The season may best be described by giving the date at which the fruit is really ripe and fit for table use at the point where it is grown. Some varieties keep much better than others, holding in storage for months even, and such sorts might be said to have a long season. Any such observations regarding keeping

Descriptive Blank for Grapes

Horticultural Department

IOWA STATE COLLEGE

Name of Variety _____ *Species* _____

Color _____ *Form of Cluster* _____

Form of Berry _____ *Stems* _____

Bloom _____ *Flesh Color* _____

Skin _____ *Texture* _____

Flavor _____ *Seeds Number* _____

Quality _____ *Season* _____

Remarks _____

_____ *Sketch*

_____

_____

_____

_____

_____

_____

Described by _____

FIG. 32—DESCRIPTION BLANK FOR GRAPES. (IOWA STATE COLLEGE)
(Original, 6 x 8¼ inches)

quality, however, can better be recorded in the general remarks at the foot of the description. This matter also is more fully discussed in another connection (see Chapter V., page 66).

The use to which grapes can be put varies considerably, and some mention of this matter may properly be made in the description. The greater part of the grapes grown in the Eastern States are used for eating fresh out of hand. Under the head of use, then, one might enter the word *table*. If the variety is especially attractive in appearance and high in quality, it may be recommended for *dessert*. Many important varieties are grown only for *wine;* but it may be recalled in this connection that much of the best wine made in America comes from such varieties as Goethe, Catawba, and Delaware — varieties which stand high as table or dessert grapes.

The vine should be described as to *vigor* and as to its *susceptibility to disease* or insects. Mildew is the disease usually thought of when rating vines as to their relative disease-resistance; and this matter of susceptibility to or immunity from the attacks of the downy mildew forms one of the most important

8—87

GRAPE.

.....*Variety*..... *Species. Date* .....

P. O...... *Tp.*....., *Co.*....., *State*.....

1. Grower.

2. Vine. 3. Age.

4. Young wood.

5. Leaf.

6. Blossom.

7. Bunch.

8. Berry.

9. Skin. 10. Flesh.

11. Seeds. 12. Stem.

13. Flavor.

14. Quality. 15. Use.

16. Product. 17. Hardy.

18. Apex.

19. Base.

20. Ripens.

21. Keeping qualities.

22. Foliage.

23. Stock.

24. Congeniality.

25. Diseases.

26. Insects. 27. Pruning.

28. Soil. 29. Trellis.

NOTES.

FIG. 33—FIELD NOTES BLANK FOR GRAPES. (U. S. D. A.)
(Original, 4 x 6½ inches)

characteristics of any variety, considered from the point of view of the grape grower. In some sections, more especially in California and in Europe, the insect known as the phylloxera is a perennial menace to the grape-growing industry, and in such localities one of the most critical qualities which a vine can have is immunity from the ravages of this insect. Different species, and even different varieties of the same species, differ greatly in this respect, and these degrees of immunity or susceptibility are particularly worthy of note.

The foliage should be described as to *vigor* and *abundance*. The *individual leaves* should be described with respect to *size*, *form*, *thickness*, and *surface*. The surface is often *downy* or *tomentose* in various degrees, especially on the lower sides of the leaves. Unfortunately the description blank for grapes shown in the engraving does not give a special caption to the foliage nor to the leaf. It also omits any printed suggestion of general notes. In these respects it is seriously inadequate.

X

THE REQUIREMENTS OF NOMENCLATURE

THE term *nomenclature* is used with two different meanings. Used in one sense it may be defined as the science of names; that is, it comprises those rules by which we determine the correct names of things. It is with this meaning that the word is used in this book.

However, the word "nomenclature" may mean also simply a system of names. Thus, golf has a certain nomenclature made up of such terms as "niblick," "lofter," "driver," "caddie," "foursome," "stimmie," etc. These terms have special or technical meanings in connection with golf, and, taken altogether, with the others of their kind, they make up the nomenclature of that popular game. Similarly there is a special nomenclature for theology, including such terms as "trinitarianism," "original sin," "apochryphal," "predestination," "transsubstantiation," etc. And for every science, sport, or calling there is likewise some specialized set of words which

constitute its nomenclature. One of the poets somewhere speaks of "the sweet nomenclature of love," which is not so unscientific either.

In objective science, however, the term "nomenclature" usually refers to a set of names given to a particular group of objects. Thus, Mr. Sudworth prepared a book which he called "Nomenclature of the Arborescent Flora of North America," in which he gave simply a list of those botanical and vulgar names which have been applied to the trees and shrubs of North America. When we say that the nomenclature of the Russian apples is badly mixed we mean only that their names are mixed.

In this chapter we shall not try to determine the correct names of any fruits, but shall study only the rules and principles by which we are to determine which are the correct names; that is, we shall be investigating nomenclature in the sense first defined above.

The first requisite to the study of any science or art is a satisfactory nomenclature, using the word in either of the senses already mentioned. This is a widely recognized principle. The students of such sciences as

physics, astronomy, and botany have spent a great deal of time and effort in selecting and defining most minutely the terms necessary to their descriptions and discussions. And whether it be cause or effect, the present undeniable crudity of horticultural nomenclature is evidence that pomology, vegetable culture, and floriculture still fall measurably short of being sciences. Science is said to be classified knowledge; but before we can classify our knowledge of horticultural varieties, we must have those varieties unequivocally named and accurately described. We are fond of saying that horticulture is coming to be a science; but it certainly falls far short, in this respect, of what it ought to be.

A reasonable nomenclature assigns to each entity, be it object, process, species, or variety, a separate and distinctive name. In horticulture our attention is fixed chiefly on varieties, and varieties are hard to define; but each one, as we know and describe it, ought to have one name and one only. In other words, one variety must not pass under several names; nor must one name stand for two or more distinct varieties. It would be easy to mention examples of both mistakes. The well-known

apple, Ortley, for instance, has nearly two dozen synonymous names, such as White Bellflower, Ohio Favorite, Detroit, Greasy Pippin, Inman, Yellow Pippin, Jersey Greening, Warren Pippin, etc. Those older varieties of pears introduced from France are especially rich in synonyms. There is the common Easter Beurré, which has over a dozen, such as Doyenne d'Hiver, Beurré de Paques, Pater Noster, Beurré de la Pentecôte, Bergamotte de la Pentecôte, etc. Sometimes these synonymous names become so widely distributed and so well known as to supplant the proper names. We may cite among apples Jewett Red, which is generally known throughout New England as Nodhead. One of the most striking cases is that of the Abundance plum, which was first called Botan. The latter name, though entirely correct, has been superseded by the former. The variety is, however, still known as Botan in many sections. But other varieties also pass under the name of Botan, and this illustrates the second class of difficulties which arise in nomenclature. There are also two distinct varieties passing under the name Satsuma—perhaps more. The name Greasy

Pippin is applied to the Ortley apple, and to Grimes' Golden, and sometimes to other varieties.

There are two ways, theoretically at least, of settling such difficulties. The first is by authority, the second is by some code of rules. Not so very many years ago the former method was relied on, even in this country. Andrew Jackson Downing and Charles Downing, during their lifetime, stood so high among pomologists, and had the actual work of systematic pomology so much in their own hands, that their judgment was often accepted as final. So was the judgment of Dr. Warder among his associates. In the same way, but in a lesser degree, has the judgment of Professor Budd, Professor Bailey, and other pomologists, been accepted by those who believed them competent to settle such questions. But the circle of men who could be thus satisfied with the arbitrary decision of any one pomologist has grown relatively smaller year by year. Our country is now so large that one man can not understand nor control it all in any matter of a scientific sort. In one state one authority might be followed, but in another some other pomological dictator would be preferred; and

when these two wise men should disagree on certain names, what could the laymen do? Evidently we can not longer depend on such authority for the settlement of questions of nomenclature.

Formerly the American Pomological Society exercised a considerable influence in these affairs. Not infrequently its findings were accepted as putting an end to all further discussion. But the country has outgrown this method. For the same or similar reasons it is no longer possible for the Division of Pomology in our United States Department of Agriculture, or for any other institution or society, to exercise any final and arbitrary authority.

Our whole reliance must now be placed in some scientific system of nomenclature. We must have some simple, yet adequate, rules by which we can easily determine what the correct name of a variety is. In this respect horticulturists have much to learn from botanists and zoölogists. They name the species of plants and animals, which they study according to rules upon which they are fairly well agreed, and though there are some inconsistencies, occasionally ridiculous ones,

yet on the whole the sciences of botany and zoölogy are immeasurably in advance of horticulture in this respect. We have, indeed, a code of rules for naming fruits; and though these rules are not above criticism, they are much in advance of the general practice in nomenclature. It is safe to say that no one fruit grower in a hundred has ever seen these rules. It is also plain that the rules are openly and flagrantly disregarded by many nurserymen and writers on horticultural topics. Of course some persons will never regard the rules, no matter how perfect they are, and no matter how strongly recommended by the leading pomologists and pomological societies. But the simpler and more fundamentally correct the rules are and the more widely they are understood, the more difficult will it become for any violations of them to gain a standing.

XI

THE LAZY CLUB CODE

VARIOUS attempts have been made in this country and in Europe to formulate a satisfactory set of working rules for pomological nomenclature. It would be interesting to trace the history of these efforts, but it is not essential. Instead of doing that, we shall examine, first, the so-called "Lazy Club Code for Pomological Nomenclature," and shall then take up briefly the rules of the American Pomological Society.

In introducing this Lazy Club code it is necessary to say that it has no official endorsement and no special public recognition. Nevertheless, it has been very widely discussed by American pomologists, who have in general expressed themselves favorably toward it. It doubtless gives the best pomological expression to the fundamental principles on which a scientific nomenclature is founded of any set of rules current in America, and it probably comes nearer covering the actual practice of

the best working pomologists than any other system of rules yet prepared.

The history of the Lazy Club code deserves some mention. The Lazy Club is, in reality, the horticultural seminar at Cornell University. In the autumn of 1898 the subject of nomenclature came up for discussion, and was accorded unusual attention. The rules then current were freely criticized, and a committee was appointed to draw up as nearly as possible an ideal code. This committee consisted of Professor F. A. Waugh, then connected with the University of Vermont, but temporarily an active member of the Lazy Club; Professor John Craig, later Professor of Horticulture and Forestry in Iowa State College, now of Cornell University; and the late Mr. J. H. Cowen, afterward Professor-elect of Horticulture in Colorado Agricultural College. Other members of the club who participated liberally in the discussions, and who had much to do with the formation of the final code, were: Professor L. H. Bailey, of Cornell University; Professor S. W. Fletcher, now of Cornell University; Professor K. C. Davis, now principal of the Dunn County (Wisconsin) School of Agriculture. Several

of the leading pomologists of the United States were consulted during the progress of the work, and their advice was of material assistance. Among these persons the following should be especially mentioned: Messrs. W. A. Taylor, of the Division of Pomology, United States Department of Agriculture, and S. A. Beach, Horticulturist of the New York State Experiment Station, Geneva.

It will be seen from this recital that considerable horticultural talent was brought into play in the making of this Lazy Club code, and that the rules have a certain degree of authority, in spite of the fact that they have had no public or official adoption. The rules follow herewith:

LAZY CLUB CODE FOR POMOLOGICAL NOMENCLATURE

FORM OF NAMES

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

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, Golden Queen, and Golden Prune, all given to different varieties of plums, are not distinctive.

The use of such general terms as seedling, hybrid, pippin, buerré, damson, etc., is not admissible.

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

Numbers are to be considered as temporary expedients to be used while the variety is under trial.

The name of no living horticulturist should be applied to a variety without his full consent; and the name of no deceased horticulturist should be used without the general agreement of living horticulturists.

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.

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

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.

The term "group" as here used shall be held to desig-

nate the large general groups specified by words in common language, such as raspberry, plum, apricot.

PUBLICATION

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

Such a publication may be made in any book, bulletin, report, trade catalog, 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.

The order of these rules is not exactly logical. The priority rule (3) expresses the fundamental law of nomenclature, and probably ought to stand first. However, this and some other slightly illogical turns of the rules may be fairly overlooked.

It should be observed that the rules proper are given in large type, while those portions in smaller type are provided merely for explanation, illustration, or general direction, without having the binding force of the rules themselves.

Rule 1 might be called the rule of convenience. The great reason for using a single

word in preference to three or four is that the single word is more convenient. The fundamental importance of this point has generally been insufficiently recognized. Yet a name is essentially nothing but a matter of convenience. There is no other reason particularly why men and women should not be numbered—as the motormen and conductors are—instead of being named Richard Croker, Susan B. Anthony, or Jan Panderewski. The easiest way to deal with men and objects is to give them names. Whenever numbers are more convenient they supplant the names; witness the call numbers in the telephone exchange list, the numbers given to workmen on large contractors' jobs, or the motormen and conductors already mentioned. The law of convenience is a fundamental law of language, and so properly a primary consideration in the settlement of any system of nomenclature.

Aside from the inconvenience of speaking and writing such long names as Louise Bonne de Jersey, their application to horticultural varieties is very apt to result finally in confusion. No nurseryman is going to write a hundred labels for his pear trees with this

whole name: "Louise Bonne de Jersey." He is perfectly certain to abbreviate it. One man will write it "L. B. Jersey," another "Louise Bonne," another simply "Louise," and possibly another will write it simply "Jersey." Then the man who sees these labels, especially if he is somewhat unfamiliar with the names of pears, will be uncertain whether he has one, two, three, or four different varieties. After such an abbreviation is itself abbreviated or remodeled several successive times, it is apt to lose its identity altogether. Even the Ben Davis apple is frequently called "Ben," though the Baldwin is always Baldwin. Some parents name their boys Jack or Dan to prevent other people from giving them nicknames.

A name should be distinctive for the reasons just recited. If it is not distinctive, it is not convenient. In the words of the code, "Gold, Golden, Golden Drop, Golden Beauty, Golden Queen, and Golden Prune, all given to different varieties of plums, are not distinctive." They are, therefore, an inconvenience to the nurseryman, the fruit grower, and the systematic pomologist.

"The use of such general terms as seed-

ling, hybrid, pippin, buerré, damson, etc., is not admissible," but their inadmissibility rests solely on the ground of their inconvenience. They add nothing to the distinctiveness of a name, though they add materially to its length.

The use of nouns in the possessive form is also bothersome. The possessive sign means nothing, or, if it does, the meaning is misleading. Mr. McIntosh does not own the variety named in his honor. He may not have a single tree of it on his farm, though other men own thousands. He may not even control the propagation and distribution of the trees. The name is only commemorative. It is given in his honor, because the variety originated on his farm. He is commemorated quite as well, or even better, with his name in the nominative case as with it in the possessive. Even were he not, we must not forget that names are not for historical records nor for descriptive uses, but solely for convenience.

The use of tautological descriptive adjectives as a part of variety names is also in disrepute, and is objectionable for the same reason —because they are inconvenient. McIntosh's

Red becomes McIntosh, dropping the adjective out of the name for simplicity's sake, and because that is properly a part of the description. The same apple is also oblate, white-fleshed, and aromatic; but it would be folly to put all this into the name and call it McIntosh's Red Oblate White-fleshed Aromatic apple. In the case of Crawford Early, mentioned also in the rules, the adjective "early" has to be retained to distinguish this peach from another variety, Crawford Late. The only alternative would be to give an entirely new name to one of these two varieties.

Numbers ought always to be used for varieties under test in the hands of the originator or of his immediate friends. As soon as they are sent out to the public, though, they ought to be given names. The Bubach strawberry was grown commercially in large quantities for years before it shed the "No. 5" which the originator had given it to distinguish it from his other seedlings. The late Mr. E. S. Rogers, of Salem, Mass., has furnished another case in point. He originated many fine varieties of grapes, all of which were sent out under numbers, and all

the best of which, above a dozen, were subsequently named. The numbers were used so long and widely, however, that they are still customarily given in all catalogs: "Rogers' No. 1, Goëthe; Rogers' No. 3, Massasoit; Rogers' No. 4, Wilder; Rogers' No. 9, Lindley," etc.

"The name of no living horticulturist should be applied to a variety without his full consent." But this is more a matter of politeness (or decency) between man and man than it is a concern of scientific nomenclature. It is one of the penalties of being famous in the horticultural world that then a man is always liable to have some worthless pear or strawberry advertised by his name. In the case of the President of the United States, he has a large percentage of all the new babies in the country named after him—especially colored babies.

In like manner there is no reason, aside from a regard for common decency, against the use of the name of a deceased horticulturist.

We might infer from the fact that this code mentions horticulturists only that the rule of politeness did not apply in favor of poli-

ticians, authors, millionaires, or others who may become popular or famous in other walks of life. Perhaps it would not be worth while to attack this inference.

The last clause of explanation under Rule 1 raises a point which has been widely and seriously discussed for years by American pomologists. The citation of an actual case will serve to make the difficulty plain. A nurseryman goes into the remote rural districts of Arkansas, or to other places, and finds apples of considerable merit locally grown, but unknown to the world at large. These varities have local names, as, Arkansas, Beach, and Oliver; but he brings them home, propagates, advertises, and sells them as Mammoth Black Twig, Apple of Commerce, and Senator. Subsequently other nurserymen may get cions from the same sources, and may use for them the names locally and originally known. According to Rule 3 of the code in hand the names Mammoth Black Twig, Apple of Commerce, and Senator would have to stand (except for their undue length or other conflicts with the rules). This has been widely felt to be an injustice to the horticultural public, yet it is hard to see how

any rule can be devised which will positively prevent it.

Priority of publication, as defined in Rule 3, seems to be the real basis of scientific nomenclature, and to make any exceptions to this rule would be fatal. The fact that the names secondarily given are published and properly brought first to the attention of fruit growers and nurserymen makes them in reality the prior names in the knowledge of the majority of the pomologists. To go back later to the original local and unpublished names would involve hardship to the public, and the rights of the horticultural public must always stand above any local jealousies or sentiment attaching to an unpublished name.

The direction here given, that "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," ought to be emphasized to the utmost, but it never becomes more than a piece of good advice. If the "author" publishing a new variety sees fit to disregard it, and if he has at the same time the discretion to stay inside the rules on other points, the

name he gives will have to stand, even if it is not the one given locally or by the introducer or originator.

Rule 2 might be called the bibliographer's rule. It reads thus: "In the full and formal citation of a variety name, the name of the author who first published it shall also be given." This is merely for identifying names, for tracing out their histories, and for determining their dates of publication in case any conflict arises under Rule 3.

Nevertheless, this citation of the name of the man who names a variety sometimes comes to be a matter of practical necessity. There are at the present moment two different plums being propagated under the name Klondyke, one in Iowa by a man whom we will call Brown, and the other in Illinois by a man whom we may call Black. If Mr. White were writing to the *Country Gentleman* about his plum trees named Klondyke, it would be necessary for him to specify which Klondyke plum he meant. This he would do by naming the man who named the plum, thus: "Klondyke, of Brown," or "Klondyke, of Black."

The forms of citation suggested in the explanatory paragraph show how this rule can

be advantageously followed in bulletins, trade catalogs, etc. As a matter of fact, a considerable number of recent publications have followed substantially these forms.

Such citations as those here exemplified are practically necessary in working up the synonomy of any group of varieties, and in determining what are the correct names. Almost exactly the same method is used in botany, zoölogy, and all related sciences. An example from botanical practice will make the whole matter clearer. If, for instance, a botanist were looking up the nomenclature of our common red oak, he would have to examine the following names and citations, among many others:

Quercus rubra, Linn., Spec. Pl., ed. 1, 2 : 996. 1753.
Quercus ambigua, Michx., Hist. Arb. Am. 2: 120. 1812.
Quercus coccinea ambigua, Gray, Man. Bot. N. U. S., ed 5, 454. 1867.

When it has been established that these different names were really intended all for the same species, the question turns only on which one shall be used. This is determined by the priority rule, similar to Rule 3 of the pomological code. The oldest correct name stands. The name *Quercus rubra* was given

to the red oak by Linnæus, and was first published in his book entitled "Species Plantarum," edition 1, Volume II., page 996, in the year 1753. The name *Quercus ambigua*, given by Michaux, was not published until 1812, and the name *Quercus coccinea ambigua*, by Dr. Gray, in 1867. The name given by Linnæus thus has the preference, and is the one adopted.

Rule 3 is the rule of priority. This is the real foundation of nomenclature, and the most important rule in the code. The principle might doubtless be expressed better than it is in the phraseology of the rule as it stands in the code. The writer believes that the matter may be more clearly stated in these words:

> In case of two varieties claiming the same name, the name shall be retained by the variety for which it was first published; and in the case of two names applied to one variety, the name first published must always be used to designate it.

It will thus be seen that the priority rule has two converse applications: no variety can have two correct names, and no name can properly belong to two varities.

One name for one thing is the foundation

principle of scientific nomenclature everywhere.

Rule 4, the rule of publication, is in reality only an explanation of Rule 3, and ought to be included in the same section. Priority of publication has just been established as the standard of nomenclature, and it is now necessary only to define publication. "Publication consists in, first, the public distribution of printed name and description, the latter giving distinguishing characters of fruit, tree, etc." The first public notice of any variety would have to come in this form. However, if it should be subsequently discovered that the name first published was already in use for some other variety, it would thus become necessary to choose a new name; and when this new name were presented to the public the description of the variety might be omitted. Explicit reference would be given, however, to the description originally published.

The provision that any "book, bulletin, report, trade catalog, or periodical" in which such original publication is made must "bear the date of its publication," is made obviously for the purpose once more of determining priority of names. In case two names are

applied to one variety it will be impossible, without outside help, to determine which is the older, unless both are published in such a way that the date of their distribution is known. This provision, in pomological experience, applies most sharply to the catalog of the mediocre nurseryman. This man finds it too expensive for his business for him to issue a catalog every year, so he makes one catalog do for several years by the simple expedient of omitting the date. Yet this is, unfortunately, the very style of nurseryman who is always introducing new varieties with flamboyant, unsuitable, and ill-considered names.

The provision that the "book, bulletin, report, trade catalog, or periodical," in which a new variety is published, shall be "generally distributed among nurserymen, fruit growers, and horticulturists," has its obvious meaning and justification.

Rule 5, the rule against revision, is redundant, purely negative, and unscientific. There is no real necessity for it. The four rules previously given cover all the ground. Yet the fifth rule is perhaps needed for emphasis, and the emphasis can not be too great in view of current practice in this matter. A some-

what amusing case of the present time may be mentioned to enforce this statement. A certain famous Western plant breeder has originated many good plums, and the variety which seems to be the best production in all his life's work was named Free Silver, because the man was an ardent advocate of the free coinage of the white metal at a ratio of 16 to 1, and a loyal supporter of William Jennings Bryan. Now, after this variety had been advertised for about two years under this name, and had been distributed to some extent, the entire stock remaining in the hands of the originator was bought up by one of the best, most careful, and conservative nurserymen in the United States. But this man is a rank Republican and a gold-standard man from start to finish. Whatever his horticultural principles might be, his political principles would not permit him to advertise, praise, and circulate anything under the name of Free Silver. So he unhesitatingly renamed the plum, calling it Terry. Yet this man is a high pomological official, and, more than any one else in the country almost, interested in upholding the rules. Unquestionably his provocation was very great.

XII

AMERICAN POMOLOGICAL SOCIETY RULES

It has already been pointed out that the foregoing Lazy Club code of rules has no official standing. The only pomological rules which do have are those of the American Pomological Society, adopted many years ago. These rules are as follows:

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.

These rules were adopted in 1883. They

were apparently intended chiefly to guide the American Pomological Society in its official proceedings, in its fruit exhibits and in its published reports. Only here and there do the rules give one the feeling that the men who framed them expected them to have any force or application outside the society. In this respect they differ essentially from the Lazy Club rules, which were designed to express the fundamental laws of nomenclature as applied to pomology.

It is evidently easier to make rules for a society than for the whole world, and inestimably easier to enforce such rules. But, ideally, the rules of nomenclature should rest on universal laws, or, at least, the rules themselves should have universal recognition. Perhaps the best expression of this point was the one given long ago, written, I believe, by De Candolle, saying that science "can make no real progress without a regular system of nomenclature, acknowledged and used by a large majority" of the men engaged in a given line of work.

Another closely related principle was expressed by the same writer in these words: "The rules of nomenclature should neither

be arbitrary nor imposed by authority. They must be founded on considerations clear and forcible enough for every one to comprehend and be disposed to accept." *

If these principles should be accepted as the foundation for pomological nomenclature we should feel that the American Pomological Society or any other organization or institution could not do more than to formulate a code and recommend its adoption. No one would be bound to follow that recommendation nor to use the code, unless the majority of pomologists chose to use it. Then it would be the force of custom, acting in recognition of general principle, and not the force of any society's dictum, which would prevail.

The rules given above are of great interest, however, under any view, as showing the ideas of nomenclature current, or recently current, among American pomologists.

With respect to Rule 1, it may be said that

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* From the laws of botanical nomenclature adopted by the Congress of Botanists at Paris, August, 1867. For a full and instructive résumé of nomenclatural rules, including botanical, zoölogical, and ornithological codes, the student may consult Sudworth's "Nomenclature of the Arborescent Flora of the United States," Appendix, United States Department of Agriculture, Washington, 1897.

this matter has usually adjusted itself. If the originator does not introduce his own variety, he commonly disposes of his right to name it when he turns his new apple or strawberry over to another man to introduce. The privilege of naming a new variety—or at least the division of that privilege between the originator and the introducer—is commonly considered a property right, and is bought and sold like any other property, without reference to rules of nomenclature. What ought to be chiefly noted in the application of this rule is that both originator and introducer may lose the right to the bestowal of a name, if that right is not promptly and properly occupied. If a variety should be distributed without a name, such a one might be named by any pomologist who should have occasion to publish or advertise the variety; and a name so given would hold against any subsequent action of originator or introducer, if it conformed to the other rules of nomenclature. Or if the originator or introducer should give a name contrary to any of the other rules, such an incorrect name could be revised or changed either by the American Pomological Society, as provided in Rule 2,

or by any author making formal publication with reference to the variety in question.

Rule 2, though less definite and explicit than might be wished, is reasonable and necessary. Practically the same ground is covered, though more positively and arbitrarily, in the first rule of the Lazy Club code.

Rule 3, in the terms here given, is less a rule than a suggestion. Suggestions with regard to what is suitable and what unsuitable in naming fruits, however pertinent, are hardly to be called rules of nomenclature.

Rule 4 is introduced in a hesitating tone, as though a conflict of names on the ground of priority were a very unusual or delicate matter, yet this is the rule of most importance in the whole code. We know that an old variety which has not two or three names is an exception, but in deciding among a number of names for a given fruit, choice will rest oftener upon priority than upon any other ground; in fact, priority is almost an absolute test in such cases. Any other consideration must be of the most obvious sort to justify the substitution of one name for another; but the first correct name correctly given to a variety must stand.

The rule of priority as here set forth, however, covers only half the ground. It applies to any case in which one variety has two names. Yet it is not at all uncommon to find one name doing duty for two varieties. It is evident that in such cases the name belongs to that variety upon which it was first publicly bestowed, and the second variety must find another name. This is one of those good rules which work both ways.

The rules which we have just been discussing are a direct outgrowth of another set of rules proposed to the American Pomological Society by Mr. P. Barry in 1867. These rules are very interesting in themselves, and they throw some light on the development of the science of nomenclature in its application to American pomology. For these reasons it will be worth while to transcribe these rules here:*

Rules Proposed—1867

1. No new seedling fruit shall be entitled to the recommendation of this society until its qualities shall be ascertained by at least five years' experience in more than one locality, and which is not at least equal

* American Pomological Society Report, 11 : 153. 1868.

to any similar variety of the first rank already known, or which, if only of second-rate flavor, is superior in vigor, hardiness, productiveness, or other important quality or characteristics.

2. No new fruit shall be considered as named until it has been accurately described by some person or committee known to be conversant with existing varieties, and such description shall have been published in at least one horticultural or agricultural journal, or some pomological work of acknowledged standard character.

3. The originator, or he who first makes known a new variety, shall be entitled to name it, and such name, if suitable, shall be adopted by the writer describing the fruit for the first time.

But if the name proposed is inappropriate, or does not come within the rules of nomenclature, the describer shall be at liberty to give a name.

When two persons have named or described a fruit, the name and description first published, if according to the rules, shall have the priority.

4. In giving names to new varieties, all harsh, vulgar, or inelegant names, such as "Sheepsnose," "Hogpen," etc., should be avoided, and no name should consist of more than two words, excepting only when the originator's name is added. Characteristic names, or those in some way descriptive of the qualities, origin, or habit of fruit or tree, shall be preferred. They may either be of intrinsic properties (as Golden Sweeting, Downer's Late, etc.), or of local origin (as Newtown Pippin, Hudson Gage), of the season of ripening (as Early Scarlet, Frost Gage), of the form

and color (as Golden Drop, Blue Pearmain), or which commemorates a particular place or person (as Tippecanoe, La Grange, Baldwin), or any other titles which may be significantly applied.

5. The descriptions of new varieties of fruits shall embrace the following particulars:

(*a*) An account of their origin.

(*b*) The fruit, its size, form, and exterior color; texture and color of the flesh; flavor, and time of ripening, with the addition, in stone fruits, of the size of the stone; adherence or non-adherence of the flesh, form of the suture, and the hollow at the stem, and in kernel fruits, of the size of the core and seeds, the length, position, and insertion of the stalk, and form of the eye.

(*c*) The tree, its marked characters of growth, young and bearing wood, foliage and blossoms. In peaches, the form of leafglands, and size of blossoms. In strawberries, the character of the blossoms, whether staminate or pistillate. In grapes, the form of bunch or berry.

XIII

PRINCIPLES OF CLASSIFICATION

THE natural end of systematic pomology is classification. "Science is classified knowledge," in the terms of the old school-book definition. Until we classify our pears, plums, raspberries, and other fruits, our knowledge of them does not really become scientific. Description and nomenclature are often valuable in themselves, but they do not reach their legitimate application until they are made the means to a classification.

The present need of more and better classification in pomology deserves to be very forcibly presented.

Horticulturists will agree, on general principles, that our fruits deserve as careful study and as accurate classification as the different kinds of microbes floating in the air, or the various sorts of moss clinging to the rocks of Popocatapetl. Pomology is just as promising and as proper a field for science as bacteriology, mycology, or conchology. Then when one remembers that there are probably be-

tween 1,500 and 2,000 different named varieties of apples growing in North America, some 500 to 600 varieties of plums, 200 to 300 of pears, and of other fruits in like proportion, with more coming every year, then one must see that, unless some method of topical study can be secured, no man can ever get even a superficial knowledge of our pomological wealth. If those varieties which are alike can be grouped together, then one can understand several of them at once by familiarizing himself with their generic characters. And thus from every side, and much more urgently than can be here written down, do we need more and better classification of our varieties of fruit.

Methods of Classification

There are two radically different methods of classification used in all fields of natural science. These are commonly designated the *natural* and the *artificial* methods.

It would be more accurate and more suggestive to call the latter the *arbitrary* method rather than the *artificial* method.

The essential difference between these two methods is that the arbitrary method arranges

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objects (or varieties in this case) into groups according to some one character *arbitrarily* selected, while the natural method attempts to take into consideration all the characters of the varieties in question.

This matter may be made plain by an example. In nurserymen's catalogs apples are usually classified according to one character—namely, season of ripening; that is, they are given a purely arbitrary classification. There may be two varieties almost exactly alike as regards growth of tree, color, texture, and flavor of fruit, and all other qualities; yet if one happens to ripen in August and the other in December, the two will go to the opposite ends of the nurseryman's list.

We would have similarly an arbitrary classification if we selected any other one character for our basis of assortment. We might decide to classify according to form, which is one of the best of all arbitrary ways of classifying apples. We would put the round apples into one group, the oblate apples into another, the oblong varieties into a third, and the conic varieties into a fourth. Still we would be sure to find placed together certain apples which, though of the same form, were

very unlike in most other characteristics; and conversely we would discover that many varieties, though strikingly alike in the majority of their characters, had been separated into distinct groups by our arbitrary method of classification.

To illustrate the natural method of classification among apples we may refer to the fairly well-recognized Fameuse group. This includes Fameuse (Snow), McIntosh, Shiawassee, Sweet Fameuse, Louise, Green Fameuse, and others—all having certain points of resemblance. They are usually red (but not always); they have tender skin, soft, tender, very white flesh, with pinkish markings running through it, a peculiar flavor and aroma, and a medium early season of ripening. The Fameuse group, therefore, is founded on natural resemblances. In determining these resemblances the apples are considered in all their characters, not in some single one.

Persons who are not familiar with apples of the Fameuse group may understand this point better by calling up the Ben Davis group. This consists of Ben Davis, Gano, Black Ben Davis, Beach (Apple of Commerce),

and several others—all much like Ben Davis in all their principal qualities.

It will be seen at once that the arbitrary method of classification is the easier to use. It is easier to study varieties for agreements or disagreements in one character than in many characters. The arbitrary classification is also easier to make, as well as easier to use. Any natural classification is extremely difficult with any kind of fruits, but especially so with apples, pears, and strawberries. In fact, with these fruits it is practically impossible to make a natural classification covering more than a few specially well-defined groups.

The natural method of classification, however, is the better for all reasons, except that of convenience. It is more scientific—if that adjective permits of comparison—than the arbitrary method, because it shows more of the facts of relationship. Fruits which resemble each other in several particulars are certain to be more closely related, in the majority of cases, than those which resemble only in one particular. The natural method is, therefore, the one toward which the ambitious pomologist always strives, but the arti-

ficial method is the one with which he is frequently forced to be content.

In actual practice the two systems are apt to be somewhat mixed. The mixture occurs because the pomologist seeks to make a natural classification; but, finding his knowledge imperfect and inadequate at certain points, is obliged to proceed without bringing positively all the characters of all the fruits into his scheme. As soon as he classifies anything on the basis of this partial knowledge, he is using a few characters, or a single character, in place of the full quota demanded by the perfectly natural method. Thus, we very commonly find the pomological worker piecing out a natural classification with artificial links.

The ideal system of classification combines both the natural and the artificial methods. If this ideal system were applied to any given material—say, to our cultivated grapes—we should have two classifications given side by side. In the natural classification all the varieties would be arranged according to their broad, natural relationships. In the arbitrary classification the same series of varieties would be arranged more diagramatically

according to characters arbitrarily chosen. Then any one wishing to identify an unknown variety could follow out the arbitrary key or classification, while any one wishing to study the varieties broadly would have recourse to the natural classification.

It should be remarked, for the benefit of those who are accustomed to the use of the current manuals of botany, such as Gray's Manual, that these books employ, more or less successfully, the double method outlined. The keys given in these books for help in tracing out ("analyzing," as they say in school) plants whose names are not known are purely artificial. The arrangement of plants into species, genera, and families, according to their broad resemblances, is natural—at least, it is professedly so; and though the books frequently fall far short of the whole truth in these qualifications, yet the arrangements are on a natural basis.

All these matters will appear more clearly when we take up some of the actual examples of classification, as we shall now proceed to do. The author feels that some explanation is fairly due the student for the introduction of the following very imperfect, and often

contradictory, systems of classification. It would be much better if this treatise on systematic pomology could give an ideal classification of our common fruits. Such a classification, however, has not yet been made, and it seems impossible that it should be made—at least, for many years to come.

In default of a perfect classification, therefore, the reader will be instructed by observing what the best pomologists have already done in this field. Each one of us will then be at liberty to choose for his own use that system of classification which seems to him most reasonable or useful. In many cases, doubtless, two or more systems of classification can be combined, or useful features can be taken from each. Out of such study, readaptation, and invention the future may see a better system of pomological classification arise.

XIV

CLASSIFICATION OF FRUITS IN GENERAL

It is difficult to define a fruit in exact terms. The botanist has a definition, but it is not just the same as the horticulturist's definition. In general, we may sum up the horticultural notion by saying that a fruit is an edible, more or less fleshy portion of a plant, in its development intimately connected with the seed. Sometimes it is the seed itself, as in the walnut; sometimes it is the swollen ovary, as in the plum; sometimes it is the fleshy calyx adhering to the ovary, as in the apple.

The names of fruits in common language are really generic classificatory terms. Such names as peach, nectarine, apricot, almond, etc., designate rather considerable classes of fruits. While such names are usually fairly clear in common usage, it is sometimes difficult, in critical cases, to say just what is a plum and just what is a cherry. The shrub commonly called the western sand cherry (*Prunus pumila besseyi*) has often been

classed with the plums. It may be called by either name with equal propriety.

Recently the plum has been successfully hybridized with the apricot and with the cherry. The resulting fruit is half plum and half apricot, and can not be conveniently classed with either. Mr. Burbank has called it a plumcot. The cross between the plum and the cherry has not been named.

The writer has several times seen fruits which were thought to be hybrids between the apple and the pear. They partook of the characters of both fruits. Whether such specimens could be called pears or apples would be a knotty question. About the best thing that can be done in such cases is to rely on the arbitrary definitions of our common language.

When we study all these common classes of fruit at large, we find that there are some striking natural relationships among them. The apple, the pear, and the quince, for instance, are much alike ; so are the plum, the peach, and the apricot ; and so are the orange, the lemon, the pomelo, and the kumquat. The three groups here exemplified are very generally known as the pome fruits,

the drupaceous fruits, and the citrous fruits respectively.

The most recent and comprehensive classification of fruits in general, covering the ground outlined above, is that given by Bailey,* and reproduced below with minor changes :

CLASS I.—ORCHARD CULTURE, OR TREE-FRUIT CULTURE.

SUBCLASS 1.—*Pomaceous fruits.*

Apple, *Pyrus malus.*
Crab-apple, *Pyrus baccata.*
Prairie crab, *Pyrus ioensis.*
Atlantic crab, *Pyrus coronaria.*
Pear, *Pyrus communis.*
Sand pear, *Pyrus sinensis.*
Quince, *Pyrus cydonia.*
Chinese quince, *Pyrus cathayensis.*
Japan quince, *Pyrus japonica.*
Maule's quince, *Pyrus maulei.*
Medlar, *Mespilus germanica.*
Loquat, *Eriobotrya japonica.*

SUBCLASS 2.—*Drupaceous or stone fruits.*

Plum, *Prunus domestica.*
Damson plum, *Prunus domestica damascena.*
Myrobalan plum, *Prunus cerasifera.*

* Bailey, "Principles of Fruit-Growing," p. 2. New York, 1897.

Japan plum, *Prunus triflora.*
American plum, *Prunus americana.*
Wild Goose plum, *Prunus hortulana.*
Chickasaw plum, *Prunus augustifolia.*
Sand plum, *Prunus augustifolia watsoni.*
Beach plum, *Prunus maritima.*
Pacific plum, *Prunus subcordata.*
Apricot plum, *Prunus simonii.*
Hybrid plums, combining various species.
Sweet cherry, *Prunus avium.*
Sour cherry, *Prunus cerasus.*
Sand cherry, *Prunus pumila besseyi.*
Peach and nectarine, *Prunus persica.*
Apricot, *Prunus armeniaca.*
Japan apricot, *Prunus mume.*
Purple apricot, *Prunus dasycarpa*

SUBCLASS 3.—*Citrous fruits.*

Orange, *Citrus aurantium.*
Tangierine orange, *Citrus nobilis.*
Citron, *Citrus medica.*
Lemon, *Citrus medica limon.*
Lime; *Citrus medica limetta.*
Sour lime (lime of the United States), *Citrus medica acris.*
Grape-fruit, Shaddock, or Pomelo, *Citrus decumana.*
Kumquat, *Citrus japonica.*
Trifoliate orange, *Ægle* (or *Citrus*) *trifoliata.*
Glycosmis, *Glycosmis aurantiaca.*
Lime berry, *Triphrasia trifoliata.*
White sapota, *Casimiroa edulis.*

SUBCLASS 4.—*Moraceous fruits.*

Fig, *Ficus carica.*
White (and Russian) mulberry, *Morus alba.*
Black mulberry, *Morus nigra.*
Red mulberry, *Morus rubra.*
Downing mulberry, *Morus multicaulis.*
Japan mulberry, *Morus japonica.*
Bread-fruit, *Artocarpus incisa.*

SUBCLASS 5.—*Anonaceous fruits.*

Sour-sop, *Anona muricata.*
Sour-apple, *Anona squamosa.*
Cherimoya, *Anona cherimolia.*
Pond-apple, *Anona laurifolia.*
And other Anonas.
Northern papaw, *Asimina triloba.*

SUBCLASS 6.—*Myrtaceous fruits.*

Guava, *Psidium guajava*, and others.
Rose-apple, *Eugenia jambos.*
Surinam cherry, *Eugenia uniflora.*
And other Eugenias.

SUBCLASS 7.—*Sapotaceous fruits.*

Sapodilla, *Achras sapota.*
Marmalade tree, *Lucuma mammosa.*
Star-apple, *Chrysophyllum cainito.*
And others.

SUBCLASS 8.—*Anacardiaceous fruits.*

Mango, *Mangifera indica.*
Jew plum, *Spondias duleis.*

SUBCLASS 9.—*Ebenaceous fruits.*

Kaki (Japan persimmon), *Diospyros kaki.*
Persimmon, *Diospyros virginiana.*

SUBCLASS 10.—*Leguminous fruits.*

Tamarind, *Tamarindus indica.*
St. John's Bread, or Carob, *Ceratonia siliqua.*

SUBCLASS 11.—*Nut-fruits.*

Walnut, *Juglans regia.*
Japan walnut, *Juglans sieboldiana.*
Black walnut, *Juglans nigra.*
Butternut, *Juglans cinerea.*
Pecan, *Hicoria pecan.*
Shell-bark hickory, *Hicoria ovata* and *H. laciniosa.*
European chestnut, *Castanea vesca*
American chestnut, *Castanea americana*
Japan chestnut, *Castanea japonica.*
Chinquapin, *Castanea pumila.*
Filbert, *Corylus avellana.*
Litchi, *Nephelium litchi.*
Ginkgo, *Ginkgo biloba.*
Almond, *Prunus amygdalus.*
Russian almond, *Prunus nana.*
Tropical almond, *Terminalia catappa.*
Cashew, *Anacardium occidentale.*
Pistacio, *Pistacio vera.*

SUBCLASS 12.—*Palmaceous fruits.*

Cocoanut, *Cocos nucifera.*
Date, *Phœnix dactylifera.*
And others.

SUBCLASS 13.—*Miscellaneous tree-fruits.*

Olive, *Olea europœa.*
Pomegranate, *Punica granatum.*
Papaw, *Carica papaya.*
Hovenia, *Hovenia dulcis.*
Jujube, *Zizyphus jujuba*, and others.
Myrica, *Myrica nagi* (*M. rubra*).
Sea-grape, *Coccoloba uvifera.*
Otaheite gooseberry, *Phyllanthus disticha.*
Spanish lime, *Melicocca bijunga.*
Alligator pear, *Persea gratissima.*
Strawberry tree, *Arbutus unedo.*
Mammee apple, *Mammea americana.*

CLASS II.—VINE-FRUIT CULTURE.

SUBCLASS 1.—*Viticulture, comprising :*

Wine grape, *Vitis vinifera.*
Fox grape, *Vitis labrusca.*
Summer grape, *Vitis æstivalis.*
Post-oak grape, *Vitis æstivalis linsecomii.*
Muscadine and Scuppernong grapes, *Vitis rotundifolia.*
Sand grape, *Vitis rupestris.*
River-bank grape, *Vitis vulpina.*
And other native species of Vitis.

SUBCLASS 2.—*Passifloraceous fruits.*

Granadilla, *Passiflora edulis.*
And others.

CLASS III.—Small-fruit Culture.

Sub-class 1.—*Bush-fruits.*

Group a.—Rubaceous fruits (cane-fruits), or bramble-fruits.

Raspberry, *Rubus idæus.*
Black-cap raspberry, *Rubus occidentalis.*
Red raspberry, *Rubus strigosus.*
Wineberry, *Rubus phœnicolasius.*
Blackberry, *Rubus villosus.*
Northern dewberry, *Rubus canadensis.*
Southern dewberry, *Rubus trivialis.*
Pacific dewberry, *Rubus vitifolius.*

Group b.—Ribaceous fruits.

Currant, *Ribes rubrum.*
Black currant, *Ribes nigrum.*
Buffalo currant, *Ribes aureum.*
Gooseberry, *Ribes grossularia.*
American gooseberry, *Ribes oxyacanthoides.*

Group c.—Miscellaneous bush-fruits.

Juneberry, *Amelanchier oblongifolia.*
Buffalo berry, *Shepherdia argentea.*
Goumi, *Elæagnus multiflora* (*E. longipes*).
Caraunda, *Carissa carundus.*

Subclass 2.—*Strawberry culture.*

Garden strawberry, *Fragaria chiloensis.*
Hautbois strawberry, *Fragaria moschata.*
Alpine strawberry, *Fragaria vesca.*
Virginian strawberry, *Fragaria virginiana.*

Subclass 3.—*Cranberry culture.*

Common cranberry, *Vaccinium macrocarpon.*

CLASS IV.—Non-woody or Herb-like Fruits.

Subclass 1.—*Musaceous fruits.*

Banana, *Musa sapientium.*
Plantain, *Musa paradisica.*

Subclass 2.—*Pineapple.*

Common pineapple, *Ananas sativus.*

Subclass 3.—*Cactaceous fruits.*

Prickly pear, *Opuntia tuna*, and others.
Indian fig, *Opuntia ficus-indica.*
Barbadoes gooseberry, *Pereskia aculeata.*

Subclass 4.—*Miscellaneous herb-like fruits.*

Cyphomandra, *Cyphomandra betacea.*
Ceriman, *Monstera deilciosa.*

XV

THE CLASSIFICATION OF APPLES

THERE are probably something like five hundred varieties of apples now known and propagated by name in North America; the number of named varieties available in collections and elsewhere is doubtless above one thousand; while those described in our American literature runs considerably above two thousand. Obviously it is impossible for any one man to know them all. Any scheme of classification which would group together those varieties of like characteristics would plainly be a great relief to the man who handles or studies apples.

Only once in this country has any general scheme of classification ever been attempted for apples. This was the purely artificial system of Dr. Warder, referred to below. The only essays toward a natural classification have been infrequent and of the most fragmentary character. One of the most striking of these was made by a joint committee appointed by the state horticultural

societies of Minnesota, Iowa, Wisconsin, and South Dakota, in 1898. This committee met in La Crosse, Wisconsin, August 30 and 31, 1898, "in order," as it was said, "to revise and simplify the nomenclature of the Russian apples." The service performed by the committee, however, was much more important and far reaching than the mere revision of names, for their report really presented a systematic and natural classification of the varieties discussed. The arrangement was doubtless open to some criticism—such things are seldom perfect—and it covers comparatively few varieties, and those of small general interest; yet the principle of the classification is vital and unexceptionable.*

Groups of Russian Apples

The committee, at the outset of its work, unanimously adopted the following resolution as a preamble to their findings:

> The varieties here grouped as members of the same families, while in a few cases differing somewhat in characteristics of tree, are so nearly identical in fruit that for exhibition and commercial purposes they are practically the same and should be so considered.

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* The full report of the committee may be found in the *Minnesota Horticulturist*, 27 : 41. 189). (Minn. Hort. Soc. Rpt., 27.)

In the succeeding paragraph of the report it was suggested that "the word 'group' or 'type' may be used if preferred for the word 'family.'" The present writer greatly prefers the word "group," since the word "family" is used in a special sense in the classification of plants.

The committee then proceeded to divide the Russian apples into fourteen groups, as follows, a few addenda being given at the end of the report:

1. *Hibernal group*, including Hibernal, Lieby or Recumbent, Yellow Arcadian, Juicy Burr (spurious*), Romenskoe (spurious), Silken Leaf, Zuzoff (spurious), Pendent Ear, Omensk (spurious), Romna (spurious), Ostrakoff, U. S. D. A. (spurious).

2. *Duchess Group.*—Duchess, Duchess of Oldenburg, or Oldenburg, Arabian, Borovinka, White Krim, Anisette, Glass Green.

3. *Longfield Group.*—Longfield, English Pippin, Good Peasant (spurious), No. 387 (spurious).

4. *Charlamoff Group.*—Charlamoff, Peterson's Charlamoff, Champanskoe, Pointed Pipka, Champagne.

5. *Romna Group.*—Romna, Romenskoe.

6. *Cross Group.*—Into this group is put the variety No. 413 of the United States Department of Agriculture. The following minute is then entered: "The

* In these names "the word 'spurious' indicates that the name preceding it properly belongs to another variety with which it has been mixed."

name Cross was adopted as the official name of the No. 413 of the United States Department, which has also been disseminated under the name of Large Anis. It is distinct from Cross 15 M, 8 M, Skrischapfel, and Cross Vor, the synonomy of which was not taken up."

7. *Christmas Group.*—In this group only the one variety, Christmas, known also as No. 310, was mentioned.

8. *Antonovka Group.*—Antonovka, No. 224, Vargul, German Calville (spurious), Russian Gravenstein, Bergamot.

9. *Anisim Group.*—Anisim, 14 M and 18 M of Budd, Zuzoff of Tuttle, Good Peasant of Patten, Borsdorfer of Wragg, Peterson's Anisim, Swedish Borsdorfer of Patten.

10. *Golden White Group.*—Large Long White of Tuttle & Mitchell, Golden White of Tuttle & Mitchell, White Russet of Tuttle & Mitchell, No. 4 Orel of Budd, No. 5 Orel of Budd, No. 56 Vor (spurious), Winter Stripe, Tuenarius of Patten. Under this group the following rather curious minute is entered: "The name does not describe the apple, but is adopted until the true name can be ascertained."

11. *Repka Malenka Group.*—Repka Malenka, Little Seedling, Green Sweet (spurious).

12. *Yellow Sweet Group.*—Yellow Sweet, Green Sweet of Patten.

13. *Transparent Group.*—Yellow Transparent, White Transparent, Red Duck (spurious), Charlottenthaler, Enthaler, Thaler, Erdbeer Streifling, Nitchner's Erdbeer.

14. *Anis Group.*—Anis, No. 317, Kursk Anis, Red Anis, 32 M, Russian Green, Blue Anis, Yellow Anis, Pink Anis, Striped Anis, Getman.

There were a number of varieties of Russian apples which the committee did not classify, but for which they "adopted descriptions." Their work, though incomplete, is one of the very few American examples of the natural method of classification applied to apples.

In order to find anything like a general classification of apples according to a natural system, we are obliged to go to Germany—the land whence come many of our ideas concerning the science of classification in general. There are several more or less natural systems proposed in various German pomological works, but the one which seems to the present writer to be in all ways best and most consistent is the Diel-Lucas system. The German outline is translated herewith, and a few running explanations added:

Diel-Lucas Grouping of Apples *

CLASS I.—CALVILLES.

Size for the most part medium.

Form nearly always regularly tapering toward the eye, and nearly always plainly ribbed.

* Translated from Lucas. "Einleitung in das Studium der Pomologie," p. 132. Stuttgart, 1877.

(Note —These varieties in America are seldom ribbed as they are in Europe, but the Calvilles always show the ribbed appearance around the basin, as in Harvey or Bellflower.)

Skin fine and smooth, only in exceptional cases somewhat russeted, nearly always becoming oily when ripe, covered with bloom.

Flesh soft, spongy, aromatic, mostly with a slight strawberry or raspberry flavor, here and there marked with red under the skin.

Core almost or quite open, the cells separated.

The Calvilles, while a large and important group in European pomology, are not notably represented in our American lists. Harvey (*Fall Harvey*) is perhaps one of the most typical of this group. The well-known Gravenstein belongs to this group also.

CLASS II.—Chimney Apples.

Size medium to very large.

Form variable, including round-oblate (baking apples ?), long conic (sheepnoses), cylindrical (true chimney apples), frequently irregular by reason of the ribs, the two sides of the fruit hardly ever equal.

Skin smooth, seldom or never becoming oily, tough.

Flesh granular, spongy, somewhat coarse, seldom spicy, usually specifically sour or sweet.

Core large, irregular, open.

These are called Chimney apples, appar-

ently, on account of their prevailing cylindrical shape, like an old-fashioned chimney-pot. The group is hardly known in America. The writer is unable to give a single example belonging clearly to this class.

CLASS III.—GULDERLINGE.

Size small to medium.

Form more or less ribbed about the basin, some oblate-round, tapering slightly toward the eye (Calville hybrids), some spherical or cylindrical (the true Gulderlinge).

Skin smooth, often a trifle russeted, mostly yellow-green, seldom colored.

Flesh fine, somewhat resembling the Reinettes, medium solid, subacid, sweet or very sweet and aromatic.

Core open, with cells separated.

This group (called in French *Calvilles bâtardes*, or hybrid Calvilles) may be best represented by our Bellflower. The less well-known Boiken is also referred to this group by Dr. Lucas.

CLASS IV.—ROSE APPLES.

Size small, medium, or large.

Form for the most part regular, usually faintly ribbed about the basin and sometimes at the sides, usually long conic.

Skin smooth and fine, with bloom, shining when

rubbed, yielding a rich aroma, seldom marked with russet.

Flesh soft, spongy, yielding easily to the touch, frequently red under the skin, of fine rose-like aromatic flavor.

Core usually closed.

In this country this would probably be called the Astrachan group. Red Astrachan belongs here; also, according to Dr. Lucas, White Astrachan and Wagener.

CLASS V.—PIGEONS.

Size small to medium.

Form spherical, somewhat elongated, not regularly ribbed, nor entirely without ribs.

Skin smooth, shining, lightly covered with bloom, seldom showing slight russet markings.

Flesh finely granular, medium firm, but juicy and aromatic.

Core often four-parted, sometimes open, sometimes closed.

These are called Pigeon apples, or Pigeons, because the bluish-looking bloom overlying the skin looks somewhat like the plumage of a pigeon. The fruit is considered second rate in Europe, and the type seems never to have gained a footing in America. Downing describes Pigeon and Pigeonette, evidently taking both descriptions from the English pomologist Hogg.

CLASS VI.—Pound Apples. Rambos.

Size large to very large.

Form variable, mostly irregular or unequal, or both, mostly round or round-oblate, mostly with a single obscure rib.

Skin smooth and shining, thick and tough.

Core mostly very large and open, but sometimes closed.

There are a great many different Rambos in Europe, many of which have been introduced here. There are several "Pound apples" and Rambos native to America also, but which ones might be referred to this group is a matter of considerable doubt. The only well-known variety referred to this class by Dr. Lucas is Alexander. The Rambo of Downing would hardly qualify in this group.

CLASS VII.—Rambo-Reinettes.

Size medium to large.

Form more or less irregular, like the Calvilles, and strongly ribbed about the basin.

Skin moderately thick, seldom entirely smooth, usually marked with russet, self-colored, or with a blush on the sunny side, never striped.

Flesh variable, sometimes fine, sometimes coarse-granular, sprightly subacid or sweetish.

Core mostly with wide cells, open or closed.

This group includes, according to Dr.

Lucas, the Canada Reinette, not well known in this country, and the famous Rhode Island Greening.

CLASS VIII.—Self-colored Reinettes.

Size small to large.

Form round or oblate, regular and smooth.

Skin sometimes smooth and shining, sometimes marked with russet, in certain varieties becoming unctuous, without any red coloring, or only with a little on the sunny side. (Note.—European apples are as a whole much less highly colored than American apples.)

Flesh firm or spongy, finely granular, sprightly subacid and sometimes very finely flavored.

Core generally regular and closed.

There are no American apples which can be certainly referred to this group.

CLASS IX.—Borsdorf Reinettes.

Size small, medium at the most.

Form very regular, round or oblate.

Skin smooth, shining, somewhat warty and russeted, self-colored, splashed or moderately striped.

Flesh solid, very fine grained, very characteristically sweet or wine-sweet flavor.

Core nearly always regular and closed.

Borsdorf, the type of this group, has been introduced to America, but has not become popular or widely distributed.

CLASS X.—Red Reinettes.

Size small, medium, or large.

Form variable, sometimes round or oblate, sometimes oblong, usually regular.

Skin shining, generally smooth, only occasionally marked with russet, splashed or striped on greenish yellow, clear yellow, but never golden yellow, ground; the red generally clear and unmixed with russet.

Flesh fine, firm, mostly rich and aromatic, mild subacid flavor, here and there marked with red under the skin.

Core variable.

Baumann's Reinette, Reinette Coulon, and Barcelona Pearmain, described in Downing, are referred to this group. None of them, however, is now known in America.

CLASS XI.—Russets.

Size small, medium, or large.

Form round or oblate, and mostly very regular.

Skin rough with russet markings, mostly self-colored, seldom showing any red, the color being grayish green, greenish yellow, or dull yellow; the red, when it appears, mixed with russet.

Flesh fine, rich, sweet or sweetish, and distinctly aromatic.

Core regular and closed.

Such well-known russets as Roxbury and Golden Russet plainly belong here.

CLASS XII.—Gold Reinettes.

Size medium to large.

Form oblate, round or oblong, sometimes regular, sometimes ribbed.

Skin medium smooth, seldom entirely smooth, more or less russeted, especially on the sunny side, any red color being thereby made impure, the ground color rich yellow or golden yellow, the markings sometimes splashed, sometimes striped. Fruit smoother on young trees, rougher on older ones.

Flesh very fine, juicy, rich, usually yellowish, very aromatic, and for the most part of decidedly wine-sugary flavor.

Core variable.

Ribston (pippin) and Blenheim (pippin) are referred to this group. Probably Hubbardston and King would also classify here.

CLASS XIII.—Striped Apples (*Streiflinge*).

Size small, medium, or large—never very large.

Form variable, apt to be roundish, or conical and ribbed.

Skin smooth, shining, some thin and some tough skinned, usually covered with bloom, striped and splashed, but seldom touched with russet.

Flesh sometimes firm and coarse grained, sometimes spongy, often red under the skin, generally distinctly acid, seldom sweetish or sweet, mostly without aroma.

Core usually regular and closed.

This class, though a large one according to Dr. Lucas, and divisible into five orders, seems to be unrepresented in America.

CLASS XIV.—Pointed Apples.

Size mostly medium large, only seldom very large.

Form long conic or truncated conic, often irregular.

Skin smooth, shining, fine, seldom with bloom, self-colored or splashed, never striped.

Flesh loose and mellow, sweetish, subacid or purely acid.

Core regular, mostly closed.

A small group, ill defined and unrecognizable among American apples.

CLASS XV.—Oblate Apples.

Size small, medium or large.

Form distinctly oblate, or oblate-conic, always broader than high.

Skin smooth, shining, tough, self-colored or splashed, never striped, usually covered with bloom.

Flesh white or greenish white, mostly firm, seldom mellow or spongy, distinctly either sweet or sour, never really aromatic.

Core mostly regular and closed.

Hawthornden is the only apple known in

America of those referred to this group by Dr. Lucas. Perhaps Maiden Blush might typify the group.

Dr. Warder's Classification

The work which has been done in America in the classification of apples, as has already been said, is meagre in the extreme. The standard work of Downing attempts no classification beyond arranging the names of varieties in alphabetical order. Thomas gave a rough, arbitrary arrangement to the different varieties of apples in his fruit book;* but the single important attempt at a classification of apples was made by Dr. John A. Warder.† This scheme was entirely arbitrary, but was an excellent classification of its kind. It has all the convenience inherent in the arbitrary method, and even to-day is very useful to the working pomologist; in fact, it is the only available key which may assist one in finding the name of an unknown apple. The great drawback to its use is that so many of the varieties of to-day are not given in

* Thomas, "American Fruit Culturist." New York. Various editions.

† Warder, "American Pomology," p. 379. Orange Judd Co., New York, 1867.

Dr. Warder's book. His arrangement may be seen at a glance from the following outline:

- **Class I. Oblate, or Flat, Apples**
  - Order I. Regular.
    - Section 1. Sweet.
      - Subsection 1.—Pale, or blushed more or less, but self-colored, not striped.
      - Subsection 2.—Striped or splashed.
      - Subsection 3.—Russeted.
    - Section 2. Sour.
      - Subsection 1.—Pale, or blushed more or less, but self-colored, not striped.
      - Subsection 2.—Striped or splashed.
      - Subsection 3.—Russeted.
  - Order II. Irregular.
    - Section 1. Sweet.
      - Subsection 1.—Pale, or blushed more or less, but self-colored, not striped.
      - Subsection 2.—Striped or splashed.
      - Subsection 3.—Russeted.
    - Section 2. Sour.
      - Subsection 1.—Pale, or blushed more or less, but self-colored, not striped.
      - Subsection 2.—Striped or splashed.
      - Subsection 3.—Russeted.
- **Class II.—Conical Apples.**
- **Class III.—Round, or Globular, Apples.**
- **Class IV.—Oblong Apples.**

These three classes are divided into orders, sections, and subsections, precisely like Class I., outlined above.

XVI

THE CLASSIFICATION OF PEARS

In the classification of pears we meet the same difficulties which we have already met in dealing with apples, only in the present case they are even more pronounced. As compared with apples, pears have never been at all well known in America. They have been comparatively unpopular. It is very rare to find a good judge of varieties of pears, even among the most expert pomologists of the country.

In recent years Kieffer, Le Conte, and Garber pears—particularly the first—have been extensively disseminated. These are doubtless hybrids, combining the characters of two species, *Pyrus communis* and *Pyrus sinensis*. They have characters, therefore, considerably different from the ordinary garden pears, which are derived directly from *Pyrus communis*. This difference in botanical characters has been the commonly accepted basis of classification in recent nursery catalogs and similar publications. Pears of

the Kieffer group are spoken of as hybrids, or varieties are simply referred in so many words to the Kieffer group. No further attempt at classification is usually made.

Still, the pears ought to be more carefully classified, and doubtless some student of pomology will soon offer that service to his American brethren. In the meantime it will be worth while to review one or two of the best European classifications, to see what they suggest along this line.

What seem to be the most methodical classifications are given by Lucas, who provides both a natural and an artificial arrangement, with the expectation that the two shall be used together. It will be seen on examination that neither one is so exact and satisfactory as the same author's classification of apples. The "natural" system, in particular, comes back to an artificial basis at many points.

We will now take up the natural system devised by Lucas for the classification of pears.* The classes and characterizations are

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* Lucas, "Pomologische Tafeln." Stuttgart, 1869. Also, "Einleitung in das Studium der Pomologie," p. 180. Stuttgart, 1877.

translated as fully and literally as possible, and then some remarks are added in each case, showing whether or not any American examples of the class can be named. In this matter no attempt has been made to go further than to name some of the varieties specified by Lucas as representative of each class.

It ought to be borne in mind always in studying any European literature on pears that this fruit is comparatively much more important in Germany and France than in America; it is much more popular, better understood, and very much finer distinctions are made in characterization and classification.

Lucas' Natural Classification for Pears

1. BEURRÉS (*Butterbirnen; Butter Pears*).—Fruit with completely melting flesh, in shape true pyriform, or truncate obconic, and regular, without ribs or ridges, of divers colors; mostly longer than broad, seldom as broad as long; never strongly flattened at the stem end, but always tapering toward the stem, and usually obtusely pointed.

This is the largest group in the classification, numbering many of the most prominent varieties. Of those named by Lucas the following are best known in America: Urban-

iste, Joséphine de Malines, Doyenné d'Hiver, Diel.

2. Half Beurrés (*Halb Butterbirnen*).—These are very similar to the Beurrés in external appearance, but differ specifically in the character of the flesh, which is only half melting.

No important American varieties can now be identified with this group. Beurré de Nivelles, named here by Lucas, is described by Downing.

3. Bergamottes.—With flesh completely melting, as in the Beurrés, and therefore much the same in quality; but more round or oblate in form, and flattened at the stem end.

Bergamotte d'Esperen and Olivier de Serres are typical of the Bergamottes.

4. Half Bergamottes.—Round-oblate, or round, flattened at both ends, like the Bergamottes, but differing in the character of the flesh, which is only half melting.

Lucas names only one example in this group —namely, Doyenné de Juillet, described by Downing under the name Doyenné d'Eté.

5. Long Greens (*Vertes longues*).—Flesh melting or half melting; form long, the axial diameter at least one-fourth greater than the transverse diameter; color green, with little or no russeting, even when fully ripe showing only green or greenish-yellow color.

The varieties St. Germain and Angleterre, belonging to this group, are described by Downing, but are not generally known in this country.

6. Bottle Pears (*Calebasses*).—Flesh melting or half melting; form long—at least, one-fourth longer than broad; color greenish yellow or yellow, mostly overlaid with a cinnamon-colored or red-gray russet.

This group apparently takes its name from the form of the fruit, which is supposed to resemble a bottle somewhat. The variety Clairgeau, rather well known in America, may be taken as representative.

7. Bon Chretiens.—Flesh melting or half melting; form variable and irregular, the two diameters equal or unequal.

This remarkably equivocal characterization is made by Lucas to answer for one of the most important groups in his repertory. This is the type known the world over usually by the name Bon Chretien, but in this country as Bartlett.

8. Russelettes.—Small or medium large, with melting or half-melting, cinnamon-spicy flesh; form long; color red, at least, on the sunny side, mostly rusty.

This name, "Russelettes," is taken direct from Lucas. It means fruits with a little

nose, but its appropriateness to this group is not pointed out. The variety Beurré Giffard, found in old collections in America, is classified here by Lucas.

9. Muscats.—Size small or medium; season summer or early autumn; form variable, but mostly long; flavor distinctly musky.

Lucas does not name any variety as representing this group.

10. Assez Bons.—Here belong all medium-sized and large table pears, with melting or half-melting flesh, of long or longish form, which have not been included in the foregoing nine groups.

In this characterization Lucas' "natural" system admittedly breaks down. This group is made merely a catch-all for those varieties not elsewhere classifiable. The Windsor, said by Downing to be "very commonly known in some parts of this country as the Summer Bell pear," is named by Lucas in this group.

11. Aromatics (*Gewürzbirnen*).—Here are to be included all small oblate or roundish pears, having the same minor characteristics as the Assez Bons, but of somewhat larger size.

No variety is named for this group by Lucas.

12. Long Cooking Pears.—Flesh hard or turnipy, or very seldom half melting, very seldom fit for eat-

ing raw; not bitter, but usually insipid, sweet; longer than broad.

The varieties described by Downing under names of Martin Sec and Pound (*Louise bonne d'Hiver*) are the only ones which I am able to identify with this group from the notes given by Lucas.

13. Round Cooking Pears.—Quality as in the preceding class, but differing in form, the breadth being equal to or greater than the height.

No examples can be identified.

14. Long Perry Pears.—Pears not suitable for eating raw; with either breaking, turnipy, or half-melting flesh, having a distinctly bitter or astringent flavor, and are long or medium long in form

None of our American varieties seem to belong to this category.

15. Round Perry Pears.—Pears having the same inner characteristics as the foregoing, but roundish in form.

Lucas' Arbitrary System for Pears

As an example of the arbitrary system of classification applied to pears, we can not do better than to examine the one made by the same author—Lucas.

He divides all varieties into three groups, according to the season of ripening—viz.,

summer pears, autumn pears, and winter pears. Each one of these groups is next divided into four parts, according to the form of the fruit—viz., oblate pears, round or roundish pears, longish pears (those which average one-fourth longer than broad), and long pears. This gives twelve groups. Each of these is next subdivided into three orders, according to color—viz., green or yellow pears, colored pears, and russeted pears. Each of these orders is further split up into three sub-orders, according to the form of the calyx—viz., open calyx, closed calyx, deciduous calyx.*

This arrangement may be summarized as follows:

I. Season—summer, autumn, winter.
II. Form—oblate, round, longish, long.
III. Color—uncolored, colored, russeted.
IV. Calyx—open, closed, deciduous.

Outlining this for the first class—summer pears—we can still more easily see the scope of the classification. When carried out in full it divides the pears into 108 groups.

* On this point the translation is purposely inexact, with the intention of making the plan more intelligible. The German literally is as follows: (*a*) regular, star-shaped calyx; (*b*) erect. leafy calyx; (*c*) incomplete, trumpet-shaped, or absent calyx.

- **Summer Pears**
  - 1. Oblate
    - *a.* Uncolored
      - Open calyx
      - Closed calyx
      - Deciduous calyx
    - *b.* Colored
      - Open calyx
      - Closed calyx
      - Deciduous calyx
    - *c.* Russet
      - Open calyx
      - Closed calyx
      - Deciduous calyx
  - 2. Round or roundish
    - *a.* Uncolored
      - Open calyx
      - Closed calyx
      - Deciduous calyx
    - *b.* Colored
      - Open calyx
      - Closed calyx
      - Deciduous calyx
    - *c.* Russet
      - Open calyx
      - Closed calyx
      - Deciduous calyx
  - 3. Medium long
    - *a.* Uncolored
      - Open calyx
      - Closed calyx
      - Deciduous calyx
    - *b.* Colored
      - Open calyx
      - Closed calyx
      - Deciduous calyx
    - *c.* Russet
      - Open calyx
      - Closed calyx
      - Deciduous calyx
  - 4. Long
    - *a.* Uncolored
      - Open calyx
      - Closed calyx
      - Deciduous calyx
    - *b.* Colored
      - Open calyx
      - Closed calyx
      - Deciduous calyx
    - *c.* Russet
      - Open calyx
      - Closed calyx
      - Deciduous calyx

Waugh's Artificial Classification

The writer of these lines not long ago prepared a tentative classification of pears on arbitrary lines which may properly be reproduced here.* The classification rests upon three separate characters, as follows:

I. *Form*—The pears may be divided into four classes, according to form of the fruit, as follows:

1. Round or oblate pears; those not tapering toward the stem.
2. Obconic pears; those tapering more or less toward the stem, but not constricted into a neck.
3. Pyriform pears; those having a visibly constricted neck.
4. Irregular pears: those markedly irregular, and not conforming to any of the foregoing classes.

II. *Season*—Each of these four classes may be divided into three orders according to the season of ripening of the fruit—*i.e.*, summer pears, autumn pears, and winter pears.

III. *Color*—Each of these twelve orders may be divided into three groups, according to the color of the fruit, as follows:

1. Uncolored fruit—*i.e.*, fruit which is pure green, or, when ripe, pure yellow.

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* *Country Gentleman*, 67 : 1016. Albany, N. Y., 1902.

2. Colored fruit; such as is marked distinctly with red in the sun.
3. Russeted fruit; such as is distinctly marked more or less with russet.

Following this outline, we may readily analyze any number of varieties into thirty-six groups, and these groups may be further subdivided by characters of calyx, basin, etc., into many smaller sections if one's convenience seems to be served thereby.

Just to show how this works we may try it on a few varieties, as follows:

I. Round or oblate.
  (*a*) Summer.
  (*b*) Autumn.
    1. Green or yellow.
    2. Red.
    3. Russet—Merriam.
  (*c*) Winter.
    3. Russet—Bergamotte d'Esperen.

II. Obconic
  (*a*) Summer.
    1. Green or yellow—Bloodgood.
    2. Red—Buffum, Manning's Elizabeth.
  (*b*) Autumn.
    1. Green or yellow—Ontario, Urbaniste, Comice.
    2. Red—Flemish Beauty, Howell, Seckel.
    3. Russet—Hardy, Boussock, Angouleme, Sheldon.

(*c*) Winter.

1. Green or yellow—Lawrence.
2. Red—Clairgeau.
3. Russet—Anjou, Dana's Hovey.

III. Pyriform.

(*a*) Summer.

1. Green or yellow—Brandywine, Jargonelle.
2. Red—Tyson, Giffard, Clapp, Bartlett.

(*b*) Autumn.

1. Green or yellow—Dix, Onondaga.
2. Red—Louise bonne de Jersey.
3. Russet—Bosc, Souvenir d'Esperen, Diel.

(*c*) Winter.

1. Green or yellow—Vicar of Winkfield.
3. Russet—Winter Nelis.

IV. Irregular.

(*b*) Autumn.

2. Red—Goodale.

These varieties are classified as shown above merely for the purpose of illustrating the scheme, and not as a result of careful study of the pears themselves. It would be a real service to pomology if some one who has access to a large collection of varieties of pears would work out such a classification as this for the use of the rest of us who are less fortunately situated.

XVII

THE CLASSIFICATION OF PEACHES

SYSTEMATIC study of varieties of peaches in this country is of recent origin. Apparently the first important contribution to the subject was made by Professor R. H. Price, in his Texas Experiment Station Bulletin 39, published in 1896. In this he proposes to divide the cultivated peaches into several natural groups. These groups he characterizes fully, and into them he distributes a majority of the varieties then known in Texas. All the more recent classifications have been founded on this one, and are like it in some degree. In his "Cyclopedia of American Horticulture" (3 : 1227), published in 1901, Professor L. H. Bailey gives a natural classification for peaches very closely modeled on the Price classification. In W. G. Johnson's book, "The Peach Crop," * the present writer in turn has outlined a natural classification of peaches, which, with a few changes of names and descriptive terms, follows the same outline. It

*Orange Judd Co., New York.

seems best, under the circumstances, to give only one of these outlines here, and doubtless the latest one can be properly offered. This divides the cultivated varieties into five natural groups, named and characterized as follows:

1. *Persian Group* (or typical peaches).—These are round, more or less pointed, marked with an indistinct suture; flesh yellow or white, and characteristically soft and juicy; pits roundish or elliptical, pointed, deeply corrugated, mostly clinging to the flesh or only partially free. This group includes all the commonest old-fashioned varieties, such as the Crawfords, Oldmixon, Alexander, Amsden, Salway, etc.

2. *Chinese Cling Group.*—Trees broad-headed, open, spreading or even drooping, usually very vigorous, hardy, and prolific; foliage large, flat, almond-like, dark green, retaining its color late in the fall, when it changes to a grayish-green tint; glands reniform in the pure type; flowers very large, light pink in the pure type, but smaller and darker colored in some of the mixed descendants; fruit large, often enormously so, generally long oval and compressed, creamy white, with a delicate blush in the pure type, but white or yellow in the mixed descendants; skin very delicate and thin in the pure type, with a delicate marbled or stippled appearance, but firmer in many of the recent varieties; flesh fine grained, soft, juicy melting in the pure type, but firmer in mixed descendents;

stone somewhat flat, with medium corrugations, adhesion various; season variable, but early varieties predominating. Chinese Cling is the type of this group; but Belle of Georgia, Waddell, and Hiley are, perhaps, the best known commercial types. Elberta, best known of all, belongs to this group, but its characters do not conform nicely to those of the pure type.

3. Honey Group.—Fruit long and irregular in form, with a deep suture, and usually with a long, pointed apex; pits long, corrugated, and sharply pointed. Tree not hardy, suitable for planting only in the extreme southern states, along the Gulf of Mexico. The variety Honey is the one commonly grown.

4. Columbia Group.—Mostly large trees (Columbia itself being an exception to this rule); fruit late, firm, often streaked and mottled; pits small, oval, pointed. The variety Columbia, taken as the type, has been long known in the United States, but has never been cultivated on an extensive commercial scale. Other varieties are Cobler, La Reine, Lula, Texas, and Victoria.

5. Peen-to Group.—Tree large and vigorous, willowy, with long, slender branches; leaves long and narrow; fruit much flattened endwise. (Though this is the most striking characteristic of the variety Peen-to itself, the seedlings raised from this variety seldom show this peculiar form.) Skin white and mottled with red, much as in the Chinese Cling group, flavor sweet but peculiar; stone flattened endwise like the fruit. This is said to be a distinctly southern type, ranging farther south than any of the other peaches.

Until very recently it was supposed to be too tender to be grown outside of Florida; but in 1902 the variety was discovered growing thriftily and fruiting nicely on the grounds of the Massachusetts Agricultural College, Amherst, Mass. The variety is said to grow in China as far north as Tien-Tsin. These things suggest that the Peen-to group may have a northern range much beyond that now assigned to it.

The peaches are unusually easy of classification on purely arbitrary lines, and such classifications have accordingly been in most general use. The one which we may take as representative of them all, and which is, at the same time, one of the best yet devised, is the classification of John J. Thomas. This arrangement was used in the various editions of "The American Fruit Culturist."* The "Synopsis of Arrangement" follows, a few varieties being named in each group by way of illustration. These varieties are named and classified here exactly as given in Thomas' book. Many varieties of recent introduction might, perhaps, be used better by way of illustration; but this would require not only a

* The edition which I have in hand as I write this is dated 1885. In this volume the "Synopsis of Arrangement" for peaches is given on p. 331.

thorough study of the varieties in question, but perhaps also some readjustment of the scheme of classification. For this reason, and equally because this is the general plan of the present book, the work of Mr. Thomas is taken just as it has been found.

I. Free stones, or melters; flesh not clinging to the stone.

1. White flesh, or nearly white.

(*a*) Glandless leaves, which are deeply and sharply serrate—Tillotson, Red Rareripe.

(*b*) Leaves crenate, with globose glands—Bellegrade, George IV., Hale Early, Troth.

(*c*) Leaves with reniform glands—Breevort, Morris White.

2. Flesh deep yellow.

(*a*) Leaves crenate, globose glands—Barnard, Crawford Early, Crawford Late.

(*b*) Leaves with reniform glands—Bergen.

II. Clingstones, or Pavies. Flesh adhering to the stone.

1. Flesh pale or light colored.

(*a*) Leaves serrate, without glands—Newington.

(*b*) Leaves crenate, glands globose—Oldmixon Cling.

(*c*) Leaves with reniform glands—Heath.

2. Flesh deep yellow.

   (*a*) Leaves serrate, without glands—Orange Clingstone.

   (*b*) Leaves with reniform glands—Lemon Cling, Tippecanoe.

3. Flesh purplish crimson.

   (*a*) Glands reniform—Blood Cling.

XVIII

THE CLASSIFICATION OF PLUMS

From the standpoint of classification the plums are the most diverse and complicated of all our fruits. They have received more critical study in this country, however, than any other class of fruits, and as a proper result we have a much better system of classification for them than we have for apples or pears. The classification is more nearly natural, more scientific, and more useful.

All our American plum classification has been done on purely natural lines; at any rate, it has been planned on such lines. If it is unnatural or arbitrary at certain points it is only because it is seldom possible to see all the facts at once in any case so complex.

The most recent, as well as the most comprehensive, scheme of classification for plums, is that used in Waugh's "Plums and Plum Culture,"* and the general outline of this scheme will be followed here with the inter-

* Waugh, "Plums and Plum Culture." Orange Judd Co., New York, 1900.

polation of only so much explanation as seems necessary to our present purpose.

It will be seen at once that in this scheme the classification is made to rest almost wholly on a botanical basis. The plums belong to a great many different botanical groups, and when we have given these their proper characterization and arrangement we have really made a classification for the cultivated varieties derived from those species and botanical varieties. This method was first effectively used in this country for plums by Professor L. H. Bailey.*

In the book on "Plums and Plum Culture" just mentioned the common European garden plums, derived from *Prunus domestica*, are subdivided considerably further than the purely botanical classification has usually been carried. Several natural types within this species are distinguished and classified, and this arrangement is also adopted in the following outline. At the same time the Japanese plums are similarly classified into several more or less distinct natural groups. This classification runs as follows:

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*See especially Cornell Experiment Station Bulletin No. 38. 1892.

I. European Garden Plums (*Prunus domestica*).—Leaves large, coarse, rough, thick, usually pubescent beneath, coarsely serrate; flowers large, white, showy; fruit various; stone large, usually compressed and roughened. This group contains several important types, the most conspicuous being the following:

1. Reine Claude Type.—Leaves comparatively large, broad, and flat, with very coarse serrations; fruit nearly spherical, green or tardily turning to a dull, creamy yellow, flesh rather firm or even hard, green, clinging to the stone. Bavay, Green Gage, McLaughlin, Imperial Gage, Jefferson, Lawrence, and many other varieties belong here.

2. Dame Aubert Type.—Tree large; leaves large, coarse; fruit very large, oval, compressed, with more or less of a neck; flesh yellow. Yellow Egg (*Magnum Bonum*) and Golden Drop represent this type.

3. The Prunes.—Fruit medium to large, always oval or ellipsoid, usually with one side of the oval straighter than the other, compressed; color blue or purple; flesh mostly greenish-yellow, firm; stone usually free in a large cavity. Represented best by Fellenberg and German Prune.

4. The Perdrigons.—Fruit medium to large, spherical or oblate, sometimes distinctly depressed at the apex, usually with a deep suture, blue or purple; flesh greenish-yellow, rather firm. Not well represented in America, but typified in Goliath and Royal Tours.

5. Diamond Type.—Fruit mostly large, oval, very slightly compressed, always dark solid blue in color, with a heavy bloom which also appears to be blue;

flesh yellow, very firm, usually clinging to the stone. Well-known plums, such as Kingston, Quackenboss, Gueii, Arctic, etc.

6. Bradshaw Type.—Fruit large, obovoid, pinkish o purplish, with thin skin and moderately soft, yellow, juicy flesh; quality excellent in all cases. Here belong Bradshaw, Pond, Sharp (*Victoria*), Field, Duane Purple, and a few others.

7. Lombard Type.—Closely resembling the foregoing, but differing in certain respects, more or less, as follows: Fruit usually smaller, more nearly oval, bluish, purplish, or pinkish-purple, more opaque in appearance than in the Bradshaw group; quality inferior to Bradshaw. In this group I would place Lombard, Communia Merunka, etc.

II. Damsons (*Prunus domestica damascena*).—Differ from *Prunus domestica* in being dwarfer, wood shorter jointed, leaves smaller, more sharply serrate; fruit small, oval, usually blue, very sour. Cluster Damson, French Damson, and several other named varieties are propagated in America.

III Myrobalans (*Prunus cerasifera*).—Differs from *Prunus domestica* in having a more slender habit, smoother, shinier leaves, smaller flowers, softer, juicier fruit. The variety (possibly there are several different varieties) known as Cherry, or Early Cherry, is the best type of this group. De Caradeuc and Marianna are best known, but do not show pure Myrobalan characters.

IV. Japanese Plums (*Prunus triflora*).—Flowers usually densely fasicated; leaves smooth, glabrous, mostly flat, obovate or oblongovate, prominently

pointed and evenly and finely serrate; fruit with firm flesh and usually small, clinging stone. Represented by several rather diverse varieties, among which the following types are readily distinguishable:

1. Botan Type.—Fruit roundish but always more or less pointed; flesh yellow; skin mostly heavily sprinkled or splashed with red, never solid red or yellow. Abundance, Burbank, Chabot.

2. Red June Type.—Fruit usually small to medium, frequently oblong, compressed; color solid red or yellow; flesh firm, meaty, dry; flavor flat; quality poor. Red June, Kerr, Willard, Ogon.

3. Satsuma Type.—Fruit large, round, pointed, dark red; flesh firm, red. Satsuma.

4. Kelsey Type.—Tree tender; fruit large, oval, flattened; yellow skin and flesh. Kelsey. This type is closely related to the Red June type, and perhaps the two ought to be grouped together.

5. Hale Type.—Tree very vigorous, upright grower, coming tardily into bearing; fruit medium to large, round or round-oblate, with a comparatively long stem, transparent yellowish skin (very different from the opaque tomato yellow of Ogon), considerably washed and splashed with red or purplish red; flesh rather soft and juicy. Hale, October Purple.

6. Berger Type.—Fruit small, somewhat cherry-like, usually round-oblate, sometimes slightly compressed, usually with a distinct suture; color yellow or red; flesh hard and dry; quality generally poor; ripening very early. Berger, Earliest of All, Engre.

V. Gonzales Group (*Prunus triflora robusta*).—A comparatively homogeneous group, made up of hy-

brids between *Prunus triflora* on one side, and, on the other, *Prunus hortulana* or *Prunus angustifolia.* Characterized by very vigorous, upright, or spreading growth; long, willowly branches, which are usually red or reddish; leaves broad obovate, shining, finely serrate; fruit red or yellow, intermediate in texture between the Japanese and the Wildgoose plums. Represented by Gonzales, Golden, Nona, Yates, etc.

VI. Omaha Group (*Prunus triflora rustica*).—Very vigorous-growing upright tree, with large, stiff, rather straight branches; leaves large, a little coarse, irregularly serrate; fruit large, usually cordate or conic; flesh yellow, firm. Hybrids between *Prunus triflora* and *Prunus americana.* Omaha typifies the group, but there are no other conformable varieties in general propagation.

VII. Wickson Group (*Prunus triflora recta*).—Tree upright, with slender, willowy, greenish branches; leaves rather small, stiff, green, ovate, somewhat conduplicate; fruit usually red, large; flesh yellow, firm; flavor peculiar, somewhat resembling the Simon plum. Hybrids between *Prunus triflora* and *Prunus simonii.* Wickson is typical. President and Bartlett are other varieties.

VIII. Simon Plum (*Prunus simonii*).—Tree distinctly upright, branches slender and willowy; leaves oblong, lanceolate, conduplicate, closely serrate; flowers borne singly or in pairs; fruit oblate, dull, red, with a very short stem; flesh firm, poor quality; stone roundish, rough, somewhat spongy. Native to China. Cultivated for market. There is as yet only one pure variety, the Simon plum.

IX. Americana Group (*Prunus americana*).—Tree rather small, but in extreme cases reaching a height of of fifteen to twenty-five feet; short jointed, dark colored, hard wood, thorny; leaves large, coarse, rough, more or less pubescent, especially underneath, coarsely double-serrate; petioles seldom glandular; fruit mostly dull red, occasionally yellow; flesh yellow, soft, juicy; skin tough, frequently astringent. Native to the Mississippi Valley generally. Represented by hundreds of varieties, which, however, are very similar to one another. Typical named varieties are Hawkeye, De Soto, Stoddard.

X. Nigra Group (*Prunus americana nigra*).—Somewhat like the foregoing group, but bark darker colored; leaves broader and more obtusely pointed, less conspicuously double serrate; petioles always glandular; fruit dark colored, compressed. Native to this continent; general range from Ontario and New York, north and east. Cheney and Aitkin are representative varieties.

XI. Van Buren Type.—Certain plums, resembling *Prunus americana* in general appearance, have leaves and young shoots strongly pubescent. These varieties seem to occur in nature most frequently in the southwestern states—Arkansas, Oklahoma, and Texas. This variation has been recognized botanically in the name *Prunus americana mollis.* Varieties in cultivation which show this characteristic pubescence are Van Buren and Wolf.

XII. Miner Type (*Prunus americana mineri*).—Closely related to *Prunus americana;* differing chiefly in having leaves a trifle smoother, not so coarsely and

markedly double serrate; fruit much as in the Americana group, but with thinner skin, which has a peculiar crackling quality when broken between the teeth. Indigenous distribution doubtful. Typified by Miner. Other varieties are Forest Rose and Surprise.

XIII. Wayland Type (*Prunus hortulana waylandi*). Branches long, bending willowy when young; leaves large to very large, oval or slightly obovate, tapering at the point, glabrous above, finely tomentose beneath, especially on the veins, margins rather finely oppressed serrate, petioles with two to six glands; flowers appearing rather late in long, dense clusters along the branches; fruit red or yellow, firm, late ripening, cling. Indigenous in south central Mississippi Valley. Best represented by Wayland and Golden Beauty.

XIV. Wildgoose Type (*Prunus hortulana*).—Tree medium size, spreading, with slender branches and a somewhat peach-like habit; leaves usually rather small, narrow ovate, thin and firm, somewhat peach-like, closely and finely glandular serrate; fruit spherical or slightly oblong, bright colored and glossy, nearly always brilliant transparent red, with a thin bloom; skin thin; flesh yellow, soft, stringy, juicy. Occurs naturally at various stations in the Mississippi Valley. Wildgoose is the type. Other varieties are Whitaker, Downing, Dunlap, Kroh, Milton, etc.

XV. Chicasaws (*Prunus angustifolia*).—Tree small, slender, often only a bush, somewhat thorny; leaves small, shining, smooth, conduplicate, closely and finely serrate; fruit red or yellow, soft, yellow flesh; clinging to the small, rough stone. Spontaneous in

the southern states. Best represented by such varieties as Newman, Munson, and Robinson.

XVI. Sand Plums (*Prunus angustifolia watsoni*).—Much like the foregoing, but dwarfer, never reaching a height of more than eight feet, usually only four to five feet; branches short jointed, zigzagged, and thorny; leaves small, conduplicate, finely serrate; fruit small, much like that of the Chickasaw group. Native in Kansas. The variety Strawberry, found only in large collections, is the best named representative.

XVII. Miscellaneous Plums.—Even these sixteen diverse groups will not accommodate all the cultivated plums. There are still a number of varieties to be accounted for. These fall mostly into two classes, though without any necessary resemblance of individnal varieties in each class. These are:

1. Hybrid Plums.—Such as are derived from the combination of various species in the foregoing list, and are yet not provided for in the three hybrid groups named above.

2. Miscellaneous species are represented by one or two varieties each, but are not of sufficient immediate or presumptive economic value to justify their special mention in a list of plums for orchard planting. The most important botanical groups thus reserved are as follows: *Prunus subcordata*, *P. maritima*, *P. gracilis*, *P alleghenensis.*

Arbitrary Classification

Any one who looks over the foregoing natural arrangement of plums, even super-

ficially, will be satisfied that a general artificial classification is impracticable. The various species differ so materially in some cases that there is hardly enough common ground left for the foundation of an arbitrary system. In the large groups, however, as among the Domestica or the Japanese plums, an artificial classification might be contrived so as to be fairly useful.

The best arbitrary classification of this sort is the one designed by Dr. Hogg,* covering the Domesticas and the Damsons. This outline is transcribed herewith:

I. Fruit round.
  1. Summer shoots smooth.
    (*A*) Skin dark.
      (*a*) Flesh separating from the stone—Nectarine, Peach, Prince of Wales.
      (*b*) Flesh adhering to the stone—Belgian Purple, Sultan.
    (*B*) Skin pale.
      (*a*) Flesh separating from the stone—Boddaert, Bryanston, Hand, Green Gage, Reine Claude. †

* Robert Hogg, "Fruit Manual," p. 532 (ed. 4). London, 1875.

† These are the varieties named by Dr. Hogg, or, at least, a part of them. Many varieties not known in America have beem omitted. Several of the varieties as grown in America would not suit the characterization given for them in this outline.

(*b*) Flesh adhering to the stone—Lucombes Nonsuch, McLaughlin.

2. Summer shoots downy.

(*A*) Skin dark.

(*a*) Flesh separating from the stone—Columbia, Royal Tours.

(*b*) Flesh adhering to the stone—Morocco.

(*B*) Skin pale.

(*a*) Flesh separating from the stone—Apricot, Drap d'Or, Lawrence.

(*b*) Flesh adhering to the stone—Huling Superb.

II. Fruit oval.

1. Summer shoots smooth.

(*A*) Skin dark.

(*a*) Flesh separating from the stone—Agen, Czar, Fellenberg.

(*b*) Flesh adhering to the stone—Blue Impératrice, Lombard, Pond, Prince Engelbert, Smith, Orleans (Victoria).

(*B*) Skin pale.

(*a*) Flesh separating from the stone—Transparent Gage, Ouillin's Golden.

(*b*) Flesh adhering to the stone—Coe Golden Drop, Jefferson, Downton Impératrice.

2. Summer shoots downy.

(*A*) Skin dark.

(*a*) Flesh separating from the stone—Diamond, Damson, Red Perdrigon.

(*b*) Flesh adhering to the stone—Belle de Septembre, Goliath, Blue Perdrigon.

(*B*). Skin pale.

(*a*) Flesh separating from the stone—Washington, Prince Imperial.

(*b*) Flesh adhering to the stone—Denniston Superb, White Damson.

Most of the Japanese plums may be readily classified according to the following arbitrary plan, here published for the first time:

I. Skin Red.

1. Self-colored; solid, dull red.

(*A*). Flesh yellow.

(*a*) Form round or oblate—Maru.

(*b*) Form oblong or compressed—Red June, Willard.

(*B*) Flesh red—Satsuma.

Striped, dotted, or splashed with red.

(*A*) More or less conic and pointed—Abundance, Burbank, Berckmans, Chabot.

(*B*) Round or oblate—Hale, October Purple.

II. Skin yellow.

1. Form round or oblate—Ogon.

2. Form oval or compressed—Kelsey, Kerr.

3. Form conic, somewhat pointed—Georgeson.

The Americana plums number more varieties than the Japanese plums, and almost as many as the Domesticas. It would be a great help to have an analytical key for them—that

is, to have a good arbitrary classification. The varieties are so much alike, however, that many of them cannot be distinguished with certainty by the best experts living; and under such a condition it would be impracticable to attempt their separation by means of an arbitrary key.

XIX

THE CLASSIFICATION OF CHERRIES

THE cherries seem to divide naturally into several comparatively distinct classes. These classes are so far separate and distinct that nearly every pomologist who has studied them has been able to recognize and describe them, and various pomologists are, therefore, fairly well agreed as to the limits of these different groups. There is still some disagreement, to be sure, and at many points it seems impossible to reconcile one particular classification with another; but these discrepancies and contradictions are less important than with most other classes of fruit.

We have, at the outset, two distinctly different botanical species, *Prunus avium* and *P. cerasus*, giving us our sweet cherries and our sour cherries respectively. There is very seldom any doubt as to whether a given variety comes from one or the other of these species. Beyond this point we may divide the two species into several fairly well-marked

groups, as will be seen from a study of the various classifications reproduced herewith.

One of the briefest and best arrangements of cherries, according to their natural types, is that made by O. Thomas. This has been commonly overlooked because of its rather obscure publication in a nursery catalog.* The outline of this classification is translated and described herewith :

1. GUIGNES.—Sweet cherries, with soft flesh.—Black Tartarian, Elton.

2. BIGARREAUX.—Sweet cherries, with firm flesh.—Black Hawk, Powhattan.

3. MERISES.—"Which are recognized by the flavor, ordinarily honey-like, relieved by a slight bitterish taste, and by the aspect of the tree, which resembles the wild Merisier of the woods." Not an important group, from the cultural standpoint, as may be judged from the fact that not enough varieties are named in it to enable one to identify the group with our American varieties.

4. ENGLISH CHERRIES.—Sour-sweet sorts, "distinguished by the form of the trees, which mostly have branches strong and erect, not spreading so much as the preceding, and lending themselves much better to pruning in special forms." This description seems to characterize the so-called Dukes, and the text goes on

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*"Guide Pratique de l'Amateur de Fruits," p. 5, 2d ed. Paris and Nancy, 1895.

to name in this section such varieties as May Duke, Reine Hortense, and Belle de Choisy.

5. AMARELLES.—Sour cherries, with watery flesh, dwarf trees, and small foliage. Here belong Montmorency and its near relatives.

6. GRIOTTES.—Very sour cherries, with trees resembling the preceding. This group, according to the author, seems to be typified in Morello, which he gives as a synonym of Griotte du Nord.

It should be said, before going further, that these semi-generic terms, such as Amarelle, Biggareau, Griotte, etc., do not have the unequivocal significance which one is led to expect of them. Different writers use them in very different senses, as was pointed out by the present scribe in discussing this matter several years ago. *

We have already referred several times to the systematic work of Dr. Lucas. His cherry classification is also worth study. It was derived partially from Dr. Truchsess, but was materially the work of Dr. Lucas himself.† The general outline was translated and published in this country by the present writer in 1898.‡ It runs as follows:

* *Country Gentleman*, 63 : 948. Albany, N. Y., 1898.

† See Lucas' "Einleitung in das Studium der Pomologie," p. 196. Stuttgart, 1877.

‡ *Country Gentleman*, 63:928. Albany, N. Y., 1898.

I. *Sweet cherries.*

1. BLACK HEARTS.—Fruit with colored juice, black skin, and soft flesh.
2. BLACK CRACKLING CHERRIES.—Fruit with colored juice, black skin, and hard flesh.
3. VARIEGATED HEARTS.—Fruit with colored juice, variegated skin, and soft flesh.
4. VARIEGATED CRACKLING CHERRIES.—Fruit with colored juice, variegated skin, and hard flesh.
5. YELLOW HEARTS.—Fruit with uncolored juice, yellow skin, and soft flesh.
6. YELLOW CRACKLING CHERRIES.—Fruit with uncolored juice, yellow skin, and hard flesh.

II. *Tall-growing Weichsels.*

7. SWEET WEICHSELS.—Fruit with colored juice and dark skin.
8. GLASS CHERRIES.—Fruit with colored juice and hard flesh.

III. *Dwarf Weichsels.*

9. WEICHSELS.—Fruit with colored juice and dark skin.
10. AMARELLES.—Fruit with uncolored juice and light-colored skin.

IV. *Hybrid cherries.*

11. HYBRID SWEET CHERRIES.—Growth like the sweet cherry; fruit like the Weichsel.
12. HYBRID SOUR CHERRIES.—Growth like the sour cherries; fruit like the sweet cherries.

Each of these twelve classes is again subdivided into three orders, according to the

form of the stone, whether they are round, egg-shaped, or long oval. To carry the classification still further the cherry harvest was divided into six weeks, and the several varieties were distributed into these six periods.

It will be remarked that this classification has a very arbitrary air, a quality which it shares with the preceding classification. Appearances are somewhat deceitful in this case, however; for the types pointed out, even thus vaguely, are natural types; and it is simply the failure of the author, Truchsess or Lucas, to characterize them broadly enough. The latter part of the Truchsess-Lucas classification is palpably artificial, of course.

The two classifications best known in this country are the one prepared by Professors L. H. Bailey and G. Harold Powell, and the one of John J. Thomas. The former was first presented in Cornell Experiment Station Bulletin 98, and has more recently been republished in the "Cyclopedia of American Horticulture," 1 : 291. It runs as follows :

I. *Sweet cherries—Prunus avium.*

1. Mazzards; inferior seedlings; fruit of various shapes and colors; common along roadsides. In the Middle Atlantic States the wild Maz-

zard trees often attain great age and size, particularly in the Delaware-Chesapeake peninsula. There are no cultivated varieties, or practically none.

2. HEARTS, or heart-shaped; soft, sweet cherries, light or dark. Represented by Black Tartarian, Governor Wood.
3. BIGARREAUX; heart-shaped, firm-fleshed, sweet cherries, like Napoleon and Windsor.
4. DUKES; light colored, somewhat acid flesh, such as May Duke and Reine Hortense.

II. *Sour cherries—Prunus cerasus.*

5. AMARELLES; light colored, sour cherries, with colorless juice, such as Early Richmond and Montmorency.
6. MORELLOS; dark colored, sour cherries, with dark colored juice. Morello, Ostheim, Griotte du Nord, Lutovka.

The classification devised by Thomas may be studied from the following "Synopsis of Arrangement": *

I. HEARTS AND BIGARREAUX.—Fruit heart-shaped, inclining to sweet; tree vigorous and regular in growth.

1. Fruit black, red, or crimson. Black Hawk, Black Tartarian.
2. Fruit bright red, or lighter. American Heart, Downer, Elton, Governor Wood, Napoleon.

* Thomas, "American Fruit Culturist," p. 381, edition of 1885. New York.

II. Dukes and Morellos. Fruit round, black, dark red, or crimson.

1. Fruit black, red, or crimson. May Duke, Morello.
2. Fruit bright red, or lighter. Belle de Choisy, Belle Magnifique, Early Richmond, Reine Hortense.

Though this classification at first sight seems to be no more arbitrary than the others previously reviewed—than the Bailey-Powell classification, for example—it is, nevertheless, less natural in its result. This is shown in the circumstance that it throws together varieties which are obviously of different natural types, as May Duke and Morello.

XX

MISCELLANEOUS FRUITS

BESIDES the staple fruits of the temperate regions of North America, which are discussed more fully in this book, there are a great many species of lesser importance which can be noticed here only in the most general and summary manner. A large number of these secondary fruits are actually grown, and are familiar to the ordinary person. The quince, the apricot, and the chestnut may serve as examples of this class. Other species are of secondary interest to us, more because they are grown outside the limits of our customary geography. All the tropical and subtropical fruits are of this class. Certain of them, as the orange, for instance, are of great commercial importance in their proper latitude, and deserve as careful study from the men who grow them as the apple or the strawberry deserves from the fruit growers of Massachusetts or Ohio. But, as we have said, these fruits, for one reason or another, are of only incidental interest to the average pomologist; and it seems

necessary, for practical reasons, to take advantage of this fact by lumping them all off together in a single chapter.

In case any pomologist should undertake a special study of any of these secondary fruits, he would naturally apply to them the same general methods which are here outlined for apples, pears, and peaches. He could devise some regular form of description which would assist him materially in keeping record of his observations. He would apply to the different varieties in hand the same rules of nomenclature which have been found essential in dealing with other groups of fruits. And, finally, he would classify the varieties under survey, according to the principles laid down in Chapter XIII of this book. So far as the writer knows, no special form of description has ever been used in this country for any of the fruits discussed in the present chapter, nor has any classification of the varieties in any group been proposed beyond what is here set forth.

The quince is closely related to the apple and pear. It may be described on the same blank form used for pears, or even on the one used for apples. There are only a few varie-

ties, hardly enough to warrant any classification, and these few all belong to one species. Though the fruits of the Japanese quince (*Cydonia japonica*) and of Maule's quince (*C. maulei*) are edible, they are not of enough culinary value to have been recognized by fruit growers or fruit dealers.

The medlar is a fruit mentioned in all the old European books on pomology and in most of the early American works, which were largely copied from the European. The medlar stands nearly midway between the quince and the hawthorns, having a sour fruit one to two inches in diameter. A number of varieties have received names, and have been perpetuated by grafting or budding. The tree or bush is perfectly hardy and fruitful in the middle latitudes of North America, but probably not one fruit grower among one hundred ever saw the plant, and not one in five hundred ever saw the fruit.

The loquat (*Eriobotrya japonica*), sometimes erroneously called the Japanese medlar, and still more mischievously known as the Japan plum, is now considerably planted from Florida west to Texas, and the fruit comes somewhat regularly to northern markets in

the early spring. It is a small ovoid, pleasantly acid fruit, a trifle smaller than a guinea-hen's egg. It shows the same tendency to variation which has given origin to our numerous varieties of strawberries and oranges, but as yet this tendency has not been taken advantage of for the establishment of distinct sorts through bud propagation.

The apricot stands nearly midway between the peach and the plum, being, perhaps, a little more like the former. It may be described according to the same formula applied to peaches; and almost exactly the same range of descriptive adjectives would be brought into play. There are two or three different species of trees which bear apricots, and the varieties would naturally be classified first by referring them to these parent species; or the varieties could be arbitrarily classified, as peaches sometimes are.

The nectarine is the offspring of the peach, and so closely related to it that peaches and nectarines not infrequently grow on the same tree (without being separately budded in). In systematic pomology the nectarine is to be treated exactly like the peach.

Mulberries come from trees of several dif-

ferent species, and this gives a botanical basis for their classification. They would be described after much the same pattern as that applied to blackberries and dewberries. They are so seldom cultivated for fruit in this country that they are hardly worth mentioning.

The persimmon is a delicacy of high repute among those persons who know it best. It already has some small place in our best fruit markets, and we may fairly expect that it will increase in commercial importance as time goes on. Several attempts have been made to cultivate persimmons in orchards, and these attempts have met with reasonable success. The persimmon is much unlike any of the other fruits which we have been considering, and would require a special scheme for its description. The varieties, of which a considerable number are recognized, are almost universally separated into two groups, according to their botanical pedigree. Some are known as native persimmons, having originated from the American species. The others are known as Japanese persimmons or kakis, and are developed from another species, a native of the Orient. The varieties are also

sometimes classified according to the shape of the fruit. This method has been applied more particularly to the Japanese sorts, but is convenient for all kinds.

Nuts are sometimes grown commercially, the trees being planted or tended primarily for their fruit. This brings them under the survey of pomology, and requires us to take some notice of them here. There are already a number of books, pamphlets, and bulletins on nuts, and in these may be found descriptions of varieties. The best examples of good descriptive work applied to nuts are to be found in Powell's bulletin on chestnuts (Delaware Experiment Station Bulletin No. 42), and Hume's bulletin on pecans (Florida Experiment Station Bulletin No. 54). The elaborate description form used by the Division of Pomology, United States Department of Agriculture, is shown in the accompanying engraving, page 207, greatly reduced in size. The nuts cultivated or collected in this country comprise a considerable number of botanical species, and the botanical basis of classification is naturally assumed for the most part in dealing with them. There are almonds, walnuts, hickory nuts, pecans, chestnuts, and

United States Department of Agriculture.

DIVISION OF POMOLOG.

Pomological Notes.

SECTION I. Nuts.

Date of Receipt, ...

" " Description, ...

No. of Receipt, ... Journal page, ... Volume, ...

Name and address of sender, ...

Kind, ... Name, ... Purpose, ...

Condition at time of receipt, ...

Year of crop, ...

Season, ... Order, ... Genus, ... Species, ... Variety, ...

Hull, or involucre, ...

arrangement, ...

persistence, ... dehiscence, ...

Form; general, ... vert. sect. ..... cross sect. .....

Size, ... weight of single nut, ... dimensions, ...

Base, ... Apex, ...

Surface, ... Wing, or other appendage, ...

color, ...

markings, ...

Shell; character, ... thickness, ...

dehisence, ... inner structure, ...

Cracking qualities, ...

Kernel; form, ...

divisions; by shell, ... by cotyledons, ...

plumpness, ... color, ...

skin, ... umbilical suture, ...

flavor, ... quality, ...

How illustrated, ...

Notes, ...

Sketch.

Tree.

Herb. arrange, ...

Form, ...

Growth, { vigor, ... character, ...

Shoots, ...

Flowers, ...

pistillate, ...

staminate, ...

Date of bloom, ...

Leaf. { form, ... no. of leaflets, ... surface, ... size, ... color, ... margin, ... petiole, ...

Kind, ...

Variety, ...

Herb. box, ...

" package, ...

Productiveness, ...

Hardiness, ...

FIG. 34—DESCRIPTION FORM FOR NUTS

several others; but these large group names correspond very closely to botanical species names. The species names even go further than the common names, as is usually the case, and subdivide groups which in popular language have only a single name. Thus there are several separate species of walnuts, several of hickory nuts, and two or three at least among the chestnuts. Yet in certain species groups the varieties are now growing so numerous that some further classification would be very appropriate, as, for example, among chestnuts and pecans.

The citrus fruits form a large group, comprising several species, many of which are of great economic importance. In the regions where they are grown the description and discrimination of the varieties of citrus fruits and their intelligent classification are quite as important as the description and classification of apples, for instance. Indeed, the orange is to Florida and Southern California what the apple is to Maine and Ontario. There are very few American books on the citrus fruits in which the student may consult descriptions of varieties. The only descriptive form which has ever come to the writer's

notice is the rather complicated one originating in the United States Department of Agriculture, Division of Pomology. This form is engraved and printed, much reduced in size, on page 210. The citrus fruits are classified almost exactly as the nuts are—according to the several botanical species from which they are sprung. Such common names as orange, tangerine, citron, lemon, lime, pomelo, kumquat are merely vernacular substitutes for the Latin botanical names. Some further classification seems to be desirable, but it has not yet been given.

The olive is grown to a considerable extent in California. Varieties should be described on special forms, following somewhat the model of the blank used for plums. No classification of varieties has ever been suggested —at least, not in this country.

Palms of two species bearing fruit occur within the limits of North America. The cocoanut palm is found in Southern Florida, and the date palm grows and bears fruit in Arizona and Southern California. At present it seems hardly likely that the former will ever be of any commercial importance in this country; but the date palm gives reasonable

United States Department of Agriculture,

DIVISION OF POMOLOGY.

SECTION G. Citrus Fruits. **Pomological Notes.**

ORANGE, LEMON, LIME, etc. Date of Receipt: .....

No. of receipt, ... Journal page, ... Volume, ...

Name and address of sender, ...

Kind, ... Name, ... Purpose, ...

Condition at time of receipt. .....

Season, ... Classification, ...

Form; general, ... vert. sect. ..... cross sect. .....

Size, ... Dimensions, ...

Attachment, ... Basal markings, ...

Apex; Character, (navel or tip) .....

Surface, ...

Color, ... Bloom, ...

Oil cells, ... Fungous or insect damage, ...

Weight, ...

Peel; adherance, ... thickness, ...

texture, ... color, ... flavor, ...

Segments; number, ... reg. .....

Flesh; color, ... texture, ...

Cells; size, ... charac. .....

Tissue; envelop. ..... core, ...

Juice; color, ... quantity, ...

Flavor; acidity, ... sweetness, ...

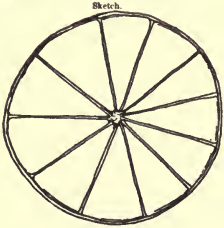
bouquet, ... bitterness, ...

Seeds; form, ... size, ... color, ... number, ...

How illustrated, ... ;

Notes, ...

Sketch.



.....

.....

Tree.

Herb. arrange, ...

Form, ...

Stock, ...

Growth; { vigor, ... character, ...

Flowers, pollen, etc .....

Date of bloom, ...

Leaf; { form, ... surface, ... size, ... color, ... margin, ... petiole, ...

Productiveness, ...

Hardiness, ...

FIG. 35—DESCRIPTION FORM FOR CITRUS FRUITS

promise of becoming a profitable export crop in the districts mentioned. Just now the knowledge of both these species is too meager ever to have received systematic study.

The fig has long been the delight of the amateur fruit grower, and has been brought to fruiting size in the open ground, by means of much winter protection, as far north as New York and Connecticut. In the northern states, however, it seems to be less prized as a curiosity than formerly, and one seldom hears of its being tried north of Georgia. In the Gulf states fig culture on a commercial scale has been somewhat frequently tried, but never with marked success. The fig is a commercial fruit only in California, and even there it is of quite minor importance compared with such fruits as apricots, plums (called prunes in that country), and peaches. There are a large number of varieties known and propagated, and one may find descriptions in all the more complete works on pomology. These descriptions, for the greater part, however, are not models for the diligent pomologist. Indeed, the writer has been unable to find a single work in which the varieties of figs are described with the

same care and completeness which we ordinarily bestow on apples or peaches. Along with this defective description goes an almost entire lack of classification.

The banana can be grown in Southern Florida, or even in the warmest parishes of Louisiana, but it is of no general importance. There are several varities, but beyond the botanical classification of the species they have received no systematic study.

The avocado, or alligator pear, is grown in Southern Florida and California, and is occasionally seen in our fruit markets. There seems to be only one variety in cultivation, and this has received no attention from our pomologists.

The pineapple is quite largely grown for market in some of the southern states, especially in Florida. The varieties are numerous and quite diverse. Recently they have received considerable attention, but there are few good examples of variety description in print. No system of classification can be cited.

Various briers, brambles, or closely related species of the genus *Rubus*, furnish edible fruits, and are cultivated in this country. The loganberry, wineberry, and raspberry-straw-

berry are the commonest examples of these. These different names nearly always stand for separate botanical species, and there are no horticultural varieties of consequence in any of these groups. The fruits may be described according to pomological formulas whenever desired. In doing this one might choose the form used for blackberries or the one for raspberries, usually the latter. The botanical classification of the species covers the ground for the present, no further classification of the groups being necessary.

The June-berry (*Amalanchier*) is sometimes cultivated in the United States, and probably deserves to be more frequently planted in gardens. There are only a few recognized varieties, though the plants vary greatly in the wild state. If many varieties were to be described some new form of description would have to be devised considerably different from any of those illustrated in this book. Naturally there has been no attempt at systematic pomological classification of the June-berries.

The cranberry forms a distinctively American fruit crop, and is one of our most important subsidary fruits. There are several distinct varieties which deserve much more

careful systematic study than they have yet received. These would require a special form of description, suited to their peculiar characters. It is possible that some form of classification for the varieties would prove useful, but up to the present time none has been given.

XXI

WARDER'S CLASSIFICATION OF APPLES

REFERENCE has already been made to the apple classification prepared by the late Dr. John A. Warder, as published by him in 1867 in his "American Pomology." This piece of work exemplifies better than anything else which has ever been done in this country the artificial or arbitrary method of classification. This is not stating the case very strongly, to be sure, since no other general classification of consequence has been prepared; but, aside from the comparison, the Warder classification is a valuable one in itself. It is, indeed, not possible to discover with certainty the name of every unknown apple by the use Dr. Warder's key, but with standard varieties there is usually no great difficulty.

There is, of course, a considerable objection to the use of the Warder key at the present time, because since its publication over thirty-five years ago, a good many varieties have been added to the list. The classification, however, is of so much practical utility, the

method is of so much importance, and the study of fruits with a view to discovering their names is such a valuable exercise for students, that I have felt constrained to include the Warder classification practically entire in this volume.

Of course, to do this some revision seemed necessary. First, it was desirable to add many of the newer and most important varieties, and, second, it seemed possible to cut out a good many of the old varieties which have now been lost from Warder's original list. Warder's list of varieties has, therefore, been revised more or less in both these directions, and appears in the remodeled form below.

In the elimination of obsolete varieties I have been especially assisted by Mr. William A. Taylor, of the United States Department of Agriculture, to whom my most grateful acknowledgments are due. Mr. W. M. Irwin and Mr. W. H. Ragan, also of the Department of Agriculture, have assisted more or less. In this part of the revision it appeared that about forty per cent of the names in Warder's list are now obsolete; about thirty per cent are of uncertain identity, or cannot now be either established or discarded

with confidence; about thirty per cent only are positively known to be in existence at this time.

Aside from the rejection of obsolete names and of a number of uncertain ones, the revisions in Warder's list, as printed below, have been very slight. In a few cases names have been simplified somewhat. In a very few instances the classification has been altered. The writer feels that it would be desirable to make an entire restudy of the subject; but since the presentation here given is intended merely to be an illustration of the methods of taxonomic pomology, and not to be a fresh monograph of the apples, this treatment can doubtless be excused.

In the addition of new names to the list the writer has followed the "Revised Catalogue of Fruits of the American Pomological Society," circulated as a bulletin of the Division of Pomology, United States Department of Agriculture.

The student will notice that in the following classification some varieties appear in two different places. This is because the characteristics of a given variety are not always constant. Bellflower, for instance, is regular

when grown in some localities, though generally it is remarkably irregular in horizontal section.

The classification follows herewith:

I—I—1—1

Oblate, regular, sweet, self-colored *

Baltzley
Camack *Sweet*
Campfield
Green Sweet
Haskell *Sweet*
Hog Island *Sweet*
Lincoln Sweet
Munson *Sweet*
Pearson's Plate
Snepp
Trumbull *Sweet*

I—I—1—2

Oblate, regular, sweet, striped

Granniwinkle
Hartford *Sweet*
Hoops (*Greyhouse*)
Jersey *Sweet*
Kenrick *Sweet*
Moore's *Sweeting*
Sweet Winesap

I—I—2—1

Oblate, regular, sour, self-colored

Baccalinus
Bachelor's Blush
Better than Good
Black Lady *Apple*
Brigg's Auburn
Cooper's Early White
Court Plunder Plat
Cranberry *Pippin*
Dalton
Early Chandler

* Names in parentheses are synonyms. Words in italics, but not in parenthesis, indicate parts of names which may be dropped.

Early Harvest
Faust
Fink
Fulton
Green Cheese
Green Crank
Green Skin
Hawley
Hawthornden
Horn
Junaliska
Kane
Kittagesgee
Lawver
Lancaster *Greening*
Louise, *Princess*
Maiden's Blush
Male Carle
Mann
Margaret, *Early Red*
Menagere
Oconee *Greening*
Osceola
Pickard's Reserve
Pittsburg *Pippin*
Ralph
Rhode Island *Greening*
Swaar
Swazy Pomme Gris
Southern Greening
Stevenson's Winter
Sturmer *Pippin*
Tinmouth
Turkey *Greening*
Virginia *Greening*
White Doctor
White Juneating
White Rambo
Wood's *Greening*
Yellow June
Yates

I—I—2—2

Oblate, regular, sour, striped

Abram
Adams
American *Pippin*
Annette
Arkansas (*Arkansaw, Mammoth Black Twig*)
Arnold
Baldwin
Baltimore (*of Elliott*)
Beaufin, Norfolk
Beefsteak
Bevan's *Favorite*
Bethlemite
Betsey's Fancy
Blackburn
Blondin

Blooming Orange
Bonum
Brandywine
Carolina *Beauty*
Carter's Blue
Catline
Cheese
Cibert
Cluster Pearmain
Devonshire Quarrenden
Doctor
Doctor Watson
Dominie
Early Joe
Equinetelee
Evening Party
Father Abraham
Fall Wine
Grosh
Honest Redstreak
Hicking
Hurlbut
Indiana Favorite
Jefferis
Kent Beauty
Klaproth
Lacker
Lady
Major
Milwaukee
Minkler
Newtown Spitzenberg
Nickajack
Norfolk Beaufin
Ohio Nonpareil
Oldenburg, *Duchess of*
Pennock
Pennsylvania Vandevere
Pettinger
Press Ewing
Rambo
Red Astrachan
Richard's Graft
Rome Beauty
Shiawasee Beauty
Smokehouse
Summer Cheese
Summer King
Summer Rambo
Townsend
Trader's Fancy
Twenty Ounce *Pippin*
Tuscaloosa
Vandevere
Vaughn's *Winter*
Washington Royal (*Palmer Greening*)
Wealthy
Western Beauty
Windsor
Wine, Fall
Wine, or Hays
Winter St. Lawrence
Wright's Janet

I—I—2—3

Oblate, regular, sour, russet

Junaliska
Perry Russet
Pomme Grise
Whitney Russet

I—II—1—1

Oblate, irregular, sweet, self-colored

Autumnal Sweet Swaar
Sweet and Sour

I—II—2—1

Oblate, irregular, sour, self-colored

Antonovka
Borsdorfer
Canada Rinette
Chattahoochie *Greening*
Cranberry *Pippin*
Fall Honey
Ganetson's *Early*
Golden Pippin—*American*
Loudon
Newtown Pippin, Yellow
Ohio *Pippin*
Pittsburg *Pippin*
Yellow June

I—II—2—2

Oblate, irregular, sour, striped

Berry
Buff
Cabashea
Cheese
Cooper
Equinetelee
Evening Party
Gano
Gravenstein
Horn
Hurlbut
Ingram
Jewett's *Fine Red* (*Nodhead*)
Macomber
Malamuskeet
McIntosh
Mangum
Melon, *Norton's*
Muster

Ontario
Pewaukee
Rolfe
Saint Lawrence
Tuft's Baldwin
Vaughn's *Winter*
Wagener
Wolf River

I—II—2—3

Oblate, irregular, sour, russet

Roxbury *Russet*

II—I—1—1

Conical, regular, sweet, self-colored

Bough, Sweet
Higby *Sweet*
Ramsdell *Sweet*
Victuals and Drink

II—I—1—2

Conical, regular, sweet, striped

Bailey's *Sweet*
English Sweeting
Jersey *Sweet*
Milam
Sweet Winesap

II—I—2—1

Conical, regular, sour, self-colored

Amber Crab
Canada Baldwin
Carlough
Disharoon
Fallawater
Franklin Golden
Green Seek-no-Further
Holland Pippin
Hoover
Jackson
Lankford
Lemon *Pippin*
Lily of Kent
Longfield
Oliver (*Senator*)
Shockley
White Winter Pearmain

II—I—2—2

Conical, regular, sour, striped

Alexander
American Summer Pearmain
Bradford (Kentucky Redstreak)
Cayuga Redstreak (Twenty Ounce)
Charlamoff
Chenango
Clark's Pearmain
Clayton
Cooper's Market
Cracking
Early Joe
Early Pennock
Early Strawberry
Family
Fanny
Foundling
Haas (Fall Queen)
Hibernal
Huntsman
Julien
July, *Fourth of*
Krouser
Limbertwig
Magog *Redstreak*
Malinda
Missouri *Pippin*
Northern Greening
Paragon
Peach (*of Montreal*)
Plum Cider
Rawle's Janet (Ralls)
Repka Malenka
Red Gilliflower
Red Winter Pearmain
Reine des Reinettes
Scott Winter
Seek-no-Further, *Westfield*
Smith Cider
Spitzenberg-*Flushing*
Stayman Winesap
Stribling
Tetofski
Walbridge (Edgar Redstreak)
Westfield (*Seek-no-Further*)
Willowtwig
Winesap
Yellow Transparent

II—I—2—3

Conical, regular, sour, russet

American Golden *Russet*
Cheeseboro
Egyptian Russet
Hunt's Russet
Poughkeepsie *Russet*
Ross Nonpareil
Roxbury *Russet*

II—II—1—1

Conical irregular, sweet, self-colored

Belden *Sweet*
Mote *Sweet*

II—II—1—2

Conical, irregular, sweet, striped

Red and Green *Sweet*

II—II—2—1

Conical, irregular, sour, self-colored

Belmont
Bietigheimer
Black Detroit
Carolina *Red June*
Celestia
Chestatee
Cloth of Gold
Detroit Red
Drap d'Or
Fall Chandler
Gideon
Harrison
Hawley
Pomme Royale (*Dyer*)
Pound Royal
Primate
Ridge *Pippin*
The Cook's Favorite
Trenton *Early*
Water
Winter Maiden Blush

II—II—2—2

Conical, irregular, sour, striped

Anisim
Arctic
Ashland
Bethel
Buckingham
Carolina Striped June
Cornish Gilliflower
Cross
Early Red Margaret
Esopus Spitzenberg
Fall Jenneting
Glass Green
King (*of Tompkins Co.*)
Kinnard
Lansingburgh
Late Strawberry
Melon, Norton
Northern Spy
Red Canada (Steel's Red Winter)
Red Stripe
Scalloped Gilliflower
Stannard
Summer Queen
Titovka
Toccoa
Whinery
Winesap

III—I—1—1

Globular, regular, sweet, self-colored

Autumnal Bough
Broadwell
Danvers *Winter Sweet*
Golden Sweet
Higby *Sweet*
Hightop *Sweet*
Holston *Sweet*
May (*of Myers*)
Morton
Paradise Summer
Paradise Winter
Pumpkin Sweet (Pound Sweet)
Tolman *Sweet*

III—I—1—2

Globular, regular, sweet, striped

Bentley *Sweet*
Blenheim Orange
Bowling *Sweet*
Cullasaga
Hall
Hartford *Sweet*
Jacob *Sweet*
Ladies' Sweeting
Moore's Sweeting
Sweet Romanite

III—I—2—1

Globular, regular, sour, self-colored

Ashmore
Blooming Orange
Cat's-head
Champlain
Cherry Crab
Cole's Quince
Colton
Cornish Aromatic
Count of Wyck
Disharoon
Dumelow
English Golden *Pippin*
Fall Pippin
Fall Swaar (*of West*)
Faust
Gloucester White
Green Crank
Holland *Pippin*
Hoover
Horse
Hunge
Limber Limb
Michigan Golden (Lowell)
Mammoth Pippin
Newtown Pippin, Green
Ounce Greening
Ogleby
Patten Greening
Peter
Pickard's Reserve
Roman Stem
Sine qua non
Styre
Summer Pippin (Nyack)
Surprise
Yellow Ingestrie
Yellow Siberian *Crab*
White Astrachan
White Doctor
White Juneating
White Pippin

III—I—2—2

Globular, regular, sour, striped

Abram
American Beauty
American Summer Pearmain
Aromatic
Ashmore Striped
Baccalinus
Baer Hiester

Baltimore (*of Elliot*)
Beauty of Kent
Ben Davis
Bethlemite
Blackburn
Blondin
Blue Pearmain
Brandywine
Caroline Watson
Christmas
Cluster Pearmain
Cogswell
Daniel
Doctor Fulcher
Dutch Mignonne
Oldenburg (Duchess)
Early Pennock
English Redstreak
Fameuse
Father Abraham
Farley Red
Gabriel
Garden Royal
Gilpin
Greyhouse
Hagloe
Hague
Herefordshire Pearmain
Hewes' *Crab*
Hockett *Sweet*
Hoover
Hubbardston
Jackson
Julien
Krowser
Large Striped Pearmain
Leland Spice
Lyscom
McAfee
Mexico
Nickajack
Osceola
Pawpaw (Rubicon)
President
Ragan Red
Red Streak (*English*)
Ribston Pippin
Rome Beauty
Russian Baldwin
Seaver
Sops-of-Wine
Stark
Switzer
Summer Rose
Sutton *Beauty*
Waugh's *Crab*
Wells
Williams *Favorite*
Willow
Wine, or Hays
Winter Rambo
Wright's Janet
York Imperial

III—I—2—3

Globular, regular, sour, russet

Count of Wyck
English Golden Russet
English Russet
Golden Russet
Golden Russet (*of Massachusetts*)
Pryor's Red
Red Russet

III—II—1—1

Globular, irregular, sweet, self-colored

Mote *Sweet*

III—II—1—2

Globular, irregular, sweet, striped

Bailey's *Sweet*

III—II—2—1

Globular, irregular, sour, self-colored

American Golden *Pippin*
Belmont
Calville, White Winter
Cole's Quince
Donneghan
Drap d'Or
Ewalt
Fall Orange
Fall Swaar of West
Ganetson's Early
Golden Pippin—*American*
Kentish Fillbasket
Lowell
Mammoth (Glori Mundi)
Michigan Golden (*Lowell*)
Newtown Pippin, Yellow (Albemarle)
Peck's Pleasant
Pomme Royale (Dyer)
Primate
Progress
Riest
Seek-no-Further, White
Summer Pippin (Nyack)
Swaar
White Pippin

III—II—2—2

Globular, irregular, sour, striped

Baldwin
Benoni
Brennaman
Chandler
Early Red Margaret
Irish Peach
Jersey Black
King (*of Tompkins*)
Lowland Raspberry
Lucombe's Seedling
Pennock
Taunton
Tetofski
Sutton *Beauty*
Utter

III—II—2—3

Globular, irregular, sour, russet

Pryor's Red

IV—I—1—1

Oblong, regular, sweet, self-colored

Downing's Paragon
Honey
Isham *Sweet*
May (*of Myers*)
Munson *Sweet*

IV—I—1—2

Oblong, regular, sweet, striped

Black Gilliflower
Ramsdell *Red*
Red and Green *Sweet*

IV—I—2—1

Oblong, regular, sour, self-colored

Bailey's Golden
Belle et Bonne
Carolina *Red June*
Cumberland Spice
Curtis Greening
Grimes *Golden*
Keim
Kirkbridge *White*

Mouse
Ordley
Porter
President
Red June
Strode's Birmingham
Titus *Pippin*

IV—I—2—2

Oblong, regular, sour, striped

Ben, or Eustis
Ben Davis
Benoni
Cannon Pearmain
Carolina Striped June
Cooper Market
Cornell Fancy
Hubbardston
Hague
Jonathan
Long Island Pearmain
Mother
Pease, Walter
Red Winter Pearmain
Salome

IV—I—2—3

Oblong, regular, sour, russet

Cooper's Russeting
Long Island Russet

IV—II—1—2

Oblong, irregular, sweet, striped

Bentley *Sweet*

IV—II—2—1

Oblong, irregular, sour, self-colored

Bedfordshire Foundling
Bellflower
Cole's Quince
Genesee Chief
Henwood
Horse
Keswick Codling
Newark *Pippin*
Ridge *Pippin*
Santa
Toccoa
York Imperial

IV—II—2—2

Oblong, irregular, sour, striped

Beach (Richardson's Red, Apple of Commerce)
Bogdanoff
Borovinka
Chenango
Clyde Beauty
Egg Top
Farley Red
Granite Beauty
Minister
Okabena
Priestly
Red Gilliflower
Red Stripe
River
Striped Gilliflower

IV—II—2—3

Oblong, irregular, sour, russet

Bourrassa

XXII

RELATION TO THE PRACTICE OF FRUIT GROWING

Aside from the executive ability of the fruit grower himself, no other one factor has a greater influence on the success of the business of fruit growing than the selection of varieties. The improvement of our horticulture depends, first of all, on the introduction of better fruits, on their effective dissemination, and on the adaptation of particular varieties to special soils, climates, markets, and personal needs.

There are men, of course, who grow apples successfully, and who sell them at a profit, without knowing any other variety than Ben Davis or Baldwin. But you, my amiable reader, are not that kind of a man. Ignorance is no part of your capital. For you success is conditioned on knowledge. The better you understand your business the better it will pay. Also, the better you understand it the more you will enjoy it.

Both these things are important. Fruit growing must pay some dividends in the first

place, and, in the second place, you must take some interest, some pride, and some pleasure in it.

A man who takes no pride nor pleasure in fruit growing or in farming ought not to be a farmer. If his work is pain and drudgery he might as well be a galley-slave outright. The result is the same, and the responsibility is less.

Now, the man who enjoys fruit growing, and who expects to make a success of it, must study varieties. He ought to study them thoroughly and systematically. And the systematic study of varieties of fruits is systematic pomology.

Systematic pomology has been severely neglected in North America during the last thirty to forty years, quite to the detriment of the business of fruit growing. The two Downings, Dr. John A. Warder, John J. Thomas, Marshall P. Wilder, and most of the other men whose names shine so gloriously out of our horticultural past, were all systematic pomologists. Above everything else they studied varieties, and on their work in that systematic study were the foundations of our pomology laid.

Then came a period of development along

lines of horticultural practice. Spraying was the popular problem, the popular interest—one might almost say the popular fad. Next came cover crops, and every bulletin was full of peas, clover, and hairy vetch. Along with these came cultivation, fertilization, pruning (including Stringfellow), pollination, thinning the fruit, and every other scheme for making fruits and gardens more productive. The improvement of the practice of fruit growing developed almost into a fury.

Then came 1896. In that year there were more apples grown than could be sold. Men saw at once that the means of production had outgrown the machinery of distribution. Thus the public attention was turned to the science of fruit marketing, where again the popular interest and enthusiasm have been as intense and as effective as at a college football game.

All this while the field of systematic pomology has laid fallow. Nothing was done, or next to nothing. Only very recently have a few men essayed to study varieties broadly, to describe, name, and classify them properly. Thus have practical fruit growing and scientific fruit marketing outgrown systematic pomology—the real basis of all the rest.

Now we are just beginning to realize how we have suffered from this neglect of the old study. We are beginning to see that we must have a more intimate knowledge of varieties. If it was important for men of Prince's, Cole's, and Kenrick's times to know varieties it is ten times more necessary for men of to-day.

It is more necessary, because we have more varieties. Fruits have multiplied, and replenished the catalogs over and over again since that day.

It is more necessary because we have a larger country. There are hundreds on hundreds of new localities opened up to fruit growing, in each of which the varieties best adapted to soil and climate have to be determined.

It is more important because competition is sharper. In Kenrick's time Early Strawberry, Red Astrachan, and Belle de Boskoop would sell almost as well as anything else; but now only the very best varieties will answer, and they must be selected so as to suit exactly the particular customers to whom they go.

In fact, the two lines of development which our pomology has followed, almost to the ex-

clusion temporarily of systematic study, have naturally brought us back to the neglected subject. The refinements in our cultural practices have made a more intimate understanding of varieties necessary, and the increased commercial competition has advanced the same demand.

The fruit grower is the man above all others most interested in systematic pomology. He is the only man, in fact, to be benefited by the prolonged and critical study of the experts. But, valuable as the investigations of the experts are to him, they are of small account, indeed, compared with the variety studies which he makes on his own account. At horticultural meetings, in his neighbors' orchards, and, most of all, in his own orchard, must the fruit grower study every variety which he meets. He must acquaint himself with its smallest characteristic, with its minutest peculiarity, with its slightest preference for soil or drainage or exposure. On the foundation of such knowledge is success built; from the lack of it failure comes.

XXIII

FOR THE TEACHER AND THE STUDENT

In college circles we hear a great deal about the "pedagogic value" of certain subjects. Even the professor of Greek or Latin himself will admit at times that the dead languages are of no possible use to a living man in any of the ordinary affairs of life; "but still," he will say, "they have a very great pedagogic value."

I am sorry to be forced to admit that in many cases horticulture does really seem to have less "pedagogic value" than Greek or Latin or the Babylonian gibberish of the textbooks. But that is not the fault of the subject; it is the fault of the teacher, of the presentation of the matter, of the system of instruction. The teachers of language, out of the experience of centuries, have developed a pedagogic system which gives their work its pedagogic value. I have no doubt but that as soon as Professor Garner, or some other irrepressible crank, discovers the language of

the ape and the chimpanzee, these teachers will immediately adapt these prehistoric languages to their fine pedagogic systems, and will adopt them into the curricula of the strictly classical colleges.

However, science has a large pedagogic value, too, when it is properly presented, and we are learning slowly how this presentation ought to be made. And although horticulture is only partly a science (and partly empiricism and partly art), still we try usually to teach it from the scientific side. This is because the science of horticulture has greater "pedagogic value" than the empirical art has.

Now, among the various branches of horticultural science none has greater "pedagogic value" than systematic pomology. One reason for this is that the subject is really systematic—orderly. It has a logical arrangement, bringing each part into visible relation with with each other part. But a larger and more immediate reason for its value in a general science course is that it deals directly with the fundamental principles of classification, and these, in turn, are the foundation of all the natural sciences. "Science is classified knowl-

edge," according to the universal definition; and an understanding of the methods by which knowledge is classified must naturally open to the student's mind the very beginnings and processes of science.

Speaking broadly, science deals with two kinds of materials—with objects and with phenomena. Through the study of phenomena, science discovers laws or principles. Each so-called natural law is merely a classification of phenomena. When Newton announced the law of gravitation he classified the phenomena of falling bodies—of the attraction of masses. Through the study of objects, science discovers relationships—or, at least, similarities and dissimilarities;—and on the basis of these likenesses and unlikenesses objects are classified.

The classification of objects is obviously a simpler form of science than the classification of phenomena. The methods of science are, therefore, more easy to follow. That is why they have greater "pedagogic value."

The classification of objects naturally precedes the classification of phenomena in any science; in fact, the objects with which the scientist has to deal must be under-

stood and classified first of all. Thus this branch of every science is the first one to be developed. In every one of our sciences—most conspicuously, perhaps, in the biologic sciences—we have some sort of a classification of objects. In botany, plants are classified into species, genera, and orders; in zoology, animals are classified in a similar manner; in pomology we arrange fruits into varieties, groups, and species.

This particular kind of classification is called *taxonomy*. Taxonomy is literally the arrangement of names; that is, we may describe our objects first, then name them, and then classify them by their names. It will be seen by referring to Chapter I that these are precisely the steps followed in systematic pomology. In other words, systematic pomology is taxonomy applied to one particular class of objects.

Taxonomy, as has already been pointed out, is the very beginning of all the natural sciences. Taxonomy is the science of classification—the science of science. A college or high-school curriculum devoted largely to the sciences ought, therefore, to offer special instruction in taxonomy.

As a matter of fact, this subject is taught along with botany, zoölogy, or pomology, if it is taught at all. Nearly always it comes with botany or zoölogy; very seldom has it come with pomology. Yet pomology is the very subject in connection with which it can best be taught. The material is all more easily within reach—that is, all but the text-books. The objects to be classified are well known to all of us. Even the critically distinctive characters are such as are of common knowledge to every boy or girl who has had the privilege of growing up on the farm. Even the more complex matters of nomenclature and classification are easier to handle in a strictly scientific manner in the classroom when they concern peaches or cherries than when they concern agremones or penicilliums or ichneumons.

In a word, systematic pomology offers the best opportunity yet discovered for studying taxonomy, the basis of all the natural sciences.

There are points of detail in which the "pedagogic value" of systematic pomology is especially marked. Suppose a student is given some specimens of Sheldon pear to

study. He is directed to prepare a description according to the formulas suggested in Chapter IV. In order to do this he must examine the specimens closely, critically, point by point. He is developing his power of observation—one of the most fundamental processes in education, yet one in which the most advanced students need constant training.

The pupil goes over the specimens character by character. He studies size, form, markings. He should be required to make drawings showing what he sees. Students who do these things in other departments of biologic science say that they are studying *morphology*. Morphology is a fine word, and stands for an important kind of study; but in no science can the student have a better drill in it than in this work in pomology.

If, in addition to the specimens of Sheldon pear, the pupil is given some samples of Anjou and of Winter Nelis, with the direction that he shall learn to distinguish the three varieties with speed and certainty on sight, then his study assumes another phase. He compares each character of each variety with the corresponding character of the other vari-

eties, and notes the likenesses and differences. Now he is studying *comparative morphology.*

It is ordinarily a great satisfaction to a college student, and to his parents, when he can write home saying that he is studying comparative morphology. Let the young man do this after his first exercise in systematic pomology.

Next, when the pupil seeks the names of his pears, he is studying nomenclature; and later, when he classifies them, he is taking the last step in taxonomy. It is highly proper, too, that he should appreciate that he is at work on a science of wide application and of very great importance. He may very properly have a greater respect for systematic pomology if he sees that its principles are of such general use in so many great departments of science.

In general it is the writer's experience with students that they are helped most by those matters in the course of instruction which come into direct contact with other matters already discussed in other courses. It may be that some practice in horticulture is explained by referring it to some principle in chemistry. The principle may have been

learned already in the chemistry class; it may have had some other application in the agriculture or zoölogy class. But the fact that the horticultural explanation falls into touch with something already known, tends very much to strengthen the student's command of the subject and his confidence in it.

This is why the student should see, when he is making descriptions of fruits, when he is studying their nomenclature, and when he is practicing their classification, that he is at work upon a subject as broad as the whole of science. Everything he does has its immediate and direct application in zoölogy and in botany, and sometimes also in geology, mineralogy, and the related sciences.

The teacher will probably find it best in most cases in the administration of a course in systematic pomology to follow the laboratory method. This means simply that the subject should be taught objectively. The students should handle the fruits just as much as possible. They should become thoroughly familiar with them from every point of view.

In the descriptive work this is as easy as it is obvious. One variety after another can be

presented, studied, and described, and the descriptions can be criticized in due form. This makes very agreeable and useful laboratory work.

In the discrimination of varieties the laboratory method is almost equally easy. After a considerable number of samples have been described, the student ought to be able to recognize them one from another. Variety after variety is added to the collection, and the student frequently tested as to his ability to pick them out and name them. It is surprising how much a little well-directed training of this sort will do. Almost any student of ordinary ability can learn in two or three lessons to pick out and name a dozen or two dozen varieties of apples mixed together in a bushel basket.

The laws of nomenclature have to be studied from the book, and the teacher should not omit to require advanced students to make extended comparisons between the pomological rules and those in vogue in botany, in zoölogy, in ornithology, etc.

Actual practice in determining the correct names of fruits (aside from identification) can be given in the laboratory. The simplest

exercise is to require each student to prepare the synonymy of certain varieties. Suppose there are five varieties of plums which he has described. Do not let him rest with one name for each. Make him find all the names for each, and then let him determine which are the correct ones.

A very effective laboratory exercise consists in handing each student some nursery catalog, and assigning him to a verification and correction of the nomenclature.

Practical laboratory exercises in the classification of fruits are usually difficult to arrange. It is hard to get varieties enough at any one time to make classification really possible. Something can be done, however, even with a few varieties; and the teacher may always bear in mind that though the student's imperfect classifications may not advance the science of pomology at all, they may help greatly in developing the student himself.

Those teachers who have considerable collections of casts of fruits properly colored can probably use them to advantage for exercises in classification. Furthermore, since the classification of many fruits depends on leaf and twig characters, much use can be

made of the garden herbarium. And certainly no teacher of horticulture would neglect to take his students into the field and the orchard to observe there the characters which distinguish or which correlate varieties.

XXIV

LABORATORY WORK

THE great value of laboratory work in all the objective sciences is very generally recognized; in fact, this laboratory practice and investigation, involving actual study of the objects and phenomena themselves, and frequently direct experimental work also, doubtless constitute one of the leading advantages in educational value which the objective sciences enjoy over other subjects. "The laboratory method" is now everywhere spoken of in the highest terms by the men who make teaching a business. They seek to teach even psychology, history, and ethics by the "laboratory method."

There is a possibility, of course, of carrying such a method too far—of making it a fad. No one method is suited to all subjects, and it is possible also that the educative value of "the laboratory subjects" has been too much magnified in certain cases. But the teachers and students of horticulture are certain to feel that good laboratory practice has never

yet been overdone in this subject. There has been a good deal of poor laboratory work—usually under the name of *practical* demonstration; but even the worst of it has not been time altogether wasted. Any good system of laboratory work in pomology is, therefore, sure to find some favor.

The following scheme of exercises is offered as a suggestion only. It has the advantage of having been tested. For several years the writer has used this system, more or less completely, in his class work, though always with some changes from year to year. Any capable teacher will be able to add useful exercises, according to the materials which he may have on hand, and according to the abilities of his students. He will be likely also to cut out some of the suggested exercises for lack of time or material, or because they do not fit well with the general plans of his courses.

With these remarks, the following outline of laboratory exercises in systematic pomology is submitted.

Exercises in Description

1. Describe some well-known apple. The specimens should be typical and mature—

i.e., ripe. For the first exercise they should be of some standard variety well known to all the students. Unusual varieties and specimens which are off type should be left for later exercises. Each student should have at least five specimens if that is practicable. In many instances, with small classes particularly, it will be best to bring in the apples in a large basket or box, or to spread a quantity of them on a large laboratory table, allowing each student access to the entire pile. If the instructor thinks best, he can then assign one single fruit to each student for the final writing of the description; but in general it is recommended to make descriptions only from a number of specimens. This exercise may be repeated as often as the instructor thinks best, offering the student at each exercise some new variety. All these descriptions should be made with the greatest possible care. Each description should be minutely criticized, the choice of every adjective and adverb being specially scrutinized. The selection of happy descriptive terms is largely the result of experience and training, and in this the teacher has a large opportunity to help It is doubtless best to require that the

finished descriptions be kept in the student's note-book. They may be written first on temporary sheets, corrected, and afterward copied to permanent sheets for filing, or directly into the note-book, if the instructor sees fit.

2. After the student has had a fairly good drill in the description of apples, he should pass to other fruits. The ideal order would be apple, pear, quince, plum, peach, cherry, grape, raspberry, and strawberry; but these fruits can never be secured fresh from the fields in this order. The exigencies of the season will determine very largely what the order shall be. Before this part of the work is closed, however, the students should be very thoroughly drilled in the description of all the standard fruits which can be had in a fresh state direct from the trees or vines.

3. The student is now prepared to go to the field to study the trees and vines for their systematic characters. He has now on hand a number of descriptions of fruits; let him complete these by adding descriptions of the plants from which the fruits came. This should always be done, if possible, at the season when fruit is maturing, for a fruiting tree

is ten times as interesting as one without the fruit. But whether it can be done at this season or not, it should not be omitted. In these field exercises students should be required to make note of peculiarities of soil, exposure, drainage, etc., which may account for differences in trees or fruit. It is always difficult, with healthy boys of effervescent spirits, to keep a field excursion up to the level of a laboratory exercise or a classroom recitation. The critical condition, however, is that some specific subject of inquiry must be kept before each student. This must be something which he has to find out for himself, not something which is going to be told him very simply by the instructor in the field.

4. Some unusual fruits should now be taken up. Persimmons, kumquats, tangerines, or pomegranates can usually be secured through the marketman. Even bananas or tomatoes will answer in a pinch. The student should then be required to form his own descriptive outline for these. If the teacher has sufficient ingenuity and perseverance, these exercises can be made to cover a wide range, and they will then be found to be very instructive. They will greatly broaden the field of the

student's knowledge, and will give him more confidence in himself and in his subject.

5. Finally, this subject should not be left without giving the student an opportunity to describe one or two samples from every class of fruit commonly grown in his neighborhood. To this end cherries may be preserved in formalin, salycilic acid, or other preservative solution; and any other fruits likely to fail during term-time should be kept in stock in the same way. Even strawberries and blackberries can be kept in condition sufficiently sound for this purpose if proper pains are devoted to them. Many teachers of botany and zoölogy do all their laboratory work with dried or preserved materials; the horticulturist ought not to shrink from an occasional exercise of that sort.

Exercises in Identification

6. Place several well-known varieties on a table, and require the student to name them at sight. Begin with two or three varieties only, but add others rapidly. Apples are naturally best for these exercises, but plums, peaches, grapes, and pears are also valuable where they are available in sufficient numbers.

This exercise is of special value, both pedagogically and pomologically. It should be repeated at frequent intervals, but should not cover more than a few minutes at a time. It is best to have a few new varieties on hand every day, and to give the class an exercise of this sort when they first enter the laboratory, after which they may proceed to the regular work of the day.

7. After the students become expert in the recognition of varieties in this way, several samples should be mixed indiscriminately in a basket or on a table, and the students required to separate and name them. The task of sorting out closely related varieties will be found to be altogether different from the simple recognition of the varieties when they are separately displayed, and altogether harder. This exercise, too, should be frequently repeated, with a frequent change of material.

8. It is usually possible, without too great effort, to come within reach of one or two general fruit exhibits. During the fall these can be found in connection with county, district, or state fairs, or at grange field-days, and during the winter at meetings of the hor-

ticultural societies. After the students have become thoroughly familiar with standard fruits, they should be given the freedom of some such collection as can be found at a county fair. Here they are likely always to find some specimens incorrectly named and some untrue to type. They will also discover interesting local variations. Every variety in such a collection should be challenged, every name verified or corrected. Here, for the first time, the students should use a book of descriptions, like Downing's, Warder's, or Thomas's, for the verification of varieties. It may be well to require each student to make a complete and fully detailed report of the exhibit, or, if it is large, of certain sections of it.

9. At this stage of the class work the instructor should secure samples of fruit from a distance, in order to show the variations to which varieties are subject in different environments. During peach season it may be possible to get samples from considerable distances; but the one fruit which is naturally the main reliance is the apple. Apples can be secured at almost any time and from any distance. The writer has found it easy and

mutually advantageous to arrange exchanges of apples with other teachers of pomology in other states. During the months of October, November, and December, 1902, the Department of Horticulture in the Massachusetts Agricultural College was able to place at the disposal of its students collections of apples from Nova Scotia, Quebec, Ottawa (Ontario), New Hampshire, Western New York, Michigan, Kansas, and Virginia, besides many samples from different parts of Massachusetts. No special effort or expense was required to do this, and so this matter is left with each individual instructor, in the confidence that he will find some way of securing fruits from abroad for the sake of widening the experience of his pupils.

When these fruits are secured they should be critically compared with home-grown specimens of the same varieties. If the collection contains varieties not represented in the home orchard, as it ought often to do, these new varieties should be carefully studied, comparing the specimens with any available descriptions, verifying names, making new descriptions, and particularly investigating the economic merits and demerits of the variety.

Huntsman, Missouri Pippin, and Jonathan, of great commercial importance in Kansas, are unknown to ninety-nine Massachusetts students out of every hundred. In like manner, Baldwin, Sutton, and Gravenstein, market standards in Massachusetts, are curiosities to a class of Kansas boys. The student who is to have a thorough training in pomology should make the acquaintance of just as many of the standard varieties as possible. There are some experienced apple growers, indeed, who don't know what a Ben Davis looks like!

10. Outright identification comes next. This is extremely difficult, as every fruit grower or fruit man knows. It can hardly be expected that immature students will make great progress at it. Nevertheless, after the preliminary training outlined above, some practical exercises can be managed. Apples again offer the best material. Give each student a sample of some variety, the name of which he does not know. Let him identify this variety by reference to Warder's "Pomology," or by the use of the key given in Chapter XXI of this book. In case the key is used, the identification should be verified by

comparing the samples with some standard description. The instructor naturally will take care to offer the student, at least at first, only such varieties as are included in the key to be used.

11. If the instructor has at hand a considerable collection of peaches, plums, grapes, or other suitable fruit, and is willing to spend a good deal of work on this subject, he can make an analytical key of his own for those varieties which he has on hand. This can be printed, duplicated with the mimeograph, or put into the hands of the students in some other way; and will then furnish another very useful and attractive laboratory exercise for them.

Exercises in Nomenclature *

12. Furnish a list of names of fruits for verification or correction. See that this list contains various doubtful and incorrect names. Secure as wide a range of literature as pos-

* It will be found to be a very useful exercise, though perhaps better suited for home study than for laboratory work, for each student to make a critical comparison, paragraph by paragraph, of the rules of pomological nomenclature with those used in botany and in different branches of zoölogy. The botanical rules may be consulted in various places—*e.g.*, in Britton & Brown's "Flora of North America," and in the

sible, and see that each student works it through and through. All the standard works on pomology should here be brought into play. Experiment station bulletins which offer thoroughly adequate and authoritative monographs of certain groups should be freely used; but those which merely report on varieties without careful use of names should be avoided, except they be given out for criticism. A good variation of this exercise consists in furnishing the student with some nurseryman's current catalog, and requiring him to bring the nomenclature to the best technical standards.

13. The county fairs once more offer a fine opportunity for tests in nomenclature. Names are not only incorrectly applied to fruits in such exhibitions, but the names are often wrong in themselves. These exercises, which bring the student into practical touch with the evil consequences of inaccurate nomenclature, are of special value.

Appendix to Sudworth's "Nomenclature of the Arborescent Flora of the United States" (United States Department of Agriculture, Washington, D. C.). In this latter work will be found also the principal rules in use among zoölogists, with other interesting data on matters connected with nomenclature.

Exercises in Classification

14. Present to the class a number of varieties for classification. For this purpose plums will be found especially satisfactory, though almost any fruits can be used. Begin with a small number of varieties for the first exercise, but increase the collection rapidly after the first trial. Require each student to prepare both arbitrary and natural classifications of these varieties. The natural classification, however, is rather an ideal to be sought than an end likely to be realized in most instances. Greater time must usually be given to the artificial classification, not because it is better, but because it is workable. Repeat this exercise as often as possible, with as many different varieties and classes of fruits as can be secured.

15. Require theoretical, arbitrary classifications without materials. Thus the class may be assigned to prepare an outline for the classification of cherries or strawberries or oranges without being given a single specimen of any kind. All that is requisite is that the pupils should have a fairly clear notion of the fruits they are asked to classify. This exer-

cise is more practicable and more instructive than appears from the description of it.

16. If the student is doing specially thorough work in systematic pomology, he should be required to make a complete set of descriptions of all varieties available, at least in one or two classes of fruits. The aim in this case is to make the set of descriptions complete as well as accurate. Special effort should be given to the extension of this collection. After all available material is exhausted, vacancies should be filled in by securing descriptions of important but still missing varieties at second hand. These may be copied to standard blank forms, edited and rearranged where necessary, and put into the general list. They should be arranged alphabetically, card catalog fashion, as explained in Chapter II.

17. Finally all students of systematic pomology should make frequent visits to the orchards and gardens where the fruits are ripening. Here they should be tested as to their knowledge of varieties, of names, and of matters of relationship brought out in classification. Constant contact with fruit and fruit trees in all situations and under all circumstances is the key-note to success in the study

of systematic pomology. (See also remarks under paragraph 3, page 251.)

Exercises in Judging

18. Frequent exercises in judging fruits, after the manner described in Chapter XXV, should be provided. There will be no difficulty in doing this in a small way anywhere. When the suggested visits are made to the fruit shows or the county fairs, there will be special opportunities for judging. At ordinary fairs the managers will be glad to make the pomology class the official judges, and the responsibility which comes with this position makes the work more interesting to the students, and tends to make them do it better. The teacher must not be too modest to recommend his class for such work.

19. Students should be required to design score-cards for different fruits and for various purposes. If the various systems of points were quite generally established—if they had received the sanction of some special authority—this might not be justifiable. But as long as there are no authorities and no accepted standards, the subject is open to everybody's investigation.

XXV

JUDGING FRUITS

The student of systematic pomology must always be interested in fruit exhibits wherever held and for whatever purpose planned. Such fruit shows give opportunity always for the study of specimens, sometimes for the examination of new varieties, and usually for the comparison of many good samples of old standard sorts. The man who is interested in fruits in a practical way cares only indirectly who gets the blue ribbon and who gets the red; but he is pretty sure, nevertheless, to be on hand when the judges make their awards. In fact, the man who knows varieties is commonly chosen on the committee of judges. Thus, though the subject of systematic pomology does not naturally include the judging of fruits, it seems very proper to say something here about how it may best be done.

In judging fine stock, poultry, butter, or seed corn a scale of points is commonly used.

Each character or quality is given its due weight, and the merit of any particular hog or sample of butter is estimated point by point. It has often been proposed that this system be adopted in judging fruits, especially at exhibitions where competition is apt to be keen. Thus far no great progress has been made, however, toward bringing the score-card method into vogue in this country. The most effective attempts appear to have been made in Canada, especially in Ontario, where fruit exhibitions are more popular and generally better conducted than in the United States. For the most part, though, experienced fruit judges, like those of the American Institute, the Massachusetts Horticultural Society, the Worcester Horticultural Society, etc., depend upon their extended knowledge of the fruits in exhibit, and make up their judgments offhand after an examination of the various samples.

This is not usually very difficult, especially when only a single variety is being passed upon and when that variety is one well known to the judge. It is almost always easy to eliminate the large majority of samples as being manifestly inferior, thus reducing the compe-

tition to two or three. Then by more careful examination and by repeated eliminations the various samples are thrown out up to the one best sample.

In judging large collections this offhand method is more unsatisfactory. Unless the judges are thoroughly experienced and known to be quite unbiassed, the results are sure to be disappointing. Under the best of circumstances it is difficult to convince every man who failed of the capital prize that his collection is really inferior to the one marked by the judges. It is certainly better for men whose knowledge of fruits is limited to avail themselves of the help of a good scale of points, and it is probably better for any judge or committee of judges to use a score-card whenever their decision is of considerable consequence or likely to be called into question.

The real difficulty arises in choosing a suitable score-card; for our lack of experimentation along this line has left us in this country without much knowledge of what is really required.

Mr. R. W. Starr, of Nova Scotia, who has probably had as much experience as any man

on the continent in judging fruit, says that he does not commonly use a score-card; but that in close competitions he makes up a scale of points about as follows:

Form	2
The specimens should have the normal character of the variety, and should be nearly uniform.	
Color	2
Should be bright, clear, and clean, and typical of the variety.	
Size	2
Good size is a sign of high cultivation.	
Freedom from Imperfections	6
Should not show worm-holes, spots, bruises, or blemishes; the stem should be intact, and the bloom undisturbed.	
Total points	12

The scale of points for judging fruits, established by the Massachusetts State Board of Agriculture, and sometimes (but not always) used at county and district fairs, is shown on the following page.

SCALE OF POINTS FOR JUDGING FRUITS

ESTABLISHED BY THE MASSACHUSETTS STATE BOARD OF AGRICULTURE

	Number of Points	*Score*
Quality	20	
Form	15	
Color	15	
Size	10	
Uniformity in Size	20	
Freedom from Imperfections	20	
Perfection	100	

In judging fruits it is manifestly better, if a score-card is to be used, to go one step further than indicated in the cards already shown. In order to have a scale of points perfectly adjusted to the characters of the fruit to be judged, it is necessary to have a different scale for each group of fruits. The same scale which would offer a good basis for the comparison of apples would not answer for peaches or gooseberries. In fact, to be entirely perfect the system of judging by points ought to be separately worked out for each

particular variety. In judging Ben Davis, for example, one ought to use a different standard from what he would use for Spitzenberg. A perfect sample of Ben Davis would hold its place in a competition more by its color, form, and soundness, while the best Spitzenberg would be rated at the head of its class for flavor and aroma.

The following score-cards, used by the Ontario Fruit Growers, do not go quite to the extreme just suggested, but they are a step in the right direction :

ONTARIO SCORE-CARD FOR APPLES AND PEARS

	Value of Points	*Score*
Form	10	
Size	10	
Color	10	
Freedom from Blemishes	20	
Uniformity	20	
Quality	30	
Perfection	100	

ONTARIO SCORE-CARD FOR GRAPES

	Value of Points	*Score*
Flavor	30	
Form of Bunch	10	
Size of Bunch	15	
Size of Berry	15	
Color	10	
Firmness	5	
Bloom	5	
Freedom from Blemishes	10	
Perfection	100	

In the judgment of the present writer, the Ontario score-cards place too much weight on quality in apples and flavor in grapes. It is well known that color counts more than quality in the market. Even if we renounce the market standards altogether, and judge apples and grapes solely from the standpoint of the amateur, we shall still find it very difficult to discriminate closely between two samples of McIntosh or Maiden's Blush or Bartlett on the point of quality. They will be more readily (and quite as justly) separated on the

basis of some other rating—form, uniformity, or freedom from blemishes.

Under present circumstances—that is, until the standards of judging become better recognized — each judge or committee of judges is at liberty to adjust the scales of points to suit their own ideals. The same judge might very properly change his scale for different varieties, or for the same variety exhibited under different conditions. Samples of Baldwin, for example, shown before the National Apple Shippers' Association would doubtless be judged differently from what the same samples would be judged before the Philadelphia Horticultural Society. The author's ideas on the proper design for score-cards, as nearly as they can be expressed in general formulas, are shown in the following examples:

SCORE-CARD FOR APPLES

Form	15
Size	10
Color	15
Uniformity	20
Quality	20
Freedom from blemishes	20
Total	100

SCORE-CARD FOR PEACHES

Form	15
Size	10
Color	15
Uniformity	20
Quality	20
Freedom from blemishes	20
Total	100

SCORE-CARD FOR PLUMS

Form	10
Size	15
Color	15
Uniformity	20
Quality	20
Freedom from blemishes	20
Total	100

SCORE-CARD FOR GRAPES

Flavor	15
Form of Bunch	20
Size of Bunch	15
Size of Berry	10
Color	10
Firmness	5
Bloom	5
Freedom from Blemishes	20
Perfection	100

A score-card for strawberries, suggested by Mr. J. R. Reasoner, of Illinois, is shown on the following page, with four varieties scored, to show the method of using it.

STRAWBERRY SCORES

Scale of Points	CHARACTER	*Warfield*	*Senator Dunlap*	*Brandywine*	*Marshall*
5	Rootage	4.5	4.5	4	4
5	Stock and foliage . .	4	4.5	4	5
7	Vitality, drouth proof .	5.5	4.5	5	5
10	Plant maker	10	10	6	5
5	Healthfulness, rust proof	4	4.5	3	3
5	Blossoms				
	Staminate		5	4	4
	Pistillate	5	....	....	....
25	Productiveness . .	20	20	16	14
10	Size	7	8	9	10
5	Shape	5	5	4	5
5	Color	5	5	4	5
8	Flavor	8	7	6	7
10	Firmness, shipping qual.	9	9	8	7
100	Totals	87	88.5	73	74

One of the most elaborate and carefully considered score-cards for fruits ever proposed in this country is the California score-card for oranges. This matter was fully discussed before the twenty-third session of the Ameri-

can Pomological Society in Washington, D. C., in 1891, when the approaching World's Fair at Chicago gave the matter a special importance. The views of the California citrus fruit growers were rather fully presented by Mr. J. E. Cutter.* It should be said, however, that the Florida citrus fruit growers, while not having such a definite system of their own for judging oranges and lemons, disagree materially from the schedule of points here presented from Mr. Cutter's report.

CALIFORNIA SCORE-CARD FOR ORANGES

Size		10
Form		5
Color		15
	Bloom	2
	Peel	10
	Flesh	3
Weight		10
Peel		10
	Finish	3
	Protective quality	7
Fiber		8
Grain		4
Seed		8
Taste		30
	Aroma	10
	Citrous quality	10
	Aroma	10
	Total	100

*American Pomological Society Proceedings, 23:154. 1891.

Some further explanation of this schedule of points seems necessary.

In size the following standards are proposed:

Large	"126's,"	$3\frac{1}{8}$ inches in diameter
Medium	"176's,"	$2\frac{3}{4}$ " " "
Small	"226's,"	$2\frac{3}{8}$ " " "
Mandarins and Tangerines		$2\frac{1}{8}$ " " "

Three-eighths of an inch in excess of these standards is to be allowed without discount to "medium" and "small" fruit, one-half inch excess to "large" fruit. For each one-eighth inch deficiency in any size, a discount of 1 unit in the score is to be made. Thus, if "medium" oranges, or "176's," were found to measure $2\frac{1}{4}$ inches in diameter instead of the $2\frac{3}{4}$ inches required by the standard, the difference of one-half inch would incur a discount of 4 units on the score of size, and the sample would score 6 instead of 10.

In form oranges must be either round, oval, ovate, or pyriform, and discounts from the perfect score of 5 are to be made for lack of symmetry or form blemishes. Navel marks are not to be discounted except when of abnormal size or of bad form.

Color is scored under three heads, as shown

by the card. The bloom should be perceptible, and any deficiency or injury should be discounted. The peel should be of rich deep orange color, in natural condition, and should be discounted according to the degree of deviation from this requirement. Rust, scale, and smut to be discounted 5 to 10 points, and fruit which gives visible evidence of having been cleaned of these defects should be subject to the same penalty. Peel which has been rubbed or polished, giving a gloss at the expense of breaking or pressing the oil cells, should be similarly discounted. The flesh should be rich, clear, and uniform, in any of the shades common to fine fruits. (The color of flesh should not be scored till after weight and peel, further down in the scale, have been determined.)

As to weight, oranges should have a specific gravity of 1; that is, they should have the weight of an equal volume of water. An excess (buoyancy) of three-quarter ounce is allowed to "large" fruit, of one-half ounce to "medium," and of one-quarter ounce to "small," without discount. For the first one-half ounce of buoyancy in excess of allowance, a discount of 1 point is made, and

for each additional one-half ounce, 2 points. (Buoyancy may be determined easily by fastening small weights to the fruits with light rubber bands and placing the whole in water.)

Peel counts 10 points, of which 3 go to finish, and 7 to protective quality. Finish requires that the peel should have smoothness and uniformity of surface, and should be pleasant to the touch. For protective quality, firm and elastic texture is required, with abundant, compact, and unbroken oil cells; and the peel should be one-eighth to three-sixteenths of an inch in thickness. Discount 1 point for the first thirty-second of an inch above or below required thickness, and 2 points for the second thirty-second of an inch shortage or excess. As the peel shrinks as the fruit cures, these standards are subject to some allowance for fruits freshly picked or for those thoroughly cured.

In scoring fiber the judge considers the core and septa. The septa should be delicate and translucent. The maximum diameter of the core should be three-sixteenths of an inch in "large" fruit, and one-eighth of an inch in other grades.

The grain should be fine, firm, and compact.

Seeds count against the fruit. One point is discounted for each of the first three seeds, and one-half point for each additional seed. Each rudiment is considered as a seed if any growth has developed, otherwise it is allowed without discount.

Taste scores 30 if perfect, and is considered under three heads — sweetness, citrus quality, and aroma. All the elements of taste here specified should be clear and definable; the sweetness should be rich rather than heavy; the citrus quality should be pronounced, showing abundant citric acid, but should be free from acerbity; the aroma should be pervasive and agreeable. Deficiency in any of these elements is to be discounted, and excess of sweetness is likewise to be discounted; also excess of acid in citrus quality. Any staleness or flavor of decay, or any unusual taste due to improper storage, etc., is to be discounted from aggregate of points under taste.

A very similar scale of points for judging lemons was proposed at the same time.

Without analyzing it fully, we may recapitulate it as follows:

CALIFORNIA SCORE-CARD FOR LEMONS

Size	7
Form	3
Color	10
Weight	10
Peel	10
Fiber	8
Grain	4
Seed	8
Taste	40
Total	100

When the problem before the committee is that of judging a large collection of fruits the difficulties naturally become much greater. Since the varieties in no two competing collections are the same, they cannot be checked off, plate against plate, and a direct comparison made. Even if each variety is judged by the score-card and the scores averaged, the result is not necessarily a fair settlement of all claims. The varieties in one collection may be such as rank low for color or for quality, judged in any single scale of points. And how can the judges say whether a Fallawater

scoring 93 points may rightfully offset a Shiawassee, scoring the same?

In such cases, where a thoroughgoing judgment is required, recourse may be had to some such plan as that adopted by the Ontario Fruit Growers' Association. To illustrate, we may refer to the catalog of grapes "prepared for the guidance of judges of fruit at exhibitions." In this catalog all the varities likely to be exhibited are given a rating, showing what should be their natural standing when each variety is properly grown. A few of the entries from the catalog on the following page will make the idea clearer.

With a catalog of this sort in hand the fruit judge might rate each variety perfect whenever it came up to the standard set for it. Its proper rating, in any case, could then be determined by dividing its actual score by the normal score as given in the catalog. Such a method is not practicable, however, in our present state of pomological development, except for very large competitions or very elaborate fruit shows. In all such cases it would be necessary to work out many details very carefully in advance.

CATALOG OF GRAPES

ARRANGED FOR THE GUIDANCE OF JUDGES OF FRUIT

VARIETIES	*Color*	*Season*	*Table Quality*	*Shipping Value*	*Market Value*	*Total*
Agawam	R	L	9	10	9	28
Barry	B	M	5	8	6	19
Brighton	R	E	9	6	9	24
Catawba	R	L	9	8	10	27
Concord	B	M	7	6	8	21
Delaware . . .	R	E	10	7	10	27
Empire State . .	W	L	3	4	4	11
Early Victor . .	B	E	4	3	3	10
Faith	W	E	2	2	3	7
Goethe	R	L	8	5	5	18
Hartford . . .	B	E	3	5	6	14
Isabella	B	L	3	7	6	16
Lady	W	E	7	3	5	15
Moore Diamond .	W	E	7	7	8	22
Niagara	W	M	9	5	9	23
Salem	R	M	8	8	8	24
Vergennes . . .	R	L	7	9	7	23
Worden	B	E	9	4	8	21
Wilder	B	M	8	9	8	25

GLOSSARY

The page numbers indicate where terms are defined or specially referred to in the text.

Acid, distinctly sour, 53.

Anastigmat, a photographic lens having anastigmatic properties; one which is corrected for astigmatism; specifically, one which comes into focus on all parts of the photographic plate at once, thus giving what is known as a "flat field" of view, 29.

Apex, the end of a fruit or leaf opposite the stem, 58.

Apical, pertaining to the apex; the apical end is the end opposite the stem.

Areolar, applied to dots on the surface of fruits, which appear to have centers of one color, surrounded by more or less distinct rings of another shade, 50.

Basin, the depression at the apical, or "blossom" end of a fruit, especially one of the pome fruits, 46.

Berry, any pulpy or juicy fruit with several seeds loosely set in the pulp; the gooseberry and grape are good examples.

Bisexual, having both sexes represented; said of strawberry blossoms, 74.

Bloom, the powdery or downy covering seen on ripe fruits, 52.

Calyx, the outer set of floral leaves in a flower; interesting to the pomologist chiefly because these leaves usually hold on to apples, pears, and other pome fruits until ripening time, when they may be found in the basin or eye, 49.

Cavity, the depression about the stem of a fruit, 43.

Chalaza, the mark on the back of a grape seed, 92.

Commercial pomology, the business of selling fruit, particularly when the fruit is sold by the grower, 2.

Compressed, flattened sidewise, 56.

Drupe, a fruit having one single hard seed surrounded by flesh, as a cherry.

Eye, the basin, with the calyx; applied to stone fruits, 47.

Flat, applied to fruits which are extremely oblate, 38.

Folded, the same as plaited, which see; used in the description of cavity or basin, 46.

Hardiness, the degree in which a tree resists cold or other injurious influences. Usually applied to cold-resistance, but may be applied with equal propriety to the power of resisting heat, disease, etc., 19.

Hermaphrodite, having the organs of both sexes; said of strawberry blossoms, 74.

Imperfect, having pistils only, while lacking stamens; applied to strawberry blossoms, 74.

Irregular, applied to fruits in which the horizontal section is not circular; used also in describing the cavity or the basin of the fruit, 40.

Lanate, wooly, with long, soft hairs.

Lopsided, the same as oblique, 38.

Nomenclature, the science of names; or a system of names applied to a particular series of objects; or a collection of terms used in a particular science or craft, 6, 98.

Oblate, applied to fruits in which the vertical diameter, from stem end to apex, is distinctly less than the horizontal diameter, 36.

Oblique, said of fruits in which the vertical axis and the horizontal diameter do not seem to cross at right angles, 38.

Oblong, applied to fruits in which the vertical diameter, from stem end to apex, is greater than the horizontal diameter, 36.

Orbicular, nearly circular in outline.

Peduncle, a flower or fruit stalk, 83.

Perfect, having both stamens and pistils; applied to strawberry blossoms, 74.

Pistillate, bearing pistils only; applied to various imperfect flowers, but especially to strawberry blossoms, 74.

Plaited, applied to the cavity or to the basin when the irregularities are very deep, and when they appear to be folded, or plaited, 44.

Pome, a fruit having a core normally containing several seeds, as an apple.

Pomology, the science of fruits, 1.

Pomologist, one who studies, understands, or practices pomology.

Practical pomology, the practice of fruit growing, 1.

Pyriform, pear-shaped.

Raphe, the cord which runs from the chalaza over the top of a grape seed.

Rapid rectilinear lens, a photographic lens made in two sections, with a diaphragm between, in such a manner as to prevent the distortion of lines. A poor lens renders straight lines as curves. A rectilinear lens should always render straight lines straight, 31.

Regular, applied to fruits in which the horizontal section is circular or very nearly so. Used in a very similar sense in describing the cavity or the basin of the fruit, 40.

Reniform, kidney-shaped, 21.

Ribbed, applied to fruits having distinct longitudinal ribs, 40.

Rugose, wrinkled.

Self-colored, composed of one solid color; having only the ground color, 50.

Shoulder, that portion of a cluster of grapes formed by a branch from the main stem, 88.

Subacid, mildly sour, 53.

Suture, the depression in the surface of many stone fruits, running from the stem toward the apex, 58.

Sweet, without acidity, and having more or less sweetness to the taste, 53.

Systematic pomology, the description, naming, and classification of fruits; pomological taxonomy, 5.

Taxonomy, the science of classification; literally the science of names, 240.

Tomentose, having a fine, matted, wooly covering; especially applied to leaves.

Type, a group of fruits showing the same characters.

Unequal, having one side larger than the other, 38.

Wavy, having the cavity or the basin irregular in such a manner that the irregularities look like little waves, 44.

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