One of the marked and strongly stamped characteristics of man, is his constant and ungratifying desire for variation. Mortal beings are not content to use the same thing always; to travel in the same old rugged path; there must be a change, however small, or in whatever direction it takes.

The eye commands an alternation of colors, a change of form, a constant desire for something new in order that it may not become weary and in like manner, the ear demands variation in sounds to harmonize with the auditory temperment of man.

The sense of taste is of no less importance, perhaps, than that of seeing or hearing, yet it imperatively demands a constant variation, and will be gratified. It is constantly seeking something new and urging man onward to satisfy this craving.

And in accordance with this law, although the Creator intended that plants should reproduce by their seeds, we find man constantly aiding nature, whether he evokes the mysteries of artificial fecundation, or propagates species by grafts layers or cuttings. And who shall limit the progress of science, and its application to man in this boundless field? When reasoning man does with science and skill what has hitherto been left to wind and insects, the most important results may be anticipated.

It has long been known that there is a marked tendancy, in plants, when successfully propagated from the seed, to depart from the character first stamped upon them. These departures give rise to new varieties. This tendancy to vary is increased as plants are removed from their

native localities and in an eminent degree through cultivation. Planted in gardens and subjected to high culture, often develops striking changes in those which for previous centuries had remained unchainged. By a constant selection of seeds from the best, a gradual improvement on the original is effected. Most of our finest fruits doubtless owe their existance to this improving process.

When trees are raised from the seeds, as before stated, there is no certainty that the same identical variety will be reproduced. In many cases, the shade of variation will be scarcely perceptible; in others, it will be wide and distinct. It hence becomes desirable in preventing a return towards the original wild state, or, in other words, to perpetuate the identical individual, thus highly improved,

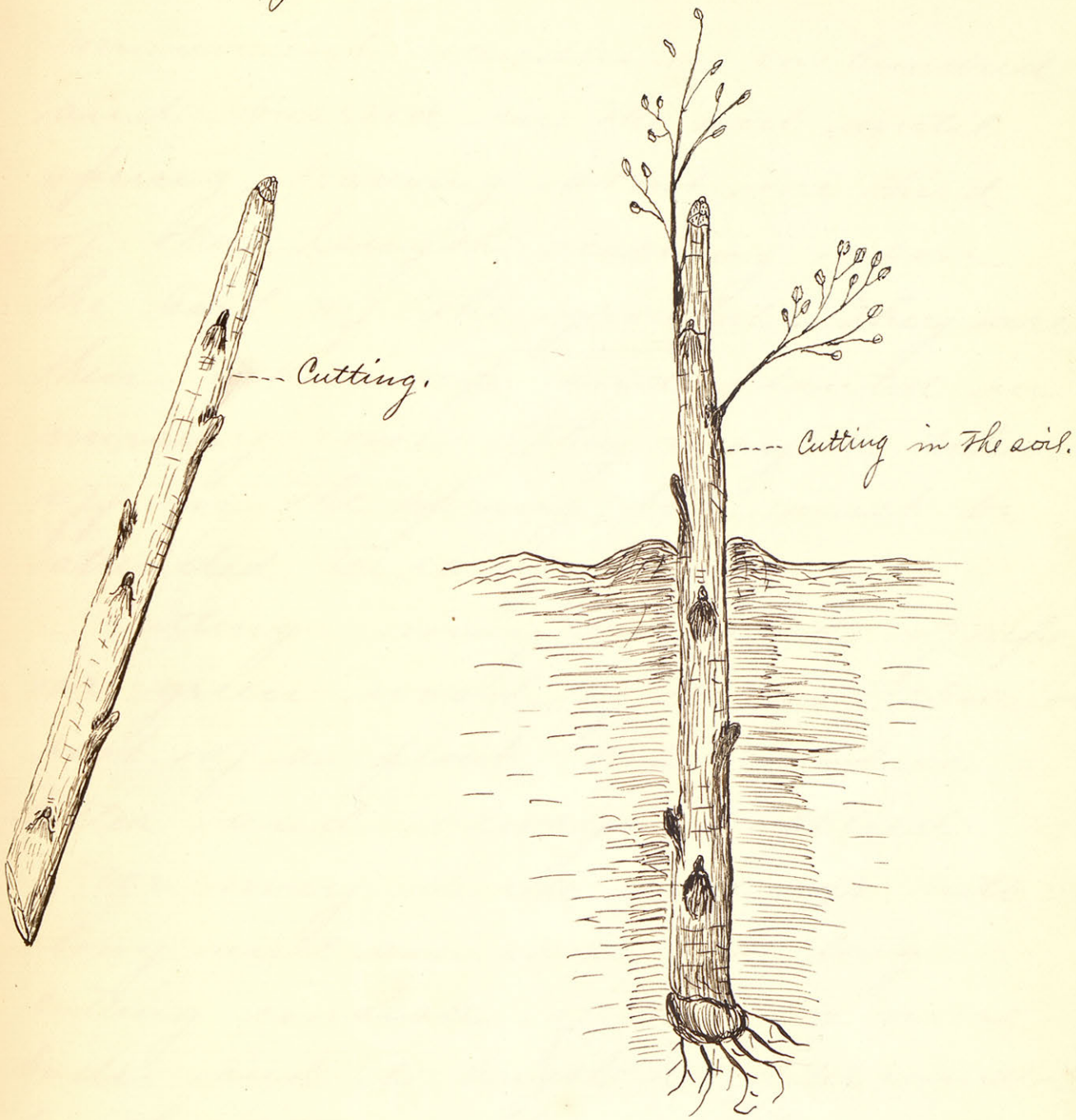
to adopt some other mode of propagation for the purpose of multiplying plants of such varieties as possess a high excellence, instead of constantly creating new ones, which are apt to prove worthless.

Bud variation is possible and sometimes is taken advantage of. The most common way is through the seeds. But the same individual variety can be reproduced only by separating the buds, or shoots, bearing the buds of such individual plants.

This multiplication or propagation of varieties is effected in several ways. First, by cuttings; second layers; third Grafting and fourth by Budding.

Without these means of reproduction our delicious fruits could have never been tasted, except as picked from the single parent tree.

Fig I.



Propagation by Cuttings.

Propagation by cuttings is the simplest mode of multiplying a variety. It consists in taking a shoot, usually, of the previous years growth and inserting it in the ground at the proper time and season. Figure 1. Roots form at the lower end and the cutting becomes an individual plant.

All fruit trees may be propagated in this way, by using proper care and precaution. But as some are very difficult to multiply by this means, and are more readily reproduced by other methods, it has not become a common means of propagation. Under ordinary circumstances this mode is applicable only to such species as readily throw out roots, as the Currant, Goosberry, Quince and Grape.

The cuttings may be prepared in the fall or winter, tied up in

convienient bundles of one hundred and burried in the soil until spring, leaving about one third of their length reaching above the level of the ground. They are then taken up and planted in nursery rows. They may be taken off in the spring, but must be attended too, early.

Cuttings may be made of ripe or green wood, of the leaf, stem or root of a plant. Ripe wood is better and always prefered.

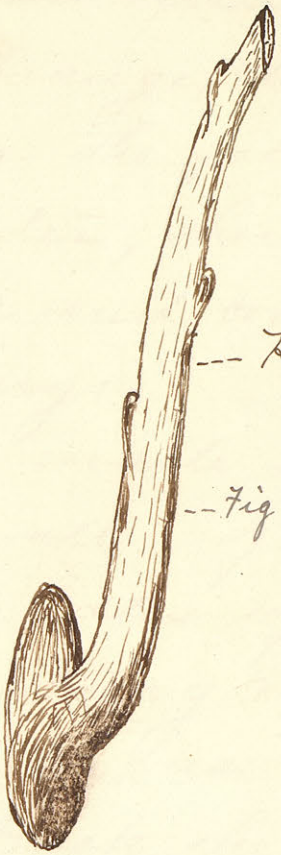
We may devide cuttings into long and common. The long cutting consists of three or more buds and its length is determined by the distance between the buds. Common cuttings usually have two or three buds and their length is determined in the same way as in the long cuttings.

In making cuttings, there should be left about one inch of wood below the lower bud and two inches above

Plate II.

--- Mallet cutting.

Fig 2



--- Heel cutting.

Fig 2

--- Single eye cutting.

Fig 3

the upper one.

Different Methods. Plate II.

Heel and Mallet cuttings are used, generally, in the propagation of Roses. Some of the old wood is removed with the new. And these kinds with their mass of cambium are the strongest. Fig. 2.

Single Eye Cuttings.

This is a method used in any plant in which we devise to make the most plants from a given quantity of material. They are called single eye, because there is but a single bud to each piece. Fig. 3.

Propagation by this method takes greater care than by the first method described, (Fig. 2) and is commonly used in indoor reproduction, i.e. Green houses and with garden plants.

Root Cuttings.

A Root Cutting, as the name implies, is a piece of a root containing a bud or capable of producing buds.

all suckering plants are propagated by Root Cuttings, as Blackberries, Red Raspberries, Osage Orange, Etc.

They are prepared in the fall, placed in sand over winter, then dropped in furrows and covered up.

Handling Cuttings.

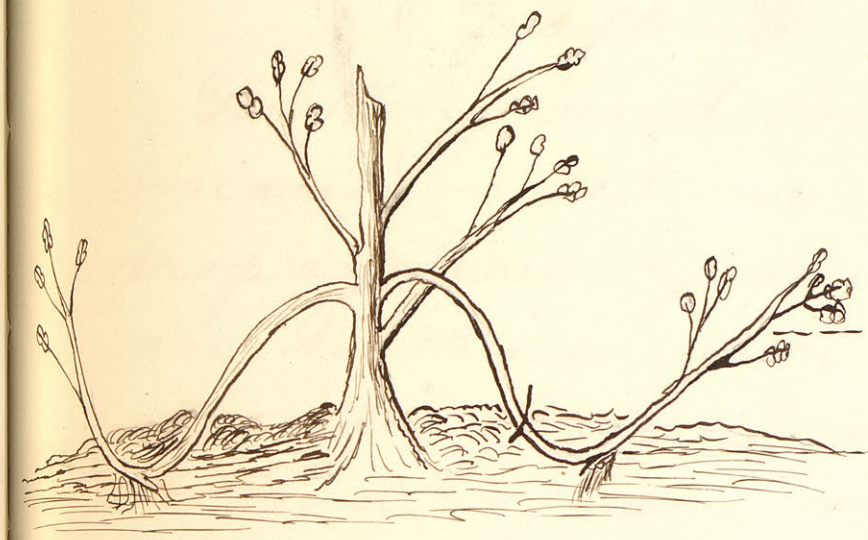
Cuttings should be made with a sharp knife and all of uniform length. Tie up in bundles of one hundred with some strong material. Wilow withs are preferable, as they do not rot readily. Pack the bundles in moist sand, in a good cool place, in order that they may remain dormant until spring.

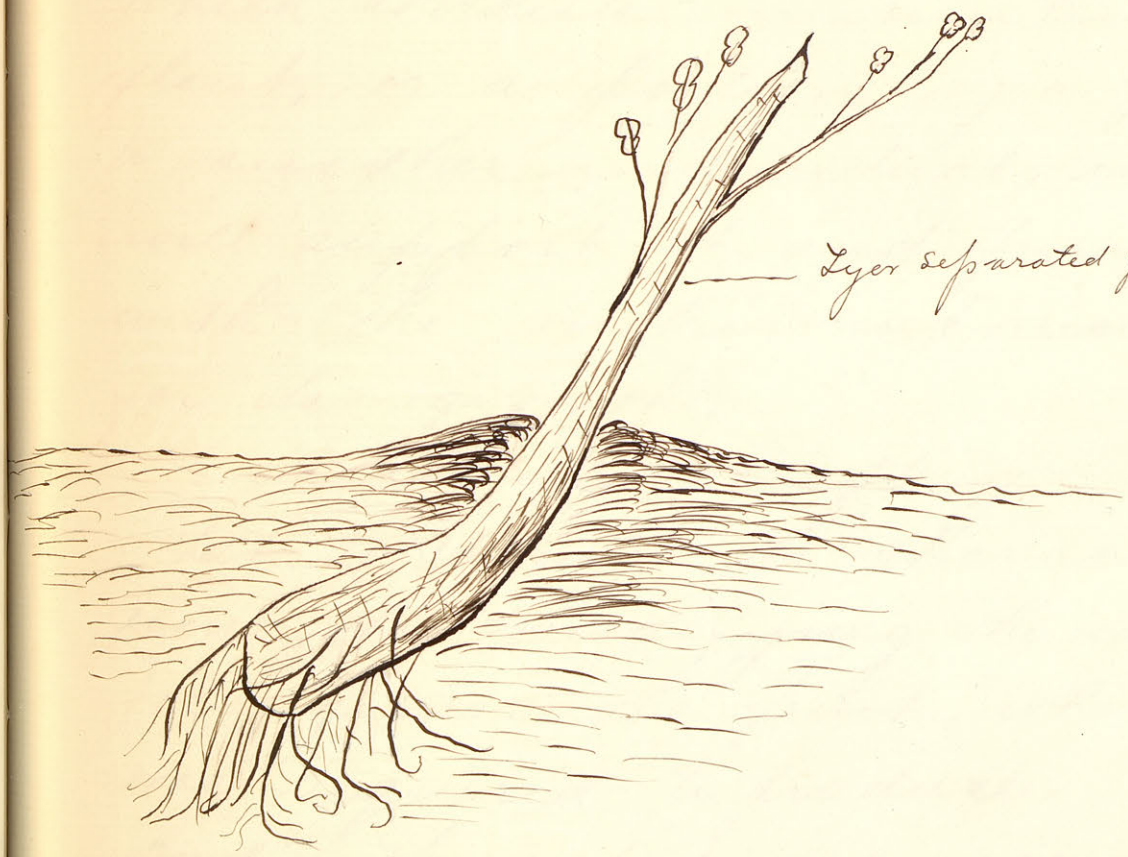
Propagation by Layers.

A Layer is nothing more than a cutting, except, that it is partially attached to the parent tree or shrub. The advantage over the cutting is that it is nourished by the parent plant while the roots are forming. Thus many plants that are not easily reproduced by cuttings

Plat, III.

Fig 1





and indeed with great difficulty
by Budding and Grafting may be
propagated readily by Layers.

Method. Plate III.

The lower branches of the plant
are bent down and buried with-
the exception of the tip. Sometimes
the branch is split or cut,
immediately under a bud in
order that the desired callous may
be formed. When the Layer is
firmly rooted, it should be severed
from the parent tree and in
due time may be removed and
transplanted. Fig. 1.

Layers like Cuttings may be made
of the ripened wood, in Autumn or
Spring, or of the growing wood, at
or a little before mid-summer.

Almost all woody or herbaceous
plants may be propagated by
Layers, if they are given time to
root. Those easily given to Layering
are; Currants, Gooseberries, Grapes,
Honeysuckles. Most common, however,

are the Roses, Snowballs &c.

Grafting.

Grafting and Budding are the means most in use for the propagation of fruit trees. They are nothing more than the inserting upon one tree the shoot or bud of an other.

Grafting is an operation which consists in uniting a plant, or a portion of a plant, to another individual, which will support it and furnish it with the nutriment necessary for its growth.

Objects of Grafting.

1st. To change the character of a plant, by modifying the wood, the foliage or the fruit, which it was required to produce.

2nd. The rapid increase of propagation of valuable sorts of fruits, not easily grown from seeds and cuttings, as in the case with nearly all varieties.

3rd. To renew or alter the heads of trees partially or fully grown, resulting in the raising of fine fruit upon practically a worthless tree.

4th. To make certain foreign fruits more hardy by Grafting them upon more hardy varieties as the Foreign Grape upon the native.

5th. To hasten seedling varieties of fruit, or of such as are a long time in producing fruit, by Grafting them upon branches of mature bearing trees. Thus a seedling Pear, which would not bring forth fruit in a dozen years, ordinarily, may be made to bear in four or five years by this method.

Conditions of Success.

Grafting is most successful when there is a very close relation, between stock and Scion, as in the variety. Next to the variety comes the species, followed by the genus. Out

side of the Genus, Grafting is not successful, practically speaking.

Other essential features of success are a good sharp knife and clean work, a close contact of the cambium layer on both parts and the stock should be more advanced in the growth than the scion.

Preperation for Grafting.

Gathering of stocks and scions is usually done in late fall or winter. They should then be placed in moist sand and stored away in a cool cellar, preparatory to the time of using.

The scions are of hearty last years wood and the stocks are of seedling varities of two or three years growth. Each first class root will make three stocks.

Methods of Grafting. Plate IV.

The most convinient as well as the most common way of Grafting is by the Tongue method. This method consists in taking a

Plat IV.

Fig I.

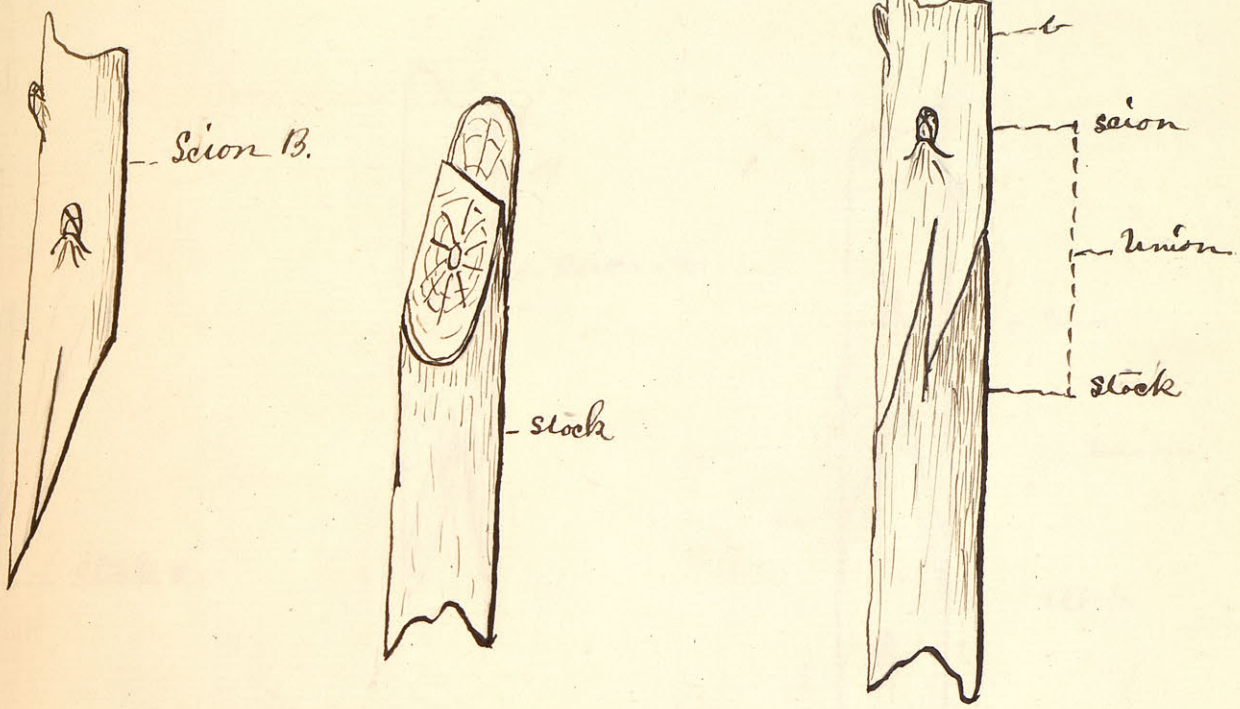
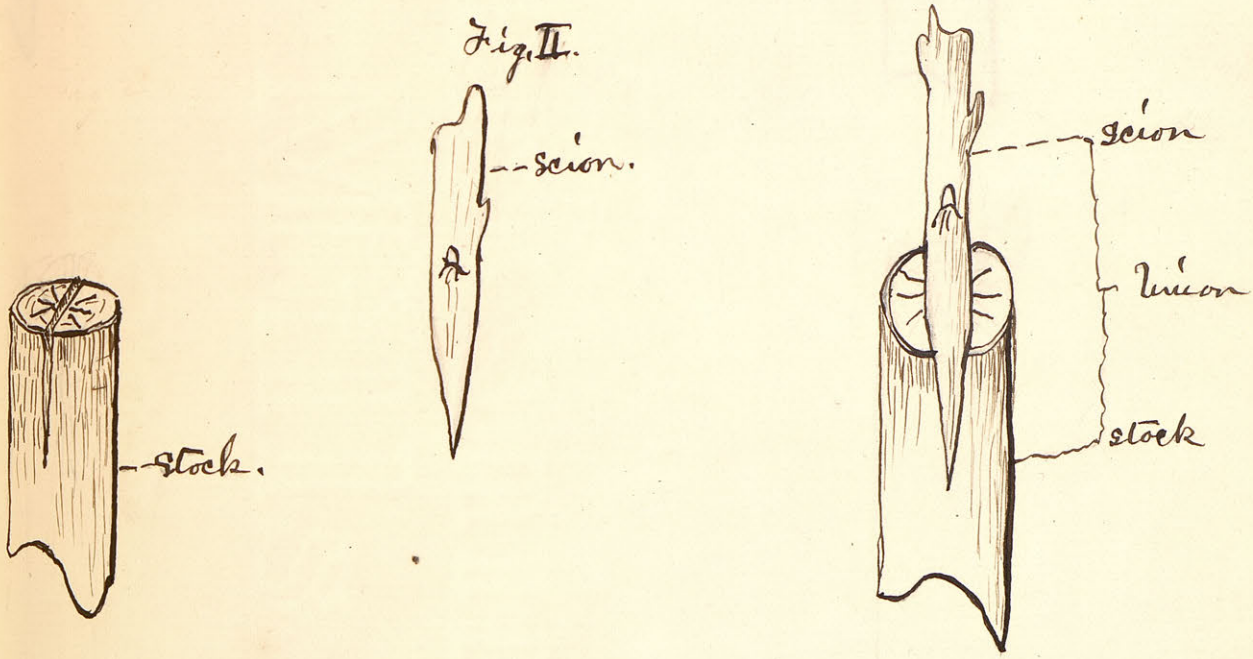


Fig II.



scion and a stock of nearly the same size. The scion, s, fig. 1, is cut with a very long sloping or splice cut; in this a long notch, a, fig. 1, is cut for about two thirds of its length. The stock is then cut to correspond, then the scion is inserted upon the stock so that the cambium layers coincide.

When the stocks are small Tongue Grafting may be employed to an advantage. But when the stock is very large, a better method to employ is, what is known as cleft Grafting. The stock is split, the scion is then made wedge shaped and placed into the cleft. Fig. 2. In practicing this style of Grafting the union should be waxed to protect it from the weather.

Another method, that may be used where the scion's and stocks are nearly the same size is Saddle Grafting. The stock is sloped off on either side, giving it the form of a wedge, fig. 3. a.

The scion is split in the middle and each side taken away with the knife, until it will closely fit the stock, like a saddle— hence its name.

This style of Grafting like the previous should be waxed or wrapped to hold in position and for protection.

As, was stated in the begining, there are numerous methods of Grafting in use. The ones I have illustrated are the most used in indoore and outdoore Grafting. Other methods are modifications and perhaps improvements on these but are not so commonly used.

Care of Grafts.

Grafts, that are made inside, should be wrapped with light wrapping twine or bound with cloth, soaked in a mixture of Grafting wax to preserve the union and for protection, tie them in bundles of suitable size— fifty or one hundred in a bundle— pack away in moist sand until spring, then set them

out in nursery rows. All outside grafting should be protected likewise.

Budding. Plate VI.

This method of propagation is closely related to Grafting, and is essentially Grafting somewhat modified. In Grafting several buds are used, while in Budding only one bud is employed.

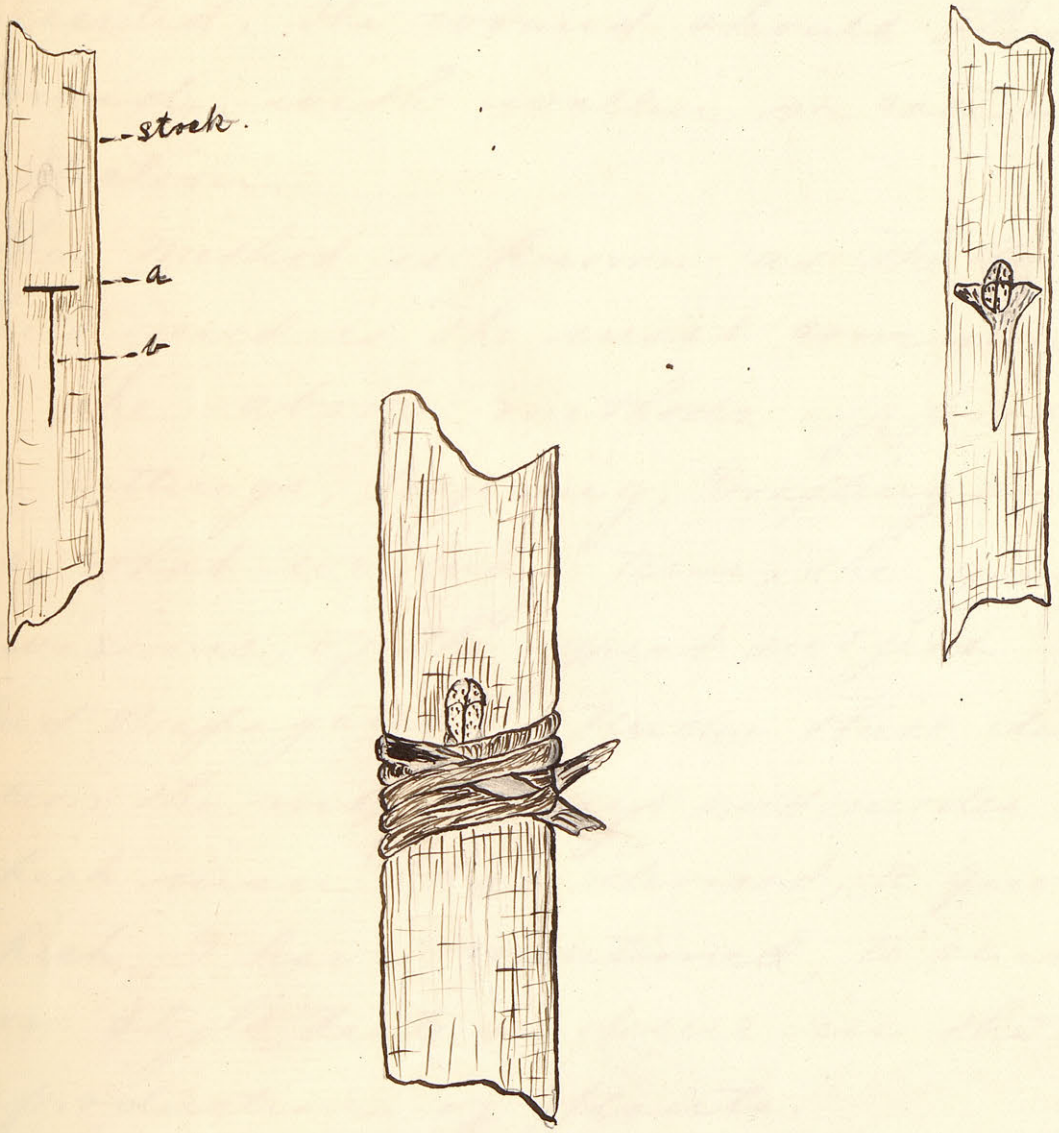
It is based on the principle, that each bud is capable of producing an individual, under the proper circumstances.

This is best performed when the stock is in a state of vigorous growth, and is especially applicable to those varieties which command extra skill in Grafting, as all the stone fruits; i.e. Peaches, Plums, Apricots etc.

The proper season in this country is from July to the middle of September. It can always be performed when the bark of the stock parts or seperates freely from

Plate VI

Fig 1.



the wood and when the wood buds are plumps and the young wood is growing firm.

There are four methods in common use in this country, i.e. American Shield Budding, common shield Budding, Reverse Shield Budding and Annular Shield Budding.

The name, "Shield Budding", arrises from the form of the strip of bark which is attached to the Bud-Graft. The shape of it, however, is variable. It may be oval, square, triangular, obtuse &c - but in any form it is termed a Shield Bud.

The buds are taken from the currant year, if the operation is done in the summer, and from the shutes of the previous year if done in the spring.

The preperation of the stock, in Shield Buddings, consists in making two incisions in the bark with a sharp knife at right angles to each other and forming a cross or T, Fig 1.

The bud is then removed from the scion. Then with a proper instrument the edges of the longitudinal incision (b. Fig. 1.) are raised up and the bud inserted. The wound should then be bound with woollen or cotton for protection.

This method is known as the American Shield and is the most common one.

The above methods of propagation, i.e. Cuttings, Layering, Grafting and Budding are, what we may term, the general divisions of the great subject of Bud Propagation. Under these divisions follow the many ways and modes in which man has devised, a few of which I have mentioned, to suit his own style, taste or desire in the reproduction of plants.

The first method used in the propagation of plants was, undoubtedly, that of cuttings. And was probably first noticed where small branches or twigs of trees became broken off & fallen to the ground, covered with

soil- taken root and grown.

As some varieties of plants are difficult to reproduce in this way, we easily see how the transition from cuttings to Layers came about- compelling the parent tree to furnish nourishment for the new individual until it had became firmly rooted and able to sustain life itself.

There can be no doubt but that the first hint of Grafting was communicated to the early gardners by nature. Excellent examples of Grafting by inarching are found in nature and from this mans ingenuity has developed the many methods in use at the present day.

This method of propagation is as old, as the civilization of Europe. The Apostol Paul, in his inspired writings mentions the Grafting of the Olive. Upwards of twenty different modifications of Grafting were mentioned by the ancient

Roman writer Varo. Pliny, also, mentions interestingly, grafting that was performed on a tree in the "Garden of Lucullus", where a single tree bore Olives, Almonds, Apples, Pears, Plums, Figs and Grapes. But it is quaintly noted that the tree did not live long and proves that deception, in the propagation of fruit trees, was practiced even at that early day.

In modern times Grafting is employed more extensively than the other methods of propagation, in the reproduction of the different kinds of fruits.

The French, who, aside from using the other modifications, practice over fifty ways of Grafting and successfully.

Budding is man's own invention. The idea evidently grew out of Grafting and both methods are essentially the same — in the one a single bud is used while in the other many are

employed. It is a method that is used most successfully in the propagation of the Stone fruits.

By these different modifications of propagation — which are artificial — we have filled our Graperies and Gardens with the choicest of fruit, enabling us to gratify the ever ruling desire or passion of individuals for variety as well as effecting transformations and improvements in all trees and shrubs no less beautiful than they are valuable.

It is not, however, mearly as a source of income that the cultivation of the finer kinds of fruits become profitable. The family, which is at all times supplied with delicious and refreshing fruit, from its own gardens, has within its reach, not only a very important means of economy, but of real domestic comfort.

The difference between a dwelling with well planted grounds and

well furnished with every rural enjoyment, and an other where scarcely a fruit tree softens the bleakness and desolation, may in many instances, to a young man just approaching manhood and active life, prove, on the one hand the turning influence between a life of virtue and refinement, or on the other one of dissipation and ruin, from the effects of a repulsive home.

Nor can any man, even in the noon or approaching evening of his life, realize his life's dream, or fail to enjoy a higher happiness without, at least, occasional intercourse with the blossoming and loaded trees which his own hand has propagated, planted and pruned, than in the noisy crowded busy world.

W. E. Smith.