HINTS

ADDRESSED TO

PROPRIETORS OF ORCHARDS,

&c. &c.

Printed by A. Strahan,
Printers-Street, London.

HINTS

ADDRESSED TO

PROPRIETORS OF ORCHARDS,

AND TO

GROWERS OF FRUIT

IN GENERAL,

COMPRISING

OBSERVATIONS ON

THE PRESENT STATE OF THE APPLE TREES, IN THE CIDER COUNTRIES.

MADE IN A TOUR DURING THE LAST SUMMER.

ALSO

THE NATURAL HISTORY OF THE APHIS LANATA OR AMERICAN BLIGHT, AND OTHER INSECTS DESTRUCTIVE TO FRUIT TREES.

BY WILLIAM SALISBURY.

A good husbandman saith, be still doing one good turn or another unto the earth and the tree, and they will do the like to you againe. *Maison Rustique.*

LONDON:

PRINTED FOR LONGMAN, HURST, REES, ORME, AND BROWN, PATERNOSTER-ROW.

And sold by the Author at the Botanic Garden, Sloane-Street.

1816.

PREFACE.

I KNOW of no character in private life that I hold more contemptible than the man who indulges himself in finding out faults with which he takes a pleasure in taunting his neighbours, and little more do I esteem those who publish the errors of others, merely for the purpose of shewing to the world, that they can ride through a country with their eyes open. On the other hand, I always hold any person excused, if in his excursions, he observes any

palpable errors, and endeavours to point them out on the pure motive of shewing how the mischiefs which result from them, may be avoided or lessened in their effects. The latter intention is my only view in publishing the following hints, and, as such, I trust, like any other person not accustomed to write for the press, but who takes up his pen from similar motives, that I shall stand excused for any error or want of that dignified style in which most of our books, at this period of British erudition, are published.

The difficulty of seeing our own errors and the natural inclination of mankind to shut their ears, whenever they are assailed with truths at variance with their conduct,

renders the task of pointing out such faults as are explained in the following pages, a great and arduous undertaking. In justification for this intrusion, I must however say, that the bad state of our apple-trees, at this time, is the general theme; for if we travel in a stage coach, or mix with company at an inn, or call at a farm-house, the conversation is found generally to turn to this point, and mostly ends with the prediction, that there is no chance of again seeing a general hit of fruit, or that cider will ever again be made in this country as it used to be; and I have in several instances heard farmers declare, that the land would be more valuable if all that was thus occupied, was turned to any other mode of culture, for that the apple-

trees in their present state, are little more than an incumbrance on the ground, as, by preventing a due circulation of atmospheric fluid, they render what would otherwise be good pasturage, sour and unfit for the food of cattle.

I am by no means so sanguine as to expect that the hints I have thrown out will be sufficiently noticed, or the antidote to the mischief generally applied, being aware of the length of time it will take to work a reformation, or to overcome the prejudices such disappointments have led to. The extent of labour necessary to apply any means for improvement in the present day will afford the argument "that it falls to the convenience of few proprie-

tors to use it to its fullest extent," to this I readily assent, but at the same time I must observe, there are but few who may not avail themselves of its benefit to a certain degree, and I am certain that those who may make the experiment will allow the following fact, "*that no more fruit trees should be suffered to grow on any farm than can be allowed the proper management necessary to promote the ends for which they are intended.*"

The want of the advantage of a knowledge of entomology among the growers of fruit, has left us almost destitute of any acquaintance with those insects which are found most noxious to trees in general. But as this branch of natural history is ad-

vancing in this age of science, and as there are persons who are capable of making the proper investigation, I trust the time is at hand when this subject will become the consideration of men who may profit both themselves and the public thereby. With a view to excite their attention to the subject, I have ventured to publish the following history of a few of different kinds. At the same time I am aware of its imperfections, but nevertheless, should the necessary corrections it requires stimulate others, who from their avocations have better opportunities than myself, to pursue this subject in a similar way, I shall have obtained my end, and I trust with such motives I shall stand excused in thus having attempted a subject which could have

come much better from more able hands.

And as it may probably become a question, how as an individual I should have had the opportunity of making the observations which are contained in the following sheets, or how a person residing at such a distance could have bestowed the time that must be necessary for the purpose; I must answer, that I have had occasion for the last four years to travel those counties more frequently than falls to the lot of men of my profession in general. It may also be remarked, that I have had an interest in the subject greater than most other persons, who perhaps, with more enlightened and intelligent minds than myself, may have visited

the same neighbourhood. Having some time since purchased for the sake of propagation, the stock of new fruit trees raised by Mr. Knight, at Elton, near Ludlow, I have of course had more than a common reason to make comparisons on the state of decay of the old varieties of fruits, with the consequent improvement of the new ones; and thus with the advantage of the honour of the above gentleman's friendship, together with a respectable acquaintance in that county, I have been enabled to give the public the following remarks, and should they be the means of stimulating any one to improve this department of agriculture, I shall feel myself happy in thus having rendered a benefit to a country where the hospitality of all ranks of people

does them the greatest honour. I must however remark, that although my observations have been made principally in Herefordshire, and the adjoining counties, I am certain of some of my remarks being very applicable to Sussex, and many other parts of this kingdom, for although some of the farmers in that county have had good crops this season*, yet I must observe that many of their fruit trees require more attention than they appear to receive. And should it fall to the lot of the following pages to be read by any gentleman interested therein, the Author entreats them to reflect, that if all the observations should not strictly apply, yet

* Several farmers near Petworth have this season paid their rent by the produce of their orchards!

both moss and misletoe produce fertile seeds, and most insects even the aphis lanata has wings.

Botanic Garden, Sloane-Street,
London, January 1816.

The Reader is desired to correct the following

ERRATA.

Page 78, line 12, *for* it has left *read* it has some of it left.
70, 23, *for* fig. 13 *read* fig. 11.
74, 11. *for* a perfect *read* an imperfect.
89, 14. *for* pupa *read* larva.

CONTENTS.

Description of Plate I.

No. 1 and 2. The branch and root of an apple tree with the American blight Aphis Lanata feeding on it, in its different states, p. 41.

3. The same insect magnified, p. 41.

4. The same magnified still higher and detached from the nest, p. 41.

5. An insect of the same kind which has obtained wings, p. 41.

6. The Caterpillar of the Black veined Butterfly, Papilio Cratægi, p. 55.

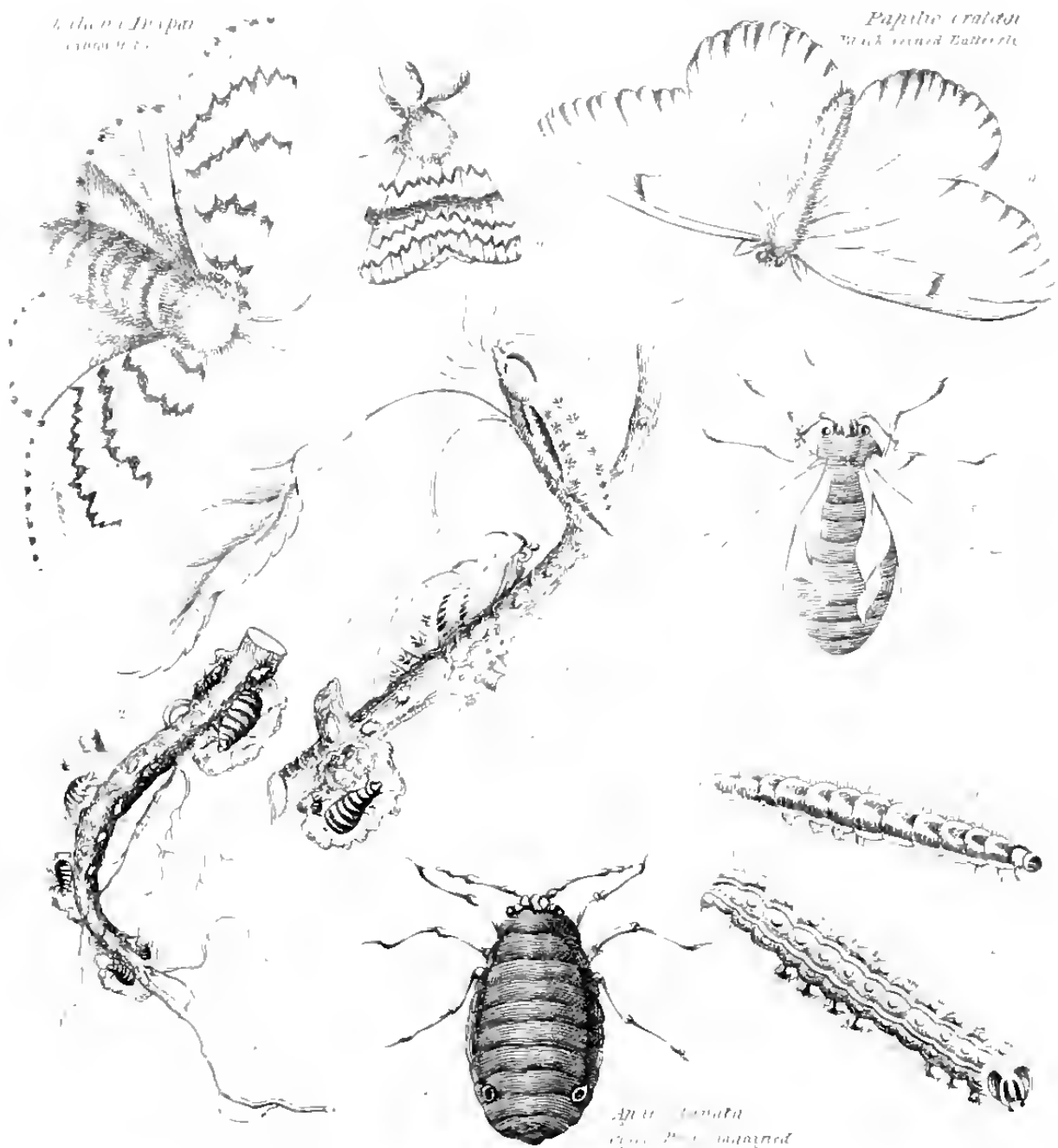
7 and 8. The same insect changed into the Chrysalis state, p. 61.

9. The Butterfly in its perfect state, p. 64.

10. The Caterpillar of Phalæna Dispar, Gypsy Moth, p. 67.

11. The male and female Insect in a perfect state, p. 70.

Ph. Papilio. Crataegi.
Bl. veined Butterfly

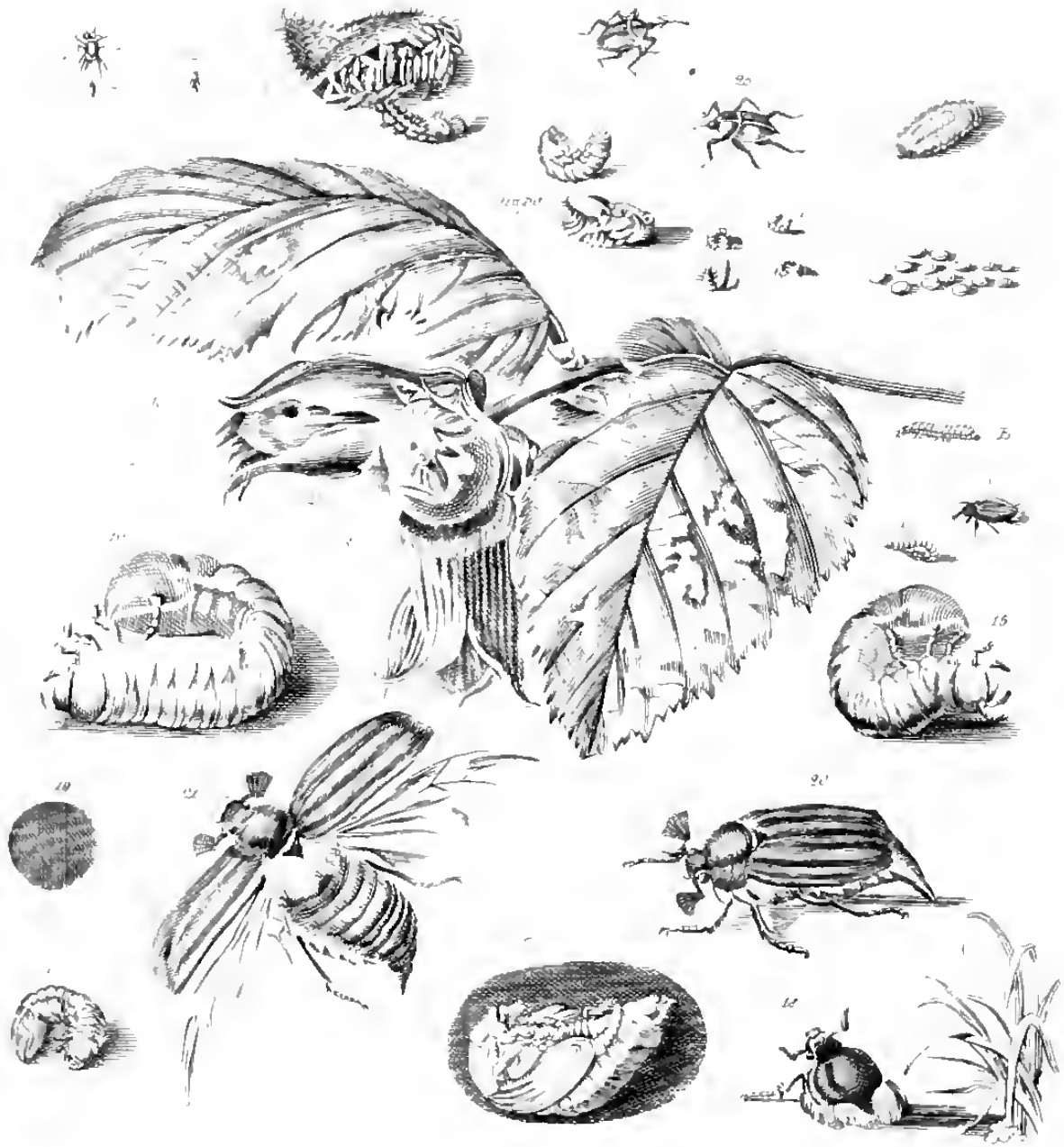


Description of Plate II.

12. The Eggs of the Cock-chafer, *Scarabæus Melolantha*, p. 73.
13. The Larva or Grub in its first state, p. 74.
14. The same Grub at one year old, p. 75.
15. The same at the second year of its growth, p. 75.
16. The same insect three years from the egg, p. 76.
17. The same in the Chrysalis state as it changes the fourth year, p. 78.
18. The Chafer as it appears first emerging from the earth, p. 80.
19. The holes in the ground denoting their breeding-place, p. 80.
20. The perfect Chafer in a sitting posture, p. 80.
21. The perfect Chafer as it appears flying, p. 80.
22. A branch of a Filbert Tree to exhibit the Nut Beetle, *Curculio Nucum*, p. 85.
23. The Larva as it is found within the nut when stretched out, p. 89.
24. The same curled up and changing into the pupa state, p. 89.
25. The female Beetle, p. 90.
26. The male do. p. 90.
27. The pupa of the Brown-tail Moth, after it is attacked by the Ichneumon, p. 95.
28. The Ichneumon Fly of its natural size, p. 98.
29. The same magnified, p. 98.

A. The Beetle that destroys the bloom-bud of the Apple-tree in the spring, p. 90.
B. The same in the larva state, p. 91.
C. The Chrysalis of the same, p. 92.


20
25
12
B
A
C
15
1
1a



ON THE NATURE OF FRUIT-TREES IN GENERAL, THE INJURIES THEY ARE LIABLE TO, AND THE PARTICULAR ATTENTION NECESSARY TO BE PAID TO THEM, SO AS TO ENSURE HEALTH, VIGOUR, AND LUXURIANCE OF GROWTH.

WERE a person to ask of any one who had been viewing human nature only through a common medium, the question, "What a man was?" The following, or some such, would naturally be the answer: He is a being possessing life, motion, and will; he walks upright, and has many peculiar propensities; the most predominant of which are, that he is always sensibly alive to the slightest injury, and particularly fond of good eating and drinking. But were I to ask the same question of a skilful surgeon, he

would answer me that he was a subject composed of a number of very curious materials, put together in the most artificial manner, and formed into muscles, fibres, arteries, veins, nerves, blood, &c. &c. so nicely contrived to act in unison, that from his birth to his death, a never ceasing motion and circulation is kept up. So that, when viewed in this light, he exhibits a system of mechanism which appears wonderful even to the most enlightened artist. The dependence of all which parts upon one another are so connected, that the whole becomes diseased from the slightest injury being given to any one part, be it ever so minute.

Now, was the same question put to the generality of persons as to their knowledge of an apple or pear tree, they would answer, that it was composed of leaves, branches, trunk, roots, &c.; that it had a tendency to increase in size, and, like a man, it was fond of nourishment, and throve most in such soils as suited it best. But, were I to put the same question to one who had considered

the subject philosophically, he would answer, that it was an organic body possessing life, and, in a certain degree, motion; that it was composed of vessels, through which circulated a liquid similar to the blood in animals, and, in fact, was in a great degree so nearly allied to animal existence, as to be liable to disease when any interruption took place in the circulation of this fluid, and which might in some instances be produced by what would appear, at first, but trifling injuries.

Although I am far from thinking that this subject will ever be fully considered by the persons who are the most interested in the growth of fruit-trees, or that the theory I have hinted will ever be perfectly believed; yet I will endeavour to illustrate it farther, as it may be the means of convincing some of my readers how necessary it is to pay more than the usual attention that this interesting subject receives in the present day, being fully persuaded that nothing but a thorough investigation can ever lead us

into the mode of treatment which is certainly necessary, if we ever hope to see our cyder counties regain that celebrity which for many years has so much declined as to be now nearly extinct.

A tree we shall then endeavour to consider as one of those bodies formed by nature, and as a link of that grand chain on which the welfare of the world, and all that it inherits, depend. It is composed of roots which terminate in small fibres, and these are furnished with tubes that attract and take up the food of the plant from the earth; and these tubes being extended upwards into the trunk of the tree, are found to exist in the softer parts of the wood, known to botanists by the name of *alburnum*, but which is more familiarly distinguished in the oak and other timber trees by the name of *sap-wood*.

It has always been a subject of dispute with naturalists as to what constituted the true pabulum or food of vegetables, and it would be foreign to our subject to pretend to explain its composition; but

be this food composed of what it may, whether it differs in its kind as to the tree taking it up, by which each plant selects a peculiar sort or not, (a subject of investigation for the curious,) it will suffice for our purpose to know that it is conveyed in a liquid state, and that it is raised up through the above-described vessels by the assistance of other tubes filled with air, which becoming rarefied by heat, act on the sap-vessels, and propel this liquid upwards. The sap, after it has passed through the trunk and branches, enters the leaves through the footstalk, when it is exposed to the action of the sun and light, and here it is observed to be filtered, concocted, and separated. The upper side of the leaf receives the rays of the sun, and the lower side, composed of pores, is the organ of perspiration, which has been found to be very copious in trees. And here the extraneous parts being thrown off, the finer are rendered fit for passing into other tubes, which descend also through the footstalk. This finer fluid, returning

through the inner bark, deposits a substance which becomes wood, and is found to be attached in layers round the trunk. These may be seen in trees cut transversely asunder, and from which the age of the trees, in many instances, can be ascertained. There is also supposed to be another deposit made of a quantity of the same finer fluid, which is laid up at the end of the season for the purpose of being forced upwards in the spring; and this is supposed to be employed in forming the blossom-buds for the production of fruit, which, considered scientifically, is nothing more than the pulp, affording protection to the seeds, which are ultimately formed for the wise intention of re-producing the species, and of fertilizing the earth for the use of animal life and existence.

Having, therefore, ventured into an examination of the different parts of a tree on the principles of vegetation, and how each are rendered subservient to its growth, it naturally leads us to the consideration, how much a body of so

fine a texture becomes liable to injury, and how small an interruption of the progress of the sap, in a young tree, may lay the foundation of maladies of which it can never recover; but, like an infant child which has imbibed the seeds of disease from neglect and bad nursing, only lives to linger out its period of existence in pain to itself and without benefit to its fellow-creatures. Now, when we consider the bad effects caused on the human body by contusions which produce swellings and gangrene, arising from the circulation of the blood in its vessels being checked, we may suppose similar bad effects to be produced from any stoppage of the natural circulation on which the health and existence of all kinds of trees so materially depend. Injuries of this sort may be caused in various ways, for instance, by the bark and wood becoming bruised from any accidental blow; by too tightly tying the stem or larger branches for training, &c.; by sheep and other animals being permitted to rub themselves against the stems, whereby

they deposit an oily substance which stops up the pores of the bark ; and, by the stems being gnawed or otherwise bruised, the trees being unprotected and unscreened from such depredations. It cannot, therefore, be thought wonderful that our young trees, when planted out in the usual mode, whether in fields or orchards, should be subject to diseases of all kinds, as such neglected treatment naturally exposes them to injuries of all kinds.

It is an axiom that holds true throughout all nature, that great evils arise from smaller ones, and thus we trace causes from effects ; the greatest crimes which the human mind and heart has ever perpetrated, had their origin in the unchecked licentious principles of the youthful mind of the malefactor. And many diseases, of the most dreadful sort, are brought on by degrees, and have their origin in the neglect of stopping those irregularities to which we are prone in our youth, and which produce in early life languor similar to old age. And effects

perfectly similar are to be observed in the vegetable world. An apple-tree deprived of its bark by an incision being made in the form of a ring round a fruit-bearing branch, causing the descent of the returning sap to be prevented, produces prematurely ripe fruit, and the small crumpling codlings are ripened from a similar cause, and which may justly be termed an early old age in this part of the tree. Thus, as accident produces disease, disease produces debility, which furthers the operation of ripening; and in this state the fluid of the trees undergoes a chemical change, producing a saccharine substance as its result. In which state it attracts and becomes the food of those numerous insects with which the great Author of nature has, for the wisest of purposes, stored every part of our globe: and here we must look up with wonder to that Almighty Being, in whose works we never see a link deficient, but a continual reproduction of matter, formed on the decay of other natural bodies, and which, like the circulation of the blood,

or the apparent movements in the heavenly bodies, never cease to operate, but flow in constant succession for the purpose of support and regeneration.

On the other hand, let us turn our attention to a fruit tree, and consider how dangerous it must be to the growth of so nicely contrived a body, to have a blow given to it by which any of those necessary sap or blood-vessels are destroyed; or if we permit moss, missletoe, and other parasitical plants, to grow and feed on the sap which is essentially necessary for its support * ; or how it must be affected if numerous insects are allowed to live and prey on its very vitals. And still more so if the whole connection of the

* " The age of a tree will make it full of mosse ; " and if it be young, then too much moisture will " make it mossie, as also too much drynesse. This " disease feedeth upon a tree, and maketh it leane, " as the scab do a beast. To remedie this, as has " been said before, is to make it cleare in winter " with a knife of wood or bone, for fear that the " mosse continuing in peace may devoure the whole " tree." Maison Ruſtique, p. 402.

sap-vessels were entirely cut asunder at the fountain head, by removing a tree after it has grown ten or more years in the same ground, where its roots have extended to a very considerable distance, and the fibres, the only part fit to take up nourishment in any quantity, lopped entirely from the main roots; and that this tree is, in its stumped state, stuck into a hole, probably of clay or stiff soil, just large enough to hold the roots in, the soil filled into the hole, and this perhaps in old pastures, where the herbage is left to grow quite round the stem of the tree, and where it is left for sheep and cattle to rub against the stem, by which means the tree is liable to be shaken from its position, and the pores of the bark quite filled by the oil and filth of their coats. Or, if planted in arable land, it is left to suffer every time the plough passes, the geer of that implement to be continually rattling against the stem; and a heavy crop of grain, perhaps wheat, growing closely round it, not only robbing the soil of that nourishment

which the roots of the tree was destined to have, but also preventing either moisture to reach the roots, or the tree itself to have the benefit of the atmosphere.

Having made these observations, I shall now leave this investigation to any one who has opportunity of judging how far the state of the trees, and the mode of management in the cyder counties, agrees with it, and should wish any one to compare this with the culture of fruit in the county of Kent, where every year some trees bear, even if the crop in general should fail elsewhere.

From having considered the nature of many of our fruit plantations, and finding, for want of the necessary care, that the young trees, after being planted, are subject to injury for want of proper treatment; it becomes the next business to point out such modes in the planting and after-management, as will be most likely to insure a healthy growth.

The first thing that attracts our attention in this department of the busi-

ness is, the choice of the tree itself; and here it should be observed, that the younger it is when removed into the orchard, the better chance there is of getting it to grow. As the fibres, or young roots, are the only parts capable of attracting from the soil the food necessary to sustain the plant, those trees that can be taken up easily from the nurseries, without damaging this essential part, should always be planted; and as this is not easily to be accomplished, if such trees are large and of great age, young trees must be considered as preferable to old ones for forming orchards.

I am fully aware that farmers in general say that young trees, on account of their small size, are unfit to plant in open and bleak situations, and in places where orchards are usually planted, and I hold the reason to be in some measure just; but I am writing with the hope, that when trees are put into such places, they will be properly protected from the many injuries to which they are liable in the present mode. However, if it should

be necessary to plant trees with large stems, it should be particularly managed that they should not be allowed to grow more than two years together in the nursery, without being taken up, and the roots trimmed short with a view to cause them to put out fresh ones, and produce fibres, so that whenever the tree is to be removed into the orchard where it is to remain, it may have such roots as will, in some measure, give it a chance of growing. It is proper at the same time to observe, that the younger a tree can be planted out where it is to remain, the better, for even in the different operations of removing it as above in the nursery, and shortening the roots, there is a great chance that it may receive an injury which may prove fatal to it.

It is a practice in Worcestershire and Herefordshire, to plant crab trees, or seedling apples, found by chance in hedge-rows and other places, of a large size, and even after they have been growing in the same place for ten or twelve years, and the roots have extended to the

length of several feet. When taken out of the ground, these are necessarily shortened so far that nothing like a root is left, and perhaps only a few branches, like horns, to which the roots were attached, but which were lopped off in the taking up. This tree is then planted in the ground, where it remains two or three years before it begins to vegetate; it is then despoiled of its head, if it has been fortunate enough to get one, and grafted, after which it is left to take its chance, subject to all the danger and invasion of insects, the common accidents attending the culture of the land, if arable, or if in pasture fields, to the injuries of cattle. I have no particular objection to the planting crab-stocks, and afterwards grafting them, because I would not wish to reject any old custom, unless it was manifestly absurd, but at all events, it must be no less than so much time lost, for if the tree was grafted when young, it might, after planting, be suffered to grow without taking off its head; a practice, which although it

may not be attended with any serious injury to the stock, cannot possibly do it any real service. One particular regarding the propriety of the apple stock for grafting, seems in the present day wholly disregarded, and that is, the kinds of fruit from whence they are raised; if seedling stocks are found near farm buildings in the cyder counties, they should be looked on with a cautious eye by the planter, for it is ten to one, if it is not the produce of some improved variety of the apple kind; and it is to be observed, that these improved varieties are more tender in their constitution than the true seedling crabs, whose wood is of slower growth, and, consequently, of closer texture, so that they can resist the injuries trees are liable to, better than those from the apples.

In the county of Sussex, there is an apple called the Bittersweet, the fruit of which makes a weak, but pleasant cyder, and the wood of which will readily grow from cuttings; this we use for making stocks to graft apples on for

bearing as small trees, and similar to what are termed Paradise stocks. These are fit for small gardens, but the state of health of the stock should be attended to, otherwise an unhealthy produce is the consequence.

Paradise stocks and seedling apples, it should be remarked, are more subject to injury from insects than crabs are, owing to the different state of the sap; that of the apple being sweeter than that of the crab. A large quantity of seedling apples and crabs mixed, which I have now growing, are more or less attacked by different insects, as the kind approaches the apple or crab in its nature. It may be observed that dwarf trees, *i. e.* trees with short stems, such as we find usually in gardens, are more healthy, and produce fruit better than standard trees in orchards, and are seldom known to fail of producing fruit, even when none are to be seen in orchards; and this is accounted for from the stem of the trees being short, they are not so liable to the same damage as those of standards, and for

this reason, if a tree is by accident broken off short in one of its upper branches just above another, the lower one takes the lead, and gets what sap the other has not room to take up.

Old trees are frequently met with both in orchards and gardens, which have ceased bearing from some cause or other, and it is usual to cut such down and destroy them. If the stems of these are sound, be they never so large, there is a chance of making them turn to good account by grafting other new sorts on them. I mention this as it is not generally known, and I have seen, in Somersetshire, an orchard entirely thrown up by a clergyman, who had lately taken to the glebe on which it grew, and the land replanted with young trees. Now, it is very probable, if that gentleman had known the advantage of grafting his old trees, he would have done so, and these would, in three years time, have had a crop more than equal to the first twenty of his young orchard; besides the risk of ever getting

his young trees to bear well, in the present mode in which orchards are generally managed.

As to the soil, it is a generally received opinion, that fruit trees removed from a rich soil into a poor one, are not likely to succeed. That they will not grow so luxuriantly in a poor soil as a rich one, is a truism; but it more frequently happens that trees removed out of well managed nursery land, although it is poor of itself, into fields of better soil, will fail from the want of such encouragement as they have been accustomed to, previous to their removal. The preparation of land in nursery grounds is, to trench it generally three feet deep, or to such depth as the land will warrant, observing to reverse the stratum, by laying the surface in the bottom; the stocks which are intended for making trees, are then planted in rows at convenient distances, and the land kept particularly clean from weeds, and repeatedly turned on the surface, or dug with a spade; and in this mode we

usually get our young stocks fit to graft in two years, and in two, or probably three years more, to become fine standard trees, sufficiently large for orchard planting; and, in fact, if they are suffered to remain longer, unless repeatedly removed, as above described, the root generally becomes too old for the tree to be transplanted with success.

In the manner in which we have seen the generality of orchards formed, a hole is made two or three feet in diameter, and probably as deep, and this perhaps in a stiff clay, or holding soil, in which the tree is planted, and if meadow *, the grass is suffered to grow all over the land, even to the stem of the tree; or, if arable, the crop covers all the land in a similar manner; and thus the tree is left without the advantage even of having

* In a meadow newly planted as orchard, near Ludlow, I observed the grass not having grown over where the holes had been made for the trees, the proprietor had endeavoured to husband this part of his land, by planting beans very thick on all the spaces; and a fine crop there was, but it was certainly at the poor apple trees' expense.

the surface of the land kept free from herbage, which not only feeds on the land, but in a great measure prevents the tree from receiving the moisture so necessary to its growth. Let any one now contrast the change of scene the plant is doomed to endure, even with all the advantages of good roots, and consider if it has a fair chance of succeeding.

When land is intended to be converted into orchard, the places where the trees are to stand, should, as soon as convenience will admit, be marked, and for the space of six feet over, the ground should be trenched as deep as the soil will admit it, and the longer this is done before planting the better; and even so if it becomes necessary to take a crop off the land in the mean time, previously to planting *. If the nature of the situation

* It would appear strange to any person who understood a little of agriculture, and who had but lately arrived in this country, if he were to view the present state of our orchards, particularly if he had read any description of this subject that was century or more old. I have in my library an

should be too wet, it should, if possible, be drained, and if not, hillocks should be thrown up, and the trees planted high on them in proportion to the wetness of the soil; and this may be done by removing some of the surrounding soil, or by bringing earth from another place. The scowering of ditches, and, in general, the scraping of roads, is good, and in particular for mixing in such places where the land is very stiff. The trees should be planted in the centre of each place so

old work translated from the French, entitled Maison Rustique, or the Countrey Farme, and which was newly corrected and augmented by Gervase Markham in 1616; as it contains more on this subject than any thing I have seen of a later date, I shall make a few extracts from it, as they may occur, mostly for the purpose of shewing the growers of fruit, the pains our forefathers took with their trees. Were Mr. Gervase Markham alive, and to ride through the cyder counties of Great Britain in the summer season, I think he would either go mad, or suppose himself to be the only sane man who had any interest in this subject in this country. Neither should I be more surprised, if, in the aphis lanata, he recognized an old acquaintance, although each of them had taken a long *nap* in the mean time.

summer months, and in the autumn and trenched * ; and this space should afterwards, for some years at least, be kept clean † by being frequently hoed ‡ in the

* "And if the case so stand as it is fit to plant "great thicke trees, the pit must be made six "months before, and that because the earth should "thereby be corrected, and as it were renewed by "the ayre and heat.

"He that will have faire young trees, must dig "about them everie month, but when they are "grown greater, they must only be digged about "twice a year. In winter, whether they be great "or small, the earth must be taken from their feet, "so that it may be mingled with dung and put "into the pit againe." Maison Rustique, p. 402.

† "Weeds growing about trees, doe sucke the "nourishment of the earth, and they must be care-"fully weeded out.

"The apple loves to be digged twice, especially "the first yeare. It is very subject to be eaten "and spoyled of pismires and little worms, but the "remedy is to lay swine's dung mixed with men's "urine at the roots." Maison Rustique, p. 379.

‡ Hoeing land gives it a natural manuring, even if no weeds are on the ground, for the oftener and deeper the surface is turned up, the more it attracts food from the atmosphere.

spring dug with a spade, turned over, and left as rough as possible, observing not to injure the roots; by this operation the growth of the tree will be encouraged. After the two first years, the tree, if thrifty, will have pushed its roots to the extremity of the limited piece of trenched land; and then it will be advisable to trench round the extremity three feet wider, as the roots by this means will have a fresh field to work in, and the growth be accelerated thereby; an opportunity is also by this mode afforded to the proprietor, to give any stimulus he may have at hand, by way of manure, and thus to forward the growth by that means also.

When trees are planted out where they are to remain, it is essentially necessary that they are supported against the roots being shaken by the wind, and also protected from any injuries they are liable to, as above described, which may be done in the best and most convenient mode that circumstances will admit of.

I am not an advocate for tying any such things as furze, thorns, or the like, round the stem, as it affords much shelter for insects of all kinds that infest trees, therefore, if it can be done so as to leave the whole more exposed to the influence of the sun and air, it is so much the better.

Pruning trees is a subject, respecting which every gardener pretends to have a competent knowledge, and those who have written on the subject have endeavoured to lay down rules for the operation: which may be expected from me in this place; but I must confess, that although I have had considerable experience for many years, and I know the theory on which rules for it may be formed, yet I am incapable of communicating my ideas on the subject, as it wholly depends on the state of the trees; and it would be as absurd for me to tell any one what branches he should cut out and what leave, from description, as it would be for a physician to prescribe for a patient who labours under a severe and

acute disease, on the mere report of the nurse, without a personal inspection into the state of his patient. I must be pardoned therefore, if I say, that nothing but experience, founded on long observation, as to the growth of trees, will ever enable a person to discover the proper art of pruning. In fact, it would be a detraction from the real merits of gardeners, many of whom are persons of much skill in this subject, acquired by close attention, if it were considered as capable of being acquired by half an hour's reading.

One observation should be attended to, which is founded on facts: that is to say, although it is certain, that nature is, in every case, sufficiently bountiful in all her works, we do not find any exuberance; and in our assistance, which we endeavour to give her in this way, we should keep in mind, that every branch in a fruit tree, more than is wanted, is a great waste of nature's purest material employed in the formation of fruit and wood, and therefore if the branch is skilfully taken

away, the sap will be sure of being employed to some other good purpose; for every useless branch, like every noxious weed, should be put out of existence. When we turn our attention to the first principles of vegetation, we observe, that the roots of every tree are intended to imbibe from the soil a certain quantum of food, which is taken into the tree to form its different parts, and in so doing a limited quantity is prescribed to each kind. The traveller's joy, which grows very quickly, and is supported by other plants, does not require, nor in fact has it, so much, as the hazel on which it is supported. Neither does the raspberry, which only exists in its lignoeus or tree state for a few months, require that quantity which the oak tree does, that is to last for ages. For if we compare them together, we shall find, on cutting pieces of each transversely, that of the raspberry to consist only in a mass of pith, surrounded by a thin cylinder of fibrous membrane just enough to enable it to stand upright, and support the fruit. The

traveller's joy we shall find in hollows like network, the hazel will exhibit an appearance of soundness, but in the oak will be seen almost solidity. Let the speculative pruner take a view of this picture, and ask himself if he has sufficiently studied this subject to imitate nature, by leaving just so much as is necessary to form fruit, but to be cautious at the same time of preventing a waste of so precious a material, which is thus so curiously husbanded by nature itself. When this theory is fairly understood, we shall be enabled to prune, or in other words, to give a check to luxuriant growth, and to assist vegetation with propriety.

It may not be altogether foreign to the present subject to contemplate that depreciation in abilities of a number of gardeners, which has so much lessened the respectability of that useful set of men. To obtain the knowledge necessary for a gardener requires the exertions of an ingenious mind for many years, as well as that of an industrious and active body, for without great mental and bodily

labour, the necessary knowledge of the business he has under his care cannot be acquired; and although among the great mass of men who are exercising this business, some are to be found of this description, yet a great number know much less than they ought to know; and the consequence for a length of time, has been the loss of reputation to that profession collectively, and the general bad management that is to be seen where a variety of gardeners have lived.

Let us hope, then, for the general good, that some measures may be adopted that will give the proper advantage to those who have spent their youth in this pursuit, and to secure them the preference of employment over those persons who were so long ago complained * of by some of our countrymen, justly celebrated for their abilities in horticulture.

* "There are a sort of men who call themselves "*gard'ners*; and of them, not a few, who having "wrought at labouring work at the new making of

There is nothing of greater moment, to a large establishment in particular, than the good abilities of the gardener, for otherwise good trees are soon irreparably injured, and the profession gets a bad reputation in consequence; but gardening is not the only instance we have known to have suffered from similar causes, even that of the law has, within our recollection, found it necessary to protect its practice from similar innovation, by getting an act passed for laying heavy duties on the induction, sufficient to cause all that could not afford to have the necessary education and the re-

---

" some *ground*, or in a *garden*, and after the young " beginner hath exercised the barrow or the spade " for twelve months, he puts on an apron and sets " up for a professed *gard'ner*; and a place he must " have: he hears of some honest country gentleman, " who is in London, and wants a gard'ner, he goes " to him and tells him his story, of what great mat- " ters he is capable of, and such a piece of work he " managed; and by this means he gets into em- " ployment, and this is sufficient to shew how the " gentleman gets imposed on." Vid. London and Wise, 2d Edition, 1699.

quisite qualifications, to keep out, which has tended no less to the increasing respectability of that honourable and learned profession, than to the comfort and safety of the lives and property of all of us.

From the increase of accidents and maladies occasioned in the army and navy during a long series of warfare, a great number of young men are employed as assistant surgeons, &c. with very slender medical knowledge, from which circumstance, similar evils have of late also crept into that profession, and so much so, that it was found necessary, last sessions, to pass a bill in parliament, to prevent any person in future from practising as an apothecary, unless he had studied all its departments sufficiently, and could produce testimonials of proper qualifications, which must, of course, have the effect of keeping down the number of irregular practitioners, and thus render the profession more respectable.

This digression is made only with a

view of shewing what good has been done, and is still to be hoped for, from proper regulations like the above. Would to God, that the ability and respectability of the practice of gardening could be secured in some similar manner, we might then expect to eat of the best produce of the soil, and our trees to bring forth good fruit in abundance.

In the islands of Jersey and Guernsey, which are noted for the produce of all kinds of fruit, which we have in gardens or orchards, the trees are planted dwarf, and comparatively close together, by which means, a greater quantity of fruit is grown on a given piece of land; those are usually grafted on Paradise stocks, and the trees begin to produce in three years abundantly, even when they are not more than four or five feet high, and the whole diameter of the extent of branches not more; in such cases, it is usual to give up the land principally to this purpose, and plant the trees in rows ten feet apart, and five feet distance in the rows. The

land between the rows may be cultivated with lucerne to considerable advantage during the first few years of the growth, *i. e.* four drills, may be sown at a foot apart, and then it leaves three feet on each side for the trees to grow. As the plant requires garden culture, and must be hoed, manured, and dug, the apple-trees are receiving advantage at the same time; as the trees increase in bulk, every other one in the rows is taken up and planted where it is wanting, and the culture of the lucerne crop discontinued. An improvement on this mode of growing a dwarf orchard was some years ago adopted by J. Tyson, Esq. of Drove-house near Chichester, by putting in four hop-poles at right angles four or five feet distant, and tying the tops in so as to form a pyramid, the branches of the trees, after having grown sufficiently long, are then pruned of the superfluous wood, and trained so as to cover the surface round completely with bearing wood, and I have witnessed in this mode the greatest crops I ever saw in my life, and few

persons who have not seen this mode, can calculate on the many advantages it possesses. Not the least of which is, that the sun and air have room, from the uniformity in size of these trees, to circulate freely through the whole. It should be observed, that it is attended with little trouble and expence after the first time of tying, excepting that of going over the trees and thinning the wood every winter. I cannot help thinking, but this mode, were it introduced into our cyder counties, might be productive of much good; I have myself, here, made an experimental orchard on this plan, and on one quarter of an acre of ground I have two hundred and forty trees growing, the area of whose surfaces, taken collectively, amounts to nearly as much as that of the whole ground. It has now been planted four years, and the trees are in full bearing. Thus the land is become valuable as a fruit orchard, in less time than the generality of orchard-planters can get their stocks to take fair root in, besides

their having to undergo the process of grafting as before described. This is a fact of which any one is at liberty to convince himself, if he pleases, by ocular demonstration. The foregoing remarks will apply generally to all trees usually planted in orchards, and it is not my intention to enter farther into the subject, as trees in gardens have, under proper management (which is unfortunately not always the case) all the advantages which it has been my wish to give to those in orchards. I shall close these hints with giving descriptions of a few of our most noxious insects, and particularly such as are injurious to fruit and other trees in this country.

Of injuries arising to fruit-trees from insects of various kinds, we have many examples, and we are far, very far from having a perfect knowledge of their nature. However, we know that some species of them appear only in certain seasons when the weather is very favourable for their hatching and existence. As we are so much at a loss in these

points, we have much to regret that the science of entomology is not more cultivated, as many facts would be ascertained, leading to conclusions that might ultimately enable us to destroy or retard the baneful progress of these natural enemies to plants; and it ought not to be forgotten that *an acquaintance with our common noxious insects is a subject of as much interest to the grower of fruit-trees, and ought to be as intimately connected in this branch of husbandry, as the necessary knowledge of corn and cattle is to farmers in general.*

The aphis or small green fly which is so common in the spring of the year, and which produces the honey-dew, is to be destroyed by burning tobacco or any strong scented leaves or rubbish under the trees, or by sprinkling them with water in which tobacco has been infused, and although this may appear to be a work of much labour when the trees are large; yet in young trees it will repay the trouble.

But the most destructive insect we know

is the white bug, described by a foreign naturalist under the name of aphis lanata, or American blight which has found means, within a few years, of extending itself all over the kingdom, and is every season gaining ground. Various are the opinions respecting this insect, both as to its nature as well as its production. I have long considered it to be the same insect that has of late years infested the poplars and the larch, and have lately been borne out in my opinion, as it has left the apple-trees and begun to make ravages on the plum, and also on a species of the ranunculus which I found growing close to some apple-trees in the neighbourhood of Worcester. As I have for some years past paid particular attention to this insect I shall give a detail of its history as it has occurred to me, which may probably stimulate some person to discover a remedy for its dreadful ravages. It does not appear to hatch at any particular season, but all the while the weather is open it continues its work of reproduction; the eggs (which are extremely minute, and must be observed

with the assistance of the microscope) are laid amongst the white cotton-like substance in which the insect is enveloped, and which it also deposits on the bark of the trees. I have from good authority heard it was brought to this country by the refugees from France, in the reign of Louis XIV., when a colony of these people settled at Paddington, and there it was first observed to begin its depredations on the apple trees: I am led to think that it is a native of a warmer climate than ours, from the circumstance that the living insects as well as the eggs remaining on the branches of the trees are frequently killed by the action of frost, which was the case in the winter of 1813, a season in which I had them continually under my notice, and I trust that it has afforded me an opportunity of giving the world a cheap mode of destroying them, or at least of retarding their progress.

I am, in some measure, warranted in my belief that the insect in question was introduced from France, as an old French

gardener who worked in my garden several years ago stated that he was well acquainted with the bug as he termed it, since his childhood, and that it had been the destruction of many fruits, not apples in particular, in the neighbourhood of Montpelier, where he was brought up. He also suggested that the frost of our severe winters might be the means of killing it, from its being, in his opinion, originally a native of a warmer climate: this caused me to pay attention to its habits, and I soon found that in the cold of our winters it usually disappeared, although there was the appearance of some of it among the cracks in the bark, but not so much as in the summer weather. I therefore had recourse to scraping the outer bark and washing the trees over with soap suds, and solutions of lime, soot, and sulphur; and although from the above treatment, or the operation of the brush, they were in great measure killed or their progress lessened, yet I was mortified greatly to find that every spring they were quickly renewed.

My surprise however was soon lessened, when on examining the roots of the apple-trees I found there existed a progeny, which in all probability served every season to renew the stock, and I therefore turned my attention to this point which led me to the following expedient. I took off, during the frost, the branches of apple trees on which there had been great abundance of the insect, and found, by the use of the magnifier, that the eggs were discoloured and incapable, to all appearance, of producing young. At the same time I searched the roots of the same trees, and there I found not only eggs but living insects, and had them moving under the lens in a few minutes after being taken into a warm room.

In order to illustrate this fact I had a drawing made of the roots with the insect attached to it, as I have considered it of considerable moment to give as perfect an account of it as my labours have afforded opportunity. I have had it engraved, and by reference to the plates the following states of this destructive insect will be seen:

Plate 1. No. 1, is a branch of an apple-tree with the appearance it makes when the insect is feeding on it.

No. 2. is a piece of the root of an apple-tree with the aphis feeding on it in a similar manner.

No. 3. is the aphis magnified and the egg, as it appears among the down in which the insect is enveloped, when the weather occasions it to take shelter.

No. 4. is the insect more highly magnified.

No. 5. is an aphis that has acquired wings; these are by no means so plentiful as those without. I regret that I cannot speak with certainty, if this is a different sex, or whether it acquires the wings from age, which is supposed to be the case with other species of aphis. In investigating the common green fly, which are so frequent on green house plants, and on rose trees in the spring of the year, we perceive some which are oviparous and others that are viviparous. This circumstance was, I believe, first noticed by Mr. Curtis, and it, in some degree, accounts for their mul-

tiplying in the astonishing way which it appears to do; and we observe that, in the later stages of existence, many of these insects become winged in a similar manner. I notice this circumstance merely as I hope some persons whose time may permit them, may be able to carry the examination of these animalculæ so far as to give us a much more perfect idea of their nature than we have at present. There is no subject that demands investigation more than this, and nothing would produce more benefit to this country, and probably the world at large, than proper encouragement being held out to persons to make the necessary experiments, and to publish the results arising therefrom. If the growth of fruit, or the produce of cyder, is of any moment to us as a country, it is necessary that attention should be immediately paid to this subject, or the result will most inevitably be, the destruction of apple trees altogether; and as the insect is beginning to attack other kinds of fruit-trees, it is not unreasonable to suppose that the mischief may not end with that loss alone.

Having thus discovered its subterraneous habitation, I had recourse to the following expedient: while the frost was in the ground, and the snow lay on the surface, I caused a necessary-house to be emptied, and its contents taken in a soft state, and spread regularly over the ground, in quantity sufficient, as my men believed, to kill all the apple trees. When the thaw came the whole was of course washed down to the roots, and ever since I have had the satisfaction of finding the trees perfectly clear from the insect and growing most luxuriantly; and to this hour all that are left unsold remain healthy. From the success of the above experiment, I should recommend that the trees be continually cleaned so far as relates to the branches, and that the roots be made as bare as possible in the winter season, and a dressing of the above or a similar material applied to the roots, and I have little doubt of its success in curtailing the evil to a certain degree, although it may probably be the destruction of some of the trees, yet if we can

by any means lessen the ravages of this destructive monster, we ought not to consider this loss as material.

That we have other insects which infest our fruit-trees, and diseases of different kinds is certain; and whoever has had opportunity of visiting the cyder counties, cannot help having observed the general decay of the fruit-trees, which appears equally to affect the young and old, with very few exceptions, a circumstance so much to be regretted, that it ought most seriously to engage our attention.

It is much to be lamented, in this age of science, that most authors who have treated on the subject of insects, have published works more calculated for furthering the scientific views of the learned, than to inform the ignorant; so that I scarcely know of any English author who has considered it worth his notice to give so much of the minor history of the subject as relates the particulars of their production, existence, and the subsequent changes through

which these wonderful creatures pass during their life-time.

As somewhat of this knowledge is necessary before we can at all speculate in destroying the noxious kinds of insects, or afford protection to others that are useful, I shall devote a page or two for the purpose of describing the history of the propagation of some of our most common kinds.

In the butterfly kind, the different sexes are as distinct as in the ordinary course of animal nature, but these insects differ from most other parts of the creation, by the metamorphoses they undergo, and which consist in a change of structure which is observed during their progress to maturity.

The egg contains the rudiments of the insect, and from it is produced *the larva*, or caterpillar, which, in many instances casts its coat as it increases in size; at each of which changes it assumes a different colour and form. In this state it is like to what the poet says of the boasting lord of the creation; "its first

" great ruling passion is to eat," being so extremely voracious of its food ; that this is the only operation it performs, and in many instances its destructive powers are truly alarming, a fact, it is presumed, not unknown to many of my readers. In the caterpillar state it exists for a considerable time, and its season of existence varies in different kinds, and also as to the food which it is destined to eat. Thus, the silk-worm is hatched from the egg in the month of April, at the season when the mulberry puts forth its first leaves, which are the natural food of this useful creature*, and its continuance in the ca-

* I am aware that those of my readers who have bred these insects for amusement, will say, that the larva is generally hatched before the mulberry is in leaf. This fact I am acquainted with, but it should be considered, that neither the insect or the mulberry are natives of our climate, which causes a difference not existing in Italy. It should be moreover remarked, that in Switzerland the breeders of the silkworms keep the eggs back from hatching by placing them out of the influence of the sun, till the food is grown, holding it a certain maxim, that giving them lettuce or any other food, as is practised here, makes them sickly.

terpillar or *larva* state, is till the month of July, during the first luxuriant growth of the tree. It then changes into a pupa which is harder and more dry than the caterpillar; in this state it is confined in a narrow compass, and becomes surrounded by a kind of web termed a chrysalis, that issues from its mouth, and which on being wound off is the raw silk, but in some other species it is surrounded by a hard impervious coat, scarcely to be penetrated by the sharpest instrument, or to be acted on by the most corrosive liquid. When the insect has escaped from this state of torpidity, in which it lies for different periods*, it becomes the perfect fly, and is then fit to fulfil the principal functions to which all nature is devoted, the reproduction of the species.

* One extraordinary circumstance attending this race of creatures is the length of time some of the species will remain alive in the pupa state; I released one from a chrysalis this last summer, which had been fixed to a wooden label in the Botanic Garden, and had been painted over for eight years. There is a

Although an enumeration of all the different kinds that infest plants at different periods is more than the limits of this work will admit, yet, these instances may serve so far to give an idea of their nature, that persons who feel interested may employ such means for counteracting these great evils, as may appear most likely to answer the purpose.

It should be observed, that in general each kind of insect has its particular food,

---

small kind of grasshopper described by naturalists as coming regularly once in seventeen years, and is called Tettigonia Septendecem from that circum stance. But a more extraordinary account is published by Mr. Marsham, in the Transactions of the Linnæan Society of London, of an insect which was known to have existed in a deal board that had been converted into a writing desk in Guildhall. The length of time it had been enclosed therein was uncertain, but it was a known fact that it must have been there upwards of forty years. It is moreover a curious circumstance, that its kind has never been noticed in this country before, and that it is a native of China, but is also sometimes found in Norway, and from the latter country it is probable the timber in which it was enclosed, was imported.

and they are often named by naturalists from the plant on which they feed. As the papilio urticæ, or tortoise-shell butterfly, is never found on any plant but the stinging nettle; there are others which feed only on two different plants as the phalæna verbasci, water-betony moth, which will eat either the mullein or water-betony, but these are comparatively scarce to the former, and much less common than either is the brown-tail moth*, which in the summer of 1783, committed so much mischief on all the trees and herbage near London, that the whole country was very much alarmed: inasmuch as advertisements, paragraphs, letters, &c. almost without number were published, and which spread great consternation about the country. Some idea of their number may be calculated from the following account, which I shall extract from a history of this caterpillar, which was at that time published by my partner, the late Mr. William Curtis: "In many of the pa-

* Bombyx phæorhea.

" rishes near London, subscriptions have " been opened, and the poor people em- " ployed to cut off the webs at one shilling " per bushel, which have been burnt un- " der the inspection of the churchwar- " dens, overseers, or beadle of the parish ; " at the first onset of this business, four- " score bushels, as I was most credibly " informed, were collected in one day, in " the parish of Clapham.*"

It should be observed, that this gentleman was induced to publish his account of this moth, to appease the minds of the people. Some of the writers of that day having asserted that "they were the usual pre- " sage of the plague," others, "that their " numbers were great enough to render " the air pestilential, and that they would " mangle and destroy every kind of vege- " tation, and starve the cattle in the fields." It was no wonder therefore, from these

* This insect forms a web which is attached to the leaves of the trees, and to which it always retires at night or in wet weather. Taking the branches of the trees with the web and insect, would certainly appear to be the readiest mode of destroying it.

alarming accounts, "That almost every "one ignorant of their history, were under "the greatest apprehensions concerning "them, so much so that even prayers were "offered in some churches to deliver us "from the apprehended approaching ca-"lamity."

"The caterpillar of the brown-tail moth "is not so limited a feeder as some, nor "so general a one as others. Its whole "economy however shews it is designed to "feed on trees and shrubs on which alone "it is ever found. These afford it a sup-"port for its web, which is an habitation "in many respects essential to its exist-"ence, and with which herbaceous plants "of lower growth cannot supply it."

The following facts will serve to corroborate what is here advanced. They are found on the

Hawthorn most plentifully,
Oak the same,
Elm very plentifully,
Most fruit trees the same,
Blackthorn plentifully,
Rose trees the same,

Bramble the same,
On the willow and poplar scarce.
None have been noticed on the
Elder,
Walnut,
Ash,
Fir, or
Herbaceous plants.

Thus it appears that the mischiefs these caterpillars are capable of occasioning, is to rob particular trees and shrubs, and thereby retard the growth of their foliage and blossoms.

"With respect to fruit trees, the in-
"juries they sustain are most serious,
"as in destroying the blossoms as yet in
"the bud, they also destroy the fruit in
"embryo, *the owners of orchards and*
"*standard fruit trees have therefore great*
"*reason to be alarmed.*"

Mr. Curtis also predicted, that although it had been uncommonly numerous for the last two seasons, it might be several years before the like occurred again; and his predictions have been perfectly fulfil-

led, for only once or twice since has it made its appearance in this country in any quantity. But we are at a loss to guess how it can occur, that for "many years "we do not see these creatures, and all at "once we have them so plentiful that "their numbers become thus truly alarm-"ing." A gentleman of Chelsea, has informed me, that he once took a nest of moths and bred them, that some of the eggs came the first year, some the second, and others of the same nest did not hatch till the third season. Now if the eggs of insects are preserved thus for three years, a chrysalis for seven, and a living insect makes its appearance from a deal board, where it must have lain upwards of forty years, why should we fix any limits to the period of their vitality in any of their dormant stages of existence. We must therefore rest contented with such objects as we can see, and be thankful to almighty Providence, for the use of them during our transitory residence in this life, the secrets of nature's operations are some of them too deep for human foresight.

We must observe that whilst we read in nature's book, every page affords instruction; the first ordination as given by the great Creator, "increase and multiply" aided by nature's first impelling instinct, self preservation, is fully exemplified in every lesson, and as men and rational beings we should always bear in view the determination as expressed, "By the "sweat of thy brow shalt thou, &c. &c." And should know that it is expected of us, to use our utmost endeavours to curtail the superfluities of nature's works, and render those things committed to our care as perfect as our intellect and industry will admit.

I shall endeavour to illustrate the above facts, by giving the history of some of our most noxious insects.

Papilio Cratægi.

THE BLACK VEINED BUTTERFLY.

THE caterpillar of this butterfly, is one of the most destructive to fruit trees that we have, and in particular to the apples, despoiling them of their foliage early in the spring: we have mentioned the brown-tail moth whose ravages are dreadful, but we have the satisfaction of knowing, that it does not frequently come in such great numbers, as it has not made its appearance, in any alarming degree, since Mr. Curtis wrote its history, now thirty-four years since.

It would be fortunate for us, and for our fruit trees, was the same fact to apply to the one in question, for although we do not see it so very powerful, yet

it nevertheless commits great destruction every spring, and not only to the apple-trees but other kinds of fruits. As my object in writing its history is intended to shew to persons not acquainted with this subject, its mode of living and producing its offspring, I trust I shall be held excused if I descend to particulars that may to some persons be already known.

The female deposits its eggs between the interstices of the bark, and as near to the ends of the branches as she can find convenient, and more generally on old trees where there is plenty of moss, &c. to shelter the young as soon as they are hatched, than on younger ones. The eggs are coated with a strong mucus, of more power than the finest glue, as being quite impervious to moisture, which serves to stick the eggs firmly to the branch, those become moreover so hard, that neither the birds nor other animals can destroy them, and in this state, we have instances of their remaining without losing their vitality for several years, until a favourable opportunity of

their being brought into existence arrives, when there is plenty of food for them. The young ones are small on their being first hatched, but as we observed before, they begin the work of destruction by marshalling themselves on the young leaves of the trees, eating off the epidermis, and destroying it altogether as they advance. As long as they are in their first skins they remain together, and are of a deep black colour, but when they arrive at about one-third of an inch in length, they begin to change their skins, this is done at three different times, which I shall describe. When the time approaches in which they put off their first skin, they spin a web together, on which they sit fast and remain quite motionless, after which their heads are observed to swell, and the old skin, which is now become too narrow, bursts, after which the caterpillar appears something larger, its head and the points of its hairs are pale, but in a few minutes change to a dark colour, nearly black; after this they begin to look abroad for food; the other chang-

ing of the skin is similar to this, and is attended with great pain to them, and in which they often are observed to die. After the third and last changing the caterpillar comes to perfection, at which time it is beautiful to appearance.

Fig. 6. shews a full grown caterpillar of the largest kind after the last changing, nearly two inches and a half long; they are not all of this length, especially if they have not had sufficient fresh food.

I shall now describe this full grown caterpillar more fully: A caterpillar consists in general of the head, neck, and body. The head is, as in most species of this class, prominent and heart-shaped, divided in the middle downwards, so that it forms a triangle towards the mouth; from the mouth are two points going out, which some call the mandibles. The head as well as the neck are covered with many yellow protuberances which render these parts somewhat shining. The body consists of ten segments, besides the last terminal part. On the

neck, as well as on these points are eight pair of legs in the following disposition; three pair of pointed fore-legs on the neck and the two first segments, then follow two segments without legs, the next four segments have each of them a pair of obtuse ones, which are commonly called belly-legs; two which follow next are again destitute of legs; the last segment has again two obtuse ones. The yellowish-red quadrangular spots on the back, are soon conspicuous, each segment has one, except the first and the two last. These spots are cut through, by a black longitudinal stripe which runs along the whole back.*

* We observe great difference in the size and colour of butterflies which causes the diversity of beauty in these insects. It must be also noticed, that each fly differs equally in its caterpillar state. The description above applies to the one in question, but others equally common are found that are hairy, and the hairs in some kinds are so stiff as to perforate the fingers when touched; others are prepared with small bladders that contain a liquid which they throw out with considerable force on the approach of an enemy, or on any molestation being offered to them.

After the caterpillar has enjoyed itself for some time on the apple-tree, and by taking sufficient nourishment has arrived at its full growth, the time approaches when they put off their worm-like appearance, and take on another very different from this; a work which no sensible man can look at without the greatest astonishment, it being done in the following manner: the caterpillar takes no food for more than twenty-four hours, but discharges in this time all the excrements contained in its body; they then quit their social life, and each looks out for a convenient place on the tree where he may shelter himself from the weather and the sun; it then fastens itself to this place with a little of the web by the two hind legs, so that the head looks downwards, and is bent in towards the belly. After remaining in this state for a day or longer, which depends on the weather, its head swells, and the skin bursts and rolls back. In a few minutes, it exhibits a figure very singular, and different from

the former, which is called the pupa, and which I shall now describe:

The upper part of this pupa is not unlike the mask of a man's face. There appears at the top something resembling a pair of horns, and lower down on each side, another pair of smaller ones; then follows an acute prominent nose in the middle, and on both sides are seen round globules like a pair of eyes; in some of them appear also some round and oblong dots of an ochre-yellow colour; the other part consists of eight joints with seven pair of beautiful yellow and black spots, the third pair of which are the largest, the rest are gradually smaller, to the last by which the pupa is affixed: all this is accurately figured in fig. 7 and 8. The colour is dirty or dark brown; in the beginning, when the skin is soft, but in a few minutes somewhat lighter.

This pupa seems to be quite lifeless, but on being touched we soon perceive a motion in it, and this is very necessary, as it serves to keep off its enemies; for

the ichneumons* and several other insects are very fond of laying their eggs in it, especially as long as there is some softness in it; for, to keep off these unwelcome guests, and defend itself from destruction, the pupa throws itself about with violence, and its horns are very serviceable in defending itself. After this pupa has remained about a fortnight, in which the weather is still warm, without taking any nourishment, (it is then of a beautiful green and yellow colour, and is found attached to the branches of the apple-tree, and not uncommonly on the white-thorn,) we see it break open at the top, and two long horns together with some legs make their appearance, and almost a moment after this the papilio climbs up on the empty shell, and places itself in such a posture that the wings are hanging down. Here it sits quiet with the wings folded together, which are at this time not larger than the shell that contained them; these wings grow

* A small insect which preys on this caterpillar, described hereafter.

so quick, that in a quarter of an hour's time they are arrived to their full size, which requires indeed attention. After they have acquired their proper firmness, which is done in another quarter of an hour, the pupa cleanses itself by discharging a few drops of a blood-coloured liquid; then the pupa expands his wings and folds them again together which causes a little noise; after this he flies away with alacrity as if it had been in the practice of it for a long time, hence it becomes one of those beautiful harbingers of spring, a butterfly.

We have now before us, instead of an odious worm, a flying creature; instead of a creeping one, an insect which flutters at its ease, inhaling sweets from every flower, instead of a caterpillar which chose the apple-tree for its food and abode. We must examine it closer: I will describe, first the wings, especially the underside of them, as this shews itself first. They are grey, painted like marble with many transverse pointed lines. Each wing is in the same manner beau-

tifully veined with blue on a white ground. The upper part of the wings is of a fine white colour like silk, striped with black lines, fig. 9. The head has two round brown eyes, at the front are two long incurved points lying together, between these a spiral proboscis, which they can put out to the length of their body, with this they suck the juice out of the flowers. At the top are two long capillary antennæ or horns, terminating in a black little club with a yellow point, the rest of the horns are black; all butterflies are furnished with these. On the forepart of the body are four yellow legs, before them a pair of blunt and hairy ones. These parts are common to all the butterflies of the first class, *i. e.* those termed Papilio.

There are two sexes, male and female. The females soon lay their eggs. The difference of the sex is not so conspicuous in the butterfly, as it is in those of the second class termed phalæna, or moths; for in the first there is no difference except in the belly, which is thicker and larger

in the females; but in the males, there is besides this mark, a considerable difference in the antennæ or horns.

At the time when the female is going to lay its eggs it quits the flowers, and goes for some time to the apple-tree or hawthorn, where it deposits them in a safe place.

If this is done in summer, the young ones will come out in two or three weeks, but when the eggs are laid in the autumn, they will remain as they are till the next spring, or longer. In all cases the young ones find their food immediately on the spot where they are hatched. Here is a wonderful thing to contemplate! Who has told the female that her offspring cannot find nourishment on the flowers, but on the trees? and who has taught her to prefer the apple-tree or the hawthorn to all other sorts of trees and plants? How does she know that the young ones cannot fly about like herself for their food, supposing they should not find nourishment on the place where they creep out? How wonderfully does the Almighty provide even for such a des-

picable worm, and prepare its food even before it is born.

After depositing the eggs, the butterflies amuse themselves for some time among the flowers, and soon after they die, mostly in the same year in which they were hatched, except the season is late, in which case they hide themselves in the hollow bark of trees, or in other places, where they remain for the winter, and appear again in the next spring.

Phalæna Dispar. 1.

THE GIPSEY MOTH.

THE caterpillar, which is figured No. 10. is a garden as well as a wood-caterpillar, because it commits its depredations not only on the leaves of all the fruit trees in the gardens, but also of the trees in the woods, especially the old oaks, on which they are to be found every year.

When this caterpillar, and especially that which becomes the future female phalæna, is full grown, its head is yellowish, full of small black characters and dots. Instead of the eyes it has two large spots full of black dots. The mouth is a little elevated and pointed towards the eyes or forehead. The width of the head generally exceeds that of the body,

and above the mouth, on the fissure of the forehead are two longitudinal black spots. The ground-colour of the body is whitish-grey, but closely covered with black characters and dots. The neck has two folded joints, which are, like the two first of the ten joints of the body, furnished with little whitish globules, each of which has a smaller one annexed to it, and both are covered with whitish hairs.

The stripe on the back is white, its edges beset with black dots, like lines. The ten joints of the body have on both sides of this back-stripe large globules, the two first pairs of them are violet-coloured, the rest purplish-red, so that there are twenty globules on the back, four white, four blue, and twelve red. Between the eighth and ninth pairs of these globules, is placed on the middle of the white back-stripe, an elevated shining globule. On the third and fourth joints such globules are placed next to the white back-stripe.

When the young ones have just crept out of the egg, they look quite black, and

even after the first changing are more black than variegated; they disperse immediately and creep singly on the upper and foremost leaves of the twigs and from them to others; they do not keep together, except it should happen that in bad weather some of them meet by chance in seeking for a shelter. After they have stripped one tree, they go to another, and do not spare any leaf, especially in gardens.

This caterpillar is very beautiful after its last changing, and when old and big enough spins itself up in some leaves of the tree, if there are any left; it draws them together by some threads, to be sheltered from the injury of the weather, it makes the web so loose that it serves only to prevent it from falling through and to keep off its enemies. If there are no leaves left on the trees it creeps down into the grass and spins itself up there. After the web is finished the pupa is formed, in which the wings, antennæ, and legs of the phalæna are already to be seen. It deposits its skin

by splitting first the head and then drawing it down over the body by a continual bending and motion.

The chrysalis has a point below, by which it fastens itself to the inside of the web, so that it cannot easily be shaken off. By the slightest touch it moves the belly strongly, to terrify and keep off the enemy, it has the head hanging downwards which it throws about as the heaviest part; and as a hard skin, is hanging and round, it is shielded from the attacks made by the ichneumons. It is entirely brownish-black, and retains on the joints of the body, and on the wings, head and face, some yellowish-red fascicules of hairs.

The big-bellied ones are females, they have white wings, undulated with brown and black, so that the extremities of them appear black, and towards the body become browner and paler.

The male, fig. 13. is not half so big, and has brown wings, so that one would take it for a different species. The antennæ or horns, are like feathers, on both

sides with hairs, bent a little towards each other so as to form a concavity. The under wings in both sexes are round, not pointed at the end, like the upper ones, but have at the brim angular black dots like the outer wings, and in the middle a brownish spot.

The female does not fly in the day, nor even a great way at night-time, on account of its heaviness; but it creeps frequently about on the trees, and seeks for a sheltered place under the branches or elsewhere, to lay its eggs. If it does not find a convenient place on one tree it comes down and creeps up to another. Where there are young fruit trees, it lays the eggs on the poles to which these are fastened, and particularly on the place below the fastenings; in the old trees it puts them in the crevices of the bark; in gardens on the espalliers, or on hedges and other places where they have a little shelter. When the eggs are laid, which are globular and shining white, they do not only stick very fast to the place where they are put, by a viscid sub-

stance which covers them, but the hairs of the belly of the mother stick at the same time so numerous to them, that each egg is kept very warm, and covered as with a smooth fur, so that rain or cold cannot easily hurt it. A stout female will lay four hundred or more such eggs, near one another in one place.

In the beginning of the month of July most of the caterpillars are spun up, and the moths creep out of the chrysalis in the same month. But the young ones from the eggs only come out the next year, at the time when the leaves are pretty much out.

Though this caterpillar is common in gardens and woods, where it does considerable damage, yet I believe its history has hitherto been but imperfectly known.

SCARABÆUS MELOLONTHA.

THE TREE BEETLE, OR COCK CHAFER.

I KNOW of no greater pest to fruit or forest trees than this insect when in its perfect state, sometimes whole countries have been so much infested with them that scarcely a single leaf was left. In Richmond Park this summer, I observed the leaves of the oak trees to be most shockingly eaten up by them, so much so that scarcely a perfect leaf was left. But it is not in the perfect state of this insect that all its mischief is accomplished: in its larva state, in which it exists for four years, it feeds on the roots of young trees and plants. I remember seeing in a nursery near Bagshot, several acres of young forest trees, particularly larch, the roots of which were com-

pletely destroyed by it, so much so that not a single tree was left alive. Some meadows at Twickenham were so dreadfully infested with them, that I have seen the grass destroyed completely on considerably large spaces, so that I advised the owner two years ago to rake it up together and burn it, which was done; this autumn the meadows are also infested with it in the same manner. —Fig. 13. represents a perfect insect of this kind.

The female digs into the ground the depth of a span, and lays her eggs, which are oval and of a pale yellow colour. After this it creeps out again and lives some time longer upon the leaves of trees, and in time proceeds to lay another parcel.

Roesel put some females pregnant into glasses half filled with earth, with a tuft of grass over each, covered with a thin cloth. After a fortnight he found in one of the glasses some hundreds of eggs (No. 12.) he left another glass unexamined for fear of hurting the eggs, and put it in a cellar. Towards autumn he looked at the glass and then perceived

at the bottom, nothing but such worms as I have represented in fig. 13. He observed that the tuft of grass was somewhat withered in the cellar, and as he guessed that the worms took their nourishment from it, he changed it for a fresh one.

Through the autumn his worms increased remarkably. He put the glass again in the cellar for the winter, and on the approach of the spring, he took it out again that the tuft might keep green. In May, or some time later in summer, when the worms were near a twelvemonth old, they were of the size of fig. 14. and he was now obliged to give them a green tuft every second or third day. When this was no longer sufficient for them, he took some pots, sowed peas, lentils, and sallad in them; and after the young plants were come out he put them in these pots that they might find nourishment on the young roots of these plants, but in order to let them have sufficient, he could not put in more than one or two worms in each. In this manner he kept them till the second year, after which they were the size of fig. 15.

The third year, before they change into a chafer, the worms or grubs are the size and form of fig. 16.

In this state I shall describe the worm. Its length is nearly an inch and an half, but as it mostly lies crooked it looks somewhat shorter. The colour for the most part whitish-yellow, under which, on the wrinkles of the back, it appears greenish. The under surface is smooth, the upper one round and arched. The last segment is the largest, and has, from the food and excrement contained in it, a shining violet colour. The whole body, the head excepted, consists of twelve segments, as in the caterpillars, and on the arched part of the back, are on each segment a couple of wrinkles or folds to be seen, which serve to push the worm forwards. On each side of the body runs a prominent margin, furnished with nine dots, which are air holes, there is one on each side every segment, the second, third, and last excepted. The six legs which are under the three first segments, are yellowish red, and have four or five joints, the last one of which, especially

on the hind leg, is blunt. There are no claws on them, but all the joints are beset with tender hairs, as is the whole body here and there. The head is pretty large and flat, rounded; its colour, yellowish-brown and shining, it has strong brown blunt palpa or feelers obtusely dentated, between them a half round maxilla; with these instruments, the worm gnaws the roots of plants and sucks the nourishment out.

There are no eyes to be seen; but behind the palpa, there is on each side a yellowish-brown tentaculum with five joints. I could never find out which are the males or the females, though in the perfect chafer the difference is very conspicuous. They hardly creep out of the ground, and when dug out, endeavour to hide themselves again directly. Because birds are very eager after them, and they do not like the light of the sun.

The worm renews its skin at least once a year, and for this, it makes a spacious hole in the ground, in which it deposits the old skin; this hole is round

and hard. After the skin is deposited, the worm leaves its hole and goes to the roots of plants again. But when the winter comes on and the ground becomes hard and frozen, it goes again down deep into the ground, and remains without food till the weather gets warmer. This will seem to some people incredible, but if we dig the ground in the month of May, when the chafer appears, we shall see the worm, and not only of one, but of all four sizes at several times, as figured in 13, 14, 15, 16. The changing is performed also by the worm going down into the ground to the depth of more than a yard, there it makes a hole, the inside of which it makes smooth by its excrements and moisture, so as to have a safe and convenient place ; soon after, it begins to swell and deposits its last skin ; it has now the form of fig. 17. Many of these were kept in pots, but the most part of them always died. It looks first white, but gets by degrees darker, and at last becomes a dirty orange or reddish-yellow colour. The

form and outer structure shews already what is concealed in the inside. The head and shield is depressed towards the belly. The legs, horns, and wings are observable, half of the feet are covered by the wings. On the hinder part of the body are dark spots on the last segment, a part which is bent backwards towards the back, in which the tail is concealed. On being touched it shews a good deal of motion, and is able to turn itself. In the month of January, or at farthest February, the chafer comes out of this pupa, it is quite soft, and of a whitish-yellow colour, and in ten or twelve days it acquires its due hardness and colour, but it still keeps under ground for three or four months longer; this has made some people believe that the chafer goes into the earth and comes out again every year.

After, therefore, the insect has been in the state of a worm for four years, and for the most part of this time has been under ground, it appears in the month of May, (or according as the

weather is milder or colder, sooner or later,) in the form of a chafer. About this time one may observe them in the evening coming out of their old habitations here and there, fig. 18., and if their number is great, one may see in many places on the ground, as in footpaths, &c. many round holes, fig. 19. Fig 20, and 21, shew two full grown chafers.

Thus have we a curious and instructive lesson conveyed through the history of one of nature's meanest productions, but we must regard it as one of those links in the grand scale, which like every individual wheel in a clock, is necessary to the welfare of all, and from which we may in some degree devise how to check their baneful influence. Let us contemplate the facts that some of the tribes of insects are produced by putting a plant in a pot in the sun, without the admission of the atmosphere, as it will then have insects on it; and we see no appearance for years together of the brown-tail moth so very destructive in some seasons to our hedges, although it must be during this

interval in existence ; let us I say, consider these facts and compare them with the small stock of comparative knowledge we possess of this part of natural economy. The farmers in Scotland now practise Reaumur's method of rubbing the eggs of poultry over with any oily substance to prevent their becoming putrid, &c. by which their vitality is preserved for a length of time. The eggs of many insects are covered with a mucus which has no doubt the property of preserving them, as these eggs are hatched by the warmth of the atmosphere, and their hatching may be retarded, as is instanced in the silk-worm, and there are some species that are known to live for many years both in the chrysalis and egg state, until a favourable season arrives for their coming forth.

I this season released a pupa * from a

* It should be observed that some caterpillars when turning into the pupa state, exude from their mouths a hard substance like glue, which forms their cell, and this being attached to such places as they find convenient to lie up in, they remain perfectly secure from danger.

hard chrysalis that had been painted over seven years, and which was perfectly alive. A curious fact of an insect having been found on planeing the surface of a writing desk, in Guildhall, which had been used for a great number of years, as is related in the Trans. Lin. Soc. Lond. 1815, puts the matter beyond a doubt, that these creatures will live for a great length of time without making their appearance. What reason have we therefore to put limits to the laws of nature on this head, or what reason have we to doubt of the white bug which we now complain of, having lain in a dormant state for ages, and having now again made its appear-

---

We do not know for what reason one should only be protected by a silken cord, whilst the other has a nest of a much firmer texture. It is worthy observation however, that these kinds in general are more scarce, and the caterpillars are usually found only one or two at most together.

There are some insects that are described by naturalists as coming regularly once in certain periods, one of these is the tettigonia septendecem, so called because it is supposed to appear only once in seventeen years.

ance afresh; and when this subject is thus under consideration, is it at all unreasonable to conjecture, that this insect, or some similar one may have been the cause of the ablaqueation of trees practised by the ancients, or that this insect may have increased of late from that operation having been neglected by the moderns.

" The tree must have some recreation " given to it in winter after his great tra- " vail in bringing forth of his fruit, and " that in this sort: as by opening the " earth and laying his roots bare, that you " may cleanse them. Afterwards at the " end of winter you shall cover his roots " againe." *Maison Rustique.*

From the foregoing observations, we shall naturally conclude, that a tree being constituted as it is above described, must be like the animal frame, subject to much injury from external damage as well as internal disease. If for instance we rupture a blood vessel, an interruption of the

circulation takes place, and sickness and debility are the natural consequences.

If we neglect ourselves and suffer filth and vermin to accompany us, emaciation follows of course, and rickets and other diseases fatal to growth are the consequent accompaniments of youth in this neglected state.

CURCULIO NUCUM.

IT often happens in cracking a nut or filbert, which we take to be very good and sound, we find it is inhabited by a small grub (which is the larva of a beetle,) that consumes the kernel by degrees intirely; the autumn is generally the time when the larvæ are found in them; but as these do not originate from the nut or from themselves, the question is how they come into it, especially as there is no remarkable opening to be observed in it; The case is as follows: a small chafer, which differs from all others by its rostrum, is observed on the hazel in the month of August, and sometimes later; these chafers creep some times about as if they were eagerly look-

ing to pick up something, and perhaps part of them may look for a companion, as we find at that time the two sexes often in company; and while the male chafers are looking for nourishment on the hazel, the females of them look at the same for a place where they may safely lay their eggs, and where the future young larvæ may find sufficient nourishment, and this place is always a young, green, and soft nut, in which the kernel is still very small; this the chafer bores through with its rostrum, and knows by this not only whether the nut is good and sound, but also whether another chafer has not put an egg in it already, and hence we seldom or never find more than one larva in a nut. If it finds the nut in the required state, it proceeds to lay its egg in the kernel in such a manner that it remains sticking to it, and after a fortnight or sometimes later, the larva comes out, which acquires its full size in September or October, at which time we find very often the nut filled with a larva and its excrements

instead of the kernel; sometimes the latter is only half consumed. If it happens that the larva is hatched before the kernel is sufficiently grown, it finds only nourishment so long as this lasts, and it afterwards dies, as it cannot creep out and go to another nut, being destitute of feet, the nut will then be found empty. But if the kernel be full grown, so as to fill the nut, then the larva will have sufficient nourishment till it becomes perfect; and it lives within it, though one cannot see any sign of it outwardly, except a few small brown dots. In the nut represented in fig. 22, are such dots to be seen by letter *a.*, and these are always a sure sign of a larva in the inside of it, whether it be dead or alive. After the larva has acquired its perfections, it eats through the hard shell of the nut, either when still on the tree or when fallen down on the ground, which latter case happens very often, for the nuts inhabited by larvæ ripen sooner than others, and consequently fall off sooner. In such nuts then, there is always a round

hole, fig. 22, *b.*, which, compared to the thickness of the larva, seems much too small for it to go through, but where the head can pass through, the body will easily follow. Fig. 23, shews the larva creeping and stretched, and fig. 24. bent and lying on its back. These larvæ look much like those of the earth-chafers of the first class, but they have not the grey bag at the end which these have, they have the same light ochre-yellow colour and transversal foldings, and their round head is also shining and brownish red, on the first segment are two spots of the same colour. The legs of the body are wanted in this larva; instead of these there are small warts on all the foldings of the under part, and on both sides, and on the three first segments are six very small, hard, conspicuous claw feet, which serve the larva to creep on a flat surface though very slowly, for which reason it endeavours directly to work itself into the ground, and when out of the nut, is always found under ground.

As Roesel wished to see these larvæ change, he collected, for several years running, numbers of them in the months of October and November, put them into glasses half filled with earth, and with tufts of grass upon them and observed that they dug down directly into the earth, and remained there all the winter through till the next year, and part of them till the month of June, in their larva state, and after this they changed into pupæ as figured in fig. 24. Except the colour, which was the same light ochre-yellow as in the pupæ, there was no more similitude between them, but on the contrary, all the parts of the future chafer were already conspicuous. On the last segment are two short points, which serve the pupa to turn about in its cavern, and I have often seen how quickly it moves and turns itself.

In the month of August the chafers begin to push off their tender involucrum, this was done gradually in the space from the 1st to the 20th day of that month; but they still remained un-

der ground for eight days longer, as the parts had not yet acquired sufficient hardness; they then ventured to come out of their dark habitation, and appeared as such yellowish-brown curculios as are represented accurately in fig. 25, and 26, the first of which is the female, the other the male, which is always thinner than the female, but for the rest not in the least different from it.

I have given this account of the above small beetle, because it is of common occurrence, and its mode of producing young exhibits a very curious natural phenomenon; and although this creature is only found on the nut, yet its mode of breeding will serve to explain another that almost every season commits great destruction on the blooming buds of the apple and pear trees.

During the autumn we frequently observe a small red beetle, which is busily employed in traversing the branches of the apple trees, and this is in its nature similar to the last described, it lays its eggs by perforating the bloom buds, and

in the spring these hatch, and the larvæ feed on the petals of the flowers, and by their web they draw up the whole flower in a cluster. The bloom thus becomes destroyed, and the larva falls to the ground, where it lays itself up in the chrysalic state, and in the autumn afterwards, we find the beetle renewed, which again perforates the wood buds of the trees, and causes a similar destruction thereof in the following spring.

As the larva of this beetle feeds on the buds of trees in the spring of the year, where a continual change is every hour produced in the vegetation, we cannot easily give a description of all its changes, it is, however, very similar to the one that inhabits the nut, and which is described above.

Mr. Knight, in his treatise of the apple, mentions a beetle which also commits great destruction on the apple trees in Herefordshire, but as that gentleman has described its habits as different from this, I do not think it the same, the one

I have described above is very common in the gardens near London.

There does not appear to be any more reasonable mode of preventing this insect from proceeding in its business of procreation, than by putting round the branches where it is observed to be abundant, some birdlime or common tar, which will hold them as they crawl, and prevent their getting to the buds, the beetle is bred in the ground, and although it has wings, it is more commonly observed crawling on the stems of the trees than on the wing.

A. is a representation of this beetle of its natural size.

B. is the larva of its full size, as it is usually found, both on the blossoms and leaves of the apple in the spring.

C. is the same changed into a chrysalis, and is often found just under small clods of earth in the spring, and not unfrequently in hollows of the bark of the tree.

From the great tendency of these in-

sects to increase, one would naturally wonder we have not a greater number always surrounding us than we actually have. We should however consider, at the same time, that the intention of Providence is by no means fulfilled to its extent, in the mere destruction which these creatures commit on the vegetable world. They are destined for food for other creatures of a similar nature, and scarcely is there among them any but what either indirectly or directly give up their bodies for food to some of a different class, the larvæ of the cock chafer described above, are the principal food of rooks, and that sagacious bird will fly many miles in the summer season to procure them for their young. Poultry, and particularly turkies, are known to be fond of these grubs, and I have also known dogs to eat the chafers; the various species of linnets and other small birds feed on the larvæ of different insects, and hedgehogs are usefully kept in gardens to devour snails. There also is known to be an enemy to these insects

existing, which is more wonderful than any of the above, and as it is a curious history, I shall finish this subject by relating it. It is a small insect which feeds on the larvæ of many of the butterflies and moths, and is often the cause of great disappointment to the curious aurelian. I remember once, before I was aware of the subject, that out of twenty chrysalides of the papilio brassicæ, or cabbage butterfly, nineteen were quite destroyed by this small insect, which lends its body in return to that animal which is by Providence destined to feed on it. Thus we see that there is not an atom of animated nature or unorganized matter, but which is of service in its turn to the general good of the whole.

ICHNEUMON PUPARUM.

FIG. 27 shews a pupa of the brown tail moth described above, which I found full of maggots, out of which the insects came, now to be described; for this reason, I figure the pupa, though it is not this species alone to which these insects confine themselves, for all the pupæ of papiliones are subject to this plague without distinction.

When the caterpillar which has changed into the pupa lays itself up to undergo the changing, and has scarcely deposited its skin, we often observe a number of little insects flying about the still soft and greenish pupæ, for the purpose of laying their eggs on it. As these little creatures choose for this purpose a fresh

and soft pupa, it seems they know, that in such a state it has not the power to prevent them from doing it, by a strong motion or throwing about; and as the females of these insects have no sting for laying eggs, they cover the pupa with them, which stick so fast to it, that they do not fall off by the increasing hardness of the pupa. If after a short time the little maggots want more nourishment, they creep into the inside of the pupa.

The eggs are exceedingly small, and hardly visible to the naked eye, and, through the microscope, have nothing uncommon with other eggs, therefore I did not think it necessary to give a magnified figure of them. The maggots, when just crept out, are of the same size, but as soon as they are in the pupa, they begin to feed upon the papilio, which lays in a half liquid substance in it. This now putrefies, and is at last totally consumed, so that the skin of the pupa only is left filled with maggots. Fig. 27. shews their natural size; they are whitish yel-

yellow, have no legs, they change likewise into pupas, which have at first the same colour, but grow soon darker and greyer. This I have observed when I cut the pupa of the papilio open, closed it carefully up again, and looked at it after some days. The number of the little pupas is often from 200 to 300 in one. Among them I observed, sometimes, some larger ones of a different form, which as I soon found, produced different insects. These maggots do not spin themselves up in webs as others do, when they change into pupas, nor have they occasion for it, for the skin of the large pupa is a safe habitation for them, where they can remain without danger, until they acquire their perfection. This is about a fortnight in summer, but those which are produced in autumn remain all the winter. They deposit their pupa-skin all at one time, after this, they eat through the large pupa, and fly for some time about it, as the bees do about their hives. Some of them copulate immediately, and the females go to find ano-

ther pupa of a papilio to lay their eggs on. Fig. 28. is the natural size. Fig. 29. is a little magnified. The antennæ are capillary; the females are bigger than the males and destitute of the aculeus. The fore and back part of the body is shining like a gold chafer, the ground colour of it is green; the legs are orange colour.

ON THE MANAGEMENT OF APPLE TREES IN GENERAL.

THE theory lately published as to the period of existence of fruit and other trees, for which the world is indebted to Mr. Knight, is fixed on reasonable and true principles, and we see it more and more evident as time elapses; we also observe a gradual change in many of our fruit trees for the worse. Yet I nevertheless think, that this state of decay from old age, may in some cases be mistaken for the bad effects produced by mismanagement. I have observed in some places, the trees of the royal russet, the nonpareil, and the golden rennet exhibit appearances of this kind equal to that generally noticed of the golden pippin, &c.; but notwithstanding, I observe such kinds in other places healthy and thriving, so that I am of opinion, that these

varieties are capable of being brought round again, equal to what they have been, and what they were with us thirty years past. I would therefore wish to caution the growers of fruit from falling into the extreme, of attributing what is caused by maltreatment, to old age and irrecoverable decay; although there is room enough in our cider countries for persons to despair of ever seeing any kind of apple trees in health again.

The two most destructive diseases to the human race, whose very names alone carried fear and dismay into every part of the world, we have happily seen much lessened in their progress. The plague, from a habit of cleanliness amongst nations, is scarcely known, but in a small filthy district in Asia: and the small-pox, which was considered a scourge from Heaven among the Europeans, has been nearly extirpated by the ingenuity and application of one of our own countrymen. Shall we then, after contemplating such blessings as these, which have been obtained by industry alone, despair

of being capable of growing a fruit that was so much the boast of our forefathers, and one, too, which is indigenous to the country?

Having therefore endeavoured to take into consideration the great injuries trees receive in the common way in which they are usually planted out for orchards, and having also given an account of a few of our most noxious insects, it remains to point out such a mode of treatment as seems most likely to forward the purposes of a change in this system.

In the first place, *the adapting of the tree properly to the soil.* Loams or stiff holding deep soils, are such as the apple tree usually succeeds in; at the same time, as too much moisture is highly injurious, particular care should be paid to the proper draining all kinds of orchards.

Œconomy in manure*, such as is formed from animal substances, as that

* There is no subject that more interests the orchardist in the present day than this, and none that is more lost sight of. It has been observed by one of our best agriculturists, "that nothing should

from slaughter-houses or night-soil is found the best for fruit trees in general, and where it is used, should be well rotted and mixt with earth some time pre-

---

be wasted that any animal will eat," and we may with equal propriety say, *that nothing should be wasted that will add to the stock of manure.* The people of Switzerland, a country noticed for its husbandry, have always paid great attention to this, and by having tanks formed in their farm-yards, they preserve all the urine from the cattle, and also all other subjects formed from the concerns of house-keeping, &c. and which being every hour increasing, amounts to a valuable mass in the aggregate; and it will be worth the English farmers' while to consider, how great and valuable a quantity is continually running to waste in the course of the year, even from the soap-suds of his wash-house to the draining of his hog-sties, &c. and as there is no mode of giving manure to old trees so convenient as to apply it to the roots in a liquid state, such a mixture would be of essential service at this time, *vide note, page* 23.

I have noticed in more than one instance, the country farm-yards where cattle are fed, and where the grand depot of manure is made, through which runs a brook, the water of which passes through the dung for many months together, this absurdity I cannot help noticing, and I only refrain from being more particular, because I would not wish to be considered personal in my observations.

viously to being applied. In the neighbourhood of London and other places, many useful manures may be obtained, such as the refuse of sugar-bakers, soap-makers, &c. &c. bullocks' blood, hair, and the scraping of seal skins, bone dust, and the refuse of manufacturers of cart grease, the coarse graves from tallow-chandlers not fit to feed animals. The neighbourhood of Saffron-hill affords a large variety of these precious things.

As to preventing the ravages of insects, I can give but little hopes to our fruit growers, except by the destruction of their eggs, or when they are in their young state, and in some instances, by exposing of the parts where insects breed to the action of frost *, and this in par-

* I am aware of its being the received opinion, that the eggs of insects are in general impervious to the frost; this, I am fully aware, holds good in a great number, but we have many species of these creatures that are not originally natives of this country, and consequently, if they are from a climate not accustomed to frost, they are likely to be killed or checked thereby. Hothouses used

ticular in the case of aphis lanata. The cleaning trees by scraping and cutting

---

for forcing grapes and other fruits, are stored with a great number of species that are introduced by exotic plants; and it has been, for time immemorial, considered by our best gardeners, as a requisite practice in winter time, to expose such places or the trees at least, to the influence of the weather. We know our chafer gets into the ground for protection, our earth worm goes also into the ground, below the action of the frost, and the eggs of moths and butterflies are secured by a strong gluten, as is described above. The snail has its protection in its shell, and its eggs are laid under the protection of stones, &c. But no doubt it would be difficult to keep alive the eggs of silk worms if exposed to frost, or the cock-roach, which is always abundant in ships when they arrive from hot climates, or the coccus, so destructive to grapes in the hothouse: of the last, it is worthy notice, that it is never seen without doors.

I have noticed an opinion given by a very intelligent gentleman on this subject, in the Transactions of the London Horticultural Society, that the idea of the eggs of insects being killed by the action of the frost is in general erroneous; but this observation was made to caution gardeners from laying too much stress on the effects of the weather for performing what they by their industry ought to accomplish. I am truly sorry the practice of gardening is at so very low an ebb, as to furnish reasons for such hints. But I am

off all the moss and missletoe, and thinning the trees of the wood where it is necessary, washing the trees all over in the winter season with hot lime and water, with a little oil or soft soap, to which sulphur and soot are excellent additions. No insect can exist long in such a mixture; and those materials are also certain antidotes to all species of Lichen *, the moss that usually grows on apple trees. Many of our insects are nurtured in this substance, as well as in the ground under the trees. By frequently turning up the soil numberless insects are destroyed in the chrysalis state, both by the weather

---

nevertheless of opinion, there are many useful men in the profession who want no such stimulus to excite them to their duty, and who will blush to see it named. Mr. Spence in *Communications to the Hort. Soc.*

* All species of mosses bloom in the winter, at which time they are most easily destroyed. I have this winter seen many apple trees in Herefordshire so incumbered with this substance and missletoe, as to have formed a favourable place of retreat for a white owl, and where it would have rested safe from the prying eye of even a cockney sportsman at noon day.

and by the birds that are always in attendance on this operation.

There is nothing in human economy more calculated to insure health and comfort than *cleanliness* in the full extent of its meaning, whether with regard to the person or clothing, and the same principle holds good in husbandry; we see its influence in the breeding, nurturing, and fattening of all kinds of animals, we also observe it in the land among our crops, and if we only pay a proper attention to the subject, amongst our fruit trees; for we shall find that the eggs of many of our insects, as well as the chrysalides in which they lie up, are fixed to the dead wood on the trees, and also to that which is found on the ground below the trees, on dead leaves, and on the withered grass. It would therefore, after all that has been said on this subject, be superfluous to caution the farmer against letting such litter remain, and, for the above reasons, to keep his orchard land always in a state of cleanliness and good order. Dead hedges should at all times be as much avoided as possible; my rea-

ders will probably conceive I am descending into particulars too minute to be worth notice, but I am certain that to those who may apply with diligence to this subject, they will be found reasonable. Grass in orchards should always be kept eaten down as much as possible, and in the winter season in particular; perhaps geese are of all other animals the best inhabitants of orchard land. It should therefore be particularly noticed, that for the reasons above recited, all dead wood should be cut from the trees, all leaves and other rubbish carefully removed from the surface and burnt, as the best mode of establishing that system of cleanliness in this department which is necessary above all other things. *

* The late Dr. Roxburgh, who had the care of the botanic garden at Calcutta, was some years ago desirous of taking out from this country a quantity of plants, and accordingly, had them planted in boxes of mould, and he chose rotten leaves and wood to put underneath, to serve as a draining for the boxes, saying that as these became decomposed, they would serve as food for the roots better than potsherds which are usually used. He

The protection against trees being shaken by the wind, or against cattle, should be such, if possible, as would not serve for shelter to insects, and be usually washed with the same materials as above described. Although it is not to be supposed that the eggs will in all cases be affected by this application, yet if it is used about the time of the insects hatching, it is likely the young brood may be killed thereby.

The practice of ablaqueation, which is stated to have been common with ancient gardeners, will be very applicable in the present day. There does not appear to be any mode more likely to get the better of the evil occasioned by the aphis lanata; the roots of trees affected by this insect, should therefore be laid bare in the winter season, well washed, and left to the action of the frost, and the application of such things as urine, night

---

however found, as soon as the ship reached a warm climate, that innumerable insects bred in the boxes, and he cautioned me, in a letter on that subject, and also the publick, from using such again. See Transactions of Society of Arts, Vol. 27.

soil, hogs dung, &c. laid round them in a moist state, so as to keep this part of the trees perfectly clean from this pest.

The wire worm is an insect much complained of by farmers whenever they turn up land that has been cultivated with clover or grass, and it in general does great injury to the corn crop which succeeds. It should be noticed that clover, or other plants of such description, give protection to this insect; it is bred in the roots of these plants, and the land is so well stocked with it, that it attacks the corn and other succeeding crops very much to their injury. Land of this description is therefore unfit for corn immediately on breaking up. Turnips or potatoes are not so liable to injury from this insect, but the best preventive is probably a summer fallow, and burning the rubbish on the land before cropping, by which means the eggs which are laid in the stalks are destroyed, and the live worms die for want of nourishment. Soot and lime will also kill this destructive worm; before breaking up old lays, it should be always a point with the farmer

to examine the then existing crop, and observe if any of these insects are in the roots and stalks, and if so, to apply the above as a preventive previous to sowing a crop of grain in the land. Nothing but the preventing such a pest as this insect, will justify the fallowing of land according to our improved system of agriculture; in this case, however, it is indispensable. May not this insect, which is now more prevalent among our crops of grain than ever, owe its prevalence to the system of fallowing and burning the refuse of such crops being nearly exploded?

Since the foregoing pages have been printed, I have this evening, 20th Nov. 1815, passed through Covent Garden, and seen upwards of 1000 casks of apples that have been imported from France, and not less than an equal quantity heaped together in warehouses near Fleet Market, containing in the whole not less than 40,000 bushels. The fruit itself consists of fine specimens of several varieties, which appear with us nearly extinct, and these are grown mostly on the opposite coast to this country; and as there must

be some cause for the abundant crop in that country in a season when we have scarcely any, would it not be advisable for our agricultural societies, to send over some intelligent person to inspect the nature of the orchards in that country, and if possible endeavour to ascertain in what the difference of culture consists? Some writer on agriculture, I think Mr. Young, recommends to young farmers at certain seasons to "take their nags and see what their neighbours are about;" would it not be equally prudent for the growers of fruit here to endeavour to find out what their rivals on the other side of the channel are doing? The fruit I have this evening seen, is, at a moderate calculation worth twenty thousand pounds, at the price it is selling for in the London markets, and this has been paid for in hard cash, to those who are our political enemies.

The Golden Pippin,	Royal Russet,
Pome Grise,	Golden Russet,
Holland Pippin,	Piles' Russet,
Cockle Pippin,	Golden Rennet,
Wheeler's Russet,	Ferns Pippin,

were among the sorts I noticed. There are also some other very fine-looking varieties which are new to my view, but none appear better than the above, which are fine in the extreme.

I am aware that the speculative theorist will suppose that this difference is more the effect of climate or chance*,

---

* It is usual with human nature on the first appearance of any strange phenomena, to endeavour to account for them off hand. Many persons are apt to attribute the change in this state of our trees to an alteration in climate. And some very curious reasons are given by a gentleman of Worcestershire, who from the appearance of our fruit trees, very ingeniously attributes such change to a greater degree of moisture being exhaled from the increased number of exotic plants that have lately been introduced. *Vide I. Williams, Esq. on Climate.*

Others, considering the great quantity of ice that has accumulated of late years between Greenland and Iceland, and which it is said has produced an alteration for the worse in the climate of Iceland, have supposed that it affects even that of our own island; but as we pursue the thread of these ingenious reasonings, we find many knots that few persons are able to untie, by cutting any one of which the argument becomes confused, and consequently the clue is lost altogether; — the small age of reason

than the consequence of France having adopted better management. But I consider it otherwise: *the failure of our crops is not from any such casualty; it is from the neglected state of our fruit trees altogether.* During the late arduous struggle in which this country has been engaged, from the interrupted state of the world by war, our articles of common consumption have necessarily increased in value, as well from the quantity in demand, as from the want of the usual importation, and, also not a little from the waste attending the supply of our army and navy abroad.

---

allotted to human life does not allow of a comparison in this way, with the long data of four thousand years.

Is it not, therefore, a wonder that such change should have been left for the present age to discover; our forefathers, who have been remarked for studying convenience, have not been noticed to change their cloathing, for if we compare the costume of the present and late ages with the dresses of former times, although we find it differently cut in fashion and shape, yet it does not appear to have been less calculated to resist the cold.

We have therefore seen wheat raised to four times its natural value, and as this appears almost generally to be the standard of regulation as to price, all other necessaries have got up in proportion. Rents have been raised to the grower, taxes increased to the landlord, and wages to our manufacturing community, and all this has been supported and kept up by the advantages of external commerce during war. France fortunately for her, has been without the means of corresponding commercially with the world, and has been forced to turn her attention to agriculture.

From the above remarks it may be supposed that I do not duly appreciate the improvement of our own system of agriculture, but not so, no man is more convinced of the improved state of husbandry in many respects: all our attention from the above causes, has however been directed to the growth of grain and to the fattening of cattle. The former from its high price enabled the farmer to cultivate land with wheat, which if it pro-

duced only half a crop paid him, and he could afford to fatten cattle with expensive dainties. Now this succeeded so well that he looked no further. Every other domestic advantage was lost sight of, and fruit trees in particular, which I think is sufficiently proved by the foregoing remarks.

Now the agriculture of France has been improved from views of a different nature, namely, the necessities of the nation, and hence every department has been regularly encouraged and assisted, and her fruit trees in general, will be found to have had the proper treatment they required, and now that the peace has given her the opportunity of sending some of her produce over, she has, in more than one instance, proved to us, that although trade is a valuable blessing to any country, that does for the time being enjoy it; yet agriculture is the only certain wealth of a nation, and the sheet-anchor of its people.

Time has been when it might not have been prudent to have made such

comparisons, or at all events a person broaching them would have been branded with the names of croaker or Jacobin, but fortunately for the world this scare-crow hydra has lost its charm, and without presuming to construe the unavoidable errors or misfortunes of late times into blame to any party, we hail the time now approaching when the system of warfare will be changed for that of internal and domestic improvement; and when those, as I before observed, who can point out deficiencies in order to guard against their pernicious results, may without blame make them known.

It is not the bad system of growing apple trees alone that requires better management, we have others equally hurtful in their consequences which call for amendment, and the time is come when we may hope to see these things properly conducted, and mankind taught to tread those paths which are best suited to their respective pursuits.

THE BEST KINDS OF FRUIT TREES IN GENERAL.

TO pretend to enumerate all the different kinds of apples grown for the purposes of cider, would be a task no less useless than difficult, for from description alone no one could make them out, their number is immense, as every district has some one favourite fruit for that purpose, but in general the cider is made of many sorts, mixed indiscriminately together. As the attention of the growers of fruit has lately been called up by the spirited exertions of T. A. Knight, Esq. both in his exertions in forwarding the publication of Pomona Herefordiensis, as well as by his labour and attention to this particular in his place as president of the Horticultural Society of London,

we may shortly expect that a revolution in the choice of sorts will be produced.

I shall, however, for the sake of such of my readers as may not have had the advantage of consulting the Pomona Herefordiensis, take the liberty of transcribing the characters given of such apples as are there inserted, together with such observations as I have myself been able to make. It must be observed, that no persons can possibly make themselves acquainted with the real merits of apples from a slight acquaintance; there are so many contingents for consideration, that the same variety must be seen growing in many different places. The trees should also be of different ages, as that circumstance, and the difference of the soil, will greatly alter the flavour of fruit. Few persons have lived and enjoyed sufficient advantages in this way, to enable them to form a complete judgment of the merits of fruits in general; and these considerations, added to the strange confusion in the nomenclature, has rendered the work of description very uncertain.

CIDER APPLES.

* *Herefordshire Redstreak.* An old fruit which can no longer be propagated. This was once much esteemed for cider. The specific weight of the juice when recently expressed was .1079.

The Golden Pippin. This is evidently getting into decay from age, it has for many years retained the character of a prime cider apple.

The Fox Whelp. Many of the old trees of this variety still appear healthy and vigorous, though grafts taken from them do not grow well, some attempts are nevertheless still made to propagate it. The specific gravity of the juice of healthy fruit I found to be .1076, and in small and shrivelled fruit to be .1080.

---

* Vide Pomona Herefordiensis.

The Red Must, or Musk. The cider made of this apple used to be much esteemed, though latterly it has been considered light and thin. Two varieties of this apple, the red and white, are still found in the orchards of Herefordshire, but this alone is the only one that has any appearance of health. The specific gravity of the juice has never exceeded .1064.

The Hagloe Crab. Scarcely any apple affords a finer cider than this. The trees are rarely very productive of fruit, and this variety does not succeed generally, it being only in certain soils and situations that it is capable of acquiring maturity and perfection. The specific gravity of the juice has not been mentioned.

The Loan Pearmain. This variety as a cider apple is stated to contain a considerable portion of saccharine matter with a good deal of astringency; qualities considered necessary in making good cider, hence it is supposed to possess much merit for that purpose. The specific gra-

vity 1072. N.B. This is a very different variety from the Loan's pearmain of the Kentish orchards, which is much larger, more inclined to an oval shape, and of a more dull red colour; it is however nearly green when grown under the shade of the leaves. This variety keeps till April, and is till that season a very useful fruit, both for the desert and culinary purposes, and is justly esteemed by the growers of fruit in that county on account of its great tendency to bear fruit.

The Orange Pippin. Is cultivated in different parts of the county of Hereford; but such is the confusion of names, owing to the multiplicity of apples in cultivation, that the fruit figured is very different from the orange pippin of the county of Kent, and has all the appearance of the Royal pearmain of that county. The specific gravity of its juice is about .1074.

If I may judge from this variety, which is plentiful in Sussex, where it is a most abundant bearer, it is a fruit of all others

that merits cultivation by the proprietors of orchards.

The Wood Cock. The specific gravity of its juice is about .1073, but in consequence of the age of this variety it has long since ceased to deserve the attention of the planter. The name is supposed to have been derived from some imaginary resemblance of the form of the fruit and fruit-stalk, which has a particular twist and a certain protuberance, which may in some instances be supposed to have a distant resemblance to the head and back of a woodcock.

The Forest Stire. Once a very celebrated fruit, but it has been remarked to be rapidly decaying.

The Foxley Apple. The specific gravity of this fruit is .1080, and it obtained the annual premium of the society in 1808.

The Pawsan. The specific gravity of its juice is .1076, but the trees are

generally unproductive, and the fruit does not ripen well except in certain situations.

The Best Bache. The specific gravity of its juice is .1073; is principally in cultivation in the south-east of Herefordshire where it is now considered as a good cider fruit.

The Yellow Elliott. An apple in high estimation; the specific gravity of its juice is .1076. It once occupied its proper place at the yeoman's table, but on which it has given place to very inferior liquors, under the borrowed name of wine.

The Old Quining. This apple is now in the last stage of decay, and like the redstreak and golden pippin has survived its good qualities for the press. Mr. Knight states the weight of its expressed juice at about .1073.

The Bennett Apple. This has been chiefly cultivated in the deep strong soils of the south-west part of Herefordshire.

where, in conjunction with other varieties, it contributes to afford cider of great excellence. It is common in that part of the county called the Golden Vale, and which is the only part of that county that at the present day can be said to produce good liquor of this sort.

Mr. Knight says it was known before the seventeenth century, although it is not mentioned by any of the writers on this subject at that time.

The specific gravity of its juice is also .1078.

The Siberian Harvey. This variety is the offspring of a seed of the yellow Siberian crab, and the pollen of the last mentioned, and it possesses the hardy character of the former with the saccharine juice of the Golden Harvey: the gravity of its juice was .1091.

Steads Kernel Apple. Much prized on account of its astringency and saccharine juice, its specific gravity is .1074; it is a new variety, and highly deserves culture.

The Garter Apple. Has been much cultivated, but the specific gravity of its juice does not exceed .1066; yet when mixed with other varieties, it contributes to afford excellent cider.

The Cawarne Red. This apple is greatly inferior to many of the older varieties. The specific gravity of its juice never exceeded .1069. It is still capable of being cultivated, but its merits are not equal to several other varieties which have recently been obtained from seed.

The old Pearmain. This is the winter pearmain of the Kentish fruit gardens, it is an excellent apple, and well calculated for the press or the desert. Mr. Knight found the weight of its juice .1079, and he says it has almost disappeared in the orchards of Herefordshire; but, however, Covent-garden market exhibits this fruit in good seasons in great abundance, and we observed it in a fine state of preservation among the varieties of apples brought from France.

The Friar. The trees of this variety are of vigorous growth and productive of fruit, so that it frequently produces a cask of good cyder, but from its old age, an orchard now planted with it would probably soon exhibit symptoms of the debilities of old age.

I shall also give in detail, a description of a few new varieties, which, from their good properties, are now in considerable demand, and conclude with a list of such as are worth attending to for general culture, for, as I before observed, the number of kinds cultivated in the nurseries near London are superfluous in the extreme. In my experimental orchard, I have every sort that I can get with any character tending to recommend them, amounting to nearly 300 sorts. Several of which having bore fruit I have put out of the collection, by cutting down and grafting the trees afresh with such sorts as I found better worth keeping.

The kinds of fruits, therefore, which I shall give in the following lists will be

only such as I can recommend from my own personal knowledge of them. My intention is to publish from time to time the merits of other kinds, as I may find them turn out on a fair trial. And as inclination to bear is a very necessary qualification in all fruit, I shall be particular in recording this circumstance; but it is not the experience of only one or two seasons that will justify the giving of the character of fruit, and the recommendations of many persons should not be heeded, when such are only drawn from local instances, which are not in general proper proofs of merit, as soil, situation, and particular seasons, will much alter the course of nature in these things.

The Downton Pippin. Mr. Knight, in his communication to the Horticultural Society, says of this fruit, it is equally well calculated for the desert, the press, and for every culinary purpose, where a large size is not required; and I do not know any apple which can be brought to

market at any given price, with so much advantage to the cultivator.

The Grange Apple. A fruit of great beauty, and similar in colour to a very fine golden pippin, it ripens early in October, but remains sound till February: it is the offspring of the orange pippin, fertilized by the pollen of the golden pippin. *

The Bringewood Pippin. Its form and character are those of a large and flat golden pippin, with russet stripes: it is a fruit of exquisitely fine flavour, and keeps late, I have known it saved till February, and the flavour not impaired by keeping.

The Worlmsley Pippin. This apple ripens in the end of October, and many of my friends think it the best apple of its season: it is very large, and in the

---

* Pomona Herefordiensis, and Mr. Knight in Trans. Hort. Soc.

consistence and juiciness of its pulp, it more nearly resembles the New-town pippin of America, than any other apple with which I am acquainted. This does not keep, but is very fine when in season. I find the trees are given to bear profusely.

The Golden Harvey, or Brandy Apple. This variety is generally esteemed in Herefordshire the best fruit of its species, and I think with reason. Its season commences in November, and it remains in perfection, with proper attention, till May. This variety has long been cultivated, and it has, consequently, passed the period of youth and vigour, but it is still perfectly well calculated for garden culture. A coloured plate of this variety is given in the eighth number of the Pomona Herefordiensis, with that of its offspring, the Siberian Harvey, to which alone it is inferior in richness and in the high specific gravity of its juice. It is of little value, except for the press.

The Elton Golden Pippin. This is a fine variety of the old golden pippin, and somewhat like it in appearance; it is a fine fruit, but not equal in productiveness to that of the Downton pippin. It is a new variety, produced in the nursery late Mr. Knight's, at Elton, but we do not exactly know its pedigree, it is undoubtedly one of his new seedlings.

The Spring Grove Codling. This is a new fruit, produced also by the labours of Mr. Knight. Sir Joseph Banks, in a communication to the Horticultural Society, p. 197, says, that "this apple "baked in the beginning of September "had all the quickness and flavour of "the best winter apples. All who tasted "the pye, agreed they had not met with "any autumn apple, which for baking "could be compared to this new one. "Mr. Knight informs me, that it is "ready for use in the month of July, "when London geese are probably better "than at any other season, but when the "old English accompaniment of apple

" sauce was not, till Mr. Knight fur-
" nished us with the apple, possible to be
" obtained; in this point of view, it
" becomes an addition of importance
" to the old English kitchen, the
" cookery of which true Englishmen
" prefer to French ragouts or Spanish
" olios."

The Yellow Ingestrie Pippin. Similar in colour and flavour to the golden pippin, but ripens early in October; a very productive variety, and amongst the best of its season. Although this is ripe in October, it will keep sound and good till March; it is nearly allied to the golden pippin, and considered one of the handsomest fruits which has been grown.

The Red Ingestrie Pippin. Ripens a fortnight later than the yellow, and resembles a good deal in colour, a very ripe golden rennet. This and the preceding variety sprang from two seeds of the same apple which occupied the same cell.

Their names are derived from Ingestrie, (pronounced Ingstre,) the seat of the Earl of Talbot.

The Court of Wyck Pippin. This is a fine thriving variety and not an old fruit, it is much cultivated in Somersetshire, and is highly prized. This appears more like the golden Harvey than any other apple, and I should think, is really an improvement on that fruit. I brought some of the fruit to London, and on giving it to several persons who are judges, it was pronounced one of the best apples. This, as well as the golden Harvey, partakes much of the nature in all respects, of the old golden pippin, except in colour; the golden Harvey has a fine yellow russet on a red, and the court of Wyck is so much like it, that except in its being a more freely growing tree, and the fruit somewhat larger, no one I think could tell any great difference in the two.

Next to the court of Wyck pippin, is the *Canbury Pippin*, possessing all the

good properties of desert fruit, and one in particular, that it is of all others, the Downton pippin excepted, the most productive bearer.

The New Ribstone Pippin. Is a fine large striped apple very little inferior to the Ribstone pippin which was its parent. The seed of this kind was sown in the garden of the Right Hon. the Earl of Egremont, and has produced an offspring so much like itself that I should scarcely have supposed them to have been different. The tree, however, from which I have raised my own stock from buds and grafts is on its own bottom. I can congratulate the amateurs of fruit, on this new variety, not that I believe it to be better than its parent fruit, but on our having an apple possessing all the superior properties of that fruit in a young healthy seedling tree, a circumstance of the greatest moment, as from it we may hope that prince of apples can be kept with us for many years to come in a healthy state. The good properties of

the Ribstone Pippin are so well known that it would be superfluous to descant on the merits of its flavour; and this seedling offspring is in all respects, as far as I have yet seen, equally as good.

The Petworth Nonpareil. Is a russet green apple, and partakes much of the acid of the nonpareil combined with a fine flavour peculiar to this variety. It has the property of keeping till late in the spring, the first fruit two years ago I had kept good till the 20th of April. It is a good bearer, for even this season the tree produced a crop, part of which I have tasted, and am not only confirmed in my opinion as to the merits of this apple, but have been corroborated in the same by others who are probably better judges than myself.

A Seedling from the Newtown Pippin, partaking in appearance much of the nature of the French crab. It is most certainly a fine keeping variety, and the tree remarkable for hardiness and disposition to bear. At this time, 16th October, 1814,

I find it full of fruit buds although the tree is not more than six or eight years old at farthest.

The Petworth Pippin. A small brown fruit, in shape very like the Hall-door apple, its flavour is however superior to it, and it keeps longer. It is quite a young tree, but I cannot speak as to its property for bearing until I have had more experience; if, however, nothing should be found to depreciate its merits, it bids fair to be one of the best apples I have ever seen.

The Scarlet Nonpareil. Is also a fruit of considerable value; it was raised from seed at Kimpton Park, near Sunbury, a few years ago. It has been noticed for some time that the old nonpareil has got into disuse from age and its being subject to canker, the cause of its not succeeding in many instances. The scarlet variety is however but little inferior both in flavour and produce to the old sort, so that we have in it a valuable substitute.

La Pomme Grise. A variety between the golden pippin and the nonpareil is a fruit of great merit.

Padley's Pippin, was raised by the gentleman of that name, who has the care of Hampton-Court Gardens. Its merits are similar to those of the pomme grise, which it resembles. One difference in the two varieties is, that this does not keep quite so long, which renders it of course inferior to that apple.

The Carlisle Codlin is a fine dwarf variety of the English codlin, and remarkable for producing fruit on small dwarf trees.

List of Apples worth cultivating.

N.B. — Those which have an asterisk affixed are for the desert. — The months indicate the time each variety lasts in season.

**Aromatic Pippin* -	October
**Bernstorf Apple* -	Jan. to March
**Cockle Pippin* -	Oct. to April
Catshead - -	Oct. to Dec.
Cockagee - -	Cider
Dutch Codlin -	June and July
English Codlin -	June and July
**Fearns Pippin* -	Nov. to Feb.
French Crab -	Oct. to Aug.
**French Pippin* -	Oct. to Dec.
**Golden Pippin* -	Dec. to May
**Golden Rennet* -	Dec. to Feb.
**Golden Russet* -	Dec. to April
Hall Door - -	Jan. to March
Herefordsh. Pearmain	Dec. to March
Holland Pippin -	Dec. to April
Hawthorndean -	October
**June-eating* - -	June
Kentish Fillbasket -	Aug. to Oct.
Kentish Pippin -	Dec. to May
Kitchen Rennet -	December
**Lewis's Incomparable*	December

**Leadington* -	December
Loan's Pearmain -	Sept. to May
Lemon Pippin -	Dec. to March
Minier's Dumpling Ap.	Oct. to March
Margaret - -	August
**Margill* - -	Nov. to March
**Newtown Pippin* -	Nov. to Jan.
**Nonpareil* - -	Nov. to May
**Nonsuch* - -	Aug. to Oct.
Norfolk Paradise -	Dec. to May
Norfolk Beafin -	Dec. to Aug.
Norfolk Storing -	Dec. to Aug.
North's Crab (for preserving)	Oct.
**Pigeonette* - -	October
**Pile's Russet* -	Oct. to April
Quince Apple -	Oct. to March
Royal Pearmain -	Jan. to March
Royal Russet -	Oct. to April
**Ribstone Pippin* -	Oct. to April
Red Quarantine -	Oct. to Jan.
Red Calville -	Sept. to Oct.
**Syke House* -	Jan. to April
Wheeler's Russet -	Oct. to May
White Calville -	Oct. to March

All the above sorts I have growing, and believe the whole of them to be worth notice: I have retained the golden pippin in the list, because I have seen it is so fine this season among the fruits from France.

PEARS.

WHAT has been said with regard to the orchard culture of apples, will in general apply to pears, but as this kind of fruit tree is more hardy and longer lived, it is not quite so subject to insects and disease. It is in general longer in getting into a state of fruit bearing, but it will exist for centuries and still keep its health, productiveness, and vigour.

In the garden culture of this fruit it very frequently occurs that trees on walls will get into a state of luxuriance, which scarcely any thing known will check, and in this state the trees bear very sparingly and seldom any where but at the extremities; it is absolutely necessary in these cases to examine very minutely

the cause of the luxuriance, for it may be occasioned either by the nature of the tree itself, or by the soil. I have known the swan's egg pear, which is an early bearer*, shooting so excessively luxuriant, that it grew thirty or forty feet previously to its ever producing fruit, making shoots of great length and proportionate strength, after these had reached the top of the wall, the ends of them were turned over, from which circumstance these shoots received a check in the circulation, and it was supposed that the previous barrenness of the trees was occasioned by the richness of the soil. Recourse was had therefore to taking up at the distance of twelve feet from the trees a deep trench ten feet wide and of considerable depth, which being wanted for a gravel road, was filled with sand stone; during this operation the roots were a little cut. This mode had the desired effect; it produced shortly afterwards an immense crop, on the above described turned shoots, and

* Producing fruit in a young state of the tree.

the trees have continued every season to bear fruit, which is now nearly thirty years since.

It sometimes happens that a tree in a soil which is not rich, may take to grow very luxuriantly from the nature of the stock on which it had been grafted, the roots of this having probably extended to very considerable distances in search of food, which is not an uncommon case. This seems to have been particularly noticed by our older gardeners, and they have given us some curious antidotes to luxuriance, one of which was to dig under the roots, and place immediately below the stem of the trees a dead dog, cat, or any other animal. This has been said to answer the purpose, as was once the case at Watford. It should be observed that it was not owing however to the animal, but was probably the effect of taking out the earth and laying bare the roots; a mode that has for many ages been practised for such purposes, but not known in the present day. It was probably ordered that a dog or some other large animal should be laid

under the stem, in order that the roots should be sufficiently uncovered. We also find in an intelligent old book, the following receipt, " To hasten and helpe " forward a tree in bringing forth his " fruit, which is long before it bears anie " thing, you must make a hole with a " wimble in the thickest branch of his " root without boring it through, and in " the hole which you have made, put in " a staff or stop it with wax, afterward " cover the root over againe and the tree " will bear the year following."

This only goes to the checking the luxuriance by cutting off the usual quantity of supply of food by thus wounding the roots. These matters if managed judiciously are useful, but we are so much out of the habit of having recourse to them, that on the first sight we consider only the application, not the consequent effects it is intended to produce.

As apple-trees are made dwarfs by grafting on the paradise stock, the pear by using the quince for the stock will be made also to bear in a small state. It

will be advisable always to take the grafts from such trees as have bearing wood on them, when it can be done. Trees of this description will admit of the training as described for the dwarf apple I before noticed.

For the best new kinds of pears of which we have any account, we are indebted to Mr. Knight; namely,

The Elton Pear. This variety it appears sprung from a tree growing at Elton, late the residence of Mr. Knight; it ripens in the autumn, about the time of the orange Bergamot, at which season it is remarkable that we have few good pears in season; this, however, at that time, when gathered and left a few days, is equal in flavour to a well-ripened Cressanne, it however does not remain long in season; but this may be prolonged by putting them in close dry jars, and placing them either under ground, or in a dry cellar.

The Red Doyenne Pear. This has been mentioned also in the Hort. Soc.

Transactions, and been much praised; it is not however found to be good in all situations.

I shall mention a few of the leading kinds of pears cultivated for perry, but the variety and nomenclature of this fruit I am sorry to say is more confused than even that of the apples. Almost every parish has its different names for their favourite fruits, and very often different names are applied to the same fruit, only a few miles distant.

PERRY PEARS.

The Teinton Squash Pear. The perry made from this pear has been said to be sold for Champagne, to which it is much allied in colour and brightness. The trees of this variety are supposed to be in the last stage of decay.

The Long Land Pear. This is a common pear by the road sides in Worcestershire, and also in Herefordshire; it is very

hardy and productive. Mr. Knight in the Pomona Herefordiensis, states the specific gravity of its juice to be 1063.

The Holmore Pear. This is also recommended as a good pear for the press, the specific gravity of its juice is about 1066.

The Huff-Cap Pear. The perry made from this pear has been long celebrated for its richness and great strength, its flavour has been considered scarcely inferior to any. Mr. Knight states the juice to be about 1070.*

The Barland Pear. This has also for many years been considered a valuable perry pear and is very productive, many thousands of hogsheads have been sent from the cider counties in a favourable fruit

* I have observed this fruit growing in the neighbourhood of Tenbury, at a village called Rochford, where it is called the Rochford Longtail. So much is the nomenclature of fruit confused.

season. The specific gravity of this juice is estimated at about 1070.*

* I have taken the liberty of transcribing the several accounts of the juices of those fruits as they may be depended upon, and as it appears to be the best criterion to judge of the saccharine nature, and consequently the principal basis of a spirituous liquor, and as being a ready mode by which persons may ascertain the power of any other kind on comparison, but it must be observed, that this principle alone is not sufficient to constitute good Perry. It is necessary that a certain degree of astringency, which, uniting in chemical combination with particles from the atmosphere, on the juice being freshly expressed, constitutes what is considered the best liquor of this nature.

It is a curious phænomenon in chemical attraction, that the juice of a pear, which when expressed by the action of the teeth alone, may be found so extremely crude and austere as to render it difficult to swallow, (and hence the name given of *choke pears*, to many of this kind of fruit), should, as soon as the pulp is crushed, be found to change colour, and by uniting with the oxygen of the atmosphere, to almost instantly change, and become sweet; and indeed it may be remarked that the fruits which form the best perry are crude and unpleasant to the taste so that nothing short of absolute experience after fermentation will enable a person to judge of its value in this point of view.

PEARS IN GENERAL CULTIVATION.

When w *occurs in the following lists, it denotes such as are best adapted to training on walls.*

Autumn Bergamot	October
Bergamot de Bugy w	April to June
Bishop's Thumb	Oct. to Dec.
Brown Beurré w	October
Cardiliac (for baking)	Dec. to May
Catharine -	Oct. to Dec.
Chaumontelle -	Nov. to Jan.
Citron de Carmes	July
Colmar w -	Beg. of Dec.
Cresanne w -	End of Dec.
Cuisse Madame w	Mid. of Aug.
Dutch Bergamot	Jan. to April
L'Eschasserie w -	Beg. of Jan.
Gansel's Bergamot	Dec. and Jan.
St. Germains w -	Dec. to Feb.
Golden Beurré -	Sept. to Dec.
Green Chisel -	Beg. of Aug.
Jergonelle -	Mid of Aug.
Little Lard -	End of Dec.
Orange Bergamot	September

Overated w -	Oct. and Nov.
Poire d'Aush w	Jan. to April
Spanish Boncretien	End of Dec.
Summer Bergamot w	End of Sept.
Swan's Egg -	November
Uvedale's St. Germain	December
Virgouleuse w -	Beg. of Jan.
Windsor -	End of Aug.
Winter Boncretien w	March to June.

THE PLUM.

This fruit is not of so much concern to the orchardist, as the kinds already mentioned, and we have little new to add to what former writers have said on this subject; however as I often find, that in the planting plum trees, a wrong choice is made of such as are placed out to grow as standards, I shall, in the following list of the sorts, distinguish such as will produce fruit in that state, and such as should be confined to the walls, or espaliers, of enclosed gardens.

Apricot Plum w	End of Oct.
Black Damson w	End of Sept.
—— *Perdigron* w	September
Blue Gage w	August
—— *Imperatrice* s	End of Sept.
—— *Perdigron* w	August
—— *Primordian* w	August
—— *Violet* s	End of Aug.
Brignole s	End of Sept.
Diaper s -	End of Sept.
Drap d'or w -	End of Sept.
Fotheringham w -	August
Green Gage w -	Aug. and Sept.
Jaune Hative s -	Beg. of Aug.
La Royale s -	End of Sept.
La Rus Carbon s	End of Sept.
Maitre Claude s -	Beg. of Aug.
Morocco, or damask blue s	End of Aug.
Orleans s -	End of Aug.
Early Orleans s -	Beg. of Aug.
Precoce de Tours s	End of Aug.
Pruin s -	December
Red Bonum Magnum s	End of Sept.
True Pruin Damson s	December
White Bonum Magnum w s	End of Sept.
—— *Bullace* s -	October

White Damson w	September
—— *Perdigron* s	September
Winesour s -	October
Yellow Gage w s -	August

"*Coe's Golden Drop Plum.* The merit of this new variety of plum as a fruit for the desert during winter, is a fact with which the public are not sufficiently well acquainted. Having suspended by their stalks in a dry room some fruit of this variety, which had ripened on a west wall in October, in the year 1808, it remained perfectly sound till the middle of December, when it was thought by my guests and myself to be not at all inferior either in richness or flavour to the Green Gage, or Drap d'or Plum. I am informed by Mr. Whitley, of Old Brompton, from whom I received it, that it bears well on standard trees."—See Mr. Knight, in Trans. Hort. Soc.

FILBERTS.

Of this fruit we have two kinds, commonly cultivated in the South of England, the red and the white, both equally good, and of which the culture is of considerable value in the county of Kent. As these trees affect a shady situation, they are usually planted in the same rows as the apple trees, at about six feet distance, so that their growth does not impede the working of the land between the rows.

The trees usually selected in Kent for this purpose. are raised from layers, as being less liable to produce suckers at the bottom, and are trained up to single stems about eighteen inches high, when they are suffered to branch out, and whilst young to have three or four shoots only. When the trees, or more properly shrubs, have reached six feet high, which they commonly do the year after planting, the trees are pruned every year regularly, the same as gooseberries and currants,

but not by a person who "gets into the "middle and lays about him right and "left*," but by experienced men, who make it their profession in that county: and few gardeners who have not seen the operation, would conjecture what rule they could have for it, as the bearing buds of this tree are not to be distinguished in the usual way of other fruit.

The time, however, chosen there for this purpose, is the month of March, when the shrubs are in bloom; at this season they are regularly cleared of the superfluous branches, and the blooming branches left, most of which are stopped, a few buds before the fruit. From this management alone is the crop of nuts usually produced in Kent, but in all other places where they grow, this crop is not only uncertain, but not one half so productive, I had long been informed of the practice of pruning, but as I had never heard it explained, I purposely went into the country to observe it, and

* Vide Mr. Knight's treatise on fruit, 4th edit. p. 87.

was much gratified with the mode when I saw it.

There are some fine new varieties of nuts, between the filbert and Barcelona nut.

The Cosford Nut, which is large, of fine flavour, and the shell so thin, as to be often broke with the pressure of the fingers alone.

The Dwarf Prolific Nut, which is also very finely flavoured, a great bearer, and seldom exceeds four feet in height.

The Cob Nut, is a well known large variety, and an excellent accompaniment to the desert.

Filberts may be kept till quite late in the spring, by putting them with the husks on into jars, stopped close with a waxed bung, and either buried in the ground, or kept in a close cellar. I have eaten them in the month of July,

at which season, their flavour was not worse than when fresh gathered.

FILBERTS.

Red *Cob-nut*
White *Cosford-nut*
Dwarf prolific-nut

APRICOTS.

As this fruit is in its nature similar to the peach, the same mode of culture will apply to it, and also the same protection.

Mr. Knight is of opinion, that the apricot stock is the best for the apricot tree; but I fear we shall never be able to procure a quantity equal to the demand for what is annually used in the nurseries in this country. I find that those trees which budded on the muscle plum stock, to stand very well for many years; that is not, however, the case with those

worked on the Brussels plum, as this stock is very liable to decay.

Apricots.

Algiers	Aug.
Black	Aug.
Breda	End of Aug.
Brussels	Aug.
Gold blotched leaved	Aug.
Early Masculine	July.
Moor Park	Aug.
Peach	Aug.
Large Dutch	Aug.
Royal Orange	End of Aug.
Transparent	Aug.
Temple	Aug.
Roman	Middle of Aug.
White Masculine	Aug.
Turkey	End of Aug.

GRAPES.

This delicious and useful fruit is but little adapted to the open air of our cli-

mate, and of course we can add but little information on this subject that will appear new. Mr. Speechley has given us a very complete history of this fruit and its culture, to which I shall refer my readers when they want to consult this subject fully. Mr. Knight has succeeded in raising two fine varieties, which, as they are new, I shall give their history in his own words as taken from the Hort. Soc. Trans. and from a description he gave me of them in our correspondence.

The Striped Chasselas. "It is a very hardy and productive variety, and bears well in the open air; and in moderately warm situations, it will ripen sufficiently well to afford a very palatable fruit at this season, February 1st."

"This variety sprang from a seed of the white chasselas, and the pollen of the Aleppo grape, which readily variegates the leaves and fruit of the offspring of any white grape. I believe this little grape to be better calculated for the press in a cool climate than any we now possess; and that if trained to low walls

in the warmer parts of England, it would afford a wine of considerable strength."

Grape Vines.

h, *denotes Hothouse*, v *Vinery*, w *such as will ripen Fruit on the open wall.*

Alicant or black Spanish	h v
Aleppo	h v
Black Frontiniac	h v
—— *Muscat of Alexandria*	h
—— *Prince*	v w
—— *Hamburgh*	h v
—— *Muscadine*	h v
—— *Portugal*	h
—— *Gibraltar*	h v
—— *Morocco*	h
—— *Esperion*	h v
—— *Cluster*	w
—— *Damascus*	h
—— *Sweet water*	v w
—— *Tripoli*	h
—— *Muscadel*	h
Claret	h v
Chasselas	w v

Frankendale grape	-	-	h
Genuine Tokay	-	-	h v
Grizzly Frontiniac	-	-	h v
Lombardy	-	-	h v
Malvoise	-	-	h v
Muscatelle	-	-	v
Miller's Burgundy	-	-	w
Malmsey	-	-	w
Muscat of Alexandria	-	-	h
Parsley leaved	-	-	v
Red Raisin	-	-	h v
—— *Constantia*	-	-	h
—— *Frontiniac*	-	-	h v
—— *Hamburgh*	-	-	h v
—— *Muscadel*	-	-	h
Royal Muscadine	-	-	v w
Sir Ab. Pitche's black grape	-	-	h v
St. Peter's grape	-	-	v w
Smyrna	-	-	h v
Syrian	-	-	h
White Frontiniac	-	-	h v w
—— *Hamburgh*	-	-	h
—— *Muscadine*	-	-	h v w
—— *Muscat*	-	-	h v
—— *Muscat of Alexandria*	-	-	h
—— *Raisin*	-	-	h

White Nice grape v
—— *Sweet water* - - h v w
—— *Syrian* - - h

CURRANTS.

Red *Black*
White *Champaigne*

FIGS.

Those marked p *being of small growth and abundant bearers, are proper for forcing in pots.*

Black Ischia
Brown Ischia - - - p
Large White Genoa - - p
Small Black Italian - - p
Maltese
Murray - - - p
Green Ischia
Madona
Common Blue - - - p

Brown Naples
Hanover
Yellow Ischia
Brunswick or Hanover
Cypress
Early White - - - p
Small White - - - p

RASPBERRIES.

Early White
Double Bearing
Large Red
Red Antwerp
Yellow Antwerp
Smooth Cane

STRAWBERRIES.

Scarlet
Hautboy
Black Fruited
Carolina
Chili
Surinam
Alpine
Pine Apple
Wood Strawberry
Roseberry.

ALMONDS.

Bitter	*Striped leaved*
Sweet or Jordan	*Silver leaved*

CHERRIES.

This fruit has long been a profitable culture in this kingdom, not only for the London markets, but also in the neighbourhood of some other cities and provincial towns.

The kinds usually grown, as standards, for Orchards have been the Mayduke and the Kentish cherry; the Black-heart has also been planted, but it does not appear to bear that crop it was used to do; and the Mayduke is to all appearance wearing out. We have of late had from the labour of Mr. Knight, two new kinds which bid fair to become of great service, although we have not yet had sufficient trial of them to ascertain if the kinds will

be hardy enough for orchard culture. The grower of cherries should be particularly careful as to the stock to which it is grafted, as no other kind is fit for the purpose but that of the wild black cherry and it should not be used if there is the least appearance of wound or gum to be perceived on any part it, for *they are seldom known to recover of this disease, which is very prevalent in cherry trees.*

It should be observed that the cherry is, in the nurseries, often budded or grafted close to the ground, and the stems trained up to single stems, which are formed into standard trees; now, as I have observed before, all cultivated varieties of fruit are more tender than the wild parent; the latter should never be chosen in preference for orchard planting.

This fruit, I observe, is cultivated in all kinds of soil, and does not seem at all nice as to its selecting any particular kind more than another.

Notwithstanding the supposed absur-

dities of our forefathers in gardening, we now and then find they have been capable of making a proper choice, especially of fruits for particular situations, and we observe it manifest in the cherry mostly grown in Kent, as the Kentish kind, which is called after that country, is the best adapted of all we know for orchards. The wood of this kind, which has an horizontal habit, is very slender, and yields an easy motion to the operation of the wind, by which it is not broken, nor does it become liable to the injuries that the duke or heart kinds; whose wood being more robust and stiff, would suffer by it. The morella has also a similar character to the Kentish as to the wood, but the fruit is not in general so valuable for the market.

The Elton Cherry. A fine new variety raised by Mr. Knight.

The Black Eagle Cherry. Another fine new black variety, and is also much esteemed.

"The trees of both varieties (which "are only eight years old) are at present "trained to walls, the Elton on a north-"west and the other on an east-north-"east aspect; but I am perfectly confi-"dent that both will succeed thoroughly "well as standards, and that the black "one so cultivated will prove excessively "productive of fruit.

"The Elton cherry-tree has borne well "but it has never loaded itself so heavily "as the other. The Elton ripens about "ten days before the Ambree, and the "Black soon after the Mayduke. The "growth of both trees is extremely "luxuriant." *

The Waterloo Cherry. This is also a fine variety, raised by the same gentleman, and is much praised for its productiveness and sweet flavor.

This fruit was produced by that gentleman to the fruit committee of the Hort. Soc. and they found its merits so superior, that it was generally thought the best cherry known.

---

* Mr. Knight, in communication to the Hort. Soc.

CHERRIES.

Ambree	Aug.
Black Heart	July
Bleeding Heart	Aug.
Black Coroon	Aug.
The Black Tatarian Cherry	Aug.
Biggeroon or Carnation	Aug.
Early May	June
Flander's Duke	July
Flemish	Aug.
Gascoign's Heart	End of Aug.
Harrison's Heart	July & Aug.
Holman's Duke	July
John Tradescant's	July
Kentish	Aug.
Lukeward	Aug.
Morella	Aug. to Oct.
Mayduke	End of June
Early Mayduke	Mid. of June
Ox Heart	July
Late Archduke	Beg. of July
Ronald's Superb	July
Yellow Spanish	Aug. & Sept.
White Heart	July

PEACHES AND NECTARINES.

The almond appears to be the parent of the peach and nectarine, and is its best and most appropriate stock. These can only be propagated by budding; for although they will grow by grafting, they are liable to become diseased, and to gum at the part where the scion is fixed on the stock. In sheltered situations, I have seen very fine peaches produced on standard trees in the open ground, and had a tree growing which, for many years, produced a considerable quantity of fruit, which was large and of good flavour; it was a seedling tree, and I have retained the kind which I now call the Botanic-garden peach in our catalogue. In America peach trees grow commonly in orchards, and the principal purpose to which they are applied, is for distilling an ardent spirit called Peach Brandy, which the American farmers turn to good account, by selling it to the Indians of the back states.

Our climate is nearly as far north as the peach will ripen without artificial heat and protection, it is not to be wondered at therefore that it should be so uncertain as to its bearing. To counteract the bad effect caused to this fruit by the change of weather we are so subject to in the spring, a number of means have been recommended for covering the trees over in the season of blooming and setting of the fruit, such as woollen netting and bunting, (which is a kind of thin woollen stuff made for flags of ships) but these, at the same time they protect the tree from the cold winds, require in fine weather to be removed to admit a free circulation, and also the sun's rays, which is attended with labour. The best mode of protecting trees, in such cases, is by affording it something that may remain on without the labour of changing it, and a very useful and cheap covering of this kind I have used with great success in the long green moss found in woods (Hypnum of several species.) This should be laid next the

wall at the time the tree is nailed, and left its full length to wrap round the smaller branches, either by the motion of the wind, the wet, or the frost, either of which will operate more or less on it; in dry weather when the sun shines it becomes relaxed and spreading, gives room for the sun and air to get to the bloom and the young fruit, but by moisture it becomes in some degree compressed, and folds round the branches; it is also the most convenient covering, approaching in its nature to those operations which the leaves perform as a protection to the fruit in a more advanced state: it is moreover very cheap, and very easy in its application. After the fruit is set and the season advances, it should be pulled out from the branches, as it otherwise affords shelter for insects and vermin when the fruit is ripe.

I know of no convenience in modern gardening which equals this, and it is well worth every persons trying who has trees to protect. It may be used with an

equal degree of success with apricots, cherries, or other early fruits.

From the observations I have made on the peach tree bearing as a standard, I found that in some seasons it bore plenty of fruit when the almond trees that grew nearly in the same place had in general failed; which difference was occasioned entirely by a frost; for the almond will bloom ten days before the peach, and a difference in the weather in that interval is often fatal to the fruit. It should moreover be observed that they are natives of Persia, where the seasons are consequently more settled than in this island. In North America also the peach trees bear fruit in orchards, although the winter season is so much more severe, yet when the frost goes an immediate and uninterrupted spring commences, and no change of weather occurs to prevent the regular progress of vegetation. Those trees and in fact most of our stone fruits are in bloom and the germ completely set before the leaves appear, and it is evident that the young fruit is in a sick or languishing state

between that period and the commencement of the leafing, which affords the tree shelter as well as promotes circulation: it is then adviseable to afford to the fruit the best protection we can; and as vegetation can only be accelerated by warmth at this season, that mode of covering will be found best which partakes of the mechanical action of leaves, it therefore appears that the above mode of protection is of all others that which comes nearest to the leaves in this operation. — It is moreover of all others the cheapest and most convenient mode of protection.

Mr. Knight has also raised some fine varieties of peaches, viz.

The Acton Scott, and

The Downton Peach. The fruits of both are fine and ripen early: I have trees of both kinds.

We have most undoubtedly reason to lament the number of kinds of peaches with which our nurseries abound, and

the strange confusion in their names; but the following list contains those which are usually in demand.

PEACHES.

Bellegarde, bears early	Mid. of Sept.
Bourdine -	Ditto
Botanic Garden Peach	September
Catharine -	End of Oct.
Chancellor -	Beg. of Sept.
Double Montagne	September
——— *Swalsh* -	Ditto
Early Admirable	End of Aug,
—— *Ann* -	Beg. of Aug.
—— *Avant* -	August
—— *Newington*	Mid. of Aug.
—— *Vanguard* -	End of Aug.
—— *Purple* -	Ditto
Ford's Seedling	September
French Mignion	Beg. of Sept.
——— *Vanguard*	September
Galande -	Ditto
Grimwood's Royal Geo.	End of Aug.
Gros Mignion -	End of Sept.

Incomparable -	October
Late Admirable	October
—— *Purple*	Beg. of Oct.
La Belle Chevreux	Beg. of Sept.
La Belle de Vitrey	End of Sept.
Maltese -	Beg. of Sept.
Millet's Mignion	September
Monstrous Pavia of Pompone	End of Oct.
Montagne -	September
Montauban -	End of Aug.
Nivette -	Beg. of Sept.
Noblesse -	Ditto
Old Newington -	End of Sept.
Pavia Royal -	September
Persique -	Ditto
Portugal Peach	End of Sept.
Purple Avant -	End of Aug.
Rambouillet -	End of Sept.
Red Magdalen -	Beg. of Sept.
Red Nutmeg -	End of July
Rosanna -	Mid. of Sept.
Royal Charlotte -	End of Sept.
—— *George* -	End of Aug.
—— *Kensington* -	Ditto
Superb Royal -	Mid. of Sept.

Teton de Venus	Beg. of Aug.
Yellow Alberge	Ditto

NECTARINES.

Brugnion -	Beg. of Sept.
Clairmont -	Ditto
Dutilly -	End of Sept.
Elruge -	Beg. of Sept.
Fairchild's early	Mid. of Aug.
Genoese -	September
Luccomb's -	Ditto
Murrey -	Beg. of Sept.
Newington, early	September
Newington, late	End of Sept.
New White Nectarine	September
Old White -	Beg. of Oct.
Peterborough -	Mid. of Oct.
Roman - -	September
Scarlet - -	Beg. of Sept.
Tawny - -	September
Temple -	Ditto
Vermasch -	Ditto
Violette Hative	End of Aug.

On the Mode of Producing new Kinds of Apples and other Fruits from Seeds.

THE science of Botany, by which all the different flowers which adorn our gardens and fields are classed and reduced to a system, is founded on the structure of the interior parts of each, We know that our delightful songsters of the woods which have been celebrated by all our forefathers, for time immemorial, produce their young by means of eggs, but for the purpose of which it is necessary that they pair together, which marks a period of delight to our spring seasons. The production of singing birds by matching goldfinches and linnets with canary birds and others have been long known to produce varieties between the several kinds, which have been justly celebrated for the improvement in their plumage and the melody of their notes. But it was left to the great Linnæus,

the father of Botanic science, to point out to us a mode of discriminating certain parts in flowers and by bringing such as are different from each other into contact, enable us to produce hybrid fruits and vegetables, in a mode similar to the above, and which I shall now endeavour to explain, for the information of my readers.

In the bloom of the apple-tree we find four distinct members, i. e. that green cup which is placed beneath the flower, which remains till the fruit is ripe, and forms the eye of the apple, is the first part, which as botanists we notice, and this we call the flower cup or calyx."

The tender beautiful leaves, five in number, which constitute the principal part of the flower in our first view, is called the corolla."

In the centre of the flower and growing out of the calyx are observed small pillars, which, when viewed with a microscope, are found to be hollow, and to contain a substance like honey, and which is collected in considerable quantities and taken away by the bees at the

time of blooming,—these are known by the name of stiles.

Independently of these are also seen surrounding them, a considerable number of other little pillars, formed in some measure like pins, each bearing a small round head, and which are in fact so many hollow cases, which are filled with a very fine yellow powder, and these when taken collectively are called stamens, and when the flower is in full bloom these cases burst and this is discharged. It should be observed, that this dust which is called the pollen, is what is also collected by the bees, and is what these interesting creatures form their nests and combs with, in which they lay up their young, &c.

Now it is by a chemical combination of these two substances that the seeds for the reproduction of the future plant proceeds, and it will therefore appear obvious that by the removal of either of these parts from the flower, that it renders the same incapable of forming seeds, at the same time it is worth no-

tice, that in some instances the removal does not affect the fruit, as the apple will after such removal swell and ripen, but in that case it does not produce any pips or seeds, a circumstance that not unfrequently occurs where one or other of these necessary accompaniments to the flower are by any cause destroyed, so that it will be from hence seen that it is not the fruit that is thus affected, but the seeds which are enclosed in the pulp of the fruit. Now it may from hence be imagined that if one of these parts be removed from the flower of a crab tree, and its necessary office as before detailed, be performed by that from the flower of a fine sweet apple, it may be conjectured that the mixture thus formed will produce seeds partaking of the qualities of each, and that these seeds will be rendered capable thereby of forming trees, the fruit of which will be between the two extremes of sour and sweet, a combination of two properties well known to be present in all good fruits. And it may not be foreign to our pur-

pose to observe, that although the above may appear to be an operation militating against nature, yet it is not altogether so, for a mixture of sorts is continually formed by the intervention of bees, &c. in orchards and gardens where different varieties of fruits are grown, hence the number of different apples produced when stocks and seedling trees are suffered to bear fruit, and in some instances, very valuable varieties by this means have been produced. In making this illustration, and taking a fruit tree for our clue, we are under the necessity of looking to a considerable lapse of time for the result of our experiments, but to those who are in the practice of saving cabbage or turnip seeds for sale it is known that they must not grow any two different sorts near to each other, lest by such mixture the seeds so saved become a spurious produce, which would deprive the grower of his object. Now for the use of such persons as may be inclined, either from motives of curiosity or interest, to try the above, I shall finish

this account by stating, that fruits in general may be altered and frequently improved thereby; but it is necessary to observe, that places where experiments of this nature are made should be at a distance from any other trees of the same species, and that the two varieties thus intended to be used should be grown very near together; that both should be deprived of all fruit buds except so many as can be kept within the scope of the experiment.

Thus the Grainge apple and Downton pippin were produced by Mr. Knight; in the former instance a bearing branch of the Orange pippin was brought in contact with that of the Golden pippin, and the stamens of all the flowers left on the Orange pippin were cut away, and thus the fruit became impregnated by the pollen of the Golden pippin.

In the case of the Downton pippin, there was also the bloom of the Siberian crab impregnated by the pollen of the Golden pippin, and the experiment succeeded so far that even a prediction made some years since by the

great Linnæus himself, has been verified. Mr. Knight having remarked "That the "opinion of that great naturalist, that "the character of the male parent gene-"rally predominated in the exterior of the "offspring*," was true, for both the above varieties are perfect instances of the truth of it. This hypothesis is equally illustrated in the new cherries lately raised by the same gentleman. The Waterloo and Black Eagle cherries described in the foregoing pages were the result of two kinds, and the Mayduke was selected as the male parent. The trees even at this time, although very young, may be known by the exterior form of the wood, and shape and situation of the buds, particularly that of the Waterloo both at Downton Castle on the parent tree, as well as in the progeny therefrom in my own nursery, which bear the very stamp and character of the Mayduke, while the fruit both in colour and flavour is totally dif-

* Mr. Knight, Pomona Hereford. Art. Downton Pippin.

ferent, being very black and exquisitely fine to the taste. The new varieties of apples described as being raised at Petworth, were also the produce of a mixture in the above way, and although it was not conducted with all that mechanical precision which is described above, the effect in point of produce has been equally as interesting. The circumstance of the reproduction of the Ribstone pippin from its own seeds, described in page 133 of this work, is a singular circumstance. It has not hitherto fallen to our lot to congratulate our countrymen on the reproduction of the Golden pippin, which is evidently going into decay from age. Yet from the above we have no reason to despair of success, as the noble and public spirited proprietor of that fruit tree having sown a considerable number of the seeds of the best Golden pippin, which I had the honour of selecting for the purpose, there is still hope that this object so very much to be wished may be obtained.

It should be observed, that it is a blessing to society when men of independ-

ence and fortune take up experiments of this nature, the success of which is always a hazard. The labour attending it although not great, requires to be conducted with precision, and the time it takes to obtain the result is long, so that although from the above facts, it is evident a great improvement may be made in following up a work which has thus been so far crowned with success, yet the above reasons will prove that private individuals, or such as are engaged in the necessary employments of an humble station in life, cannot pursue it without considerable loss of time, and an expence that does not come within the scope of men of that description.

I have therefore made the above remarks with the view of shewing what has been hitherto done, and what may be still hoped for, and I trust that this among other domestic improvements may at a proper time become a question of public notice and encouragement.

On packing up Trees for sending to great Distances.

IT frequently happens, that persons wish to transmit trees and plants to a great distance, but from doing which they are deterred by the difficulty of packing, and the probable distance they may have to travel.

As I was so fortunate some years ago, as to discover a mode of preserving such articles in close boxes for many months, in which mode they may be conveyed to almost any part of the world, I think it may be useful to give an account of it in this place. The Society of Arts having at the time honoured me with a handsome premium for making known the process, and having printed my communication thereon, I shall take the liberty of transcribing it: and to those who may be thus desirous of sending such things to great distances, or where the package is liable to be detained, there is no mode so easy, cheap, and convenient.

The Sphagnum palustre, which is the material I have used for this purpose, is found in

great quantities on all peat bogs, growing generally in the moist places. It should be perfectly fresh, and not left any time pulled up before it is used for the intended purpose.

I have since receiving the premium from the Society, sent with success to the East and West Indies, Africa, Constantinople, and to Finland, many packages of fruit and other trees, which have been found to succeed beyond my most sanguine expectation, an account of which may be seen by referring to the Trans. of the Society of Arts, vol. xxx. p. 195 to 203.

Some years ago, I had an opportunity of viewing a large heap of this moss which had been collected for decorating a grotto; and I observed that although it had lain exposed for several months in the heat of summer, yet with the exception of the very outside of the heap, its particles appeared in the same state as when first collected, and that a gentle state of vegetation was still going on. I moreover observed, that several species of heaths, grasses, and plants, that had been by chance collected in the heap were preserved, and in several instances had the same appearances as when growing, others were a little blanched for want of light; but even these were alive and capable of growing by proper manage-

ment. These circumstances led me to make some experiments to ascertain how long trees of different kinds might be preserved in this substance, when excluded from the external air, and I so far succeeded as to keep them for six months, part of which time had been extreme hot weather, and I had afterwards the pleasure of getting them to grow in my garden equal to any that had been transplanted the same season.

As I have endeavoured to discover what property this particular moss possesses when compared with others generally used for packing plants, I shall remark, that, as its name implies, it is in a great measure an aquatic, and consequently not liable to injury from moisture, which it has the power of retaining in a wonderful degree, whilst all the species of Hypnum cannot be prevented from rotting, unless they are kept perfectly dry; and although the mosses in general, when moistened with water, are useful to wrap round the roots of trees when packed up, yet they gradually undergo a decomposition, and consequently if plants were completely enveloped therein, they would decay in time from the same cause, which I have proved in many instances.

The manner in which I have been accustomed to pack up plants is as follows. When the moss is collected from the bogs in which it

grows, it should be pressed, in order to drain out as much moisture as possible, and having boxes prepared of sufficient size for the young trees, (which may in some instances be shortened in their branches), I lay in the bottom of the box as much moss as will, when pressed with the foot, remain of the thickness of four inches. A layer of the plants should then be put thereon, observing that the shoots of each do not touch, and that the space of four inches be left round the sides; after this, another layer of moss, about two inches thick, is placed, and then more plants; and I thus proceed, till after the whole of the plants are pressed down as tight as possible, and the box filled within four inches of the top, which space must be filled with the moss; the contents are then trodden down with the foot, and the box nailed closely up.

When trees are intended to be sent to distant countries, I should advise such to be selected as are small and healthy, and when arrived at their place of destination, they should be cut down quite close, even to the second or third eye from the graft, or in trees not grafted, as near the former year's wood as possible; and having prepared beds according to the following mode, let them be planted therein, to serve as a nursery; for trees of

every description, suffer so much from removal, that unless the weather is particularly favourable, they do not recover it for some time, even when only transplanted in their native climate. I do not think it advisable, therefore, to plant them at once, where they are liable to suffer from want of water, and other attentions necessary to their perfect growth. I therefore recommend beds to be thus prepared for them; viz. On some level spot of ground, mark out beds five feet wide, and leave walks or alleys between them, of two feet wide, throwing a portion of the earth out of the beds upon the alleys, so as to leave them four inches higher than the beds.

If the ground is shallow, and the under stratum not fit for the growth of trees, the whole should be removed, and the beds made good with a better soil.

The advantage arising from planting trees in this way is, that the beds being lower than the walks, the water which is poured on, for support of the trees, is prevented from running off. The plants are also less exposed to the influence of the winds, and if a dry and hot season should immediately follow after they are planted, hoops covered with mats, straw, or canvas, may be placed over them, to pre-

vent the sun from burning the plants, and to hinder a too speedy evaporation of moisture.

In warm climates, canvas cloth will answer best for these shades, to be fixed during the heat of the day, so as to prevent the surface of the mould from becoming dry, and if a little water be sprinkled upon the canvas, once or twice during the day, it will keep it tight, and produce a moist atmosphere underneath, which will greatly facilitate the growth of the plants.

These shades should be removed at the setting of the sun, and the plants then watered, when they will also receive the benefit of the dews during the night. In the morning the shades should be replaced, and the plants thus protected till they can stand the open air, to which they should gradually be enured by removing the shades daily more and more, till they can be wholly taken away.

THE END.

Printed by A. Strahan,
Printers-Street, London.