PAPERS ON AGRICULTURE,

CONSISTING OF

COMMUNICATIONS

MADE TO THE

Maſſachuſetts Society for Promoting Agriculture,

WITH EXTRACTS FROM

VARIOUS PUBLICATIONS;

RECOMMENDED TO THE ATTENTION OF FARMERS,

BY

The Truſtees of the Society.

BOSTON: PRINTED BY YOUNG AND MINNS, PRINTERS TO THE STATE AND TO THE AGRICULTURAL SOCIETY.

1799.

PREFACE.

THE TRUSTEES of the MASSACHUSETTS SOCIETY for PROMOTING AGRICULTURE, in offering to the publick the original papers and extracts from printed works, contained in this pamphlet, believe they are complying with the deſign of the Inſtitution.—They return thanks to the Gentlemen, whoſe communications they have received; and earneſtly requeſt of them and others, engaged in agricultural purſuits, every intereſting hint, obſervation and experiment, relating to huſbandry, which may be in their poſſeſſion. Whilſt they mean not to vouch for the abſolute expediency of *every* improvement recommended, or importance of *every* experiment detailed in their publications, they mean to admit nothing which they deem unworthy of attention or likely to miſlead.

The Natural Hiſtory of the Slug Worm muſt pleaſe, not only as a highly correct and entertaining performance, but as a firſt ſtep to the diſcovery of a cheap and effectual method of deſtroying this devouring inſect; for which a premium is ſtill offered.

Further accounts are here given of the cultivation of the Early Wheat in Connecticut and New-Jerſey, which conſpire with the repreſentations in the former pamphlet, to juſtify and to demand a trial of it in the various parts of this Commonwealth, and eſpecially in thoſe places near the ſea-coaſt, where the certainty of blaſt has long prevented any attempts at raiſing wheat. The ſeed may be obtained of Mr. HILL, Milk-ſtreet.

In the chapter on Fruit Trees and Cider, it is believed there are ſeveral important directions, not generally known, or if known, not regarded. If care and attention,

with

with a ſmall additional expenſe, will render good, a liquor, ſo univerſal, and often, from its miſerable quality, as unhealthful as it is unpleaſant, it is pity they ſhould not be beſtowed.

A paper on Manure is inſerted (extracted and abridged from a work of Mr. KIRWAN, recommended to the inquiſitive) which is deſigned to invite the more intelligent cultivators to attend carefully to the connexion between the reſpective kinds of ſoil and kinds of manure.—To procure an analyſis of ſeveral kinds of ſoil, and a knowledge, founded on this analyſis, of the manure beſt adapted to each kind, the TRUSTEES have offered a Premium.

For a detail of the beneficial effects and mode of application of Plaiſter of Paris in Pennſylvania, inquirers are referred to a treatiſe by Judge RICHARD PETERS, and printed in Philadelphia in 1797. It appears to have been uſed with ſucceſs in ſome inſtances in Vermont, and it is hoped it will have an ample trial in this State. It may be commonly purchaſed in Boſton.

Since ſo much is ſaid in Great Britain, of the advantage of ſoiling cattle, it is thought proper to publiſh ſome remarks and calculations, from a pamphlet in favour of this practice, printed in Pennſylvania: upon the preſumption that ſome perſons, who have the means, will try the method: and upon the belief that, notwithſtanding the additional labour, it may be found highly profitable, provided the health and vigor of the cattle will not be impaired.

The Truſtees would ſet their faces againſt a wild ſpirit of innovation, as well in agriculture as in every ſocial eſtabliſhment: And would encourage none to adopt untried modes of culture upon a large ſcale, to their diſappointment and loſs. At the ſame time, they cannot approve that blind adherence to the beaten track, which deems all diſpoſition to improvement, diſeaſe; which refuſes to hear reaſon and to correct obvious errors; and which diſcourages thoſe wealthy farmers, who can afford the riſk, from engaging in a courſe of promiſing and often profitable experiments.

PREMIUMS

PREMIUMS

OFFERED BY THE TRUSTEES OF THE MASSACHUSETTS SOCIETY FOR PROMOTING AGRICULTURE.

1ſt. TO the perſon who ſhall diſcover an effectual and cheap method of deſtroying the Canker-worm, and give evidence thereof to the ſatisfaction of the Truſtees, on or before the 1ſt day of Auguſt, 1799, a premium of 100 Dollars, or the Society's gold medal.

2d. And a premium of 100 Dollars, or the Society's gold medal to the perſon who ſhall, on or before the 1ſt day of November, 1800, diſcover an effectual, and the cheapeſt method of deſtroying the Slug-worm, and give evidence thereof to the ſatisfaction of the Truſtees.

3d. To the perſon who ſhall, on or before the firſt day of November, 1801, ſhew by actual experiment, to the ſatisfaction of the Truſtees, the cheapeſt and beſt method of cultivating white oak and other foreſt Trees, for building or fuel, in thoſe parts of the country where the annual conſumption now equals, or nearly equals, the annual growth; and ſhall raiſe the greateſt number of trees, being not leſs than 4000, a premium of 100 Dollars, or the Society's gold medal.

And to the perſon who ſhall in like manner have raiſed the next greateſt number of foreſt Trees, being not leſs than 3000, a premium of 60 Dollars, or the gold medal.

And to the perſon who ſhall in like manner have raiſed the next greateſt, or 3d number, being not leſs than 2000 Trees, a premium of 30 Dollars, or the Society's ſilver medal.

Provided

Provided however, that candidates for each of theſe premiums, will be required to ſhew that their Trees are of not leſs than 3 years' growth at the time of application, and have been produced in the method, on the ſucceſs of which the premium is claimed.

4th. To the perſon who ſhall introduce into the State of Maſſachuſetts, for the purpoſe of propagation, the firſt Ram or Ewe, of a breed ſuperior to any now in the State, a premium of 30 Dollars, and for the ſecond 20 Dollars; claims to be made previous to the 1ſt of Auguſt 1800.

5th. To the perſon who ſhall produce the largeſt quantity of wool, meat and tallow, from the ſmalleſt number of Sheep, not leſs than one ſcore, a premium of 30 Dollars; to be claimed on or before the 1ſt day of Auguſt. 1799.

6th. To the perſon who ſhall, in one year, by a method new and uſeful, or that ſhall be an improvement on the methods already practiſed, make the greateſt quantity of Compoſt Manure in proportion to the expenſe; to be of a good quality, and compoſed of materials common to moſt farms; the quantity to be at leaſt 200 tons, and the claim to be accompanied with a deſcription of the yard or place, and the mode in which the ſame is made; a premium of 50 Dollars, or the gold medal.

And for the next greateſt quantity, being not leſs than 100 tons, 30 Dollars.—Claims to be preſented previous to the 1ſt of Auguſt, 1799.

7th. To the perſon who ſhall ſhew by actual experiment, to the ſatisfaction of the Truſtees, a new or improved method of working oxen, being ſuperior to any now practiſed in New England, a premium of 30 Dollars; claims to be preſented on or before the 1ſt day of Auguſt 1799.

8th. To the perſon who ſhall ſhew, by actual experiment, on not leſs than two acres, to the ſatisfaction of the Truſtees, a new or improved, being the beſt and cheapeſt, method of introducing fine graſs, fit for hay or paſture, into low freſh meadows, now producing coarſe wild graſs or buſhes, a premium of 30 Dollars.

9th.

9th. To the perſon, who ſhall aſcertain, by accurate analyſis, the conſtituent parts of ſeveral fertile ſoils reſpectively, and in like manner the parts of ſeveral poor ſoils; and thus ſhall diſcover the defects of the latter; and ſhall ſhow by actual experiments how the ſaid defects may be remedied by the addition of earths or other ingredients, which abound in the country, and in a manner that may be practiſed by common farmers, 50 Dollars. And if it ſhall appear to the ſatisfaction of the Truſtees, that, upon an extenſive practice, the improvement of the poor ſoil would be more than equivalent to the expenſe of the improvement, the addition of 100 Dollars. A minute deſcription of the ſeveral ſoils, and all the circumſtances attending the proceſſes, cultivation and reſults will be required. Claims to be made on or before November 1801.

10th. It is required that the Communications for which the foregoing Premiums are offered, be accompanied with proper certificates from the Selectmen, Magiſtrates or Clergymen of the vicinity, or other vouchers to the ſatisfaction of the Truſtees; that they be delivered in without names, or any intimation to whom they belong; that they be ſeverally marked in ſuch manner as each claimant ſhall think fit; the claimant ſending alſo a paper ſealed up, having on the outſide a correſponding mark, and on the inſide his name and addreſs.

By order of the Truſtees,

JOHN AVERY, *Secretary,*

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ERRATA.

Page 9—For Dandrige read Dandridge.
In motto—After magis inſert *quam*; and for minimus read minimis.

Fig. 1

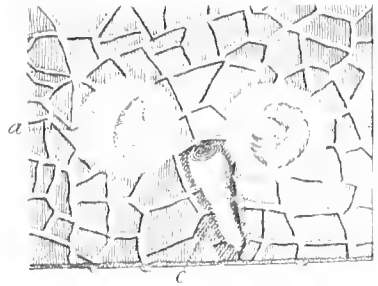
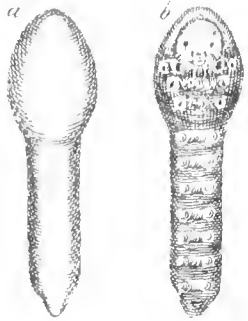


Fig. 2.

Fig. 3.



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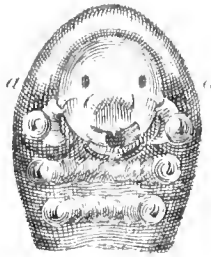


Fig. 5.

Fig. 6.

Fig. 7.

Fig. 8. a

Fig. 8. b.

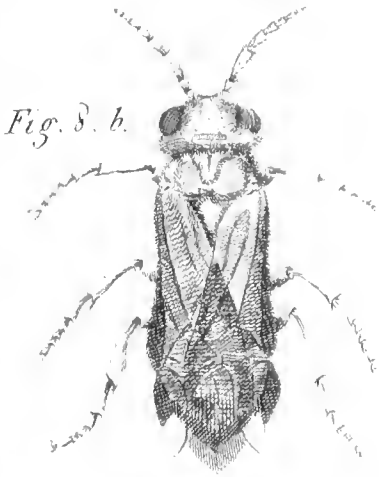


Fig. 9

Fig. 10

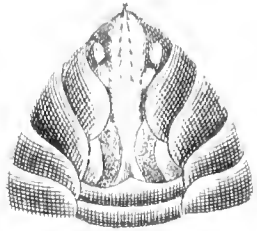


Fig. 11.

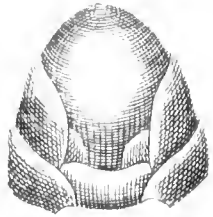


Fig. 13.

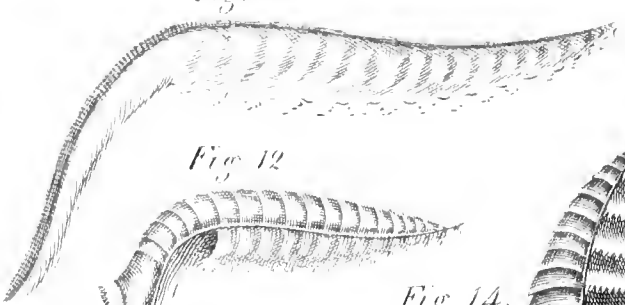
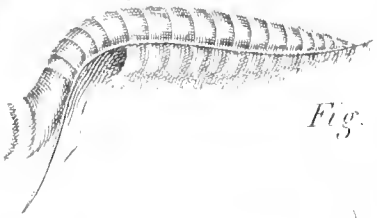


Fig. 12



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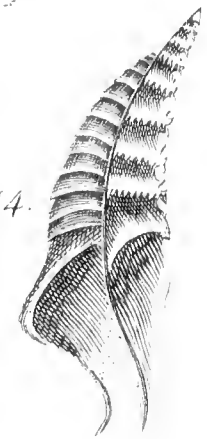

Fig. 15.

Fig. 16

Fig. 17

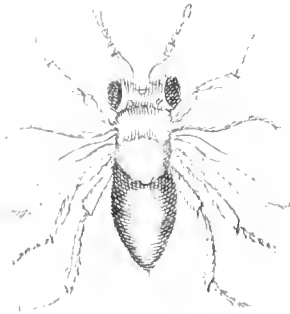

Fig. 18.

Natural History of the Slug Worm.

By WILLIAM DANDRIGE PECK,
Member *of the* Agricultural *and* Historical Societies, & A.A.S.

Natura nuſquam magis in minimis tota eſt.

Plin. lib. xi. cap. 2.

Addreſſed to Jonathan Mason, *Eſq. Correſponding Secretary to the* Massachusetts Agricultural Society.

SIR,

IN every branch of agriculture, and particularly that which compriſes gardening, we cannot but take notice of inſects, which inhabit the plants we raiſe: The variety of trees which you cultivate, muſt have preſented to your obſervation many inſects, that the diligence of your gardener is ſcarce able to repel.

Most inſects, from the time of their being excluded from the egg, till they ceaſe from feeding, wear a different form from that which they put on in their perfect ſtate. The name of Larva, has been given to the form under which they firſt appear, and in which they are moſt injurious to trees and plants. At the termination of this firſt period, they become contracted, ſome before, and others after, they have formed around them a covering, with materials furniſhed by themſelves. In this ſecond period they have received the name of Pupa and Chryſalis. In this ſtate the inſect remains, till every part of its new form has acquired its full growth, and at the end of this period it leaves its narrow priſon, and may be figuratively ſaid to have arrived at the age of puberty.

Caterpillars

CATERPILLARS are exceedingly numerous and generally known; there are however other larvæ, which bear a conſiderable reſemblance to them; but are transformed to inſects widely different: Naturaliſts have called them falſe caterpillars. The largeſt of theſe that I have ſeen, were upon the White Birch and the Willow. Thoſe which inhabit the willow are common enough: They are ſmooth and black, with a ſeries of yellow ſpots on each ſide, along the whole length of the body. They feed in ranks arranged along the edges of the leaves, and throw themſelves into very odd attitudes. Examined with a magnifier, they are found to have the ſix firſt feet, armed with a ſingle claw, like the caterpillar; but the other feet are more numerous, and inſtead of being furniſhed with a number of little hooks, as in the caterpillar, are only retractile prominences terminated by a ſoft, ſmooth, and rounded ſurface.

I GIVE you this deſcription, Sir, and refer you, for the obſervation of the ſeveral particulars of it, to the black larva which infeſts the willow, as it is large enough to be eaſily examined, becauſe the Slug, which ſeems at preſent to threaten the deſtruction of ſome of our beſt fruit-trees, is of the ſame family.

IT is ſaid to be about eight or ten years, ſince the Slug was firſt obſerved in gardens, in the county of Eſſex, from whence it is ſuppoſed to have ſpread.

HAVING been in the habit of frequently viſiting my trees, in order to deſtroy the canker and web-worms, or other inſects which infeſted them, I think I ſhould have ſeen the Slug if it had been in my garden; but it was not till the 8th of July, 1796, that I ſaw any on my trees: I will not however aſſert, that it did not inhabit them before, in ſuch ſmall numbers as to elude obſervation.

ON the 12th of July I plucked ſome leaves on which the Slugs were feeding; and having filled a glaſs veſſel with light earth, laid the leaves upon it; by the 19th theſe had all ceaſed to feed, and having thrown off the ſlimy ſkin, appeared in a yellow one, and deſcended into the earth. A few which had entered the earth at the ſide

of

of the veſſel, afforded me an opportunity to obſerve, that when they had attained a certain depth, they, by moving their body, preſſed the earth equally on all ſides, and thus ſmoothed the cavity, which they then lined with an adheſive ſubſtance, reſembling Lac in colour, and of the nature of ſilk; though not fibrous. To this ſubſtance the earth cloſely adheres. The cell is rather of an oval form, externally of a rude appearance, internally ſmooth, and in ſome degree gloſſy.

As ſoon as the cell was compleated, they remained contracted for ſome time, till the yellow ſkin was thrown off and the pupa ſtate ſucceeded. In ſixteen days after their deſcent, one end of the cell was broken off tranſverſely, and through the opening, thus made, the perfect inſect aroſe.

It was a ſmall black fly, a little more than a quarter of an inch in length, with four tranſparent wings. It is to be noted, that this was the firſt hatch of the year 1796, which had now paſſed through all its ſtages. The fly is repreſented at *fig.* 8. *a.* and magnified at *fig.* 8. *b.*

On the 7th of Auguſt the eggs, placed in the leaves by the flies of this firſt hatch, began to be ſeen, and on the 16th I firſt ſaw the larvæ of the ſecond race. A number of the ſmalleſt of theſe were collected, and I found that they began to ceaſe from feeding on the 11th of September; a term of 26 days from their being hatched; and by the 19th of the ſame month there were none any where to be ſeen.

These are the principal obſervations I was able to make that year.

Having acquired a certain knowledge of the fly and the eggs, I determined in the ſpring of 1797, to watch their progreſs very carefully. Some young cherry trees, five or ſix feet high, afforded me good ſubjects for this purpoſe. From the firſt unfolding of their leaves, I examined them every day. It was the 2d of June before I ſaw a fly; but eggs had been depoſited the day before.

On the 6th, as I was ſtanding by a ſmall tree, a fly came and reſted on a leaf before me, and while I was look-

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ing at it, ſhe raiſed her head a little, bending down the hinder part of her body, reclined a little on one ſide, and throwing out a ſmall ſting, pierced the leaf obliquely, and by degrees ſeparated the upper membrane from the fleſhy part of the leaf; making a circular inciſion of about half a line in diameter: then withdrawing the ſting a little, forced an egg into the aperture. I marked this leaf, by putting a thread looſely round it, in order to determine the preciſe time which would elapſe before the egg was hatched. Examining it from time to time with a magnifier, I found it encreaſed in bulk, and from a long oval, approached a ſpherical form, as repreſented at *fig.* 1. *a.* & *b.*

On the tenth day I could perceive, through the membranes of the leaf and egg, the eyes of the larva, as at *fig.* 1. *b*; and on the 20th of the month it appeared on the leaf and began to feed. This was the fourteenth day from the depoſite of the egg, and the reſult accorded with the appearance of the other Slugs that firſt ſhewed themſelves on the 15th of the month from eggs depoſited on the 1ſt.

From the 11th to the 19th the flies appeared in the greateſt numbers, ſo that I caught 50 or 60 in a ſhort time while ſtanding by the trees. They have not the timidity of other inſects, and may be taken with very little trouble. When the fly is about to place an egg in a leaf, after ſhe has begun to make the inciſion, the leaf may even be cut off, and with a magnifier of about 3 4ths of an inch focus, this very amuſing operation, which is performed in leſs than a minute, may be diſtinctly obſerved through the tranſparent ſkin of the leaf. The inciſion is generally made on the under ſide of the leaf, without wounding the ſkin of the upper ſide; the egg being forced in raiſes the upper ſkin, and the ſpot appears like a ſmall bliſter; the health of the leaf and the circulation of its ſap, appear to be in no wiſe injured; the egg is kept moiſt, and defended from the action of the air and rain; but has all the benefit of light and heat.

The ſkin of the egg is ſoft and ſuſceptible of diſtention, and in order to preſerve theſe qualities, it ſeems neceſſary, that

that it ſhould be placed in contact with the ſap-veſſels of the leaf, which may, perhaps, in ſome ſort, contribute to the nouriſhment of the embryo larva. If the cuticle of the leaf is carefully raiſed, the young larva may be ſeen, rolled in a ſpiral form, as at *fig.* 1. *b.* and white; a ſlip of a leaf in the vial, with the aſſiſtance of a glaſs, will afford you an opportunity to obſerve it in this ſtate.

SOON after emerging from the bliſter a viſcid exudation takes place which covers the whole upper ſurface of the larva with a ſlimy coat of an olive colour. In this, as well as in its tardy motion, it reſembles the Slug or Snail, whoſe name has been applied to it. This coat retains its humidity although expoſed to the fierceſt heat of the ſun: it is probably a defence againſt its enemies, and anſwers the further purpoſe of ſupport when removed from its natural poſition. The olive colour in ſome is very deep, in others more dilute and inclining to a dirty yellow.

ON firſt quitting the egg the larva is nearly white, the head brown and apparently large in proportion to its body, as in *fig.* 1. *c.* where it is delineated both of its natural ſize and magnified.—In the courſe of twenty days it throws off four ſkins at nearly equal periods; it remains in the fifth or laſt viſcous ſkin ſix days, and acquires its full growth (*fig.* 2. *a.*); it then quits this fifth ſkin which is left adhering to the leaf (*fig.* 2. *c.*), and appears in a clean yellow one, entirely free from viſcidity, and has ſo different an aſpect that it would not be ſuppoſed to be the ſame larva (*fig.* 2. *b.* and *fig.* 5.)

AFTER reſting ſome hours, it proceeds ſlowly towards the earth, creeping down the leaf-ſtalk and along the body of the branch—I did not watch its tedious progreſs to the trunk; but believe, when they arrive at the rough bark, they loſe their foot-hold and fall; as I have never ſeen any on the trunk, which muſt be covered with them at the ſeaſon of their deſcent if they were able to move on rough ſurfaces.

THEY do not all proceed thus regularly; for I have obſerved, that if the leaf on which they reſt, receive the leaſt ſhock, they roll themſelves up and fall off. They

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enter the earth to the depth of from one to four inches, and the proceſs of transformation goes on as related above.

Frequently as ſoon as the ſkin is ſhed, they are ſeen feeding upon it; this appears to be an inſtinctive act, and perhaps contributes to furniſh a more copious ſupply of the viſcous exudation; but the laſt mucous ſkin which is thrown off remains extended on the leaf, as at *fig.* 2. c, and ſuch ſkins have been miſtaken for dead ſlugs.

On the 12th of July, perceiving many in the yellow ſkin, I directed cloths to be ſpread on the ground and the trees to be ſhaken: About 170 were collected which I threw into a veſſel filled with light earth. On the 30th, or in eighteen days after their deſcent into the earth they began to riſe in the form of flies.

I was then unexpectedly called from home, and was abſent through the months of Auguſt and September. At my return, in October, the ſlugs of the ſecond hatch were in plenty on the trees, and ſome of them remained till the 21ſt, a month later than in the preceding year, when almoſt all the leaves had fallen and after having ſurvived ſeveral froſts.

They had been far more numerous in the firſt hatch, than they were in 1796; but according to the beſt information I could collect, their numbers in the ſecond greatly exceeded the firſt: the ſmall trees were covered with them; and a breeze of air paſſing through the trees, became charged with a very diſagreeable and almoſt ſickening odour.

In order to determine, with ſome degree of preciſion, the time when the fly firſt riſes in the ſpring, I filled a box with earth taken from the foot of a cherry tree, from one to four inches deep, in the month of February of the preſent year. It contained about two cubic feet. This earth I cauſed to be ſifted, and by this means 190 cells were collected, which were put with ſome of the ſifted earth in a garden pot. At the ſame time I examined the earth in which the larvæ of the firſt hatch of the laſt year had paſſed their transformation; and finding

finding many cells whole, ſuppoſed the larvæ within them had periſhed; but on opening ſome of them, I found they were alive, and in the ſame ſtate as on their firſt entrance. I examined both parcels of earth again on the 6th of May: the larvæ had then juſt entered the pupa ſtate in both. It appears hence that if all the Slugs of the laſt hatch of 1797 had been deſtroyed on the trees, there would have remained in the earth a ſufficient number to have continued the ſpecies.

ON the 21ſt of May they began to riſe and depoſite their eggs. About the 5th of June the young Slugs began to ſhew themſelves, and continued to do ſo in great numbers, till towards the end of the month; and it appeared, that the flies not only roſe earlier; but that they continued to riſe and depoſite their eggs longer this year than in the two former years.

IN the beginning of July the larvæ began to deſcend; about the 23d, the flies from theſe began to riſe, and by the 7th of Auguſt the Slugs of the ſecond hatch began to appear on thoſe trees which had any green leaves remaining, in ſuch abundance that by the 15th there were from twenty to thirty on a ſingle leaf. In the mean time the trees which had been ſtripped, had thrown out new leaves, at the ends of thoſe branches that had not periſhed, from buds, which ſhould not have unfolded, according to the uſual courſe of vegetation, till the next ſpring; thus anticipating the growth of one year, and cutting off the proſpect of fruit.

As the flies continue to depoſite their eggs about three weeks, and the period of hatching is as long, the Slugs are conſequently of different ſizes: the larger diſappear leaving the ſmalleſt on the leaves. Hence, ſome perſons have ſuppoſed there were three or four hatches in a year; but there are certainly only two.

HEAVY ſhowers are ſaid to deſtroy them, and it is poſſible that a few may be waſhed off; rain appears to be diſagreeable to them, and, in ſhowers, I have obſerved that they make a ſafe retreat to the under ſide of the leaves.

THEY

They ſeem to prefer different trees in different places. In my neighbourhood the common red Cherry was more attacked, than the Plumb or Pear: in a garden about a mile diſtant, they ſeemed more pleaſed with the Quince, than with the Pear, Cherry or Plumb: In another place the Button-Pear was preferred to any other. I have alſo found them on the wild Black-Cherry and wild Pear.

The largeſt ſlugs that I have ſeen, were about 9-20ths of an inch in length. The head of a dark cheſnut colour, is bent under and entirely concealed (*fig.* 3 & 4.) This conformation is neceſſary as the direction of its bite is in the plane of the leaf; but when it has aſſumed the yellow coat, its head is more prominent and diſcernible (*fig.* 2. *b.* & *fig.* 5.) The ſix firſt feet are terminated with a little hook; beſides theſe there is a limb on each ſide, between the firſt pair of feet and the head, which is unarmed, and always laid over the ſide of the face juſt below the eyes. I have not obſerved any thing analogous to theſe in any other larva; they are ſhewn at *fig.* 4. *a*: their uſe may perhaps be to regulate the depth of its bite, and to wipe off any extraneous particles that may adhere to the jaws or antennæ. The other fourteen feet are entirely unarmed (*fig.* 3. *b.*) It is mechaincally ſupported by the former; but its ſupport by means of the latter appears to depend on the preſſure of the atmoſphere.

Their body is largeſt towards the head, and diminiſhes gradually toward the tail. They have the faculty of ſwelling out the anterior part of the body (as in *fig.* 2. *a.* & *fig.* 3.), and they moſt frequently appear in this manner with the tail a little turned up (*fig.* 2. *a*).

The cell is repreſented at *fig.* 7; the pupa is yellowiſh, the eyes brown and is delineated at *fig.* 6.

The fly is of *a full gloſſy black except the legs which are of a browniſh aſh colour*: the antennæ black with nine articulations. It is repreſented at *fig.* 8. *a*, of its natural ſize, and magnified at *fig.* 8. *b*. The wings are tranſparent, with a footy tinge, reflecting the priſmatic colours when held in certain directions to the light. They are a little tumid or convex on the upper ſide, which is one the

characteriſtic of this genus; but a more certain one is the ſting, or inſtrument with which the female makes the inciſion for the reception of her eggs. This reſembles a ſaw, and from this circumſtance they are called by Engliſh writers Saw-flies. One of the anterior and poſterior wings is ſhewn at *fig.* 9. The male reſembles the female in colour; but is conſiderably leſs and has no ſting. A part of the abdomen of the female, containing the ſting, is ſhewn at *fig.* 10; and the correſponding part of the male at *fig.* 11.

In the thirteenth edition of the Linnean Syſtem, by Profeſſor Gmelin, there are 142 ſpecies of this genus, of which the Tenthredo Ceraſi or Saw-fly of the Cherry-tree, has the greateſt affinity to the Slug-fly; and is deſcribed as being "*black, with the legs and triangular part on the* "*back, between the inſertion of the wings, yellow. The* "*larva ſlimy and black, inhabits the leaves of the Cherry* "*tree, which it rolls up.*"*

The Slug-fly has no yellow about it, neither does the larva roll up the leaves: it may, notwithſtanding, be a variety of the Tenthredo Ceraſi, as it agrees in ſize and in the ſlimy covering.

An eminent French author, on the ſubject of inſects, has a figure of the fly and of the larva; but deſcribes only the latter, which he calls the Falſe Caterpillar of the Pear-tree. In his deſcription he ſays, "Another kind of "falſe caterpillar, which differs very much from the com-"mon kind in form and which it is difficult to character-"ize is found on various fruit trees, as the Plum, the "Cherry, but eſpecially on the Pear-tree. Fruit-trees "however are not the only ones on which they are found; "for I have alſo ſeen them upon Oaks. In both they "live on the upper ſurface of the leaves, and there con-"ſume the parenchyma; their ſkin is always mucous, "which would make them to be taken for ſnails, if one "did not perceive their feet. Their colour is a brown-"green. They are rarely ſtretched out like the Cater-"pillar, and can at pleaſure ſwell a certain part of their "body: they frequently ſwell the fore part for a third

* Syſtema Naturæ, pa. 2659, no. 20.

" of its length or more, and narrow the reſt. They have " but twenty feet and none in the laſt ſegment. Theſe " inſects ſometimes multiply exceedingly on the Pear- " tree, ſo that four or five are found on the ſame leaf. " I have ſeen of theſe trees in the month of July without " a green leaf."†

THIS deſcription, according ſo exactly with the Slug, and the author's mentioning it as a ſingular ſpecies, incline me to believe that it is the only ſpecies of this genus which has a mucous coat, and that our Slug-fly is a variety of the Tenthredo Cerafi. The form of the ſaw in the European ſpecies will determine this point.

THIS inſtrument is a very curious object, and in order to deſcribe, it will be proper to compare it with the tenon-ſaw uſed by Cabinet-makers; which being made of a very thin plate of ſteel is fitted with a back to prevent its bending. The back is a piece of iron, in which a narrow and deep groove is cut, to receive the plate, and is fixed; the ſaw of the Tenthredo is alſo furniſhed with a back, but the groove is in the plate and receives a prominent ridge of the back which is not fixed, but permits the ſaw to ſlide forward and backward as it is thrown out or retracted. The ſaw of artificers is ſingle, but that of the Tenthredo is double, and conſiſts of two diſtinct ſaws with their backs; the inſect in uſing them, firſt throws out one, and while it is returning, puſhes forward the other, and this alternate motion is continued till the inciſion is effected; when the two ſaws receding from each other, conduct the egg between them into its place. In the artificial ſaw the teeth are alternately bent toward the ſides, or out of the right line, in order that the fiſſure or kerf may be made ſufficiently wide for the blade to move eaſily: to anſwer this purpoſe in ſome meaſure, in that of the Tenthredo the teeth are a little twiſted ſo as to ſtand obliquely with reſpect to the right line, and their points, of courſe, project a little beyond the plane of the blade, without being laterally bent, and all the teeth in each blade thus project a little outward; but the kerf is more effectually made, and a free

† Reaumur in Mem. des Inſectes. Tom. 5. Mem. des Mouches à ſcie.

free range procured for the ſaws, by ſmall teeth placed on the outer ſide of each; ſo that while their vertical effect is that of a ſaw, their lateral effect is that of a raſp. In the artificial ſaw the teeth all point outward and are ſimple; but in the ſaw of the Tenthredo, they point inward or towards the handle, and their outer edge is beſet with ſmaller teeth which point outward. Some idea of the ſaw as connected with its back may be formed from *fig.* 12, and of the ſaw alone from *fig.* 13. The lateral teeth in the ſaw of the Slug fly are very minute, and the want of light, when the greateſt magnifiers are uſed to examine a flat ſurface, has prevented my ſeeing them ſufficiently well defined, to be able to expreſs them accurately, though the contour of the object is very diſtinct, but viewed edgeways they are plainly ſeen. I have therefore given *fig.* 14. of one from another ſpecies inhabiting the cherry-tree, which ſhews this part of the ſtructure very plainly.

I KNOW not how long the flies continue to live after their firſt appearace; though plenty about the trees, in the time of depoſiting their eggs, they become, afterwards, very ſcarce. I am equally uncertain as to the number of eggs from a ſingle fly. If all in the ovaria come to perfection, a ſingle fly may depoſit between two and three hundred; but probably not more than half theſe are excluded by the fly. The ovaria are compoſed of ſeveral tubes, about ſix on each ſide, which occupy a great part of the abdomen, flowing from a common point, enlarging in their courſe and uniting again on each ſide, in a canal leading to the oviduct. (ſee *fig.* 15.) The eggs in theſe tubes are of all intermediate magnitudes, from a ſcarce viſible ſpeck to thoſe ready to be excluded, of which laſt I have frequently counted fifty, though the ſeaſon of depoſiting was advanced.

THE flies do not feed like moſt inſects of this claſs, on the honey of flowers; but upon the moiſture which they lick up from the leaves, moiſt with dew or ſhowers.

THE viſcous coat of the Slugs ſeems to be their ſufficient defence in the larva ſtate; they are not, however, without

without enemies, and ſuch as I hope will be a conſiderable check upon the increaſe of this very diſagreeable and deſtructive inſect.

In proſecuting my inquiries the laſt year, I obſerved ſome eggs in the leaves of the Cherry-tree, which were not ſemitranſparent; but opaque and black; concluding they were abortive, and deſirous to know the cauſe, I examined them and found each egg occupied by two or three white ſpecks: theſe were ſo many inſects in the pupa ſtate, one of which is repreſented at *fig.* 16, and I afterwards found the perfect inſect which is ſhewn at *fig.* 17. This is an extremely ſmall fly of the genus Ichneumen, which depoſits its eggs in thoſe of the Tenthredo and other inſects. *It is of a pale ruſt colour; the eyes and three ſpots* (ſtemmata) *on the top of the head, of a bright red; the wings tranſparent, ſtudded and fringed with fine briſtles, the poſterior wings very narrow; the antennæ conſiſting of* 5 *articulations.* I obſerved this year that great numbers of the eggs of the Slug-fly, eſpecially of the ſecond hatch, were rendered abortive by this atom of exiſtence. The out line of the egg of a Slug fly at *fig.* 18, magnified to the ſame degree as *fig.* 16 & 17, will enable you to judge of their comparative magnitudes.

I CANNOT but remark here, how juſt was the obſervation of a naturaliſt who lived in the firſt century, and how amply it is confirmed by the microſcopes of the moderns, "that the author of nature is no where more perfect than in the minuteſt of his works!"

To make this account as perfect as I was able, I have noted every particular which has come to my knowledge; this has rendered it prolix: but I hope the ſatisfaction you may receive, will, in ſome meaſure, compenſate for the fatigue of going through it.

I BEG you to believe me to be, with much reſpect,

Sir, your moſt obedient ſervant,

Maſſachuſetts, Auguſt—1798— RURICOLA.

N. B. The above Hiſtory obtained the Agricultural Society's premium of Fifty Dollars and the Gold Medal. ☞ *The preſerved ſpecimens, referred to in the Hiſtory, may be ſeen by calling on the Corr'g. Secretary.*

The

The following LETTER *and* TABLE *have been already publiſhed in a ſingle ſheet, in conſequence of a* COMMUNICATION *from the Honorable* JAMES WINTHROP, *Eſq. and are now inſerted to excite* OBSERVATIONS *on the* SUBJECT.

BOSTON, APRIL, 1797.

SIR,

IN conſequence of a Communication from James Winthrop, Eſq. F. A. A. F. H. S. and Member of Maſſ. A. S. on the progreſs of Vegetation, ſo far as came within his obſervations for the years 1793, '94. '95 and '96, the Truſtees of the Maſſachuſetts Society for promoting Agriculture have judged it very important to form, agreeably to Mr. Winthrop's plan, the following Table: And to requeſt your aid and aſſiſtance in forwarding their views by making, and recommending to others, ſuch obſervations and remarks as will promote the end they have in view. This is, by correct obſervations, ſo to regulate the periods of planting, ſowing ſeed, &c. that crops may be made more certain by being commenced at the proper ſeaſons; and that in a climate ſubject to ſuch variation as ours, we may be prepared to avail ourſelves of the firſt commencement of ſuch vegetating powers, as are adequate to the full and complete nouriſhment of the ſeed put into the ſoil. Such a period can only be aſcertained by regular and correct notice of the firſt evidences of vegetation in the trees and plants that cover our ſoil.

Beſides, the Truſtees, ſtimulated by the exertions and arrangements of Countries more experienced in Agriculture, and warmly embarked in the improvement of that of their own, flatter themſelves, that this may lead to further arrangements for other information and more valuable communications, on which the improvement of the Country will much depend. Embarked in the ſame cauſe, in aſking your exertions, we have full confidence in a compliance, and your attention to this ſubject on the receipt of this letter, may ſecure ſome valuable obſervations for the preſent year. We hope to be able hereby

to aſcertain the firſt appearance of vegetation in the various parts of this State, which muſt eſſentially differ in the northern and ſouthern parts. The table to be filled up, comprehends the principal foreſt and fruit trees, and the fruit-bearing ſhrubs. If any other articles of vegetation ſhould come under your obſervation, ſuch as the time of planting, bloſſoming and the ripening of the fruit or ſeed, you will pleaſe to inſert them, on any other ſcale you pleaſe, and conſider this only as a model for arrangement. The Truſtees requeſt your obſervations may be tranſmitted to their Preſident or Secretary, or to either of the Board, as often as is convenient.

A Table

A Table pointing out the periods of the Leafing and Bloſſoming of Foreſt Trees and Shrubs, and of the Leafing, Bloſſoming and Ripening of Fruit, on Trees and Plants. That the obſervations made in the different parts of the Commonwealth may be accurate, and equally determine the ſtate of firſt Vegetation, it will be expedient to fix the firſt opening of the Bud, and the firſt appearance of the form of a Leaf, as well as the ripening of the Fruit, at the ſtages to be minuted.

Kind of Trees.	*Period of Leafing.*	*Period of Bloſſoming.*	*Period of Ripe Fruit.*	*Situation of Trees, ſtate of the Weather & other obſervations.*
	179	179	179	
Elm, Upland				
Swamp,				
Oak, White				
Grey				
Black or Blue				
Maple, Rock				
White & Red				
flowering				
Birch, Black				
Yellow				
White				
Oilnut				
Shagbark,				
Walnut,				
Beach,				
Baſſwood,				
WhitePoplar,				
Trembling				
Button,				
Apricot,				
Apple,				
Pear,				
Peach,				
Cherry				
Plumb,				
Grape Vine,				
Red Currant,				
Gooſeberry,				
Raſberry,				

Letter

Letter from WILLIAM RUSSELL, *Esq. on the* EARLY WHEAT, *to the* GENTLEMEN *of the* MASSACHUSETTS SOCIETY *for promoting* AGRICULTURE.

MIDDLETOWN, 19th SEPT. 1797.

GENTLEMEN,

I BEG to acknowledge the honor you have done me by electing me a member of your uſeful and valuable Inſtitution, and to aſſure you I ſhould have made theſe acknowledgments long ago, had not the certificate of my election, as well as every information reſpecting it, been accidentally withheld from me until my arrival at *Boſton* in the preſent month. The day after this information reached me I received a requeſt that I would communicate to you the ſucceſs of an experiment made upon a ſmall field of White Wheat, and I now very cheerfully embrace the firſt opportunity, after my return home, to comply with this requeſt. The land is of a moderate quality, and rather ſtony. The quantity is ſomething ſhort of two acres. It was ſowed (without any manure, and after being careleſsly worked) with three buſhels of Wheat, in the middle of Sept. 1796. It came into my poſſeſſion on the 1ſt of Nov. following. About the middle of that month, thirty buſhels of ſoaper's aſhes (being all I could procure) were ſtrewed over it. The Wheat looked weakly all through the winter, therefore as ſoon as ſpring approached, and I found the ground dry and free from froſt, I had it harrowed twice in a place, with a good thorn harrow, which I attended and carefully loaded as much as it would bear, ſo as to looſen the ſoil without tearing up the Wheat by the roots. As ſoon as this was done, it was ſowed with Clover and Herds Graſs Seed, and then rolled with a heavy wood roll. I was induced to uſe this proceſs from two motives. The firſt aroſe from my obſerving the ſurface of the field to wear an appearance of being ſomewhat caked together, which led me to conceive that looſening the ſoil would facilitate the growth of the Wheat. The ſecond conſideration was a deſire to have the field ſeeded this year inſtead of the

following.

following. The operation of furrowing in the firſt inſtance, and rolling in the ſecond, attracted the notice of my neighbours, being unprecedented here; but I now hope their good conſequences will introduce the practice, for the appearance of the wheat was very ſoon improved, and the ſeeds, which came very regular, have yielded far more help, and now make a better appearance, than I can ſee in any of the fields around them. The wheat has yielded 44 buſhels, weighing 68 lbs. per buſhel, amongſt the whole of which, whilſt growing, I did not ſee a ſingle car that was blaſted, nor was any part of it lodged. It was mowed and carried the ſecond week in *July*, and the whole immediately diſtributed amongſt my neighbours, who eagerly ſought after it for ſeed, at 15*ſ.* per buſhel.

I am ſorry my ſtay at *Boſton* was too ſhort to admit a repetition of the ſatisfaction I received by attending a meeting of your Society, in Octob. 1795, as it would have given me pleaſure to have had an opportunity of obſerving to you, in perſon, that I have been diſpoſed to attend to the cultivation of white wheat in preference to any other, from a communication made to me laſt year by Mr. JOSEPH COOPER, a very obſervant, induſtrious, and ſucceſsful cultivator in *New Jerſey*, whoſe uncommon genius has met a rich return in the improvement of the *quality* as well as *quantity* of every kind of grain and vegetable, which he has raiſed upon his Plantation, by being particularly attentive, not to changing his ſeed, but ſelecting it from the ſtrongeſt and moſt productive plants. Amidſt his attentions and experiments on theſe ſubjects, that pernicious inſect, commonly known by the name of the Heſſian Fly, attracted his notice, and, as I was pleaſed with his obſervations, and have his permiſſion to communicate them, whenever a proſpect of uſefulneſs preſented itſelf, I take the liberty of ſubmitting a copy of his letter to your peruſal. I ſhall only add, that I am the more gratified by the preſent occaſion of addreſſing you, becauſe, from the unreaſonable price and ungovernable ſtate of labour here, I find my inclinations and intentions toward agricultural purſuits ſo much

impeded and abridged, that I cannot promiſe myſelf many occaſions of correſponding with you; but whenever any obſervations occur in my confined practice, which may appear worthy your notice, you may reſt aſſured of their being tranſmitted, by,

Sir,

Your Obed. Servant,

WILLIAM RUSSELL.

Letter from Mr. JOSEPH COOPER *to* WILLIAM RUSSELL, *Eſq. on the* HESSIAN FLY *and the* EARLY WHITE WHEAT.

COOPER'S POINT, 30th DEC. 1796.

FRIEND RUSSELL,

AGREEABLE to promiſe I have reduced to writing ſome of my obſervations on the inſect called the Heſſian Fly. Their firſt appearance, on my place, was in the autumn of 1798, when they did great damage to the early-ſown grain; but the fore part of the ſucceeding winter was ſo warm that they came out a fly, and the nights being cold and froſty, they periſhed before depoſiting their eggs, which almoſt annihilated them. The fore part of the two ſucceeding winters being nearly ſimilar, they did but little injury in our neighbourhood until the ſpring of 1791, when they were numerous. In the month of April I took ſome ſtools of wheat, with inſects in them, in their brown ſtate, put them in glaſſes, and covered them with paper to prevent their eſcape, which I pricked with a pin to admit air. In about a week, the inſects began to come out a fly, nearly the ſize, ſhape, and colour of a ſmall muſquito. About the ſame time this kind of fly was very numerous in the wheat field. Soon after which I found the maggots very numerous in the wheat: Thoſe, undoubtedly, were from the ſecond hatching that ſpring. When the wheat came into ear, a great part of it fell and periſhed. After harveſt

veſt I took ſome of the ſtubble, which appeared to be moſt infeſted with the maggot, and placed them as before, which came out a fly irregularly until the beginning of Sept. after which time no more appeared. The ſeaſon had proved extremely dry, but a fine ſhower happening in the ſecond week of that month, I was tempted to ſow both wheat and rye in the week. The conſequence was the inſects deſtroyed the greateſt part of the wheat and greatly injured the rye. In the laſt week of the ſame month I ploughed a ſmall piece of ground that had been in clover, but which was now killed by the drought. I ſowed it with the ſame kind of wheat I had ſown before (which was the bearded, as I ſowed no other that year.) This laſt mentioned piece of ground lay a conſiderable diſtance from any other winter grain, but it was not in the leaſt injured by the inſect, either in the fall or ſpring. I muſt remark, that an acquaintance in *Burlington* county ſowed a field with wheat very early, the ſame year, which was all deſtroyed by the inſect. In the beginning of October he ſowed about an acre, adjoining the other, which had been in pumpkins that ſeaſon, highly manured, and in excellent order: The wheat came up well and flouriſhed for a while, then dwindled till there was ſcarcely a green blade to be ſeen. On examination he found the roots full of the inſect, from which circumſtance, it appears to me, he raiſed a brood of the fly in his early-ſown wheat to deſtroy the late. From the above, and many other obſervations, I am fully of opinion, that if it was a general cuſtom to prevent the vegetation of winter grain, as much as poſſible, from harveſt till the third week in September, very little damage would be done by the before mentioned deſtructive inſect, as I have been very attentive, and have not found them in any other vegetable than wheat and rye; therefore thoſe broods which are hatched before harveſt muſt periſh before that time, and, for want of ſuitable plants, they cannot have propagated their ſpecies in the mean time. In favour of late ſowing I would recommend the culture of the early white wheat, which originated (if I may be allowed

ed the expreſſion) in *Virginia*. This wheat is particularly favourable for late ſowing, as appears from the following circumſtance: I procured 1½ buſhel, which I ſowed on the laſt Tueſday in October, in an orchard of large apple and other trees, the ſoil ſandy and not highly manured, it was greatly injured by poultry, both in fall and ſpring, yet ſome of it was in ear the 4th of May. It produced 45 buſhels and 3 pecks of clean wheat, the firſt buſhel of which, took up at the head of the heap, and meaſured with a ſealed meaſure, as exact as poſſible, weighed 70 lbs. and none of it leſs than 66. The probability of this wheat eſcaping the ravages of the fly more than any other, ariſes from its being peculiarly ſuitable for late ſowing, and that, notwithſtanding this, it comes forward ſo rapidly in the ſpring, that the ſtraw hardens before the ſpring hatch of the fly can injure it. A very conſiderable and curious farmer, in the back part of *Virginia*, being deſirous of procuring a better kind of wheat than was to be had in his neighbourhood, went to *Baltimore* and examined the wheat in every ſtore in the place, took home ſome of the kind which pleaſed him beſt, gave it the beſt cultivation, and being very attentive to its growth and appearance, happened to obſerve one ſtool or plant ſo much earlier than the reſt that it became perfectly ripe when the grain of the other was only getting into the milky ſtate. The grain from that plant he ſaved, and ſo careſully and ſucceſsfully cultivated, that. in a very ſhort time, he ſold 1500 buſhels for ſeed. This I mention as a further proof of the advantages of ſelecting ſeed in the manner I have practiſed for many years, from every different crop I rear, and have always been ſufficiently rewarded for my trouble, by the improvement of the quantity and quality of the productions of my farm. If theſe lines may be made uſeful to others, either by inducing them to try ſuch experiments, or communicating theirs to the Public, it will be a tenfold reward for the trouble of writing the above, as well as a gratification to Your Friend,

(Signed) JOSEPH COOPER.

Letter

Letter from JEREMIAH WADSWORTH, *Esq. to the* CORRESPONDING SECRETARY, *on the* FORWARD WHEAT.

HARTFORD, MARCH 3, 1798.

SIR,

I HAVE your favour of the 25th ult. It is not in my power to give a satisfactory account of the forward wheat, of last year's growth. I went from hence before my crop was harvested, except one small field, and did not return before October. The small fields yielded thirty bushels per acre, a fine plump berry, very sound and good, but not being threshed before I left home, was not weighed. In my other field all the crops were good, and fit for the sickle from the 1st to the 16th of July; except one piece of two acres in a stiff moist clay, after Indian corn, put into the ground the 1st of November; this was very much shrunk. In an adjoining field of pasture ground, were many Barberry bushes, which might have been the cause of this blast; but I am satisfied it will not do well to put this wheat in the ground after the middle of October; that which was sown early in September was the best. I hope this year to furnish a more satisfactory account of this wheat. I have much in the ground in a variety of soils, sown at different seasons. I was promised particular information from several persons, whom I furnished with seed wheat last year. All I have been able to obtain is general. All the forward wheat has been good, and all the other wheat very indifferent. I cannot at present offer the Society any thing worth their attention on any other article of Agriculture.

I have the honour to be,
Your most obedient
Humble Servant,
JEREMIAH WADSWORTH.

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The following EXTRACTS *and* REMARKS *relating to the* CULTURE *of* FRUIT TREES, *and the* MAKING *and* MANAGING *of* CYDER, *are submitted to the* PUBLICK *by the* TRUSTEES.

INTRODUCTION.

THE following extracts and remarks are thrown together, with a view to attract the attention of practical Farmers, and more especially those who are settling on new lands. It certainly must be considered a very important point, that the first arrangement, or laying out the Farm, should be made with judgment. The judicious husbandman will carefully examine the quality of the land on which he is about to settle, and build on that part of his Farm where he probably will be required to do the most labour. How many Farmers do we see obliged to travel a long distance from their houses, to the fields they cultivate, and how extremely expensive, as well as inconvenient is this to them! Especially if the real value of an hour's labour in the time of harvest is estimated! Hence we see the importance of fixing well; the cost to a husbandman being too great ever to contemplate the removal of his buildings. The beauty, convenience, and generally the extraordinary price a Farm will command, are determined by a wise arrangement of the buildings. If we see the house of a Farmer placed in the best situation, combining the advantage of being contiguous to the cultivated fields, at the same time sufficiently near a good spot for the Barn, we naturally calculate on the advantages and profits arising to him. But to go farther, admit this husbandman had made it his next care, to have planted his Farm with a good collection of Fruit Trees, and in doing it, had, as in placing his buildings, discovered taste and judgment, can it be doubted what the effect would be? Not only is his place more useful, but the real value, if estimated by comparing with his neighbour who has practised by chance, will be

be double; and would command a handſome price, when a badly improved place could not be ſold. How valuable is ſuch a Farmer to the town in which he lives! His Farm is an ornament to the country. What is meant by a collection of the beſt Fruit Trees, muſt be principally confined to the culture of the Apple: The circumſtances of our country demand, that it ſhould have our firſt care, although in other countries the Grape ranks before it, yet, for the preſent, that delicious and valuable fruit muſt give place to thoſe kinds that can be cultivated with leſs labour. The plant which gives the Grape is quickly produced; ſo are the Peach and Nectarine. The Cherry and Plumb require more time to arrive to a bearing ſtate. Every wiſe Farmer will, however, exert himſelf to reſcue a little time from his more neceſſary labours, and plant a few Trees, to give him that variety which theſe fruits afford. The man who has been fortunate in ſelecting land favoured by nature, and profited of its advantages, may certainly enſure himſelf the ſatisfaction of having ſufficient leiſure, by the meridian of his life, to cultivate the finer kinds of fruits.

OF THE CULTURE OF APPLE AND PEAR TREES.

To produce good Apples and Pears is as completely within our power, as it is to raiſe potatoes; and would the Farmer take the ſame care of an Apple Tree that he plants, as of a hill of potatoes, we ſhould not ſee plantations of Trees in the moſt diſordered ſtate, ill-formed, ill placed, withering in conſequence of being badly planted, broken by cattle, and often loaded with monſtrous neſts of caterpillars. The apple is of ſufficient value to arreſt not only our attention, but great care; neither is a cultivator in any inſtance more certain of reward than by carefully promoting the growth of this Tree. From a little experience, ſome obſervation, and attending to the inſtructions of ſome of the beſt writers on the ſubject, it is believed to be within the power of every Farmer, to provide himſelf with Trees ſufficient

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for his Farm at a ſmall expenſe, and with more certainty in regard to the ſorts, if he will, of himſelf, produce the ſtocks from the kernel, and attend to the grafting.

OF RAISING THE STOCKS.

It may be done in the following manner: The latter part of October, in ſome ſecured part of the Farm or Garden, dig over, and make ſoft, a piece of good ground; 4 feet by 8 will be ſufficient: On this bed ſow the ſeed of the Apple, which is obtained by taking the pomice from the cyder-mill, ſcatter it of a proper thickneſs on the bed, and with a common hoe dig it in to the depth of about two inches. The ſummer following keep the bed clear from weeds, and take out ſome of the ſeedling plants, if they come up too thick: They ſhould not ſtand within two inches of each other. By keeping them clear, and not being thick, they will grow more freely; and, if on good ground, will be ſufficiently large to tranſplant to the nurſery the next ſpring. This operation may be performed with ſucceſs, if the following method is carefully attended to: A piece of ground being fixed on, ſecure from any kind of cattle, dig it well over, if it is in good heart (as the common term is) nothing will be required, but to plant the ſeedlings in rows. Theſe rows ſhould contain each as many Stocks as the proprietor would like to plant of a ſort on his Farm; four will unqueſtionably contain a ſufficient number: For the huſbandman will find, that to plant a few Trees annually, and to do it with care, his proſpect of ſucceſs is greater than to plant many and leave them to chance. In planting, if it is determined to have four rows, and the ground is 9 feet broad, draw a line one foot from the edge, and on this line open a trench 8 or 10 inches deep; here place the plants at 15 inches from each other; when this line is filled draw a ſecond, leaving a ſpace of 18 inches, and fill it as before, not regarding to ſet one exactly againſt the other, but rather to paſs, and place them ſo that they ſhould not be in ſquares. The next line ſhould be

be drawn at 4 feet diſtance, and a row planted, as in the firſt inſtance. A parallel row being planted 18 inches from the laſt, the ground will be occupied. In nurſeries, the outſide rows are always found to be largeſt. For this reaſon, to plant in the manner above directed will be found beſt. In removing the ſeedlings from the bed, if a ſpade is uſed to looſen the earth, and bring up the plant, without deſtroying the ſmall fibres of the roots, it will flouriſh better after tranſplanting. A weak plant ſhould not be carried to the nurſery; neither is it an object to preſerve ſuch. Nothing is eaſier than raiſing ſeedling apple tree plants; therefore, take only thoſe that have grown well, that are ſtraight and fair; it is generally beſt to take off a little of the top or downward root. If the ſide root lets are long, they muſt be ſhortened; becauſe it is better they ſhould be ſhort, and ſpread fair in the planting, than to be left long, and in any degree curved. Juſt in proportion to the care in placing theſe ſmall roots, will the cultivator be benefited. If well done, when they are taken up to go to the orchard, a fine ſpreading circular root will be found. Such young trees may be removed, and ſcarcely check their growth. During the ſummer, care ſhould be taken to keep the ground free from weeds. The ſucceeding ſeaſon the ſame attention is required. The April following, which completes two years from the plants having been taken from the ſeed bed, they will be in a good ſtate to graft; a work, that requires great care, and ſome ſkill.

OF GRAFTING.

This operation is well deſcribed by a gentleman in *England*, Mr. A CROCKER. He obſerves, of all the methods uſed and recommended by different perſons, he has found that beſt, termed whip or ſplice grafting; which is thus performed: "Some fourteen or twenty days before the ſtocks are to be grafted, take from ſome healthy, fruitful trees, of ſuch kinds of apples as are intended to be propagated, a ſufficient number of ſhoots of the laſt year:

Tie them in ſeparate bundles, label them; and put the larger ends thereof about three inches deep in the earth, in ſome expoſed part of a garden, there to remain till they are wanted for uſe.* The nurſery-man, having mixed and well tempered with water a ſufficient quantity of ſtrong clay, the new feces of a horſe which feeds on hay, and ſome freſh cow-dung, he muſt betake himſelf to his nurſery; where, ſtanding on the north ſide of a ſtock, he muſt place his left foot firmly on the earth, cloſe thereto, and with a ſtrong pruning knife take off the ſtock, about five or ſix inches above the ground, in a ſloping manner; and on the ſouth, where the bark is clean and free from knots, with a very keen penknife, he muſt take off a thin ſlice of bark and wood, of two inches or more in length; he muſt then take his graft and ſhorten it to three or four buds; and from the part oppoſite the lower bud but one, ſlope it down ſo as to match the thin ſlice taken from the ſtock, and ſo place his graft and ſtock together, that the inner bark of each may coaleſce; inſerting the bottom of the graft into a ſmall plaſh inciſion made at the bottom of the ſlope of the ſtock. In this order he muſt bind his graft and ſtock firmly together with a liſt of baſs-matting wetted; and then, by himſelf or aſſiſtant, ſurround both with a ball of his tempered clay, taking care ſo to cloſe it about the ſtock and graft, as totally to exclude the external air.† To prevent the clay being chapped by cold winds or ſun, it may be proper to wrap a thin layer of tow round the ball of clay, ſmoothing the whole with the hand dipped in water. Thus he will proceed, until all his ſtocks are grafted.

In this ſtate the whole muſt remain, until the latter end of June following;‡ at which time it will be neceſſary to cut

* The reaſon for taking the grafts from the tree, and thus expoſing them before they are grafted to the ſtock, is, that the juices in their tubes may evaporate through the bark, or be extravaſated into the ground. Their tubes being in ſome meaſure thus emptied, will the more freely admit the aſcent of ſap from the ſtock after their union.

† This operation of grafting ſhould be performed, if poſſible, when the weather is moderate; not during the time of very cold winds, or open ſunſhine.

‡ Frequently ſlipping off ſuch buds as break out from the ſtocks below the clay.

cut through the ball of clay, diſplace it, and carefully take off the baſs bandage, when, to his ſatisfaction (if the former operation was well performed) the nurſery-man will perceive a perfect union of the graft and ſtock. If any extraneous ſhoots, around the ſtocks under the clay, ſhould appear, they muſt be cut off with a keen knife, or ſlipped down with the fingers, and the whole clayed as before, but without any baſs bandage."——The method above deſcribed has been found to ſucceed well in this country, with this alteration: The ſtocks were cut nearer the ſurface of the ground; no more was left than to give room to place the graft: In this way the earth may be hilled up to the ſtock, and, covering the ball of clay, ſecures it from being chapped with the ſun or wind: The ſecond claying is by this method unneceſſary. If the ſtocks were healthy, and the ſeaſon good, the growth will be great the firſt ſummer. Of the firſt ſhoots that are made, the ſtrongeſt ſhould be left; all the others ſhould be rubbed off with the thumb and finger. An attention to the growth of this ſcion, during the ſummer, will be a pleaſant care. The leader muſt be carefully preſerved, and two or three of the ſtem ſhoots immediately under it. As the ſtem riſes, theſe ſide buds will increaſe; therefore it will be neceſſary once in ten days to go over the nurſery, and, with the thumb and finger, rub off all the ſhoots, preſerving only three or four under the leader. This is very eaſily done, if the ſhoots are not ſuffered to remain too long. The leaf, under the bud rubbed off, muſt not be injured. By this method the graft may be reared up to the height of four or five feet the firſt ſummer. In the autumn, the ſtem will be perfectly ſmooth, and the graft have a good leader, with three or four ſtem boughs; and, if at the time the clay is taken off, the ſtock has been ſloped away very carefully with a ſharp knife, ſo as to be ſmooth with the graft, it can hardly be diſcovered where it was grafted. The ſeaſon following, very little attention will be required, more than that of keeping the ground clean. The ſtem will ſwell conſiderably, and the leader riſing, ſide branches will form; but as the length of the ſtem muſt be increaſed,

creaſed, it can be done in no other way, than by going over them in autumn, and taking off the under branches. Eight inches at moſt can be gained in the height in a ſeaſon. Taking off too many of the boughs of young trees is very injurious.

OF PLANTING THE TREES.

Four ſummers from the grafting will bring the trees to a ſize for planting. In this time the ſkilful and attentive farmer will have opportunity to get them to a good ſtandard height; ſix feet is low enough. The trees being ready, it is of importance that the huſbandman decide well in the diſpoſition of them: For if he has wiſely choſen the ſorts of fruits, it will be in his power, by arranging them well, to unite convenience with profit. By placing the ſorts together, he will avoid much loſs, and can profit of many ſituations, that could not be occupied with a promiſcuous growth of apples. If his farm is bounded on any ſide by the public road, he might advantageouſly plant a row of a late kind of apples by the fence; very little loſs would be ſuſtained; half the tree might ſhade the road. The proprietor would gain; and the road be made more pleaſant. The choiceſt ſort of apples only require to be planted in cloſes, or ſecure places. Hence we ſhould find an abundant ſupply of trees, and yet no land occupied as an orchard. The work of planting a tree well, is of importance; an operation generally ill done. Is it to be expected that a fine tree can be produced, if no care is taken in putting it down? In the common method of ſetting apple trees, two men will plant thirty or forty in a day, whereas two men in good ground and eaſy digging, ſhould not do more than eight; and in hard and rocky land, not more than four. To prevent the inconvenience to the farmer, of ſo much time being required in the ſpring, the holes might be dug in the fall. From Mr. MARSHALL's excellent work, entitled the "*Rural Economy of Glouceſterſhire*," is the following extract:

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"The method of Planting. This requires particular notice. The ordinary method in the *Glouceſterſhire* cow-grounds, is to dig a hole, wide enough to take the roots, (if not very long;) which being placed within it, the mould is returned upon them, in the order in which it came out; carefully replacing the ſods on the ſurface, that no grazing ground may be loſt! A mode of planting, which is too common throughout the kingdom. A method which is more likely to ſucceed is this: The ground being ſet out with ſtakes driven in the centres of the intended holes, deſcribe a circle, five or ſix feet in diameter, round each ſtake. If the ground be in a ſtate of graſs, remove the ſward, in ſhallow ſpits; placing the ſods on one ſide of the hole, the beſt of the looſe mould place by itſelf on another ſide; and the dead earth, from the bottom of the hole, in a third heap. The depth of the holes ſhould be regulated by the nature of the ſubſoil. Where this is cold and retentive, the holes ſhould not be made much deeper than the cultivated ſoil. To go lower is to form a receptacle for water, which, by ſtanding among the roots, is very injurious to the plants. On the contrary, in a dry light ſoil, the holes ſhould he made conſiderably deeper; as well to obtain a degree of coolneſs and moiſture, as to be able to eſtabliſh the plants firmly in the ſoil. In ſoils of a middle quality, the hole ſhould be of ſuch a depth, that, when the ſods are thrown to the bottom of it, the plant will ſtand at the ſame depth in the orchard, as it did in the nurſery. Each hole, therefore, ſhould be made of a depth adapted to the particular root which is to be planted in it. The holes, however, ought, for various reaſons, to be made previous to the day of planting. If the ſeaſon of planting be ſpring, and the ground and the weather be dry, the holes ſhould be watered the evening before the day of planting, by throwing two or three pails full of water into each: a new, but an eligible practice. In planting, the ſods ſhould be thrown to the bottom of the hole, chopped with the ſpade, and covered with ſome of the fineſt of the mould. If the hole be ſo deep, that, with this advantage, the bottom will not

not be raiſed high enough for the given plant, ſome of the worſt of the mould ſhould be returned before the ſods be thrown down. The bottom of the hole being raiſed to a proper height, and adjuſted, the loweſt tier of roots are to be ſpread upon it; drawing them out horizontally, and, ſpreading them in different directions, as the bird ſpreads its foot when it ſtands on a level ſurface; drawing out the rootlets and the fibres, which ſeverally belong to them; ſpreading them out as a feather, or as the pond of the fern; preſſing them evenly into the ſoil; and covering them, by hand, with ſome of the fineſt mould; one perſon ſteadying the plant, another adjuſting and bedding the roots; and a third ſupplying the mould; which being raiſed high enough to receive another root, or another tier of roots, they are to be ſpread out horizontally, (or ſomewhat declining) freely, yet firmly, among the beſt ſoil; great care being had to work the mould well in by hand, among the roots beneath the crown, that no hollowneſs, nor falſe filling, may be left; to prevent which, the mould, after the roots are all bedded, and covered ſome depth, ſhould be preſſed, or trodden hard (according to the nature of the ſoil and the ſtate of the ſeaſon) with the foot; the remainder of the mould being raiſed into a hillock round the ſtem, for the triple uſe of affording coolneſs, moiſture, and ſtability to the plant. In forming theſe hillocks ſome little ſkill is requiſite. The ſoil ought not to preſs againſt the ſtem much higher, in the orchard, than it did in the nurſery: Yet it is proper that there ſhould be a deſcent for rain water, from the ſtem, not towards it. To this end a dimple or little diſh ſhould be made on the top of the hillock, and, from the rim of this, the ſlope ſhould be gentle to the circumference of the hole, where the broken ground ſhould ſink ſome few inches below the level of the orchard. Much of this will, no doubt, be deemed tedious and unneceſſary; by thoſe, I mean, who have been accuſtomed to bury the roots of plants, in the grave-digger's manner; but I can recommend every part of it to thoſe, who wiſh to enſure ſucceſs, from my own practice;

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in which this method of bedding the roots aroſe ; and in which only, I believe, it has been uſed."

OF GUARDING TREES AFTER PLANTING.

Defending the trees, is the next work to be attended to. Various methods have been adopted, and many, without anſwering the end. In general, it is well to ſet down a ſtrong ſtake by the ſtock as ſoon as it is planted. The top of the ſtake next the tree ſhould be ſloped away ; elſe, if the top is left ſquare, as the tree ſwells, or grows larger, it will be greatly endangered. Wind round the ſtake ſome tow, or a piece of cloth, and with a willow bind the ſtock to the ſtake. This is better than any other bandage : The ſmoothneſs of the willow prevents any injury to the ſtock. Once or twice in the ſeaſon, the bandage may require looſening as the tree increaſes its ſize. This will ſecure the plant againſt wind. Few, however, are the trees deſtroyed by the weather, compared to the number broken down, and eaten up by the cattle ; to provide againſt the deſtruction of the young trees by the ſtock of the farm is of importance. Mr. MARSHALL gives the following account of the method in Herefordſhire, England, " Where young Orchards are kept under the plough, two poſts only are in uſe ; namely, one large poſt ſlit with a ſaw, and placed flat way, with the face to the plant, and about two feet apart, with rails on each ſide, nailed upon the edges of the poſts. This is beautifully ſimple, ſtrong, a ſufficient guard, if carried high enough, and out of the way of the plough ; which has, in this caſe, nearly the ſame poſſeſſion of the ground, as if no trees were planted. In this caſe, however, the upper rails ſhould be compaſſing, (bowing outward) equally to protect the tops from cattle, and to prevent the ſtems from being chafed againſt them. If theſe poſts were put down at the time of planting, ſetting them within the planting-holes, the roots would not be afterwards diſturbed ; and by means of hay-ropes, the plants might be ſteadied between the lower rails, without the trouble, or the danger

of

of ſtaking. In this and every other caſe, unleſs the lower rails be placed very near to each other, the bottom of the tree ſhould be guarded againſt ſheep; which, in winter, eſpecially when the ſnow is upon the ground, will peel off the bark of the young trees, and in a few hours deſtroy the whole plantation." In this country trees might be defended thus with little expenſe, if the method deſcribed by Mr. MARSHALL is purſued. Yet it will be found uſeful to ſtake the tree. It will more certainly prevent its chafing againſt the guard.

OF PRUNING.

All the late writers treat largely on the article Pruning. Thoſe who practice that work, in general, do it with ſo little ſkill, that it is believed more injury is done than is balanced by the benefit; almoſt the whole depending on the judgment of the operator. MILLER, who all admit wrote well, is decided that the beſt ſeaſon for pruning is in the Autumn. The uſe of the knife is wholly unneceſſary, in a nurſery, during the ſpring and ſummer; provided the pruning has been done with judgment, and effectually in the autumn. The thumb and finger will do all that is required, and infinitely better than a knife, provided attention is paid in ſeaſon.

OF PEARS, AND SOME FURTHER HINTS ON GRAFTING.

The pear comes as readily from the ſeed as the apple; but as fewer pear trees are required than apples, it is not of ſo much conſequence to the farmer that he ſhould be as particular in raiſing them as the apple. By ſowing the ſeed, as directed for the apple, and tranſplanting them to a nurſery in the ſame manner, he may ſupply himſelf with any quantity of ſtocks. The ſcion from a pear grafted on a ſtock, ſtandard high, will ſucceed very well. If that method is preferred, the ſtocks muſt be reared in the nurſery to ſtandard height, and managed as has been directed, to bring up grafted apple-trees. Three or four ſeaſons in the nurſery will raiſe them to a ſufficient height

height to graft. Mr. MARSHALL, under the article grafting, obſerves, "by old orchards it appears that whip-grafting near the ground (letting the young plants remain in the nurſery until fit to be planted out) has formerly been the prevailing practice; but, in this caſe, the planter muſt take the nurſery-man's word as to the ſorts; whereas he wiſhes to be on a certainty. He likes to ſee the grafts taken from a tree, whoſe fruit he knows.* Beſides, it is thought that whip-grafting, upon free ſtocks, has injured ſome of the more valuable varieties of fruit. Be this as it may, the practice at preſent, is in diſrepute. The practice, which has lately prevailed, and which is ſtill prevalent, is this; the ſtocks having ſtood ſome two, three or four years in the plantation, until they have eſtabliſhed themſelves firmly in the ſoil, and have acquired a fulneſs of growth, are cleft and grafted in the following (extraordinary) manner:—The entire head of the ſtock is cut off horizontally, with a ſaw, about ſix feet high; (higher if the ſtock will admit of it, and the ſort to be graſted be inclined, to form hanging boughs, while an upright cloſe headed ſort, may, it is thought, be grafted upon a ſtill lower ſtock.) The top of the ſtump being cleft, the grafts are inſerted in the uſual manner." *Here* the method of whip-grafting, ſtandard height, will certainly do. The ſtock muſt not be large to practice in this mode. It is however attended with more trouble, and expoſes one to greater loſs. If a graft on a ſtock of two years fails, the loſs is leſs than to fail on one of four or five years. Some, however, are of opinion, that apples are beſt graſted on ſtocks ſtandard high. Pear trees, more inclined to raiſe their boughs than apples, if grafted on ſtandard ſtocks will do better: Leſs attention being required to prevent their forming too low a head. So little attention is required to produce the trees for the peach and nectarine, that perhaps the cauſe of our ſeeing ſo few plantations of them, ariſes from this ſource. It is a fact that a peach tree from the kernel may be raiſed in two ſeaſons, to a ſufficient ſize to go to

* It is not enough to know the ſort of fruit: The ſtate of the tree, from which the grafts are taken, ought likewiſe to be known. It is proper to ſee that it be in full health, and of a middle age.

the orchard. All that is required will be to plant the ſtone as ſoon as the fruit is in perfection. The following ſpring the ſmall plants will appear, and when not larger than a cabbage plant, take them from the bed, juſt as an annual plant is taken up, tranſplant them into rows about 15 inches apart. If the ground is good, they will grow by the middle of Auguſt to be the ſize of a large pipe-ſtem. At that time make an inciſion four inches from the ground, and inſert the bud of ſuch a peach or nectarine, as is wanted. The laſt week in October, or the firſt in November, cut down the ſtocks ſix inches above the bud. In the ſpring be careful, as they appear, to rub off all the buds on the ſtock, except that which has been inſerted. In a few weeks it will grow vigorouſly, and acquire ſtrength: Then, with a ſharp knife, pare down the ſtock to the bud; it will ſoon grow over, and no mark left to diſcover where the change in the fruit of the tree was made. During the ſame ſummer, be careful to rub off all the ſide ſhoots, as directed in the management of the apple graft. This young tree may be carried to the height of ſix feet in the courſe of the ſeaſon, and be completely fitted for tranſplanting the next ſpring. Low ſtandards, and full crowns, are beſt for the peach and nectarine. A very beautiful tree, with a handſome broad head, has been raiſed by this practice in two ſeaſons only.

OF GRAPE VINES.

The Grape, it is well known, is propagated readily from a cutting: Formerly it was thought neceſſary to have this cutting twelve or fifteen inches in length. Experience has taught us that a ſingle eye is all that is required. This, with two or three inches of the wood immediately below, is ſufficient;—and will, if placed in good ground, always ſucceed. SPEECHLEY, who has written a treatiſe on the management of the Vine, obſerves, that the particulars neceſſary to form a good cutting, are principally theſe:—The eye ſhould be large, prominent and bold; the ſhoots moderately ſtrong, round, and ſhort jointed; the texture of the wood cloſe, ſolid, and compact; but the beſt criterion

rion of its maturity, is its ſolidity, and having very little pith. Let the upper part of this cutting be taken off ſloping, with a ſharp knife, one quarter of an inch above the eye; three or four inches below cut the wood off ſquare. The ground being ready, with the finger, or a ſmall dibble, make a hole, into which let the cutting be carefully inſerted, and ſo placed that the eye may be covered a quarter of an inch with fine mould.—Small ſticks ſhould be provided to ſupport the ſhoots as they grow. Pinch off the wires or tendrils, and alſo the lateral ſhoots, as faſt as they are produced. Keep the ground free from weeds. This is all that will be required the firſt ſummer. In October, cut the vine down to three good buds; and cover it during the winter with dry, clean ſand, or with ſtraw or mulch; ſome cover them with rotten manure. Two buds only muſt be allowed to grow the ſecond ſummer; and the ſame attention muſt be obſerved, in rubbing off the ſide ſhoots as before. The vines may be trained to a ſtake, and ſuffered to grow freely. The third year fruit may be expected. The ſhoots of the laſt year's growth, being ſhortened down to two good buds, or eyes, the ground ſtirred and manured about the roots. When the buds have ſhot three or four joints, the fruit will ſhew itſelf; and when advanced three or four joints further, it will be proper to nip off the end that the nouriſhment may be more thrown into the fruit; at the ſame time taking away the lateral branches, preſerving, however, the leaves of the vine with care. Stakes or eſpaliers muſt now be provided to ſupport the vines. The fruit ripens in September, and the vines may be pruned in October. This fruit gives the juice from which the liquor is procured, ſo generally uſed throughout the world.

OF MAKING AND MANAGING CYDER.

FROM the apple in our country we obtain a beverage highly uſeful. The wines of other countries do not differ more in quality, than the cider of ours. And much of

of this difference arifes from improper management, either in grinding the apples, or, what is more common, putting the muft or juice, into foul caſks, and neglecting or miſmanaging it while fermenting. Mr. MARSHALL aſſerts, that a gentleman in *Herefordſhire, (England)* Mr. BELLAMY, produces cider from an apple, called the Hagloe Crab, which for richneſs, flavor, and price on the ſpot, exceeds perhaps every other fruit liquor, which nature or art have produced. He has been offered ſixty guineas for a hogſhead of one hundred and ten gallons of this liquor. Thus we ſee how capable the fruit from the apple tree is of improvement. We are favored with the obſervations of a gentleman reſiding near *Philadelphia*, on the making and fermenting cider, and his directions to preſerve the caſks that have been uſed for cider. He begins thus: "It would be to little purpoſe, at preſent, to ſay much on the kinds of fruit capable of yielding the beſt cider, yet it may be proper to mention thoſe moſt common here, and give them a place according to their reſpective merits. The ſweet ruſſett, called the pair apple, is unqueſtionaqly the richeſt fruit we have: The houſe apple ſtands ſecond: They both yield very ſweet muſt, and conſequently, ſpecifically heavier than that of any other apple. The Newton pippin yields its muſt free from the finer pumice, and, (although not ſo rich) from that circumſtance ferments more moderately, and is ſooneſt fine in the caſk. The Spitzenburgh and Pearmain I do not rank among the cider apples, becauſe they ſeldom afford a muſt that will bear fermentation, except the ſeaſon be *uncommonly dry*, or the trees *very old*. The largeſt and fineſt fruit grow on young trees, and in moiſt ſeaſons, and theſe yield the greateſt quantity of cider. Old trees and dry ſeaſons afford a ſmaller fruit, highly flavored and leſs juicy. The Vandever is little better than good water cider. If it be fermented, it very ſoon becomes acid, and if not fermented becomes ropy. The red ſtreak, the Cockagee, and the Royal Wilding, ſo famous in *England* and *Ireland*, are not known here, but the *Virginia* Crab, well enough ſupplies the place of them all.

all. This apple deſerves every poſſible attention, as its muſt is leſs diſpoſed, from its great acidity, to riſe too high in fermentation, than that of any apple known here. Were there no other advantages, this ſimple one would render it exceedingly valuable to the common Farmer, who will be hardly brought to pay attention to the nice operation of fermenting the ſweeter fruits, but it has almoſt every other good property of a cider apple. The trees bear abundantly, the fruit ripens late, and is free from rot of any kind; the fruit is ſmall and hard, and therefore bears the fall from the tree without bruiſing. It grinds ſmall, and the pulp is remarkably tough; yet parts with its juice readily: Hence the muſt runs from the preſs very fine: It would be going beyond my preſent object to ſay much more of this apple; yet I cannot forbear obſerving, that being acid, it will bear to ſtand in the pumice longer than any ſweeter apple. This fact deſerves more attention than is commonly given to it; and, if the time and occaſion would admit, I ſhould indulge myſelf in ſpeaking largely on it."

As the inquiry is how to make the *beſt cider*, there need not any thing be ſaid of imperfect fruit or that which falls from the tree early in the ſeaſon, as they cannot be applied to this purpoſe; the September gale beating down ſuch great quantities of apples, tempts the farmer to uſe them with thoſe that continued longer on the tree: But where this gale happens early, the effects are fatal to the cider: For, if they are made up immediately, the fermentation riſes too high, in conſequence of the too great degree of heat in the air, and this evil is increaſed by the *imperfect* and *great* quantity of juice contained in the fruit; if they remain unground they become inſipid, eſpecially thoſe which lay on the ground under the trees, and if gathered in heaps, they are diſpoſed to rot. To make the beſt cider, you muſt have ſound fruit gathered late in the ſeaſon, in dry weather, after the middle of *October* if poſſible. They ſhould lay in large heaps, covered from the dews, and rain about fourteen days; in which time they heat and throw off a great proportion of

of their indigeſted and inſipid water, and ripen more uniformly than while on the tree. They muſt not be ground while they are wet, either from the rain, the dew, or from the moiſture thrown out by the heat produced by their laying together. The finer the apple is ground, the more it will yield. If the mill is well fitted, it cruſhes the ſeed, and gives a peculiar aromatic bitter to the muſt, which becomes more and more diſtinguiſhable as the cider is longer kept. Some prefer this flavour, others diſlike it, not diſtinguiſhing it from the bitter of the rotten apples, although very different from that pungent bitter, both in taſte on the palate, and effects in the ſtomach. If ſtraw is uſed in forming the cheeſe for the preſs (cloth made of hair is beſt, but very expenſive) it muſt be clean from *ruſt*; for there is no liquor which more readily imbibes and betrays offenſive taſtes than cider. Too hard preſſing on the cheeſe before it is ſufficiently cloſed, preſſes out the pulp with the muſt, and it is in all caſes neceſſary to return the firſt running on to the cheeſe until you perceive it free from pulp. If you chooſe a pale cider, the pumice muſt be preſſed as ſoon as poſſible, from the mill: The colour is raiſed by expoſing it longer, and in greater ſurfaces to the air. The aptneſs in cider to imbibe foreign taſtes, renders an exact attention to your veſſels of great importance. New veſſels, made of ſeaſoned oak, do very well; but thoſe that have been uſed are better, provided they be kept *ſweet* and clean. To effect this, when a caſk is empty, rinſe it with cold water immediately, otherwiſe the lees will ſour and fix an acid that can hardly be removed; and if long continued, dries on the ſtaves ſo hard, as to require much labour in ſcrubbing it off: In this caſe it ſhould be white-waſhed with lime, and after a few days waſhed again; when it is rinſed *perfectly clean* with cold water, pour into a hogſhead at leaſt ſix gallons of boiling water. Roll and ſhake the water to every part of the caſk, ſo as to heat it on all ſides. Then pour out the water, and lay your caſk exactly bung-hole downwards, the water running clear and entirely off; the heat in the caſk will dry it perfectly. In this ſtate bung it up, as carefully as if filled with your choiceſt

choiceſt liquors, and it will remain perfectly ſweet, and fit for uſe in the following ſeaſon. It is beſt, however, to inſpect each caſk before you fill it. This is done by fixing a candle to a wire three feet long, and letting down the candle through the bung-hole into the caſk, you can then ſee every part of it on the inſide as diſtinctly as on the outſide. If they are clean, it is *beſt not* to rinſe them with water. It may appear ſingular to you that ſo much is ſaid on a caſe that is plain to every one; but believe me, you may take ten times the trouble in another way, and not effectually cleanſe your veſſels, and unleſs they are perfectly *ſweet*, it is impoſſible to have good cider. The muſt, or juice of the apple, being obtained, the firſt object is to clear it of pumice: The ſecond to produce a fermentation to your palate and purpoſe.

The moſt expeditious mode of doing the firſt, in the great way, is by putting the muſt in large open veſſels; there to ſtand until the firſt appearance of fermentation.* This comes on ſooner or later, from circumſtances too various for our preſent conſideration at large. It may ſerve the purpoſe to conſider the operation, as dependent on the degree of heat in the air at the time: Perhaps ſixty hours is long enough to be wiſhed for. During that time the *heavieſt* of the pulp ſinks to the bottom; the larger and *lighter parts*, riſe to the ſurface where it remains until the fermentation begins; but the fermentation would involve great part of the pulp, both from above and below, into the body of the liquor, and increaſe the fermentation beyond our controul. It muſt, therefore, be removed before this effect be produced. Soon after the fermentation begins, the covering on the top of the *muſt* cracks and ſeparates, when there is not a moment to be loſt before you draw it into your caſks, leaving the pulp behind. In this caſk it undergoes the firſt of the fermentation, for eight or ten days; but before this *moſt difficult part* of the *art* of making the *beſt cider* can be well underſtood, there are ſo

* Hogſheads, or even barrels, anſwer very well with a head out, where there are plenty of caſks; but it is as well done in the caſks you intend to ferment in, provided you attend to the firſt appearance of fermentation at the bung hole, and remove the pulp entirely out of the caſk.

ſo many points to be conſidered, that I have always heſitated to give my opinion of it, from a certainty that the ſubject would become tedious beyond ſufferance. There are, however, a few obvious principles of great importance, which may be borne with.

Cider requires a very gentle fermentation, and ought to be confined between 44 and 48 degrees of heat (by FARENHEIT's thermometer.) Muſts, of all kinds, increaſe their heat by fermentation. Liquors, of all kinds, will not be colder than the air in which they ſtand. It is eaſy to comprehend, if theſe are facts, the impoſſibility of making *good Cider*, when the medium heat of the day exceeds 48 degrees. I ſay the medium *heat of the day*, becauſe our beſt cellars being 50 degrees of heat in the latter end of *October*, renders them, generally, unfit for fermenting cider, and involves a neceſſity of having your firſt fermentation above ground, where the heat of the day will have its effect. Hence the known fact that cider ferments moſt kindly in the ſhade on the north ſide of your buildings, wherever the cool nights of the fall reduce the medium heat of the day below 48 degrees. During the firſt fermentation abovementioned, attention muſt be given to it, that, in caſe of riſing above 48 degrees, it ſhould be racked off early in the morning (before ſun riſe, if the weather be warm for the ſeaſon); this racking checks the increaſe of heat occaſioned by the fermentation: But in late made cider there is ſeldom a neceſſity of racking in leſs than eight or ten days; at which time there will be a conſiderable quantity of lees fallen to the bottom of the caſk, from which the cider ſhould now be removed.

If the air in the cellar be fallen to 46 degrees or below, you may place the cider in it, leaving however, the windows and doors open in the night, until the air becomes as low as 40 degrees (the heat in my judgment beſt for cider during the winter, provided it could be had without artificial heat, which is too difficult to manage to be applied in cellars.)

The earlier made cider, checked in its fermentation by water from time to time, becomes ſoon fine, and is a very pleaſant

pleaſant drink. That made later, and checked in the ſame manner, with the proportion of one fourth water, is ſooneſt fine, and during the winter is not inferior to the beſt cider unmixed.

During the whole time of fermentation the caſks muſt be kept full ſo that the yeaſt, pulp gaſs, or whatever you pleaſe to call that matter which riſes in fermentation, may be thrown out of the caſk, and not return into the liquor: For if it does, it operates as yeaſt, renews the fermentation, and will deſtroy the cider.

In about five weeks after the firſt racking it ſhould be again racked, taking care to draw off none of the lees. The bungs may be left out a *month* longer without any ill conſequence, or at moſt laid lightly on the bung hole, when it may be proper, if the fermentation is ended, to bung it down; in a few weeks it will be fine ſpontaneouſly; provided the fermentation has been well conducted. If any part of the proceſs has been injudicious, or unavoidably wrong, and the cider be not fine by the 20th or 25th February, it ſhould be forced with iſinglaſs. But let me warn you not to attempt fining it after the 20th March; unleſs your cellar be uncommonly ſecured from the air. For the ſpring will as certainly produce a motion in your cider, as bloſſoms on the trees; at which time glutinous finings, retaining the air produced or ſeparated by this new fermentation, will be either retained from falling down in the caſk, or borne to the ſurface of the liquor. Three ſtaples of iſinglaſs, diſſolved in cider, is ſufficient for a hogſhead. It ſhould be pulled into ſmall pieces, and covered with cider in an earthen veſſel, adding a quart of cider to it, every ſix hours, till it is diſſolved; ſtirring it frequently. When diſſolved, which it will be in two or three days, ſtrain it through a coarſe cloth; add a gallon or two of cider, and pour it into the caſk, ſtirring the whole together with a ſtick. Leave the bung out, it will generally fine in four or five days. It muſt not remain above ten or twelve days at moſt on the finings; if you do not bottle it, it muſt be racked again into other caſks; the bottles muſt be dry; three drops of water will deſtroy a bottle of cider,

after it has been well fermented, more effectually than a pint will before it is fermented.

In corking cider, or other weak liquors, no water ſhould touch the corks, dip them in cider the moment in which you drive them; they will drive the eaſier for this. If cider is to be kept in caſks after May, early in the ſpring cover the bungs with rozin, or cement of ſome kind: to do this, open a ſpile hole while the cement is laid on, otherwiſe no art can cover the bung effectually: The air from within will force up the cement, through the ſmalleſt paſſage, and diſappoint a thouſand attempts to fill it up: when covered, and the cement cooled, make the caſk tight by driving an oaken ſpile into the hole. Inferior cider, for the harveſt field, is kept by adding a gallon of cider brandy to a barrel. The method I have directed above, produces a fine ſweet cider, retaining the taſte of the apple. More frequent rackings, weakens the body and preſerves the ſweetneſs; fewer rackings, and laying long on the lees, renders it harſher and more heady. If cider be *well fermented* in *due time*, you may freeze it down to any ſtrength; taking care to draw it off before a thaw comes on. If cider be imperfectly fermented, the ſpring produces the fermentation anew, and it will deſtroy itſelf, unleſs preſerved by diſtilled ſpirits, or by brimſtone, which laſt is too offenſive to be uſed.

Letter from TIMOTHY EDWARDS *to* JONATHAN MASON, *Eſq. Correſponding Secretary of Maſſachuſetts' Society for promoting* AGRICULTURE.

STOCKBRIDGE, MAY 23, 1798.

SIR,

IN the ſpring of 1796, I obſerved a hogſhead and ciſtern of cider, which were made the latter part of the preceding October, and then placed on the north ſide of a barn, out of the influence of the direct rays of the ſun, not under cover, and which had remained there until the firſt week of April following, to be, in both veſſels, the liquor

liquor at top and bottom, being mixed, very mild, pleaſant, and clear; but at or near the top, the cider was vapid, and much the colour of water; and at the bottom, immediately above the lees, the hue was that of high coloured Sherry wine, very rich and pleaſant, not inferior to the ſyrups of a good preſerve. If this were a principle of nature, or effected by ſome unknown adventitious cauſe or cauſes, I doubted. The ſucceeding winter, I made an experiment on five barrels only. Every circumſtance in each caſk confirmed the above facts: Theſe were racked 15th May, 1797.

The winter paſt, in a ſimilar ſituation and ſeaſon, I had placed, about the quantity of twenty barrels, in various kinds of caſks, ſome in barrels, others in hogſheads on one end, the upper head out, but covered with lids, two caſks in the common form of leech-tubs, &c. In each veſſels, when the top and bottom and middle have been mixed, the cider hath been mild and very pleaſant, and, generally, very clear; but in every particular caſk, very vapid at or near the top, good in the middle, and at the bottom, adjoining the lees or near them, rich, and a fine colour, as above deſcribed. This year it was drawn off as various times from 1ſt to 15th May.

The bulk of cider is increaſed more than that of water by freezing. By my obſervations, in theſe experiments, the increaſe is about $\frac{1}{5}$ of the whole. If ſo, in a barrel put out to freeze, there muſt be a wantage of ſix gallons at leaſt, otherwiſe the caſks will be injured, and ſome of the beſt cider loſt. *If* it is a phyſical principle, that freezing and fuſion will ſo ſeparate cider, it is probable, that wine, and perhaps all fermented liquors, will be likewiſe affected.

Should the foregoing be new to the Society, it will be cordially received: If not, the good will of a member ſhall be his apology.

I am, Sir, with great reſpect,
Your moſt obedient,
TIMOTHY EDWARDS.

Correſp. Sec. of Maſſa. Society for promoting Agriculture.

THOUGHT

THOUGHTS *on* COLLECTING *and* PRESERVING SUBSTANCES *for* MANURES, EXTRACTED *from an* ENGLISH PAMPHLET, *and* RE-PUBLISHED *by the* SOCIETY.

"*LET Nothing be loſt!*" is an injunction of Divine Wiſdom, delivered on a very remarkable occaſion.* This precept, by a fair analogy, may be ſuppoſed not only to prohibit all idle and negligent waſte of proviſions, but alſo to enjoin the moſt minute attention and care, in collecting and preſerving all ſuch matters, which together, or ſeparately, may operate as manures, and may increaſe the produce of the fruits of the earth in their ſeaſon.

This branch of rural economics has been eſteemed worthy the attention of the moſt enlightened and flouriſhing nations. The Romans were remarkable for employing every means of increaſing their manures; and to a ſimilar attention of the government of *China*, is principally to be aſcribed the ſubſiſtence provided for the immenſe population of that extenſive empire.

"*Ex minimis, maxima.*"

Under our common management of manures, the practice is quite the contrary of what it ought to be; we do *not* increaſe and accumulate, but *waſte* and *diſperſe* almoſt every ſubſtance, which can be converted into a manure and improve the ſoil.

Prudence and economy point out, that what is eaſieſt and *cheapeſt* to be done, ſhould be *firſt* done. Let the *careful farmer* ſave and collect manures, and make compoſts, as he is inſtructed in this little book; he will ſoon find the means, from his increaſed crops, to proſecute more expenſive improvements. Let him, then, attend to the ſituation of his FARM-YARD and OFFICES; and the manner of placing and forming his DUNGHILLS.

With reſpect to the former of theſe, many great improvements, reſpecting contiguity, &c. have been introduced,

* Saint John, Chapter vi. Verſe 12th.

duced, which is not here neceſſary to mention, further than to ſuggeſt the forming channels in the ſtables and ſhippons,* to convey all the urine of the horſes and cattle *to proper reſervoirs.*

Dunghills ought to be ſituated nearly on a level; with a ſtone or brick floor, laid in clay or mortar; incloſed on three ſides by a wall five feet high, of the ſame kind, and open on one ſide. Its expoſure ſhould be to the north. At the end of it, *the reſervoir* ſhould be placed for the urine from the buildings, and the drainage of muck-water from the dunghills. This ſhould be of ſufficient capacity, not too deep, and be ſecured by bricks ſet in clay or mortar; in it ſhould be placed a *pump*, to draw off the moiſture for frequent uſe.

Warmth and moiſture are requiſite to carry on the *putrefaction* of dunghills; and it is adviſed, in dry weather, to throw over them frequently, by a pump or ladles, the contents of the reſervoir. The fermentation of the dunghills will likewiſe be promoted, by often adding a layer of *peat earth*, or good ſoil. It is injurious to put *lime* to the heap, before it is duly fermented; then it is a moſt valuable addition to the compoſt for all purpoſes. *Dung may be kept too long*; in time it will loſe all its fertilizing qualities.

In forming a dunghill, what is *daily* collected, ſhould be *lightly* thrown on, as is practiſed in making a *hot bed*; and the dung of a hot bed, at midſummer, or in a few weeks after it is made, is in that *perfect* ſtate, in which it is moſt beneficial to apply it to land, *by itſelf*; or to form it into *compoſts*, with lime, ſoil, peat-earth, &c.

Beſides dung, many other ſubſtances to be uſed as manures, deſerve the moſt careful attention of all farmers.

1. MUD. This is compoſed of decayed and fermented leaves, and of various kinds of vegetables: of the drainings from dunghills and farm-offices, *improperly placed*: of the urine from ſtables and ſhippons: of the fineſt ſoils from new ploughed lands, and fields recently manured or limed: from ſtreets, highways, and manufactories, &c. which

* A Cow-Houſe, an Ox-Stall.

which are all perpetually waſhed and carried off by the rains, and depoſited and *loſt* in ditches, brooks, ponds, mill-dams, and rivers.

The tide of the ſea alſo leaves on many parts of the coaſt, and at the extremity of ſalt marſhes, conſiderable quantities of ſea ooze, or *ſalt ſludge*, of a moſt inriching quality. To ſearch for, ſave, and collect MUD of ſome ſort or other, is more or leſs in every farmer's power; and by making more ſtrait, wide, and deep, the larger ditches of a farm, and the courſes of ſmall brooks and rivers, with occaſional *ſtops* and *dams* to form ſtill water, great quantities of rich mud may be obtained.

Before it is mixed with lime or dung into a compoſt for paſture or meadow lands, it muſt be expoſed to the air for ſome time, and be quite drained of its water.

2. URINE. This is ſaid to be a more perfect extract from the animal ſyſtem than dung; our ſurpriſe, therefore, muſt be excited, that it is ſo much neglected. Not a *particle* of urine, or of the drainings from dung-hills, the very eſſence of the manure, ſhould be loſt, but collected into proper reſervoirs.

Chamber-lye is a more perfect manure (when putrified) than the urine of horſes or cattle.

Urine of all kinds, when collected, and *fermented* in quantities, is a moſt powerful ingredient to form compoſts, or top dreſſings with peat earth, mould, or other abſorbent ſubſtances. In *large towns* it might alſo be preſerved, and made an article of conſiderable profit to thoſe who collect it, for the purpoſes of *agriculture*, as well as thoſe of *manufactures*.

3. SWEEPINGS OF THE STREETS, in towns; and COAL ASHES, finely ſifted, and kept *dry* and ſeparate. Even in the neighbourhood of London, it is only from a very late date that the farmers have found out the great value of theſe manures. The pariſh of *Marybone*, a few years ago, paid to the ſcavengers 500l. per annum, to remove theſe; now the ſcavengers pay the pariſh 1050l. per annum, for the liberty of carrying them away.

4.

4. NIGHT-SOIL. Decency and health require every practicable means to be uſed, to render *innoxious*, or ſpeedily to *remove* all accumulations of this kind from our dwellings. Yet why is this manure, which is eſteemed by far the moſt efficacious *of all others*, moſt commonly loſt in *England*, even in the midſt of our real diſtreſs for want *of corn?* In *China* and *Japan*, we are told, the *laws* prohibit the waſte or neglect of human excrements; and enjoin to every family to make reſervoirs for its preſervation: the cultivators of their ſoil uſe, ſolely, this *manure* to raiſe *corn*; becauſe, unlike the dung of horſes and cattle, it contains not the ſeeds of weeds.

If the privies belonging to each family were duly conſtructed, with air pipes for ventilation; if the bottoms and ſides of the receptacles of the night-ſoil were formed of bricks ſet in *tarraſs mortar*, ſo as to retain the moiſture (the moſt enriching part of this manure;) and if earth, ſaw-duſt, *fine ſifted* coal-aſhes, but more *eſpecially freſh-ſlaked lime*, were frequently thrown down the privies, all diſagreeable and unwholeſome ſmells would be prevented, and the quantity and value of the compoſt greatly increaſed. By this management, its removal would be alſo rendered convenient and inoffenſive to thoſe employed.

5. BONES. The great benefits derived from the uſe of bones, as a top dreſſing, are well known; yet they are not duly collected or uſed. Before they are applied to the land, they ought to be reduced to very ſmall pieces, or powder, by the aid of machinery, and they well repay this trouble and expenſe. Where the quantities are too ſmall to render it prudent to erect a machine to break them down, (which is the beſt way) may not bones be reduced to powder, by putting them in an heap of lime, as Mr. PAGET intimates, in the Report of Leiceſterſhire? I ſuppoſe he means *quick* lime, and that the heat produced by ſlacking it with water, diſſolves the bones.

6. REFUSE MATTERS, of various kinds, viz. of the fleſh of ſhambles and other animal ſubſtances, of fiſh, of ſoap-boilers, of tallow-chandlers, of ſhoemakers' chips, of dye-houſes, of printing-works, of rags, of hair, of horn,

of

of ſcrapings of oiled leather, *ſweepings* of cotton and woollen mills, workſhops, warehouſes, &c. Rubbiſh of old buildings, &c. &c.

7. SEA WEED, SEA SHELLS, and SEA GRAVEL.

8. RIVER WEEDS. Of theſe there are great abundance in many rivers, meres, brooks, ponds, and wet ditches. When theſe are in full vegetation, they ſhould be taken out, and be laid, for a few days, in ſmall parcels, to let the water drain from them. They ſhould then be laid in large heaps to *ferment;* when this is over, the weeds ſhould be mixed with three times their quantity of earth, and ſome lime, and after a ſhort interval turned and well mixed into a top-dreſſing for graſs lands.

9. SWEEPINGS OF ROADS, to mix with lime.

10. SPENT TANNER'S BARK, to mix with lime.

11. PEAT, or MOSS EARTH. The preſent ſuperabundant moiſture of peat moſſes renders them not *merely* unproductive waſtes, but extremely injurious to the drier lands in their vicinity. The invention and energy of a WAKEFIELD and an ELKINGTON, in reclaiming and improving *moſſes*, cannot fail to excite a general imitation of the very ſucceſsful proceſſes, by which they have rendered thoſe bogs productive of plenty; with the additional happy effects, which thoſe improvements never fail to produce on the *climate*, *temperature*, and *vegetation* of all the countries adjacent to them.

But a further and moſt beneficial uſe of peat moſſes now claims our attention; *peat earth* is capable of being converted into the moſt valuable of *all manures*. From experiments made with alkaline ſalts (pot aſh) and peat, it can be aſſerted, that the effects of ſuch mixture, weight for weight, are equal, if not ſuperiour, to thoſe of *dung*.

Peat or *moſs* earth, when intended to be uſed as a manure for other lands, ſhould be dug up at the depth of two or three feet from the ſurface, in ſmall pieces, and left expoſed to the air for three or four months, or till the dry weather of ſummer, or the froſts of winter, render it convenient to cart it away. By a due expoſure to the atmoſphere,

atmoſphere, it derives from it, what is called *oxygen*, or pure vital air; and is converted into a new ſaline compound, highly ſerviceable to vegetation.

The very intelligent Mr. BUTLER, (who lately was gardener to the *Earl of Derby*) ſtates, that for ſome time paſt he has uſed peat earth (dug as above directed) as a manure, with the greateſt ſucceſs, both in the garden and in the field. On thin clay ſoils, he ſays, it is very efficacious. And from a meadow, dreſſed with forty loads per acre with a compoſt, made of *three fourth* parts of peat earth, and *one fourth* part of dung, greater and more *laſting* crops of hay were produced, than from the like quantity of the beſt dung.

Peat earth may be uſed alone, to advantage, if laid in conſiderable quantities, on thin ſoils. The moſt beneficial preparations or combinations of peat will be found to be

Peat earth, with dung and urine;
Ditto, with alkaline ſalt or pot aſh;
Ditto, with lime.

When the ſoil does not contain a due proportion of calcareous matter (as old meadows, &c.) the two laſt are to be preferred, until it ſhall have received a due proportion of this article, ſo indiſpenſably neceſſary to produce ſweet herbage.

It is ſaid, that one hundred pounds weight of alkaline ſalt or pot aſh, is ſufficient to ſaturate peat earth enough to top-dreſs an acre.

To form a compoſt of peat earth with *lime*, it is recommended by Lord DUNDONALD, to put *five* or ſix times the weight of peat earth to *one* of lime; to mix them when the lime is freſh ſlacked, if it may be under cover, otherwiſe that the heap ſhall be ſo formed and placed, and ſo covered at the top with ſoil, that the rains may not injure it. When the compoſt is mixed together, the peat earth ſhould be moderately moiſt, and finely broken.

Where this valuable, but hitherto much neglected, ſubſtance can be carted from a moderate diſtance, or by *water carriage* conveyed to more remote ſituations, it is

hoped it will have a primary place in the farmer's calendar, eſpecially within the circuit of our ſociety, where there is ſuch an abundant ſupply of peat.

SEA WATER is found to poſſeſs powerful effects in promoting putrefaction, and if applied in ſufficient quantities to PEAT EARTH, dung-heaps, and other compoſts, it would prove highly beneficial to all farmers, ſituated near *the ſea*, and in the vicinity of *moſſes*.

12. DECAYED VEGETABLES from the gardens &c. and leaves of trees.

13. The PUTRID WATER of ſtagnant pools, ditches, &c. and from the ſteeping of flax, and hemp; from tan-pits, &c. and from reſervoirs for *dung-water*, to be carried on the fields by water carts, or mixed with peat, or ſoil, and lime, into a compoſt.

14. The ASHES of whins, fern, heath, rag-wort, thiſtles, docks, weeds, coarſe graſs, dreſſings of hedges, collected and burned, *by cloſe fires*, into *aſhes*.

15. The REFUSE of bleachers and printers' aſhes, and the great quantities of *refuſe ley* in thoſe works, and in the manufacture of ſoap, which are ſtill ſuffered to run to waſte. Theſe would make fertile compoſts, with peat earth or other ſoils.

16. SOAP-SUDS or LEY. The quantities of this valuable article, which are thrown away throughout this kingdom, are immenſe. Were it preſerved by each private family, it would form, with proper earths, an abundance of good top dreſſings. The *Chineſe* are minutely attentive to this article; even their barbers ſave their ſuds. The refuſe water of the waſh tubs is very uſeful in gardens, and for fruit trees.

17. A great addition may be made to the manure of a farm, and the quantity of dry litter, by collecting in their ſtrong growth, (though before they ripen their ſeeds) fern, coarſe bent, ling, heath, and the coarſe herbage of paſtures and hedges, refuſed by the cattle. When theſe are rotted, either in the farm yard, or in the ſtables or ſhippons, mix them in heaps with dung to *ferment*, and put in their place a ſupply of the ſame dry litter from the ſtack, and ſo go on till the whole is uſed.

18.

18. PEAT ASHES. In ſome parts, as in Berkſhire, theſe are a very valuable manure; a ſtatute acre (near Newberry) of peat, has been ſold for 200l. to burn. The EARL OF DUNDONALD ſtates, that *in general* to burn peat for aſhes is a waſteful proceſs, as *ſeldom* one twentieth part of the weight of the peat is procured by combuſtion; the remaining *nineteen* parts are thrown into the air.

19 The uſe of WATER, as a *manure*, by floating or irrigation, is an object of the greateſt conſequence to the agriculture of our counties; in many parts it may be practiſed with the utmoſt facility and advantage. With aſtoniſhment I have beheld farmers leading dung to their meadows, purchaſed and carried at an enormous expenſe, whilſt they ſuffer the draining of their home-made dunghills, and the waſh of their ſtables, farm-yards, and fields, to run waſte into the brooks and rivers; whilſt they *unconcerned* neglect every advantage they might procure, or *actually poſſeſs* of enriching *theſe very meadows*, by *floating* them in rainy, or *watering* them in dry ſeaſons; although the expenſe and trouble, would be in compariſon *as nothing*.

21. Another economical ſaving of *manure*, and great benefit to the public, will ariſe by ſoiling or feeding the *working horſes*, and perhaps the *cattle* of a farm, with clover, ſummer vetches, or tares, or *graſs* from the adjoining meadows, in the *ſtables*, *ſhippons*, &c. This judicious practice, as it reſpects horſes, is now adopted in many parts of England. In the Low Countries *cows* are *always* fed in the houſe; and in the Report of the Weſt Riding of Yorkſhire, drawn up by Meſſrs. *Rennie*, *Brown*, and *Shireff*, we read, that in the neighbourhood of *Leeds*, *cows* have been kept all the ſummer in the houſe, and fed with *graſs*, freſh cut from the field. The urine of the cows was kept in a reſervoir, and conveyed to the land; by which means, and by a dreſſing of manure in the winter, the *ſame field* of four acres was cut *four* or *five* times, and ten cows were thus fed from it during the ſeaſon.

Experience only can teach, or warrant the belief of how few acres of ground, under the culture of *clover* or

tares,

tares, when cut green, and daily given to working-horſes or cattle, will ſuffice for their maintenance; and what vaſt quantities of the beſt manure may thus be collected.*

ON LIME.

Various and contradictory are the accounts given of the uſes and effects of LIME on ſimilar, and on different ſoils. One circumſtance particularly deſerves our attention; it is this, that lands, by *long-repeated* dungings, (ſuch as our *old* meadows and *gardens*) accumulate *too large* a proportion of vegetable matter; whereby the ſoil is at length converted into an *inert vegetable compound*, of the nature of *peat*. Hence we may account for the extraordinary good effects of *lime* and *marle*, pot-aſh, ſoaper's waſte, and ſalt, but eſpecially of *lime*, when applied to ſuch ſoils; and recommend a *change* of manures for our lands in general, as a mode of huſbandry, not only more œconomical, but alſo vaſtly more profitable. The writer of this has long practiſed it with great ſucceſs, both with reſpect to his meadows and *garden*. In the latter, the crops, after deep trenching WITH LIME, have proved remarkably *ſweet* and *good*, and were alſo more abundant: and the hay of his old meadows was equally improved by *lime*. By this courſe of manuring, *another important object* may be gradually obtained, viz. the improvement of our *poor neglected paſtures*. The dung, which we now hurtfully ſpread, from year to year, in perpetual ſucceſſion, on the ſame fields, would effect a happy change in the miſerable produce of the *paſture lands* of the farm; if it was laid upon them early in ſpring, alone, or mixed with earth and lime.

The common practice of mixing *hot*, *unſlacked lime*, with dung, in any ſtate, is found to be injurious. But lime, deprived of its cauſticity by water, may be very properly added to dung, when quite putrid and rotten, in conjunction with good ſoil, peat-earth, &c.

Whilſt

* See Dr. *Anderſon*'s ingenious obſervations on this ſubject, in the *third* volume of his "Eſſays relating to Agriculture and Rural Affairs," *lately publiſhed*, page 513—539.

Whilſt dunghills are *under* the putrefactive proceſs, rich ſurface-mould is the moſt proper addition, in moderate quantities, to promote and complete its diſſolution. The vitriolic neutral ſalts, in due proportions, will *alſo* greatly accelerate the putrefaction.

Lime is a moſt invaluable manure, and its application almoſt *univerſal*. The writer of this, from long experience, recommends the uſe of *lime*, laid on *alone*, early in ſummer, on *cold clay paſtures*, which have a very thin ſtratum of ſoil: He has laid, in the proportion of two hundred buſhels of lime, on a ſtatute acre of ſuch land. The fields were firſt drained, and have remained in *paſture* ever ſince the liming, twenty years ago, and have been gradually improving. In examining the ſtaple of theſe fields, the writer has uniformly found the effect of liming, deſcribed by *Lord Dundonald*, viz. "the depth of the ſoil has been "increaſed, and rendered *leſs retentive of water*." This important amelioration is only to be brought about by a *ſufficient quantity* of lime: and it is well obſerved on the uſe of lime as a manure, either alone, or in compoſt, "that "doing things partially never anſwers." "And that land "repays in general more abundantly for the *laſt* (or an "effectual) application of manure."

Marle is a manure ſo well known, and ſo profitably employed, that it is unneceſſary to recommend its uſe. But I cannot think it foreign to the purpoſe of this paper, to ſtate the great advantages of *ſearching* for it in ſituations where it is commonly ſuppoſed it is *not* to be found. The wonderful improvements now carrying on by THOMAS WAKEFIELD, Eſq. on Trafford moſs near Mancheſter, by covering the bog, recently drained with *marle*, which he ſearched for and diſcovered in great quantities in the midſt of this moſs, hitherto deemed irreclaimable, are worthy the attention of this ſociety. Mr. WAKEFIELD's works are carried on with great intelligence and energy, and rank him amongſt the firſt benefactors of his country.

Theſe obſervations are ſufficient to ſhow the advantages of increaſing, by a vigilant economy, the quantity of manures. This care and attention are eſſential to good huſbandry;

husbandry; for true is the old *Scots* proverb, "*muck is* "*mother of the meal-chest.*"

EXTRACTS *from a* TREATISE *on* MANURES, *most advantageously applicable to the various* SORTS *of* SOILS, *&c. by* RICHARD KIRWAN, *Esq.* F.R.S. *&c. printed in* LONDON, 1796.

MANURE denotes any substance or operation, by which a soil is improved. To improve a soil is to render it capable of producing corn, legumens, and the most useful grasses. The substances principally used as manures are chalk, lime, clay, sand, marl, gypsum, ashes, stable-dung, mucks, farm-yard dung pounded bones, sea-weeds, sweepings of ditches, old ditches. Other manures, or top-dressings, as they are employed chiefly to promote the growth of vegetables, and not merely with a view of improving the soil, I omit. The operations used to improve soils, are fallows, draining, parting, and burning.

"Clay is of various colours; for we meet with white, grey, brownish red, brownish black, yellow, and bluish clays. It feels soft and somewhat unctuous; if moist, it adheres to the fingers, and if sufficiently so, it becomes tough and ductile: If dry, it adheres more or less to the tongue; if thrown into water, it gradually diffuses itself through it, and slowly separates from it. It does not effervesce with acid, unless it contains some calcareous particles or magnesia. Chalk, if not very impure, is of a white colour, moderate consistence, adheres slightly to the tongue, does not harden when heated, but in a strong heat burns to lime, loses about four tenths of its weight. It effervesces with acid, and dissolves in them; it promotes putrefaction. By sand, is meant of the siliceous kind; and therefore insoluble in acid. All flints and quartz broken to fine pieces, constitute the sand here referred to."

Lime is a substance whose external characters and mode of production, are well known. It differs from chalk and

and powdered limeſtone chiefly by the abſence of fixed air, which is expelled from theſe during their calcination. This air it greedily re-abſorbs from the atmoſphere, and all other bodies with which it comes in contact, and which can furniſh it; but it cannot unite with the air, unleſs it is previouſly moiſtened. One hundred parts quick-lime abſorb about twenty-eight of water. It is ſoluble in about ſeven hundred parts of this fluid. To regain its full portion of air from the atmoſphere, it requires a year or more, if not purpoſely ſpread out; it reſiſts putrefaction; but with the aſſiſtance of moiſture, it reſolves organic ſubſtances into a mucus. *Marl* is of three ſorts; calcareous, argillaceous, and ſilicious, or ſandy. All are mixtures of mild calx (i. e. chalk) with clay, in ſuch a manner as to fall to pieces by expoſure to the atmoſphere, more or leſs readily. Calcareous marl is that which is moſt commonly underſtood by the term marl, without addition; it is generally of a yellowiſh white, or yellowiſh grey colour; rarely brown or lead coloured. It is ſeldom found on the ſurface of land, but commonly a few feet under it; and on the ſides of hills, or rivers that flow through calcareous countries, or under turf in bogs: Frequently of a looſe texture, ſometimes moderately coherent; rarely of a ſtony hardneſs, and hence called ſtone-marl: Sometimes of a compact, ſometimes of a lamellar texture; often ſo thin as to be called paper-marl. It often abounds with ſhells, and then is called ſhell marl, which is looked upon as the beſt ſort; when in powder, it feels dry between the fingers; put in water, it quickly falls to pieces or powder, and does not form a viſcid maſs. It chips and moulders by expoſure to the air and moiſture, ſooner or later, according to its hardneſs and the proportions of its ingredients; if heated, it will not form a brick, but rather lime. It effervesces with all acids. It conſiſts of from 33 to 80 per cent. of mild calx, and from 66 to 20 per cent. of clay. To find its compoſition, pour a few ounces of weak, but pure ſpirit of nitre or common ſalt into a Florence flaſk; place them in a ſcale, and let them be balanced; then reduce a few ounces

of

of dry marl into powder, and let this powder be carefully and gradually thrown into the flask, until after repeated agitation, no effervescence is any longer perceived; let the remainder of the powdered marl be then weighed, by which the quantity projected will be known; let the balance be then restored; the difference of weight between the quantity projected, and that requisite to restore the balance, will discover the weight of air lost during effervescence; if the loss amounts to 13 per cwt. of the quantity of marl projected, or from 13 to 32 per cwt. the marl essayed is calcareous marl. This experiment is decisive, when we are assured by the external characters above mentioned, that the substance employed is marl of any kind; otherwise some sorts of the sparry iron-ore may be mistaken for marl.

Argillaceous marl contains from 68 to 80 per cwt. of clay, and consequently from 32 to 20 per cwt. of aerated calx. Its colour is grey or brown, or reddish brown, or yellowish, or bluish grey. It feels more unctuous than the former, and adheres to the tongue; its hardness generally much greater. In water it falls to pieces more slowly, and often into square pieces; it also more slowly moulders by exposure to the air and moisture, if of a loose consistence; it hardens when heated, and forms an imperfect brick; it effervesces with spirit of nitre, or common salt, but frequently refuses to do so with vinegar. When dried and projected into spirit of nitre in a Florence flask, with the attentions above mentioned it is found to lose from 8 to 10 per cwt. of its weight. The undissolved part, well washed, will, when duly heated, harden into a brick. Silicious, or Sandy Marls, are those whose clayey part contains an excess of sand; for if treated with acids in the manner above-mentioned, the residuum, or clayey part, will be found to contain above 75 per cwt. of sand; consequently chalk and sand are the predominant ingredients. The colour of this marl is browniſh grey, or lead-coloured; generally friable and flaky, but sometimes forms very hard lumps—It does not readily fall to pieces in water—It chips and moulders by exposure to the

the air and moiſture, but ſlowly. It effervefces with acids; but the reſiduum, after ſolution, will not form a brick.

Limeſtone Gravel. This is a marl mixed with large lumps of limeſtone. The marl may be either calcareous or argillaceous; but moſt commonly the former. The ſandy part is alſo commonly calcareous. Gypſum, or plaiſter of Paris, is a compound of calcareous earth and vitriolic acid; it forms a diſtinct ſpecies of the calcareous genus of foſſils; of which ſpecies there are ſix families. Of the ſix families of this ſpecies, I ſhall deſcribe only one; namely, that which has been moſt advantageouſly employed as a manure. Deſcriptions of the other five ſhould be found in treatiſes of mineralogy. It is called fibrous Gypſum. Its colours are grey, yelloviſh or redifh, or ſilvery white, or light red, or browniſh yellow, or ſtriped with one or more of theſe dark colours. It is compoſed of fibres or ſtriæ, either ſtraight or curved, parallel or converging to a common centre, ſometimes thick, ſometimes fine and ſubtile, adhering to each other, and very brittle; its hardneſs ſuch as to admit being ſcraped with the nail; commonly ſemitranſparent; in ſome, often in a high degree.

Aſhes. Sifted coal-aſhes, thoſe of peat and white turfed-aſhes, have been found uſeful; red turfed aſhes uſeleſs, and generally hurtful. Wood-aſhes have alſo been employed advantageouſly in many caſes. Charcoal is a ſubſtance well known; it has frequently and ſucceſsfully been uſed as a manure.

Soap-boilers' ſuds forms an excellent manure for ſome ſoils. Stable dung. This is uſed either freſh, or putrefied; the firſt is called long, the other ſhort dung; it abounds in animal matter, eaſily runs into putrefaction, and when putrefied, ſerves as a leaven to haſten the decay of other dead vegetable ſubſtances; its fermentation is promoted by frequent agitation and expoſure to the air; yet it ſhould be covered, to prevent water from carrying off moſt of its important ingredients; or at leaſt, the water that imbibes them ſhould not be loſt. Farm yard dung conſiſts of various vegetables; as ſtraw, weeds, leaves, fern, &c.

impregnated with animal matter; it ferments more ſlowly than the former, ſhould be piled in heaps, and ſtirred, from time to time. Fern putrefies very ſlowly: The water that iſſues from it, ſhould be preſerved. Hence they ſhould be applied not indiſcriminately, but according to circumſtances.

Pounded bones form alſo manure, much uſed in the neighbourhood of great towns. They gradually depoſite their oily part, which contains a large proportion of animal coal which is extricated by putrefaction and phoſphorated calx. Hence bone-aſh is alſo uſeful. Sea-weed, particularly if mixed with earth, ſoon putrefies and makes a good manure.

Sweepings of ditches abound with putrid matter from decayed vegetables, and hence form a manure. Old ditches, expoſing a large ſurface to vegetation, contain, when deſtroyed, a quantity of decayed vegetables, which putrefy and make a good manure; but in this and the former caſe, it may be proper to diſtinguiſh of what ſoil they are compoſed, for reaſons that will hereafter appear.

Of the MANURES *moſt* ADVANTAGEOUSLY APPLICABLE *to the different* SOILS, *and of the* CAUSES *of their* BENEFICIAL EFFECT *in each inſtance.*

I now proceed to conſider each ſoil in particular.

OF CLAYEY SOILS.

The beſt manure for clayey ſoils is marl; in this all the books of agriculture are unanimous; and of the different ſorts of marl, that which is moſt calcareous is beſt. The ſilicious next beſt; limeſtone gravel beſt of all; and argillaceous marl leaſt advantageous. Clayey ſoils are defective both in conſtitution and in texture; they want the calcareous ingredient and coarſe ſand. Calcareous marl ſupplies the calcareous ingredient chiefly; limeſtone-gravel both.

both. The other marls ſupply them in a leſſer degree. If the clay be analyzed, and its proportion of ſand and argill known, the ſpecies of marl moſt advantageouſly applicable may be determined ſtill better. For inſtance, if the argill notably exceeds or even amounts to the proportion of 40 or 50 per cwt. Calcareous marl or limeſtone-gravel are the beſt improving manures, as they contain moſt of the calcareous ingredient; but if the ſilicious ingredient amounts to 75 or 80 per cwt. as it ſometimes does, argillaceous marl is moſt ſuitable. A mixture of marl and dung is ſtill more advantageous, becauſe the dung ſupplies the carbonaceous ingredient. But the marl muſt be uſed in the ſame quantity as if dung had not been applied, otherwiſe the operation muſt be more frequently repeated. If marl cannot be had, a mixture of coarſe ſand and lime perfectly effete or extinguiſhed, or chalk will anſwer the ſame purpoſe, as it will ſupply the defective ingredient, and open the texture of the clay; ſo alſo ſand alone, or chalk, or powdered limeſtone, may anſwer, though leſs advantageouſly. Lime alone appears to me leſs proper, as it is apt to cake, and does not ſufficiently open the ſoil. Where theſe manures cannot be had, coal-aſhes, chips of wood, burned clay, brick-duſt, gravel, or even pebbles, are uſeful; for all theſe improve the texture, and the former ſupply alſo the carbonaceous ingredient.

SANDY SOILS.

The beſt manure for theſe is calcareous marl, which exactly correſponds with our theory; for theſe ſoils want both argillaceous and the calcareous ingredients; and this marl ſupplies both: The next beſt is argillaceous marl; and next to theſe, clay mixed with lime, or calcareous or clayey loams. Lime or chalk are leſs proper, as they do not give ſufficient coherence to the ſoil: however, when mixed with earth or dung, they anſwer well, becauſe they form a ſort of marl or compound, comprehending the defective ingredient.

SANDY,

SANDY LOAMS.

Theſe are defective chiefly in the calcareous ingredient, and in ſome degree alſo in the argillaceous; their texture too is imperfect, as they abound both in fine and coarſe ſand. Chalk or lime would ſupply the firſt defect, but would leave the texture unamended. Hence they are uſed when better cannot be had; yet calcareous or argillaceous marls are moſt proper.

GRAVELLY LOAMS.

Theſe ſoils are benefited by the application of marl, whether argillaceous or calcareous, for reaſons which I ſuppoſe are now apparent: If the gravel be calcareous, clay may be employed. A mixture of effete lime and clay ſhould anſwer in all caſes.

BOGS OR BOGGY SOILS.

When theſe are well dried by ſufficient drains, the nature of their ſoil ſhould be expoſed by analyſis, and an appropriate manure applied. In general they ſhould firſt be burned, if capable of that operation, then gravelled. If their upper parts contain a ſufficiency of the carbonaceous principle, as often happens, they need not be burned.

Limeſtone-gravel will anſwer beſt, or lime mixed with coarſe ſand or gravel, becauſe in general they are of a clayey nature; if more ſandy, lime may anſwer well, or calcareous marl. The preference in theſe caſes muſt be decided by analyſis.

OF GYPSUM OR PLAISTER PARIS.

This manure was diſcovered by Mr. MAYER, a German clergyman of uncommon merit, in the year 1768. It has ſince been applied with ſingnal ſucceſs in *Germany*, *Switzerland*, *France* and *America*. If in *England* it has not been ſo much approved of, it muſt be becauſe the calcareous

carcous principle prevails there almoſt univerſally: Clayey lands are moſt improved by it. The time for ſpreading it is February or March, and then it is to be thinly ſtrewed on the land at the rate of about eight buſhels to the acre: more would be hurtful. The *rationale* of its effects may be deduced from its extraordinary ſeptic power, for it is found to accelerate putrefaction in a higher degree than any other ſubſtance; and hence it is not ploughed in like other manures, but barely ſtrewed on the ſurface of the land; and in the month of February, to convert the old graſs quickly into coal, to nourish the young growth.

Letter from JAMES HILLHOUSE, *Eſq. of New Haven, Connecticut,* EXPLAINING *his* SYSTEM *of* FARMING, *dated,*

PHILADELPHIA, *Feb. 11th,* 1797.

DEAR SIR,

YOUR letter of the 16th of November, accompanied with two publications of the *Maſſachuſetts Society* for promoting Agriculture, and a certificate of my being enrolled as a member, came to hand ſo near the time of commencing my journey to this city, as did not admit of my returning an anſwer before my arrival here. Aſſure the Society they have my beſt wiſhes for the ſucceſs of ſo laudable an undertaking, and that I ſhall ever be diſpoſed to comply with their wiſhes, and communicate whatever may tend to promote the object of the inſtitution: For nothing would afford me more real ſatisfaction than to have it in my power to advance, in the ſmalleſt degree, the agricultural improvements of our country.

The price of labour being ſo much higher in this, than in European countries, a difference of climate, and other circumſtances makes it neceſſary, in many inſtances, to depart from that courſe of management, and crops, which there might be proper and profitable. Thoſe crops, and the

the mode of cultivation which require a great proportion of labour, muſt be abandoned, unleſs an extraordinary demand, or the vicinity of a large market town, ſhall afford a price that will juſtify the culture. A particular attention to every mode of increaſing manure, and to aſcertain the moſt judicious and profitable application of it upon the land, is, in every country, neceſſary to the good management of a farm; but in *this* is an object of primary importance: with little attention and without much expenſe our farmers might add greatly to the ſize and quality of the dunghill. Many of them, however, do not ſuffer more from this inattention, than from an injudicious application of their manure, which they ſcatter too thinly upon their land, ſo that the firſt or ſecond crop exhauſts all its virtue, and leaves the land in as bad, or a worſe condition, than before it was manured. Whereas, if the manure was confined to a ſmaller compaſs, the quantity of produce in proportion to the labour would be increaſed; and the ſaving of labour, the moſt expenſive article in our huſbandry, is very important. This mode would alſo greatly enrich the land, which, with a proper courſe of crops, and prudent management, would ever after continue to bring good crops: And the difference between getting a larger quantity of produce in proportion to the labour, and leaving the land after many years improvement, rich, and fertile; and getting a leſs quantity in proportion to the labour, and leaving the land in an exhauſted, impoveriſhed ſtate, is, to a farmer, almoſt incalculable.

I do not know that there is any thing in my ſyſtem of farming that would be of uſe, if communicated, yet I ſhall not object to giving it to you. I commenced farming upon poor worn-out land, and determined to proceed no faſter in cultivating it, than I could thoroughly manure. My rule has generally been, to put on twenty loads, of not leſs than a ton cart, to the acre, two years in ſucceſſion, of good ſtable or barn-yard dung, made in the courſe of the winter preceding the ſpring when uſed. The firſt year the manure to be equally ſpread on the ſurface

and

and turned under the furrow, and the land planted with Indian corn. I plough in dung as ſoon as poſſible after it is carted out. If practicable, I prefer to have the carting, ſpreading, and ploughing in, going on at the ſame time, ſo as to prevent exhalation. Previous to the firſt hoeing, the intervals between the rows are harrowed with a ſmall iron-tooth harrow. After the firſt hoeing, the corn is twice ploughed and hoed, and three times, if not entirely clean from weeds. The ſecond year the land is ploughed and harrowed ſmooth, the dung ſpread and ploughed in; the land is then again harrowed and ſowed with barley and graſs ſeed, about ſix quarts of red clover, and three of herds-graſs or timothy, to the acre, well mixed, and one half ſowed after, and ploughed in with the barley; which I always put in under a light furrow, the remaining half of the graſs ſeed is then ſowed and harrowed or buſhed in. Sometimes I prefer ſowing orchard graſs with the clover. If the land is intended principally for paſture, a mixture of white clover. When I ſow red clover only, I increaſe the ſeed to nine or ten quarts. Of whatever kind the graſs ſeed is, the one half is ploughed in. Since I practiſed ploughing in part of the ſeed, I have never failed having my land well ſtocked. It is ſaid the plough will bury the ſeed too deep; but many years experience evinces the contrary. I have known clover ſown in this way ſtand the drought, when that which was harrowed or buſhed in, has been almoſt, or wholly deſtroyed; owing, as I imagine, to many plants having a greater depth of root. Any mode will anſwer, in a wet ſummer; to guard againſt the bad effects of a dry ſeaſon, is important. Land thus laid down, will produce a good crop of hay for two or three years. From latter experience, I prefer planting potatoes after the ſecond year's manuring, on account of its being a profitable crop, and a better preparation for barley; as the plough and hoe can be uſed in the culture of the potatoe, to extirpate the weeds produced by the dung, and the ground is left in good order to be ſown the third ſpring, with barley or graſs ſeed without manure. When a piece of land, which,

after

after a thorough manuring, has been laid down to graſs, is to be again ploughed up, I ſtack ſalt or other coarſe hay, and ſtraw upon it, which, in the winter, is foddered out to young cattle. In the ſpring, the field is covered with the bottoms of ſtacks, ſedge from hovels, and other coarſe litter, which is turned in under the furrow. This is eaſily done, where a proper plough cannot be had, by a boy's following the plough with a rake. Indian corn or potatoes, or, which is moſt common, part of both, are then planted, and well tilled, and followed with barley and graſs as before. Land once made rich, and receiving ſuch a dreſſing with ſalt hay or coarſe litter, when ploughed up for Indian corn or potatoes, will bring good crops, and does not appear to be impoveriſhed by ſuch a courſe. I have always found ſalt hay or ſedge, turned under the furrow, an excellent manure for Indian corn or potatoes. Two crops of Indian corn in ſucceſſion, are, with me, inadmiſſible, except upon new ſtubborn land, and then to be both years thoroughly manured. One year's tillage, if the work is thoroughly done, will ſufficiently rot the turf. If land is planted two years in ſucceſſion, I ſhould prefer Indian corn the firſt, and potatoes the ſecond.

My barn-yard and ſtable dung, with what I can purchaſe, I carefully reſerve for raiſing every year a new piece of ground from a barren to a fertile ſtate. By purſuing this method, I have converted nearly one hundred acres of my farm, from indifferent paſture, and which was not worth cultivating for Indian corn, or barley, into good upland mowing: And now, when planted, will produce from forty to fifty buſhels of Indian corn to the acre; after that an excellent crop of barley; which is ſucceeded by a good burthen of graſs for ſeveral years. Had I adopted the practice, which is too prevalent, of ſcattering manure, at the rate of ſix or ten tons to the acre, once in three or four years, and taking a ſucceſſion of exhauſting crops, I am perſuaded I might have uſed the ſame quantity of manure, had leſs produce in proportion to expenſe and labour, and my farm, at this time, been little or nothing the better. The ſituation of ſeveral farms within my knowledge

knowledge juſtifies the remark: For the owners of theſe farms, at the time I began my ſyſtem, were able, from their own ſtock, to make more manure, than I had, or could purchaſe; but from their having followed this practice of ſcattering their manure, their land is not at all bettered, or their ability to keep ſtock increaſed: Whereas my means of ſupporting ſtock, and thereby of enriching my farm, has every year been increaſing. About one half of the land I have thus improved is a light loam, inclining to ſand; the other half a heavy loam, inclining to clay. Barn-yard or ſtable dung yields the moſt profitable return from land of the laſt deſcription. I have no doubt a compoſt might be made with a mixture of clay, ooze, mud, &c. &c. with the barn-yard dung, which would be a more laſting manure for light, ſandy, or gravelly land, on which leached aſhes are found to be an excellent manure, and particularly friendly to clover.

Wheat is not mentioned as a crop; it is ſo ſubject to blaſt as not to be depended on. I often ſow a ſmall field, which has invariably been injured by a blaſt; owing, as I preſume, to the immenſe multitude of barberry buſhes in my vicinity. That they cauſe a blaſt upon our common wheat, I cannot doubt; for where there is only a ſingle buſh, the grain about it will be wholly blaſted; and the blaſt decreaſes as the diſtance increaſes. Where the buſh is very prevalent, its influence muſt conſequently be extenſive. I can, from inquiry, find no place much infeſted with the barberry buſh, where wheat is not very ſubject to blaſt: Other cauſes may produce a blaſt. If there is any queſtion whether this effect is not alſo produced by the barberry buſh, a few experiments would decide, and a ſatisfactory aſcertainment of the fact, would be important, and, in many parts of the country, might bring about a combination among farmers to extirpate the buſh. Could a ſpecies of wheat be found, not ſubject to blaſt in thoſe places, which, on that account are now precluded from the culture of that grain, it would be an important diſcovery. From an experiment of laſt ſummer, I flatter myſelf there is ſome grounds for hope, that the early *Virginia* wheat

mentioned in the Society's publication, may be of that deſcription. I ſowed a ſmall ſtrip, from ſeed that came from *Virginia*, on the ſide of a four acre field, the reſidue of which was ſowed with plump good-looking wheat from *Long-Iſland*. In the ſpring, and till near harveſt, the whole field looked finely, and promiſed a clean handſome crop. The *Virginia* wheat headed ten or fifteen days earlier than the other, was ripe ſooner, and when harveſted, was plump: The other was almoſt ruined by blaſt; and where ſeparated from the early wheat by a furrow only, the blaſt was as great as in any part of the field. From the early wheat I have ſowed an acre and a half on land well manured in the ſpring, and planted with potatoes, which were dug, and the wheat ſowed in September; and looked exceeding well when I left home in November.

I prefer manuring for crops, which can be followed up with the plough and hoe, to deſtroy the weeds. Weeding wheat, barley, or any kind of graſs will not, in my opinion, quit coſt, at the preſent high price of labour in this country. It was my intention to have mentioned ſome experiments I have made to find a mode, eaſy and ſimple in its execution, for preſerving cider; alſo the beſt method of improving ſalt marſh, to render it productive and profitable; but my letter having already exceeded the limits I had preſcribed, and entertaining ſome doubts whether my experiments or improvements in huſbandry, attempted only for my own amuſement and information, will be of any benefit to others, I ſhall add nothing more than an aſſurance of my being, with ſentiments of the higheſt eſteem, and regard,

Dear Sir,

Your Friend and Humble Servant,

JAMES HILLHOUSE.

Dr. Oliver Smith.

HINTS

HINTS *reſpecting the* CULTIVATION *and* USE *of* BARLEY, *by the Rev.* WILLIAM WELLES, *of* Brattleborough, Vermont.

IT ſeems extremely deſirable, that this grain ſhould be more generally cultivated, than it ever has been in this country; being, when it is ſown in ſeaſon, upon land ſuitable for its growth, a moſt plentiful and certain crop; not ſo ſubject to be blighted, or injured by very wet or dry ſeaſons, as moſt other kinds of grain. It may be applied to a number of uſes. In *England* in ſcarce years bread is ſometimes made of it; their beef, pork and poultry, are very generally fed with it. Theſe purpoſes it would anſwer extremely well here. If any ſhould ſay, "we have Indian corn and do not need any thing elſe," it is to be obſerved, that barley is raiſed at much leſs expenſe and labour than corn, and is by no means ſo great an exhauſter of the land. It might be uſed to advantage in feeding beef and pork, at leaſt in part, for more than half the time they are feeding. I preſume it will be very generally acknowledged, nothing gives meat of all kinds a ſuperior reliſh to Indian corn, and for that reaſon it is peculiarly proper to be the food of animals, ſometime before they are ſlaughtered.

Barley ſtraw is excellent fodder for young cattle, and no crop is more ſuitable for ſeeding land down with clover.

One conſideration deſerves to be attended to, which will ſerve inſtead of a thouſand arguments to recommend its cultivation, that it begins to have a ready ſale for caſh, from the great number of breweries, which are ſetting up in moſt of our large towns.

The principal and moſt important uſe of barley, is its being made into malt, and brewed into beer; a moſt healthful and invigorating liquor, extremely proper for men that labour. Could the good people of this country be brought into the habit of drinking ſtrong beer, in lieu of ardent ſpirits, how many millions of dollars might be annually ſaved, which are now loſt to the country! how many

many ſinking fortunes and injured conſtitutions retrieved, and untimely deaths prevented! We have, or may have, from our own farms, at a trifling expenſe, a pleaſant and wholeſome beverage, to refreſh us in ſummer, to warm and nouriſh us in winter: but inſtead of uſing it, we are at the labor and expenſe of ſending to the Indies for a poiſonous drug, which is extremely injurious to the health and morals, and fatal to the lives of our fellow citizens every year. The general and deſtructive uſe of ſpirituous liquors is ſuch as to call forth the aſſiſtance of all the friends of ſobriety and virtue, to ſtop the further growth of ſo deep rooted and wide ſpreading an evil. This is to be done in no way perhaps ſo eaſy, as by encouraging the more general growth of barley, for the purpoſe of making ſtrong beer.

Barley ſhould be ſowed as ſoon as the ground is ſettled in the ſpring, on land enriched with manure, and completely ſubdued; loving, as the farmers in England expreſs it, *a ſoft bed*. It grows well on almoſt all ſorts of ſoil, but that which is moderately light, is perhaps moſt ſuitable. Land, that has been planted two years in ſucceſſion, and manured for the laſt crop of corn, is very often in a good ſtate for barley. Care ſhould be taken in ploughing the land, that too large furrows are not taken, and that it is not ploughed too deep; barley not being able to get through ſo large a load of earth as many other kinds of grain. I have always ſowed it upon the furrow, and generally at the rate of one and half, to two buſhels the acre. Great care ſhould be taken to have the ſeed good, and free from every other kind of grain, particularly oats. Barley ſhould ſtand till it is quite ripe, and be well dried before it is put into the barn.

DIRECTIONS FOR MAKING BEER FOR COMMON USE.

Put ground malt into the kettle, when the water is cold, in the proportion of half a buſhel to a barrel of 32 gallons, and hops according to your taſte. Let theſe boil together one hour. The whole may then be ſtrained through a ſieve.

ſieve. Where the moſt is to be made of the malt and hops, a leſs quantity of water, may be put to them, and boiled as before. In warm weather, it will be beſt to brew towards evening, and put the beer, as ſoon as it is ſtrained off, into different veſſels, that it may cool as ſoon as poſſible: early the next morning it ſhould be put with the emptyings into the barrel, and placed in the cooleſt part of the cellar in the ſummer, and the warmeſt in the winter. Great care is neceſſary at all times, and particularly in ſummer, to have the barrel well cleaned and ſcalded, and ſet in a poſition that it can drain quite dry. The emptyings or yeaſt muſt be freſh, and every veſſel uſed in the beer, perfectly clean and dry. The want of cleanlineſs in any part of brewing, and the uſing pails and other veſſels wet with cold water, cannot fail having a bad influence upon the quality and keeping of the beer. By attending to theſe particulars, I find no difficulty in having beer keep good for ten or twelve days in the hoteſt weather, and at other ſeaſons ſeveral months, provided the malt and hops are good.

DIRECTIONS FOR BREWING ALE AND STRONG BEER.

Procure a tub ſufficiently long, to contain the malt when it is maſhed, and over the tap place a ſmall box full of holes, to prevent the grains running out with the wort. On this little box, a ſtone or heavy weight ſhould be placed, to prevent its being moved when the marſh is ſtirred. Put a few pails full of water, not quite boiling hot into the tub firſt, then about the ſame quantity of malt, ſtirring them well together. Then more water and more malt, till the whole is maſhed you intend to brew. Let the malt be well mixed with the water, about the conſiſtence of a thin pudding, and the maſh covered cloſe, to ſtand from an hour to an hour and half, or till the wort will run fine. And in order to make it clear, a few quarts ſhould be drawn off and put back upon the maſh, which ſhould be ſet to run, with a ſmall ſtream at firſt.

The hops are to be put into the wort, that it may run off upon

upon them. The quantity is from four to eight ounces to a buſhel of malt, according to their goodneſs, and the length of time the beer is expected to keep.

Having drawn off the firſt maſhing, put more water, rather nearer boiling than the firſt; it ſhould be about the ſame conſiſtence, and mixed well together as before. This may ſtand one hour, or till it will run fine. When the ſecond running is all off, there may be a third maſhing, with water boiling hot. After that is off, boiling water may be put upon the grains, for ſmall beer, which ſhould be drawn off in little more than an hour.

The wort is now to be boiled with the hops about an hour, and then ſtrained through a ſieve. The hops are to be boiled for every kettle full of beer, that the bitter may be fully extracted. Add to the ſmall beer, which is to be boiled the ſame as the ſtrong, ſo much of the hops as will give it an agreeable bitter.

Immediately as ſome of the beer is ſtrained off, a ſmall part ſhould be ſet to cool, as ſoon as poſſible; and when there is a pailful or two, in cool weather, about the warmth of new milk, put it into the working vat, with the emptyings or yeaſt, and in an hour or two, when it begins to ferment, more beer of the ſame warmth may be put to it, till the whole is in a ſtate of fermentation. Let it remain in the working tub, from 24 to 48 hours, or till the froth begins to fall. The beer may now be put into the barrel, and every few hours be filled up, that the yeaſt may all run off. When it has done fermenting a few days, it ſhould be drawn off, and the ſediment being taken out of the barrel, the beer may be put into it again, and in a few days, when all fermentation has ceaſed, it ſhould be corked up perfectly cloſe till fit for uſe.

Too much care cannot be taken, in having the barrels, pails, tubs, and every thing uſed in brewing, perfectly clean and dry. Cold water, greaſe, and every kind of filth has a moſt pernicious influence. From two to four buſhels of malt, may be uſed for a barrel of beer. The mild weather of October and November is by far the beſt ſeaſon for brewing.

brewing. Thoſe not accuſtomed to this buſineſs, ſhould try their ſkill with a ſmall quantity at firſt. When the beer is tapt for uſe, the vent peg muſt not be left out, nor any more air let into the barrel, than is abſolutely neceſſary to get the beer out.

CATTLE *paſtured and ſoiled in Summer: kept and fattened in Winter: with a comparative Eſtimate between paſturing and tying up, in houſes, the year through. From an anonymous Pamphlet publiſhed in Pennſylvania.*

IN ſome of the little Eſſays written by me on Huſbandry, are intimations of modes for keeping and feeding live ſtock very different from the uſual practices by huſbandmen: but, being conciſe or in notes, they are too obſcure to be much attended to. The ſubject is important; and claims attention from farmers who are accuſtomed to think with a deſire to improve. Such particulars thereon as at preſent occur, are therefore now briefly laid open to the conſideration of this claſs of huſbandmen.

As well grain as graſs farms maintain live ſtock: but their kinds, ſize, and number, proportionate to the means of ſubſiſtence, is not ſufficiently attended to; nor are the modes of keeping them, and ſaving their manure. This ſtock is commonly produced and matured on the farm. It is ſometimes bought, full grown, of drovers; and grazed in paſture. Butchers buy them from the paſture, or from their winter feeding.

The common farmer's live ſtock runs on a ſort of paſture during ſix or ſeven months. In the reſt of the year they are fed intirely with *dry* food. Who among our farmers ever think of procuring a *juicy* winter food, for tempering the coſtive effects of dry ſtraw and maizefodder, eaten by their cattle? Juicy food in general tends to keep their bodies open, their ſkins and muſcles mellow, pliant and eaſy for their better thriving. Hence the fine effects

of

of turnip-feeding, ſo highly valued by European farmers.

Cows require, in England, from one to two acres of paſture: but the medium of a number of inſtances is found to be one and a third acre. Their paſtures are made, by *ſowing graſs ſeeds*, after the ground has been a number of years producing crops, *ameliorating* as well as exhauſting, under *manurings* and *good tillage*. They continue many years afterwards in graſs, carefully cleared of brambles and ſtrong weeds. During the 10 or 20 years of their being paſtured on, the cattle drop their dung, ſcattered and left expoſed on the ground to exhauſtion by ſun and wind. Some good the ſoil obtains from it: but the continual treading of the beaſts paſtured, has a bad effect in deadening and untilling the ſoil. Nevertheleſs, in ſo long lying, unimpoveriſhed by renewed corn crops, the ground is partially reſtored from conſtant though ſlow depoſits of the atmoſphere, rather than from the dung dropt.

Have *our* lay-fields equal advantages? Repeated *corn crops* of different ſorts have robbed the ground, generally *without any aid from manure*: The ground is then left to ſpontaneous growth of weeds and ſour or poor graſs, which give, what farmers of eaſe and pleaſure, contentedly deem good enough paſture. On this their hard fated horſes, cows, oxen and ſheep are promiſcuouſly turned early in the ſeaſon, before there is a bite: but they nibble off the ſcanty growth of rubbiſh as it riſes. Here they continue till winter; ſometimes through the winter; ſo that the ground becomes poached and trod to a dead cloſeneſs. The dung dropt is but of one or two years, towards reſtoring the ſoil, when corn crops are renewed, and reduce it ſtill lower. The acquiſition from the ſcraps of expoſed dung, and from the ſlow effects of the atmoſphere, in that ſhort time, is trifling: not equal to the damage by poaching, and the impoveriſhment from quick returns of corn crops.*

Oppoſed

* Witlings may fancy they ſee a palpable contradiction between quick returns of corn crops here mentioned, ſo greatly impoveriſhing, when the rotations recommend them to be every other year. But their genius forbids them to ſee the difference between good culture with manures and ameliorating crops intervening; and bad culture, without manures or ameliorating crops.

Oppoſed to our unprepared paſtures, are the *made* paſtures of Europe and ſome parts of America: and oppoſed to *all paſturing* is *ſoiling*. Soiling is common in Flanders, and is advancing into frequent uſe in Germany and in England. It is to the preſent purpoſe that theſe modes and their effects be compared.

Advantages in *paſturing* are, that *rich* graſs paſture keeps grown cattle at the rate of one and a third acre to a beaſt, during the ſix or ſeven warmer months. Attendance on them there is very little. They range over the paſture at pleaſure, and drop their manure on the field, ſo that labor in heaping, carting out, and ſpreading it, is ſaved to people of lounging eaſe and pleaſure. The diſadvantages are, the graſs and the ground are trod down, and reduced in value; they require coſtly diviſion fences; the dung is ſcattered on the ground, expoſed to exhalation and waſte by ſun and wind, ſo as to be greatly reduced; the horſes and oxen are caught or driven to the ſtable, with much waſte of time, and ſome vexation and conſequent abuſe.

Soiling is keeping beaſts tied up, and feeding them with cut graſs: the advantages whereof are, that the fields require no diviſion fence; grown cattle are kept at the rate of a fourth or fifth part of an acre to a beaſt, during the ſix warmer months; their manure is all preſerved, and given to the ſoil when and where it is moſt wanted, and in the beſt condition; the ſoil is untrod, and left mellow and lively; the horſes, oxen and cows, are always up, ready for uſe, without loſs of time; they are kept cool, ſhaded, and leſs worried by flies; they acquire good coats, and full fleſh, with a leſs expenſe of food.*

A farmer

* An objection is made, and I thank my friend for the communication, to the unqualified ſcheme of laying aſide *all diviſion-fences*. It is juſtly obſerved that there would be, at times, bad ſeaſons when graſs could not be cut and carried in, becauſe of great rains, and alſo becauſe of cold drying winds, which check the growth of graſs; in which caſes it is ſaid it would be requiſite that there ſhould be ſome part of the field divided off, for the beaſts to run on. This indeed would even be neceſſary, if there was not another way of providing for them, and that much preferable. In towns we ſee that horſes are kept up on *hay* the year round, and that it agrees with them. On our graſs-farms, we command a great deal of *hay*: a quantity whereof ſhould be kept in ſtore, as a *proviſion againſt ſuch untoward*

A farmer *paſtures* his ſtock: his neighbor *foils* his. Both have 32 head of grown horſes, oxen and cows.

Paſtured 32 head, at 2 *a.* of common paſture, 64 *a.*
Soiled 32 head, at an acre of cut graſs to 4 beaſts, 8

56 *a.*

Gained 56 *a.* by *foiling*; which will keep 224 cattle: or will give 140 tons of hay, worth 1400 dollars.

Accounts given of cattle ſoiled in England, make the beaſts ſoiled to be 4 to 6 head from an acre of cut clover. Mr. WYNN BAKER, who was an accurate experimenter, found an acre kept five head, the graſs partly cut from head lands. A farmer in England, ſoiled 20 horſes and 7 cows, from 7 acres of clover, without giving any corn or hay. He cloſely watched the management of his tenant, with the ſame number of ſtock paſtured in the field; and it proved that one acre mown went as far as ſix paſtured. When his beaſts had eaten 5 acres, the tenant's had conſumed 30 *a.* and his horſes were in inferior condition.

When *foiling* is recommended, farmers having inveterate habits, or who are driving after pleaſure, equally check all that might be ſaid by vehemently objecting to the labor and expenſe of cutting, carting and giving the graſs to the beaſts: and the farmer of lounging habits, ever ſeeking for ſhort cuts, and even for nothing to do, can ſcarcely find time for cleaning ſtalls, and ſaving and carrying out dung, eſſential as they are.*

A man and a boy perform all the work and attendance in *foiling* 40 to 50 beaſts, including cleaning out, and ſaving the dung. They cut graſs enough in the morning for the evening feed; let it lie to deaden a little, and cart it in the evening. So the morning feed is cut in the evening, to be carried in, in the morning. Suppoſing all the work performed

ſeaſons as ſhall deprive the beaſts of their meſs of cut graſs. Good farmers deem it requiſite always to have ſome ſtock of old hay. If hay ſhould not have been ſaved in ſufficient quantity, a practice not uncommon in Europe may be introduced of *tethering*.

* He is a bad farmer who ſeeks to have nothing to do. A good farmer knows how to accompliſh the ordinary round of work, and it is without complaining and without grudging full labor for having it complete. The ſhort cut that would do it but ſomehow, and not perfectly, he ſpurns at. When all this is done, he ſeeks to improve the eſtate.

performed in 3 hours of the morning, and 3 of the evening there then remain 6 hours for other work. The expenſe of the man and boy is therefore but one half chargeable to the ſoiling account; but even let them be 8 hours employed in ſoiling, or two-thirds the expenſe.

Reckoning on only 32 head, they give in a *year*,	
300 loads of rich manure, - - - - - -	300*d.*
Time daily ſaved in catching the beaſts: ſoil left untrod and lively: gentleneſs and docility of the cattle, &c. value - - - - -	40
Wages and expenſes of a man and boy, a year, 200 off $\frac{1}{3}$ - - - - - - 140	
Gain, in ſoiling 56 *a.* or 140 tons of hay, -	1400
	1740
	140
Net gain	1600*d.*

It is, in this caſe, unwiſe to ſuffer the mind to be biaſſed by apprehenſions of expenſes which evidently muſt be ſo greatly below the benefit acquired. Let us make trials of this new mode of managing cattle. Suppoſe only your horſes and oxen ſo kept. How docile, how well fleſhed, what healthy coats, and what an invaluable quantity of manure, of the richeſt and moſt perfect kind, on the ſpot!

Many horſes are kept up, in towns, the year through; except when employed: and all cattle thrive better, on leſs food, when tied up, than when at large in fields. Even ſheep are ſo kept. The celebrated Mr. BAKEWELL (lately deceaſed) tied up his favorites, at leaſt during winter. I believe too his choiceſt rams were tied up the year through, except for the moment of giving them the ewes, for they were not to be ſeen out. In keeping ſheep up, it will be well to give them room, and much freſh air, in ſeveral apartments, according to their ages and ſexes, allowing to ewes with lamb, a great portion of room.

Without knowing the quantity of cut graſs, that beaſts may daily require, 75*lbs.* are aſſumed; which would cure

into

into 17 or 18*lbs.* of hay: but it might be that leſs of green graſs may cloy them than what would be requiſite to cure into a ſeed of hay.

On this ſuppoſition in the morning are carried to the 32 beaſts 1152lbs of green clover—in the evening the like.

The 8*a* cut four times in the ſeaſon, is once in every ſix weeks, or about 33 perches cut in a day; that is 16 in the morning, 16 in the evening; or a ſquare of 4 perches each time. Will it require 6 hours to cut, cart, and give to the beaſts, a ſquare of 4 perches of graſs, beſides cleaning the ſtalls and heaping the dung?

OBSERVATIONS *on the* USE *of* LIQUID FOOD *in* FATTENING CATTLE.

THE great difference between the American and the European modes of winter-keeping live ſtock, is in the latter giving *with dry food, roots or liquid food*; which the former generally neglects: whereby his cattle become coſtive and hide-bound. The Engliſh give *turnips*, the German gives *drank*.*

Mr. YOUNG gives an account of an ox-houſe, which, in *England*, is reckoned very complete. The owner, a Mr. MOODY, keeps 26 beaſts. *each in a ſtall*, 8 feet wide for large oxen, 6 feet for ſmaller. How different from Mr. BAKEWELL's, of the ſame country, which are ſtalls of 6 feet for *two* cows, 8 feet for two bulls†. Mr. MOODY's has, at the head of each ſtall, a ſquare manger for hay put in through a window in the wall, oppoſite to the beaſt's head. The hay ſtacks are in a yard at the back of the building; ſo that the feed of hay is taken from the ſtack, and, at one ſtep, put into the manger. On one ſide the hay, is a ſmall ſtone ciſtern, as a trough, to eat oil-cake out of. On the other ſide is another ſtone ciſtern for water;

* Drank is a food compoſed of bran, grains, maſhed potatoes, maſh of turnips, or oat-meal, rye meal, or barley-meal, with a *large proportion of water*: The mixture being well boiled, and given warm.

† BAKEWELL *kept* beaſts; MOODY *fattened* them. Does this occaſion the difference; or is it an error in applying 8 and 6 feet ſtalls to *ſingle* beaſts.

water; which is thus ſupplied: Outſide the houſe is a pump, which raiſes the water into a ciſtern, exactly on a level with all thoſe that receive the water for the oxen. A pipe of lead leads from this pump ciſtern to all the others in the houſe; ſo that it may be ſeen, by the height of water in the pump ciſtern, how high it is in all the reſt. The houſe is ſhut quite up. In the doors are holes, to let in air: But ſliding ſhutters exclude it, at pleaſure. At one end of the houſe is a ſmall room for oil cakes, and a ſtove with a broad iron top, for laying on the cakes to heat a little for breaking. A block ſtands by it on which they are broken.

Mr. MOODY is ſingular in the practice of ſweating cattle, for promoting their fattening. He ſays the hotter they are kept the better they will fatten. He ſhuts them up, and, for ſome time, lets in no air through the holes of the doors. The breath of ſo many, and the heat of their bodies, ſoon bring them to ſweat prodigiouſly; and, when this is at its height, they fatten beſt and quickeſt. After ſweating two weeks, the hair all peals off, and a freſh coat comes, like that in ſpring; after which they ſweat no more. He adds, that thoſe beaſts which do not ſweat at all, ſcarcely ever fatten well. His beaſts are a large ſort, from 80 to 130 ſtone. He gives to thoſe of 100 ſtone, two oil cakes a day, for two months: then three till fat: alſo 20lbs. of hay each a day; of which they eat only the prime part. Lean beaſts are kept on their offal hay.—Such a beaſt, in his winter fattening, eats above 30 dollars worth; but he improves in value more than to that amount.

There is a great difference beetween "*keeping*" and "*fattening*." Mr. BAKEWELL *keeps*; Mr. MOODY *fattens*: and there is much difference in the expenſe of *ſummer fattening on graſs*, and fattening on *winter feed*.

Cattle are *kept* through the winter, on ſtraw, corn fodder, and huſks, giving them water; or much better juicy food or drink. They are *fattened* on hay, cut ſtraw with meal, linſeed jelly, &c. in the winter: on graſs in ſummer. *Salt* is frequently given the cattle, eſpecially when tied up.

Oil cake is a great fattener, and gives the richeſt dung; but

but becoming dear, *linſeed* jelly is taking place of it. This jelly is a great diſcovery; and may very conveniently be made, and applied in America, in fattening cattle. Hay, meal and linſeed jelly muſt be excellent fattening food in ſtall feeding. Linſeed jelly is thus made: 7 of water to 1 of flaxſeed ſteeped in a part of the water 48 hours: then add the remaining water cold, and boil *gently* 2 hours, ſtirring conſtantly to prevent burning. It is cooled in tubs, and given mixed with any meal, bran and cut chaff. *Each bullock* (large) has 2 quarts a day of jelly: equal to a little more than *one quart* of ſeed in 4 *days*. Cattle ſix or ſeven years old, fatten moſt advantageouſly to the grazier. Their ſummer grazing is commonly but a preparation to ſtall-fattening.

B.

OBSERVATIONS *reſpecting the* UTILITY *of* SWALLOWS, *by the Rev.* DAVID URE, *Miniſter of* Uphall, *in* Scotland, *for the* CONSIDERATION *of the* BOARD *of* AGRICULTURE.

ONE advantage, which this country enjoys with moſt others, is derived from the Swallow. Theſe migratory birds are of an incalculable advantage to the intereſts of ſociety at large, but more immediately to the huſbandman. Nature has, by inſtinct, directed them to build their neſts, and bring forth their young, at the ſeaſon of the year when thoſe inſects, on which they live, are beginning to injure the riſing crops, by depoſiting their eggs for the production of caterpillars. Were thoſe myriads of inſects, with which the air then ſwarms, allowed to fly about, without any enemy to deſtroy them, the caterpillars, their offſpring, would, in a ſhort time, become ſo numerous, that every vegetable would be totally deſtroyed. One of their greateſt enemies is the Swallow. The moſt of common birds alſo feed their young with caterpillars, which circumſtance aſtoniſhingly leſſens their number.—But the Swallow feeds her young with the inſect or parent

of

of theſe caterpillars, and is of ſuperior advantage; for, by deſtroying a ſingle fly or inſect, in the beginning of ſummer, many thouſands of vermin are prevented from coming into exiſtence. Thus applying a remedy to the evil in the moſt effectual way. Every encouragement, therefore, ſhould, by the lovers of Agriculture, be given to theſe friendly viſitants. Some thoughtleſs people diſcourage them from frequenting the neighbourhood of bee hives, from a ſuſpicion that in their flight they pick up the bees. This perhaps is no more than a ſuſpicion; for it is probable that Swallows will not injure bees or any other inſects that are armed with ſtings. But although a few bees ſhould be deſtroyed by them, their loſs is of very little conſequence, compared with the advantages ariſing from the deſtruction of the caterpillars and other devouring vermin. It is believed, by accurate obſervers, that one neſt of Swallows will deſtroy, in a ſeaſon, about 100,000 inſects, which, with their caterpillars, would deſtroy an immenſe quantity of growing vegetables. Another advantage ariſing from the Swallow is, that it never lives on grain, which is not the caſe with moſt other birds.

☞ I have been induced to hand the preceding obſervations to the Truſtees of the Maſſachuſetts Society for promoting Agriculture, as believing them true, and to induce every farmer in the country to make all the conveniencies for ſwallows in his power; as, perhaps, no country more abounds with devouring inſects.

A. DEXTER, *Treaſurer.*

Letter from Mr. WILLIAM PUTNAM, *on* MANAGING SHEEP.

STERLING, JANUARY 13, 1795.

DEAR SIR,

IN reading the 9th article of the Agricultural Society's liſt of premiums, the following queſtion occured to me, which permit me to communicate—Whether the intention

tention of the Society, in that article, would not be better promoted, by offering the premium, for the largeſt quantity of wool, meat, and tallow, in the aggregate, produced from the ſmalleſt number of ſheep, &c. ?—As perhaps, this might be a greater ſtimulus for the farmer to beſtow good keeping on his ſheep; for, if misfortune happens to his wool, which may be, he ſtill builds his proſpects on his meat and tallow. And the beſt quality of wool is generally produced from the fatteſt carcaſs, though the greateſt quantity is not always.

I herewith hand you an experiment of mine, which I wiſh you to communicate; as it may, in ſome ſmall degree, gratify the curious, and perhaps forward the purpoſes of the Society. And with ſentiments of eſteem,

I am your obedient ſervant,

WILLIAM PUTNAM.

The Correſponding Secretary.

N. B. The Truſtees have altered the premiums according to Mr. PUTNAM's propoſal.

In *Dec.* 1793, I ſelected from my flock 20 ewes, which coſt me 10s. each. In *April*, 1794, thoſe ewes produced me 24 lambs, and the ſame month I ſheared from thoſe ewes,

	lb.		£. s. d.
WOOL,	61	*ſold for*	5 1 8

In *Oct.* 1794, I ſeparated thoſe lambs from the ewes, and gave them good keeping, and the firſt week in *Jan.* 1795, drove them to market, which produced,

MEAT,	1136	*ſold & neated*	23 10 2
WOOL,	84		7 4
TALLOW,	177		6 12 9
Total wt. of meat, wool, & tallow, produced from 20 ewes & their lambs for one year,	1458	*neated in mo.*	42 8 7

☞ The

☞ The ewes are now on hand, and are better by good keeping, at leaſt 3s. each; which being added to £. 10 the firſt coſt of thoſe ewes amounts to 13

£. 55 8 7

Now the whole amount of the charges of keeping thoſe ewes and lambs, including the firſt coſt of the ewes, and the intereſt on the firſt coſt for one year, is—which deduct, 36 4

leaves the neat gains, £. 19 4 7

WILLIAM PUTNAM.

ON MULBERRY TREES AND SILK WORMS.

THE Truſtees are very deſirous of engaging the attention of all thoſe who have leiſure, to the raiſing of ſilk-worms, in order to eſtabliſh the manufacture of ſilken ſtuffs, which faſhion has introduced into ſuch general uſe, as to become an article of national importance.

The attention neceſſary to be paid to raiſing and feeding theſe inſects, would form an agreeable and lucrative employment to thoſe females, who are placed above menial ſervices. There is no part of *America* wherein the ſilk-worm cannot be fully ſupplied with proper food; as mulberry trees will thrive, with very little care, even in the coldeſt. We are informed that in 1789 no leſs than 5400 pounds of ſilk were raiſed in the cold and ſandy territories of *Pruſſia*. Perhaps no country poſſeſſes more advantages for this purpoſe, than *America*; and ſhould this manufacture ever be extenſively purſued, it will not be extravagant to expect ſilken ſtuffs as cheap as any cloth made in *America*. To encourage, as far as lies in their power, an object of ſuch importance, the Society will ſupply, on timely notice, thoſe perſons with eggs of the ſilk-worm, who will earneſtly attend to this ſubject, and raiſe the worms; and, to animate them in ſo laudable a purſuit, will grant a premium for the greateſt num-

ber of cocoons. To ſhew with what eaſe and convenience the worms may be fed, the following directions are publiſhed, extracted from ſome ſenſible letters, written by Mr. JOSEPH CLARKE, of *Northampton*, and communicated by the Hon. JAMES WINTHROP, Eſq. of *Cambridge*. To theſe Gentlemen the Society return their thanks, and ſhall be obliged by any further communications to improve the agriculture and manufactures of our country.

EXTRACT FROM MR. CLARKE'S LETTERS.

ABOUT ten years ago, I ſet over an acre of land with ſmall mulberry trees, ten feet apart; they flouriſhed extremely well, and in three or four years, they formed a perfect foreſt. From theſe I uſed to gather my leaves; but I ſoon found the trouble and expenſe were too great; for I was obliged, in the latter part of feeding, to employ a great many people, or the worms muſt ſtarve: having obſerved thoſe trees, which were accidentally broken down, ſprouted anew and luxuriantly the following year, determined me on another method. I had a ſmall incloſure of very rich ground, about ſix rods ſquare, which, in the ſpring of the year 1793, I ploughed and mellowed well. Here I ſowed my mulberry ſeed in rows, like carrots or parſnips in a garden, at ſuitable diſtances from each other for weeding and hoeing between them. The ſeed came up well, and the plants were kept quite free from weeds that ſummer; in doing which you muſt be very careful as the plants are exceeding tender; in this firſt weeding, the fingers muſt be principally uſed * The next ſpring, before they began to ſprout, with a ſcythe, I cut down all the buſhes within two inches of the ground, and carefully wed them. This method anſwered my moſt ſanguine expectation; for by the middle of July, when

* The following method of raiſing mulberry trees, for the uſe of ſilk-worms, is practiſed in the ſouth of *France*. Gather a ſufficient quantity of full ripe mulberries, take a rough horſe line, or rope, ſuch as we dry linen on, and with a good handful of the berries, run your hand along, ſo that the pulp and berries being bruiſed and maſhed, may adhere to the line in abundance; dig a trench, where you wiſh to plant them, and cutting the line or rope of the proper length, place it in the trench and cover it well with earth, remembering afterwards to water it well, which is eſſential to ſucceſs.

when the worms devour the moſt leaves, they had grown up three feet in height, and being cut with a ſickle, furniſhed me with abundance of leaves, in a cheap, eaſy and expeditious manner. The ſame method has been purſued with theſe trees or buſhes ever ſince; ſo that you ſee there is no neceſſity of ſowing ſeed annually. A field once ſown, will, for aught I can ſee, laſt a thouſand years, if it be well taken care of. My mulberry trees are more flouriſhing this year, and yielded more food for the worms than they ever did before. This I attribute chiefly to the manure I put on them the laſt ſpring; notwithſtanding they were cut down laſt July, they are now (October) about three feet high. My worms were hatched out the 24th June, and continued eating juſt four weeks. They have conſumed upwards of three thouſand pounds of leaves, and the trouble of gathering them has been but little, compared with the whole buſineſs. A man can reap three or four hundred weight within an hour; the expenſe and trouble therefore are trifling. I perform about three quarters of the buſineſs myſelf. The quantity of ſilk produced is about ten pounds: as to the quality I can in no way ſo well inform you as by ſending a ſkein of ſewing ſilk,* which I pray you to accept.

The idea that water is injurious to ſilk-worms is totally unfounded. My worms this year have been fed chiefly on wet leaves, gathered early in the morning, and as they grow dry in the courſe of the day, were ſprinkled with water. I have uſed in one day three pails full in ſprinkling the leaves, for I think it invigorates the worms in ſultry weather. Hot water for the purpoſe of killing the chryſalis, that is within the cocoon, to prevent his making his way through and ſpoiling the ſilk, is never uſed. Hot water is only uſed, when the cocoons are wound off into ſkeins.† To kill the chryſalis, the cocoons are put into an oven, about

* This ſilk will bear a compariſon with the beſt imported ſilk.

† This candid ſtatement deſtroys the idea of water being injurious to the ſilk-worm, an opinion that has long been eſtabliſhed, and is ſtill maintained in ſome late publications. To remove all doubts (if any can poſſibly remain) the following mode is added, which will not only confirm Mr. CLARRE's aſſertion, but teach us to prepare a ſtock of food for our worms, ſhould any accident deprive them of the mulberry leaves, or ſhould they be hatched before the trees have produced any: Gather in the autumn, before the froſts commence and in dry weather, the leaves of the mulberry tree, which muſt be dried in the ſun, by ſpreading them on large cloths,

about as warm as when a woman takes out her bread; or they are expoſed one or two days to the fierce rays of the ſun. The laſt method is beſt, as there is no danger of injuring the ſilk, as may be the caſe in the former way, ſhould the oven be a little too warm. Spread your cocoons on a table in the ſun, for two days ſucceſſively; if you ſuſpect they are not effectually killed, let them be out another day. They muſt be carried in at night, they muſt not be wet; if you wiſh to know whether the chryſalis be dead, take one of the thickeſt of the cocoons and cut it open; if you cannot perceive any life, you may conclude they are ſunned ſufficiently; ſhould you perceive any ſigns of life, ſun them another day. As I cannot well deſcribe the method of winding off the cocoons, I muſt refer you to thoſe whoſe particular buſineſs it is.

Extract of a Letter from Mr. JOHN W. BLAKE, *of Brattleborough, Vermont, to* JOSEPH BLAKE, *Eſq. of Boſton, reſpecting* PLAISTER OF PARIS.

MARCH 20 h, 1799.

THE beſt time to apply the Plaiſter of Paris, as a top dreſſing, is ſaid to be from the firſt of March, if the ground be free of froſt, to the firſt of May. This is in the climate of *Pennſylvania*. The quantity per acre from one to five buſhels. It is ſaid to be beſt adapted to graſs, and every kind of ſummer grain; and to have been moſt ſucceſsfully applied to high, warm, dry, gravelly or loamy ſoil: clayey, cold or low-lying land is ſeldom favourable for it. I planted, the laſt ſeaſon, about ten acres of corn in a barren plain, which had never been manured; the ſoil a light loam. Plaiſter was applied to a part of it, at planting; a ſmall table ſpoonful being thrown into each hill, in the manner of dunging in the hole. On another part, about the ſame quantity of the plaiſter was thrown round the corn or on it, at the firſt dreſſing. Ten or twelve

reduce them to powder, and lay them up in a dry place; when it is neceſſary to feed with this powder, let it be moiſtened with water and ſpread round the worms, who will immediately feed upon it. Other food has been propoſed to feed with, ſuch as Lettuces, Endive, &c. but we are aſſured by a perſon of great experience, that the ſilk produced by any other food than mulberry leaves, is of an inferior quality, and that the worms are ſickly.

twelve days after the hoeing, that, to which the plaiſter had been applied at planting, was viſibly the moſt luxuriant; but I believe there was no difference in the crop. I left in ſeveral parts of the field, two or three rows together, to which no *manure* was applied. Theſe, through the ſeaſon, were obviouſly diſtinguiſhable as far as the field could be ſeen, and the product was certainly not more than one fifth; the field producing on an average, where the plaiſter was applied, forty buſhels to the acre. I made ſome experiments upon clover ground, which were equally ſucceſsful. My ſpring wheat, my carrots and many garden vegetables, were, I thought, much improved by it. My neighbour, the Rev. Mr. WELLES, made uſe of a ſmall quantity by way of experiment on corn; and is ſo thoroughly convinced of its efficacy, that he has told me, he ſhall not in future attempt the cultivation of corn without it. Your Plaiſter, you ſay, is European. I think in the communications made to Judge PETERS,* a preference is given by ſeveral gentlemen to the American. The mode of trying the quality, preſcribed by him, is to put a quantity, pulverized, into a dry pot over the fire; and when heated, it emits a ſulphureous ſmell. If the ebullition be conſiderable, it is good: if ſmall, indifferent. If it remain an inert maſs, like ſand, it is worthleſs. In ſtocking down to graſs, where clover is generally put in with barley or oats, the beſt time to apply the Plaiſter is ſaid to be as ſoon as the barley or oats is taken off; as it gives a vigorous growth to the clover before the winter ſets in, which is apt to injure it, when ſmall. Upon the ſward, it may be well applied juſt before a ſhower at any time in the ſummer. It ſhould be ground, ſo as to produce about twenty buſhels to the ton. If it be too fine, it flies away in ſtrewing, and is ſaid not to have ſuch durable effect, as when moderately pulverized. I hope I may have the pleaſure, the enſuing ſeaſon, to ſee the effects of this aſtoniſhing ſubſtance on your farm.

Yours, &c.

JOHN W. BLAKE.

1796.

* See AGRICULTURAL INQUIRIES ON PLAISTER OF PARIS, with facts, obſervations, &c. collected chiefly from the practice of farmers in Pennſylvania. By RICHARD PETERS, Phil. 1797.

1796.		D.	C.
June 2	CASH paid for printing per order Dr. Warren's Eulogy to Mr. Ruſſell's Memory,	20	
27	Paid Benj. Ruſſell for advertiſing,	3	
Oct. 4	Paid Thomas Fleet, jun. account for printing a pamphlet, per order,	157	5
Nov. 7	Paid Young & Minns' Bill per order,	12	
	To Caſh paid W. P. Blake's Bill,	3	
	To Caſh paid Jacob Kuhn for notifying Truſtees' Meeting, collecting Aſſeſſments, &c.	25	
	To Caſh paid per order Three Premiums,	101	50
	To Caſh paid for poſtage of Papers and Letters,	1	95
		323	50
1797.			
April 1	To Caſh paid per order Mr. Loring's Bill for a Piece of Plate,	26	77
	To Caſh paid Mr. Fleet's Bill,	3	
	To Caſh paid two Bills of Mr. Calender's,	10	
	To Caſh paid for Stationary,	2	50
June 6	To Caſh paid per order for 800 Dollars Deferred Stock, at 12/9. and 20/.	510	
		875	77
	Balance due the Society and carried forward,	146	52
		1022	29
1797.			
Sept.	Caſh paid for the Tranſportation of a Buſhel of Wheat and Poſtage of Letters from Connecticut,	2	87
Octob.	To Caſh paid J. Kuhn, -	25	
Dec. 26	To Caſh paid for Copying for the Preſs,	7	25
		35	12

1796.		D.	C.
April 1	By Balance due laſt Account,	316	11
	By Principal and Intereſt on Funded Stock, from April 1ſt, 1796, to April 1, 1797,	225	90
	By Caſh Bank Dividend, from January 1ſt, 1793, to April 1, 1797,	268	
	By 90 Aſſeſſments, -	180	
		990	1
	By Intereſt on Stock, from April 1ſt, to June 12th,	28	28
	By 2 Aſſeſſments, - - -	4	
		1022	29

1797.			
June 12	By Balance due laſt Account,	146	52
	By Intereſt on Funded Stock, to June 12th, 1798, with the Principal,	205	
	By Bank Dividend, -	108	
	By Two Years' Subſcription of the Hon. James Bowdoin,	160	
	By Caſh from Aſſeſſments, -	28	
		647	52

Accounts brought over, - -	35	12
Balance in the Treaſurer's hand, June 10, 1798,	612	40
	647	52

☞ According to a vote of the Society, the annual aſſeſſment upon each member from April 1796, is One Dollar.

We

BOSTON, *April* 1, 1799.

WE the ſubſcribers have examined the Accounts of Dr. DEXTER, Treaſurer to the Society, from June 12, 1797, to June 10th, 1798, and find them rightly caſt, and regularly vouched, and a balance as above, of Six Hundred and Twelve Dollars and Forty Cents due the Society in his hand; over and above the ſeveral ſpecies of ſtock amounting to Five Thouſand Three Hundred and Seventy-Seven Dollars in the name of the Society.

OLIVER WENDELL,
THOMAS L. WINTHROP, } Committee.

Property in the hands of the Treaſurer.

	D.	*C.*
6 per cent. ſtock of the U. States. 8 & ¾ per cent. being paid,	2584	30 nominal.
3 per cent. ditto,	583	
3 Shares in Bank of the U. States,	1200	
Maſſachuſetts 5 per cent. ſtock,	1200	
Deferred Stock,	800	
	6367	30

LIST

List of Members of the Agricultural Society.

N. B. Thoſe who have no towns affixed to their names, belong to Boſton.

JOHN Adams, Preſident, *Quincy*.
Joſeph Allen, Eſq ; *Worceſter*.
John Andrews, Eſq.
Mr. John T. Apthorp, *Cambridge*.
John Avery, Eſq.

Hon. Loammi Baldwin, Eſq; *Woburn*.
Joſeph Barrell, Eſq ; *Charleſtown*.
Samuel Baſs, Eſq ; *Randolph*.
Dr. William Baylies, *Dighton*.
Benjamin Beals, Eſq; *Quincy*.
Ezra Beeman, Eſq ; *Boylſton*.
Hon. Daniel Bigelow, Eſq ; *Peterſham*.
William Billings, Eſq; *Conway*.
Joſeph Blake, Eſq.
Hon. James Bowdoin, Eſq.
Thomas Brattle, Eſq. *Cambridge*.
Hon. Ebenezer Bridge, Eſq; *Chelmsford*.
Martin Brimmer, Eſq; *Roxbury*.
Henry Bromfield, Eſq ; *Harvard*.
Hon. Eleazer Brooks, Eſq ; *Lincoln*.
Mr. Charles Bulfinch.
Dr. Thomas Bartlett.
Mr. Thomas Brewer.
Mr. John Brewer.

Hon. George Cabot, Eſq ; *Brooklyn*.
Capt. Francis Carr, *Haverhill*.
Samuel Cary, Eſq ; *Cheſea*.
Mr. Samuel Chandler, *Worceſter*.
Hon. David Cobb, Eſq ; *Province of Maine*.
John Codman, Eſq.
Hon. Daniel Cony, Eſq ; *Hallowell*.
Andrew Cragie, Eſq ; *Cambridge*.
Thomas Cuſhing, Eſq ; *Newton*.

Rev. Manaſſeh Cutler, LL.D. *Ipſwich.*
Hon. Edward Cutts, Eſq; *Kittery.*
Mr. Joſeph Coolidge, jun.

Rev. Samuel Dean, D. D. *Portland.*
Elias Haſket Derby, Eſq; *Salem.*
Hon. Samuel Dexter, Eſq; *Weſton.*
Samuel Dexter, jun. Eſq; *Charleſtown.*
Aaron Dexter, M. D.
Doct. Elijah Dix.
Mr. Joel Dix. *Waltham.*
John Derby, Eſq.
Hon. Thomas Dwight, *Springfield.*

Hon. Timothy Edwards, Eſq; *Stockbridge.*
Juſtin Ely, Eſq; *Weſt-Springfield.*
Azariah Eggleſtone, Eſq; *Lenox.*

Samuel Flagg, Eſq; *Worceſter.*
Hon. Samuel Fowler, Eſq; *Weſtfield.*
Simon Frye, Eſq; *Fryeburg.*
Mr. Joſhua Fiſher, *Beverly.*

Elbridge Gerry, Eſq; *Cambridge.*
His Hon. Moſes Gill, Eſq; *Princeton.*
Chriſtopher Gore, Eſq; *Waltham.*
Thomas Gould, Eſq; *Pittsfield.*
David S. Greenough, Eſq; *Roxbury.*

Mr. Ebenezer Hall, *Medford.*
Mr. Jonathan P. Hall.
Samuel Henſhaw, Eſq; *Northampton.*
David Henſhaw, Eſq; *Leiceſter.*
Stephen Higginſon, Eſq.
Henry Hill, Eſq.
Hon. Samuel Holten, Eſq; *Danvers.*
Rev. John Homer, *Newton.*
Joſeph Hoſmer, Eſq; *Concord.*
Hon. Daniel Howard, Eſq; *Bridgwater.*
Major Artemas Howe, *New-Braintree.*

Doct.

Doct. Ebenezer Hunt, *Northampton.*
Mr. Jonathan Hunnewell.
Mr. Richard Hall.
Mr. Ebenezer Hall, jun.
Mr. Andrew Hall.
Mr. Nathaniel Hall, jun. } *Medford.*
Hon. Jonathan Jackſon, Eſq.
Leonard Jarvis, Eſq; *Cambridge.*
Patrick Jeffery, Eſq.
Mr. John Jenks, *Salem.*
John Coffin Jones, Eſq.
Col. Joſeph Jones, *Weſtern.*
Iſrael Jones, Eſq; *Adams.*
Nathan Jones, Eſq; *Gouldſborough.*
Col. Danforth Keyes, *Weſtern.*
Martin Kingſley, Eſq; *Hardwick.*
Doct. Thomas Kitteridge, *Andover.*
Hon. Henry Knox.
Rev. John T. Kirkland.
Capt. George Lane, *Charleſtown.*
Hon. George Leonard, Eſq; *Norton.*
Hon. Benj. Lincoln, Eſq; *Hingham.*
Hon. Levi Lincoln, Eſq; *Worceſter.*
Hon. John Lowell, Eſq; *Roxbury.*
Solomon Lovell, Eſq; *Weymouth.*
Mr. Ebenezer Lane, *Northampton.*
Samuel Lyman, Eſq; *Springfield.*
Theodore Lyman, Eſq.
John Lucas, Eſq; *Brooklyn.*
Mr. Theodore Lincoln, *Paſſamaquady.*
Mr. William Martin, *North-Yarmouth.*
Hon. Jonathon Maſon, Eſq; *Boooklyn.*
Mr. Eliſha Matthews, *New-Braintree.*
Hon. Eliſha May, Eſq; *Attleborough.*
Col. Hugh Maxwell, *Heath.*
Pliny Merrick, Eſq; *Brookfield.*
Abner Morgan, Eſq; *Brimfield.*
Mr. Nehemiah Munroe, *Roxbury.*
Mr. John Mycall, *Newburyport.*

Zabina

Zabina Montague, Eſq; *Amherſt.*
Hon. Timothy Newell, Eſq; *Sturbridge.*
Rev. Jonathan Newell, *Stow.*
Capt. Thomas Newhall, *Leiceſter.*
Aſa Nelſon, Eſq; *Rowley.*

Doct. George Oſgood, *Andover.*

Hon. Robert T. Paine, Eſq.
Mr. William Paine.
Doct. William Paine, *Worceſter.*
Rev. Samuel Parker, D. D.
Col. Jonathan Patten, *Stockbridge.*
Rev. Phillips Payſon, *Chelſea.*
Mr. William Dandridge Peck, *Kittery.*
Ebenezer Peirce. Eſq; *Partridgefield.*
Thomas Perley, Eſq; *Boxford.*
Enoch Perley, Eſq. *Bridgton.*
Charles Phelps, Eſq; *Hadley.*
Hon. Samuel Phillips, Eſq; *Andover.*
John Pickering, Eſq; *Salem.*
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Mr. Henry Prentiſs.
Oliver Prefcott. jun. Eſq; *Groton.*
Capt. William Putnam, *Sterling.*

Benjamin Read, Eſq; *Mendon.*
Moſes Cheney Read, Eſq; *Brookfield.*
Edward H. Robbins, Eſq; *Milton.*
Mr. Nathaniel Ruggles, *Roxbury.*
Joſeph Ruſſell, Eſq.
Mr. Samuel P. Ruſſell, *North-Yarmouth.*
Mr. David Robertſon, *Granville.*
Mr. Sampſon Reed.
Col. John Sale, *Chelſea.*
Mr. Samuel Saliſbury.
David Sears, Eſq.
Hon. William Seaver. Eſq; *Kingſton.*
Hon. David Sewall, Eſq; *York.*
Samuel Sewall, Eſq; *Marblehead.*

Hon.

Hon. William Shepard, Eſq; *Weſtfield.*
Hon. Thompſon J. Skinner, *Williamſtown.*
David Smead, Eſq; *Greenfield.*
Capt. John Southgate, *Leiceſter.*
Doct. William Spooner.
James Sprout, Eſq; *Middleborough.*
Hon. Joſiah Stearns, Eſq; *Lunenburg.*
Rev. Charles Stearns, *Lincoln.*
Hon. Simeon Strong, Eſq; *Amherſt.*
Hon. James Sullivan, Eſq.
His Excell. Increaſe Sumner, Eſq; *Roxbury.*
Mr. John L. Sullivan.
James Swan, Eſq.
Doct. Amos Spafford, *Rowley.*
Doct. Nathaniel Smith.

Capt. Bezaleel Taſts, *Uxbridge.*
Iſaiah Thomas, Eſq; *Worceſter.*
Doct. Joſhua Thomas.
Iſrael Thorndike, Eſq; *Beverly.*
Hon. Salem Towne, *Charleton.*
Cotton Tufts, Eſq; *Weymouth.*
Dudley A. Tyng, Eſq; *Newburyport.*
Mr. Minot Thayer.

Charles Vaughan, Eſq.

Benjamin Upton, Eſq; *Reading.*

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