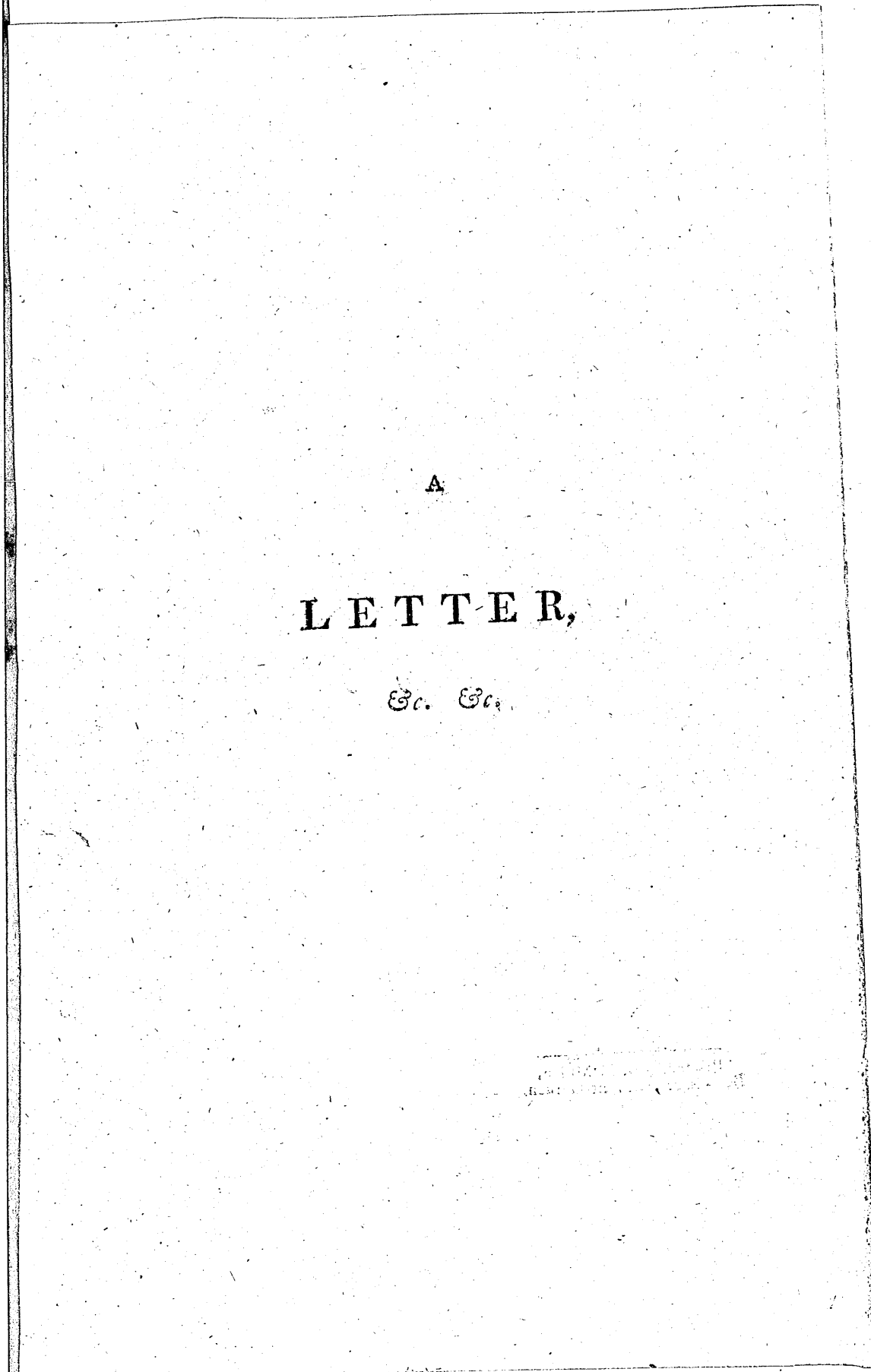


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LETTER,

ADDRESSED TO

THE RIGHT HON. LORD CARRINGTON,
PRESIDENT OF THE BOARD OF AGRICULTURE.

BY COLONEL FULLARTON,
OF FULLARTON, M.P. F.R.S.

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OF AYR.

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L E T T E R,

Et. Et.

26th January, 1801.

MY LORD,

THE subject which your Lordship, and the Board of Agriculture, propose for a Prize Essay, to be produced on the 1st of February, appears more adapted to promote the immediate increase of national subsistence, than any measure yet stated to the public.

The short period, however, which remains, during the present season, for carrying so beneficial a plan into effect, will be apt to prevent the country from deriving the full advantage, on the existing emergency.

The knowledge possessed by your Lordship, and the Board, on this important subject, would render the suggestions of an individual no less unnecessary than presumptuous :

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But, with a truly liberal spirit, you have been pleased to require communication from all description of persons, who have experience of converting Grass Lands into Tillage, without exhausting the Soil, and of returning the same to Grass, in an improved state, or at least without injury.

The rapid advance of the ploughing season, establishes the necessity of commencing operations in all directions, without a moment's delay, if any practical benefit is expected, for the ensuing harvest.

These, and other circumstances, having mited the time allowed for receiving communications, will, no doubt, preclude many intelligent and able agriculturists, residing at a distance, from transmitting their opinions within the allotted period.

Under these impressions, on a subject so very materially affecting the people's welfare, the following hasty sketch of observations is submitted.

In obedience to the printed intimations from your Lordship, and the Board, it appears necessary, in the first place, to specify the characters attached to the leading qualities of land, which you have enumerated.

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First—Under the distributions of Clay in all its distinctions, and Soils, too strong or wet for Turnips.

Second—Loam, fit for Turnips.

Third—Sand, including Warrens and Heaths.

Fourth—Chalk-Lands and Downs.

Fifth—Peat, including Moory, Sedgy, Rough Bottoms, and Fens.

If the object were, to lay before you a scientific and practical discussion of the nature and properties of different soils, with the means of rendering each of them, most fit for the various purposes of vegetation, it would here be indispensable, to enter into a chymical analysis of their component parts. This would lead, to the important and detailed investigation of chymical principles connected with agriculture; the means by which, under Providence, the skill and industry of man is enabled to cultivate, and improve the productions of the earth.

But the present inquiry seems more limited, and much more urgent. On this account, it precludes digression, or elaborate discussion, however interesting. In this view, it is sufficient to specify, that

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clay,

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clay, in the language of a chymist, is very different from clayi in the language of a farmer.

It is well known to your Lordship, and the Board, that clay, or pure argillaceous matter, such as may be obtained from the decomposition of sulphuric acid, formerly called the vitriolic acid, and the earth of alum, seldom can be found in Nature, and can hardly ever be obtained, without recourse to processes of art and science.

But clay, in the usual acceptation of that word, means any soil or earthy substance, in which the argillaceous particles so far preponderate, as to give tenacity to the mass, an aptitude to resist water, and to contract, in what is called by furnace-men, a white heat.

On the former principle, clay is used to moat ponds, canals, and other receptacles of water. On the latter principle, in pure clay, Wedgewood's pyrometers are formed.

Every potter knows, that by pounding, sifting, and levigating any earthy substance, the fine, soft and unctuous argillaceous particles will float in the water, and then

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then the gritty, silicious matter, will fall to the bottom, and may be separated.

In every clay, found on the surface of the earth, there is a large proportion of quartz, and other silicious particles, constituting sand.

These, are frequently blended with metallic substances, either in a comminuted metallic form, or still more frequently, in a mineralized state. Metallic ochres, and oxyds, in solution, often intermingled with the springs, and water currents, overflow these soils, and add other qualities. Various soluble and insoluble salts also mix with the soil, and would require particular and detailed observations.

According to the proportion of these, and other combinations, the clay will be more or less tenacious, more or less pervious to moisture, more or less apt to crack with the summer's heat, and, in an agricultural view, more or less unfavourable to fertility. On the other hand, in proportion as calcareous matter is mingled with clay, or as it has been blended with animal and vegetable substance, in a putrid state, which constitutes manure, the clay will recede from

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from its own character, and become more fertile.

It need hardly be observed, that cold stiff clay, unmeliorated by the atmosphere, or by cultivation and manure ; in short, such clay as is dug from mines, and coal-pits, is at first, almost entirely unfit for any ordinary purpose of vegetation. On this principle, it is obvious that all soils of this description, although perfectly capable of improvement, by a tedious and expensive course of cultivation, are ill adapted for the immediate objects of this Address.

A great deal depends, not only on the quality of the surface, but on its depth, and on that placed below ; in many cases, a few inches of strong soil, originally stiff and barren, has, by the operation of ages, become to a certain degree productive. If this stratum be thin, it is at all events improper to plough farther, than its depth. It is pernicious, to bury the upper soil so improved, and still more so, to turn up a barren unimproved stratum, which would require a century to fertilize. So true is this remark, that in many places, where the upper soil, being shallow, has been levelled

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levelled and ploughed down, and a poor clay or till, turned up, after twenty and thirty years of constant cultivation, still retains the marks of the ridges, where the upper soil had been buried or removed.

Such clays, however, as have for many years been under cultivation ; as have been drained, pulverized, and manured, then cropped and sown with grass-seeds, in a rich productive state, and now covered with pasture, are as fit as any other lands, to be converted into tillage. With skilful management, they will yield luxuriant crops of grain, and after a certain period, may be returned to grass in an improved state.

All lands in which clay predominates, are severely injured by springs, spouts, and surface water. It is therefore material to relieve them from moisture, by ditches, properly conducted ; by water furrows, and if necessary, by regular drains, on the principles of Mr. ELKINGTON, and other approved practitioners of this useful art.

If this be neglected, and the lands overflowed, it renders lime, compost, or manure, almost of no avail, by weakening, decomposing, and carrying off in solution, the

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the particles intended to operate as manure.

It farther renders it extremely difficult to plough in proper season, or with proper effect. It greatly increases uncertainty of sowing in cold or rainy seasons, chills the land, and in many cases, occasions a lateness and diminution of crop, amounting to a greater loss in one year, than would pay the whole expence of the operation.

The Author of these remarks, has a large field, of very rich, deep, clay land, flat, and subject to be overflowed. For many years it had produced great crops of oats and beans, but the drains and ditches being neglected, and the land unskilfully ploughed, the crops were always late, and frequently damaged, by the rains, before they could be taken off the grounds. The tenant objected to these defects. The proprietor took it into his own management. The drains and ditches were cleaned and deepened; a skilful ploughman was employed to form the ridges, twelve feet wide, and less flat than formerly. Water-furrows were so constructed, as to carry off the water to the drains; after this, it was cropped, and sown
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with grass-seeds. It has since been lett to the same tenant who possessed it before. The crops are not only excellent, but are as safely harvested, as any other, on strong land, in the neighbourhood.

In such soils, paring and burning would of course prove highly injurious, by destroying the animal and vegetable substances which may have cost the labour of ages, to collect. Wet lands, of this description, are frequently overgrown with rushes. In this case, draining, or carrying off the water, is indispensable; but even then, paring and burning appear improper. It is still more objectionable, under the pressure of the present moment, because the most eligible mode of sowing land, after paring and burning, is with rape seed. This will feed sheep, but affords no aliment for the human species.

After rich and improved clay-lands have lain a number of years in grass, the most productive method, of bringing them under tillage is, to lay 400 Winchester bushels of slacked lime per acre, on the sward; to plough them with a moderately deep furrow, from four to six inches, according

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ording to the nature of the soil, taking care to shoulder up the furrows against each other, and above all, to clear the water-furrows, and to lay the lands dry.

In order to lay the furrow neatly up, it is necessary, that the flake be at least one-third wider than its depth. If it were only as broad as deep, it would form exactly a square, and the furrow turned over, would just fill up the space left by the preceding flake.

If lime be very high priced, and the lands in very good condition, they may be ploughed and sown, without that expence. It is established by experience, in all parts of these kingdoms, that oats are the most productive grain, which can be sowed upon a ley furrow. In the northern part of the Island, it is usual in many places, to have ten and twelve Winchester quarters of oats, from what is called, the ley crop. It is also remarked, that the quality of oats from ley, is superior, and the grain heavier, than in any subsequent tillage of the same land, in a similar season.

Every farmer knows, that clay-lands, well drained, and in good condition, produce
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oats of excellent quality, frequently exceeding 40lb. weight per bushel. The straw, however, is seldom so luxuriant, as on soils of a more light, and loamy nature.

In some places, it is the practice among bad farmers, to sow wheat on land ploughed from ley. Occasionally, considerable crops, such as five and six quarters per a. r., have been produced, in this mode. It appears, however, extremely difficult, if not impracticable, to raise wheat under such circumstances, free from weeds. It will therefore remain for the wisdom of your Lordship, and the Board, to determine, whether, under the urgent demand for wheat, during the present distress, it may be proper to recommend this deviation from approved practice.

In the county of Galloway, it is not unusual, on first breaking up grass-lands, to sow big or barley: considerable crops of good, clean grain are thus procured. But as the soil of that county is not clay, this remark does not apply to the present question.

Presuming, that the established practice, sanctioned by experience, is that which in
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general, will be recommended, oats may be considered as the staple grain for sowing grass-lands, at first breaking up.

With respect to the second crop, it is admitted that clay-lands in general are too strong and wet for turnips, unless farmers would take the trouble to gather them in dry weather, and to stack, or cover them, as they do potatoes.

This seems by no means impracticable, as there are several large towns, in which the families, at the beginning of winter, lay in a stock of turnips, carrots, and other roots, sufficient for their consumption, during the season.

Supposing the first crop after grass to be oats, and that turnips are improper for the second, it is repugnant to every good principle of farming, on clay-land, to take a second crop, of the same grain.

On such soils, the most eligible second crop appears to be beans, cabbages, and potatoes. On lands congenial to beans, whether drilled or broad-cast, they are beneficial to the succeeding crop. In their own nature, they are extremely valuable, not only in ordinary times, as food for
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horses, but in these days of scarcity, affording one of the most nourishing articles of food for men. They are used in Berwickshire in meal or flour, and baked into unfermented bread: but they are much more palatable, when boiled in large quantities with broth. In this form, they constitute a principal article of food, in the Carse of Gowrie, Stirling, and Falkirk. In these places, six and eight quarters of beans per acre, are no unusual crop.

With respect to cabbages, on rich and well pulverized clay-land, it is by no means uncommon to raise a crop worth 30l. or 40l. per acre, by sowing the intervals with drilled beans. As for potatoes, they are still more valuable. When good, they almost ensure a luxuriant succeeding crop of wheat. As wetness is peculiarly unfavourable to them, every farmer will of course take care to make his land as dry as possible, before they are planted.

It is customary, in some parts of Ireland, to break up rich grass-lands with potatoes, planting them on rows of manure, and frequently adhering to the barbarous mode of
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lazy beds, alledging that it renders them dry, and better tasted.

But every intelligent person, will of course adhere to the practice of pulverizing and cleaning the land, then drilling them on manure, or under manure, in rows, at such distances as will admit of a single-horse plough destroying the weeds, and gathering up the earth between the rows, three times at least. With such management, four, five, and six hundred bushels per acre, is no unusual crop.

Whether the second crop be beans, cabbages, or potatoes, the succeeding crop at all events, ought to be, no other than wheat.

It may with confidence be asserted, that in such clay soil as has been specified, and after such crops as have already been described, the following crop of wheat, besides the advantage of avoiding the expence and loss of unproductive fallows, will average a larger produce, than any general mode of management, practised in these kingdoms.

Under the distress, and pressure of the present moment, however, an obvious objection occurs to the exclusive adop-

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adoption of the mode here recommended. A large additional supply of wheat is wanted, and by this course alone, could not be obtained, in less than three years.

At any rate, the time is past for increasing the supply of wheat, without importation, during the present year, except by sowing spring wheat.

It will then remain for your Lordship and the Board, to urge the farmers in the different counties, to break up as much as possible of their rich pasture lands, to sow part of them with oats, part of them with spring wheat, and to plant as much as possible of them in the Irish manner, with potatoes on the sward; unless, in particular cases, where the land could be prepared in time, by ploughing, or by the spade.

In all cases, where potatoes are planted, it is desirable to set them on manure, at the rate of twenty tons per acre: when it is difficult to be procured, much less must suffice, and on very rich lands, in different parts of Ireland, large crops of potatoes have been raised, when planted on the sward, with little or no manure at all.— But these exceptions cannot constitute a general

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general rule, and would not be mentioned here, unless from the urgent demand for food of every kind, and by every practicable mode.

If potatoes are planted in the first instance, on breaking up, then the succeeding crop should be wheat.

After the wheat, whether it be the second or the third crop from pasture, it remains for the farmer to determine, either to continue his land under a regular course of tillage, with a diversified rotation and succession of crops, or to return the land to pasture. If the former be in contemplation, then it remains for the farmer to adjust such a rotation of crops, as the most approved system of husbandry may recommend, and as may best suit the circumstances of the soil and climate, and the demand in the adjoining markets.

In the other view, however, more immediately considered in the present question, the object is to return the land to grass, in an improved state.

In order to effect this purpose, the best crop is barley. This, requires the land to be ploughed four times after the wheat stubble.

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Then, to receive twenty tons of compost, or manure, and to be ploughed and sowed in April or May. Along with the barley, should be sown 12 or 14lb. weight of red clover-seed, 4lb. of white clover-seed, as much yellow clover-seed, and two or three bushels of ray-grass seeds, or sweepings of hay-lofts. In the neighbourhood of London, it is customary, to sow nothing but red clover-seed; to mow the same twice, and then, to break up the land for wheat. This is an excellent course, where the object is, to continue a regular and successional crop: but in the instance now under discussion, with a view of returning the land to grass, it will be found much more profitable, to sow white and yellow clover, ray-grass and hay-loft seeds, along with the red clover.

The ray-grass adds greatly to the weight of the hay crop, insomuch, that three or four tons of hay are, not unusually, mowed off lands treated in the manner here described.

In the neighbourhood of London, this practice is not approved. At the same time, there is some difficulty of selling clo-

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ver hay in London, as the demand for it is limited to the brewers.

In the North, however, ray-grass hay is in great estimation, and would be still more so, if it were not for the weed, called goose-grass, intermingled with it, and which the seedsmen are seldom at much pains to separate.

In England, race-horses and hunters are neither fed on clover nor on ray-grass; but on meadow-hay. In Scotland, ray-grass hay is invariably preferred.

If the price of hay continues high, and the state of the farmers' stock and crop admits of it, he may mow the grass, after barley, two years successively; but it exhausts the land, and therefore every intelligent farmer will wish to content himself with one crop of hay. After this, the land will be returned to pasture, in a better state than when broken up. In many cases, old pastures are so injured by ant-hills, mole-hills, and fog, that a course of ploughing, such as has been described, improves the subsequent pasture 20 or 30 shillings per acre.

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In some cases, it may not be advisable to sow down the land with barley, but in preference, with wheat or oats.

If the crop is luxuriant, the grass-seeds will be greatly injured. On this sort of land, it would be highly improper to suffer cattle to be pastured, because, in wet weather, the clay would be injured with the cattle's feet—water would remain in the footsteps, the plants be destroyed or chilled, and the sward in no condition to resist the pressure.

As to the question between landlord and tenant, whether the grass-seeds should be furnished at the expence of the landlord or of the tenant, it ought to be regulated exactly according to the fact, who is to have the hay crop, and the subsequent pasture. If the farmer is to rent the land, returned to grass for a specified term of years, then he ought of course to pay for the seeds, and to be bound by covenant, to sow the quantities already specified along with the last crop of grain. If, on the other hand, the landlord means, that the tenant should possess the land no longer than the separation of the last crop of grain, then he ought to stipu-

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late for permission to sow the specified quantity of grass-seed, and that the tenant shall not allow any animal to pasture on the sown grass. The tenant should farther come under obligation, to consume the fodder on the ground, and to leave all the manure, receiving payment by the determination of men mutually chosen.

If it should be the intention of the landowner, only to continue the land in tillage three years, and then to return his fields to grass, he may break up with beans, taking wheat for the second crop, and sowing grass-seeds with oats or barley, as the third crop. Or, he may break up, in the more regular mode, with oats, taking beans as the second, and wheat or barley, as the third crop.

In either case, it will add greatly to the value of the produce, if the land has been limed upon the sward, previously to breaking up; at all events, twenty tons of manure per acre, should be ploughed into the field, preparatory to the last crop.

Where sea-weed can be obtained, it will be found, that fifty tons of the wet weed, ploughed immediately into the land, previ-

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ous to the wheat or barley crop, will be equivalent to half that weight of compost or manure. It does not, however, continue so long operative in the land. It is apt to give a bad taste to potatoes and greens, and to injure turnips, unless when ploughed in many months before the turnips are sown.

The mode of using sea-weed, already stated, has long been practised in the neighbourhood of Dunbar, where land within the reach of sea-weed is lett for 3l. per acre, while similar land, not having that benefit, yields an inferior rent.

In many places on the coast, the farmers are accustomed to gather the sea-weed in heaps; then it rots, and is spread upon the land. But in this state, it is greatly injured by the winter's rains, and seldom continues its operation, above two years.

The last question proposed by your Lordship and the Board, as connected with the breaking up of clay-land, concerns the principle, on which an increase of rent ought to be estimated, when permission may be given to break up old pasture, now under lease.

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In the counties of Leicester, Chester, Yorkshire, and various other districts of England, where stock, dairies, and occasional crops of meadow hay, are the principal objects, many intelligent land-holders would consider almost any rent that could be offered, as inadequate compensation for suffering their old, and valuable pastures, lett at 2l. or 3l. per acre, to be ploughed.

In many places, where the lands have been laid to grass in an impoverished state, or where they have been cut and poached by winter feeding, or injured by ants, moles, and fog, the same objections prevail.

Even in counties where the lands are ploughed, as long as they will pay for seed and labour, and then, are suffered to remain for pasture, without ever being sown with grass-seeds at all, still it is by many considered as a ruinous expedient, to plough them up. In all such instances, the *pretium affectionis*, and local opinions, will attach such a value to the continuing of the land in grass, as will require more than ordinary temptation, to submit them to the plough.

In the present period, however, such temptation can very amply be afforded; not
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on public principles only, but for the amelioration of the land, affording no less emolument to the owner, than to the tenant.

To prove this, it may be sufficient to quote the history of a county, where operations similar to those already described, actually prevail. Half a century ago, the county in question, suffered under poverty and want. Lands were lett, from five to ten shillings per acre; the fields were unproductive; the cattle starving, and the farmers were in a state of wretchedness: large quantities of grain were wanted for the annual supply.

On the contrary, in the present period, the fields are rich and productive; lett for 30, 40, and 50 shillings per acre; the farmers opulent, and large supplies of corn furnished to their less cultivated, adjoining districts.

The course by which this extraordinary change has been effected, consists in cultivating the arable farms on the principles already described. Two-thirds of the strong lands, or three-fourths of the lighter lands, are in pasture, and only one-third, or one-fourth,

fourth, under tillage; the land is sown with grass-seeds, along with the last crop, one crop of hay is taken the succeeding year, and during the five following years, pasture.

After remaining in grass during six years, the third or fourth of the farm, according to the covenants, is ploughed and sown with oats; second year, oats or beans, and part potatoes; third year, barley and grass-seeds.—So peculiarly adapted is this mode of cultivation, to the exigency of the present period, that in the year 1798, the price of oats was 16s. per Winchester quarter, and oatmeal 1s. per peck, weighing 8lb. 10 ounces.

At these just and reasonable prices, the Writer asserts, from practical and personal knowledge of the fact, that the farmers were so prosperous, that they were eagerly offering more than double rents, for lands lett for 25s. per acre. Many proprietors, that year, having farms out of lease, which had been sown down in good condition, and pastured six years, declined letting them for long leases, but advertised the letting of them for three years

years ploughing, reserving liberty to sow grass-seeds with the last crop.

Such was the competition in different places, that great farmers, little farmers, ordinary labourers, and cottagers, were anxious to obtain the preference, paying, on an average, from six to nine pounds per acre, annually, for three years ploughing.

Other proprietors chose rather to plough the lands at their own expence, and to sell the standing crop by auction. The crops of oats, and other grain so sold, frequently averaged from 9l. to 12l. per acre.

This mode of operation afforded great relief. During the high prices of the year 1799, many labourers and cottagers, thus supplied their families at moderate rates, while others, of similar condition, were starved, or ruined, by the current prices.

In any county, where this mode of treating grass-lands has not been practised, if a land-owner wishes to turn to the best advantage, land in his own possession, he should lett, by auction, the ploughing of the land for three years, in the manner already specified, obliging those who engage for

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that period, to consume the fodder on the ground, and to leave the manure.

In cases, where tenants are bound not to plough their pasture lands, the best mode of adjusting the additional rent, to be paid by the tenant for the privilege of ploughing, will be by the decision of men mutually chosen, estimating the rent of the land in grass. Comparing with this pasture rent, that, which will be obtained annually, for the course of ploughing recommended. Deducting from thence the manure, grass-seeds, and other expences, requisite to return the land to grass, in an improved condition, and dividing the extra rent, between the landlord and tenant, as may be appraised. If any difficulty should occur between the appraisers, in ascertaining the proportion of extra rent, that ought to be paid by the tenant, perhaps recourse might be had to the principle established in old times, respecting the steel-bow tenants, and half labour, or what used to be paid in France by, the metayers.

LOAM.—With respect to the second distribution of soil, including loam in all its distinc-

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distinctions, fit for turnips. Loam is understood to consist of clay and sand, mixed with vegetable or animal matter, with or without calcareous earth. The loam is strong or light, rich or poor, according as clay, sand, or putrid and calcareous substances predominate.

Under this head, may be described the rich swamps and savannahs of America, the plains of Lombardy, and the Netherlands, the deep flats of Tanjore, the Delta, flooded by the Nile, and many other tracts, including the most fertile spots upon the globe.

In these kingdoms, the rich meadows, along the Trent, the Tees, and other streams, have been formed by the sediment, or deposit, of alluvious earth, in many places extending to a great depth. In a peculiar manner, the lands near Limerick, are so deep and rich, that the farmers often throw their manure into the Shannon.

The fertility of those favoured spots, is proportioned to the quantity of putrid or calcareous matter they contain, to the depth of the mould, and to the quantity of the under-strata.

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Deep clay loams, such as the Carse of Gowrie, Stirling, and Falkirk, are too strong for turnips; but in general, loamy soil, upon a dry bottom, and not subject to be flooded, is among the most productive in nature.

In this class may be included, the site of ancient villages, and gardens, as well as the crofts, or infield land, which, in ancient times, received the manure, and chief culture of the whole farm. This practice has long ceased to be customary in England, but has prevailed in Scotland, within the memory of many persons now alive.

If loam be too strong, an admixture of sand, if too light, an addition of clay and compost, are the most appropriate manures; taking care to preserve a regular rotation and intervention of green crops. When soil of this description is deep, it may be ploughed, or trenched, for many years, under successive crops of grain.

Whoever has the good fortune to possess these fertile loams, may, with little trouble or expence, render them productive to the proprietor and to the public. From their extreme fertility, the corn, during the first
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and second crop, is apt to lodge, and then, in wet seasons, may be severely damaged.

Where the soil is deep, there can be little reason to abstain from continued crops of grain, without adhering to the regular intervention of green crops. For, if the soil upon the surface should at any time be exhausted, a remedy is at hand, by ploughing or trenching a few inches lower.

The mode of treating loamy soils, the succession of crops, and ^{never} ~~manure~~, of returning them to grass, depends on their approaching to the stiff, tenacious character of the clay, upon the one hand, or of sandy soils upon the other. These, form the third class, including heaths and warrens, as well as rich sands.

SAND.—The technical description of sand, is a substance formed of quartz, or other pulverized, silicious matter. Pure sand, when levigated, yields no mud, but falls to the bottom, leaving the water untinged. In this state, it is used in sand glasses, and

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is apt to blow with the wind, yielding little nourishment to vegetables, except to bent, sea holly, and some other appropriate productions, of little use in agriculture.

Sands of this description, are not only barren in themselves, but dangerous to the more fertile fields in their vicinity, from their aptitude to blow with every storm. When bents, or any other covering, can be got upon them, it would be an act of insanity to break them up.

In proportion as sand recedes from its own specific character, in proportion as it is mixed with loam, earth, moss, sea-shells, calcareous matter, clay, or any vegetable and animal substance, it becomes less unfit, for the purpose of vegetation.

If clay, or rich earth, can be procured in the neighbourhood, it may be a profitable operation, to adopt the Norfolk practice, and cover the sand with 3 or 400 cart loads of earth, or clay, per acre. In some instances, it has been found that lime, by adding to the tenacity of this land, has been advantageously employed. Still, however, without a long course of claying and improvement, little benefit can be expected, and much
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detriment may arise from breaking up any light, sandy heaths, or warrens.

Besides, light lands of this sort, are much more productive in maintaining rabbits, especially at present, when rabbit skins sell, like all other articles, for a price unknown in former times, amounting last year to 13s. per dozen for the skins.

In large tracts of warren, richer spots and bottoms frequently intervene. These should be carefully inclosed with stone fences, or turf mounds, and sown with rye, clover, potatoes, kail, cabbages, and carrots, which thrive on such soil, and are no less profitable in feeding rabbits, than in maintaining sheep, and other stock.

In support of this opinion, the following fact is stated.

The Writer of this Address, many years ago, broke up above 200 acres of light, sandy warren, covered partly with grass, and partly with short heath, ling, and furze. With a view of covering it with clay, he bored in various places, but found no stratum of that sort.

The inequalities were then levelled, the ground ploughed, and sown with oats in
March.

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March. The low, and moist places, yielded four or five quarters per acre, but on the dry parts, the crop was hardly worth reaping. Sweepings of ditches, sea-weed, and other manure, were collected. Five or six acres planted with potatoes, the crop not 200 bushels per acre. Above 50 acres were sown with turnips, in June, many parts extremely good; on the dry places very bad; sheep were hurdled on them. Next year, great part was sown down with barley and grass-seeds. The barley was of so little value, that it did not average two quarters per acre; the grass-seeds never were fit to cut as a crop of hay. These lands have ever since been used as a rabbit warren, worth above 15s. per acre, in that state, and raising occasional crops of turnips, carrots, and kail, in proper places, to feed the stock of rabbits, when the pasture fails.

Rich sands, however, such as many parts of Suffolk, and other districts, are to be considered on a very different footing. When long rested, and clothed with verdure, they will yield, on first breaking up, very valuable crops. At the same time, the treatment of such soils is extremely difficult and delicate;

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cate; insomuch, that the person who has the honour of addressing your Lordship, begs leave to state the following fact:

He had a field of rich, but light sandy, ground; it consisted of 60 acres, lett 30 years ago for 30s. per acre, within reach of sea-weed. Under the former management, the custom was, after pasturing six years, to break it up for oats; second crop, oats; third crop, spread 40 or 50 single horse-cart loads of sea-weed per acre, sow barley and grass-seeds, cut one crop of hay, and pasture five years. Under this management, as there was abundance of manure always at hand, it was not thought improper, to sell off the standing crops by auction. The first crop of oats used frequently to average, in moist seasons, from 6l. to 9l. per acre; the second crop of oats, and the barley crop, seldom averaged so much; the standing hay crop used to average from 3l. to 5l. per acre. A very dry year, however, always rendered the produce, both of corn and hay, much less considerable.

Allured by the advantages of sea-weed and situation, this field, having remained in

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grass

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grass for six years, was put under a regular course and rotation of crops, breaking up with oats, then turnips, rye, potatoes, wheat, barley, clover, oats, and so forth, during eight or ten years.

The crops, at first breaking up, were good, but afterwards ceased to be productive, notwithstanding unexceptionable ploughing, and approved rotation. Of late years, the former system of ploughing three years, and resting six in grass, has been resumed. The land now yields better crops of hay, and better pasture, than ever were known on it before.

If farmers and proprietors resolve to break up very light sandy grounds, to meet the pressure of the present moment, it is presumed they will find it, in no instance, eligible to take any other crop of oats, except the ley crop. Wheat, with manure and compost, will answer for the second crop; and, as on such soils there is little hazard of the corn lodging, and destroying the grass-seeds, they may be sown with wheat, and the land, after two years, returned to grass. But, if once such lands are
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broken up, there is a great temptation to continue them under a prolonged and skilful course of cultivation.

After oats, every species of green crop familiar to this island, will be found to succeed in dry rich sands, although not with the same luxuriance as on loams, already noticed. When the lands are not light, but forming a tenacious furrow, like loam, or mould, a rotation of crops may be continued with advantage, for ever.

On breaking up land from grass, the Writer of this Address has been accustomed, first, to take a crop of oats; next, drilled potatoes; then to take a crop of wheat: after this, he has found great profit and convenience from sowing, in October or November, rye and tares, or rye alone, or tares alone. In May, they afford substantial green food for all sorts of stock, and, in the neighbourhood of large towns, sell from 6l. to 8l. per acre, to supply cow-feeders, and stable-keepers.

About the end of June, the stems of the rye become hard, and unfit for green feeding. If any part remains unconsumed, it must be allowed to ripen, as a crop of rye.

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But it is much more profitable, and improving to the land, to cut the whole green crop, then immediately to plough, and sow drilled turnips: thus two green crops are obtained in one year.

In the neighbourhood of London, there is a great partiality among the farmers and ploughmen, in favour of broad-cast turnips, not only to gratify their indolence, but under the pretence, that the turnips in drills, are too large for market gardeners. The fact, however, is, that this practice leaves the land dirty, and unimproved; whereas, a crop of drilled turnips, puts the land in complete condition for barley, to be followed by a crop of clover, and grass-seeds.

It will be found, too, that selling turnips to market gardeners, is seldom in any respect, so profitable as feeding cattle and sheep upon the farm; by which all the manure is preserved, to enrich the land, and to increase the future produce.

When the land is dry, and sheltered, it is an excellent practice, to pull every alternate turnip, and feed cattle under sheds, hurdling sheep upon the remainder. When-
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ever any part of the remaining turnips are injured by the sheep, and not consumed, they should be drawn, and given to the cattle. Thus, every turnip is turned to good account, and none of that shameful waste appears, which too generally disgraces the turnip farmers all over the island, leaving great part of them spoiled, and rotten in the land. In many places, they are drawn, and cattle are fed with them in grass fields, where the manure, dried by the winds, or drenched by the rains, neither fermented, nor mixed with compost, is almost entirely lost.

Even the manure obtained from the cattle in the stables, cow-houses, and straw-yards, is frequently exposed to floods of rain, with all the juices diluted, and carried off. This is no less extravagant, than to throw gold into the sea, and can easily be prevented, by preserving the manure free from rain, covering it with layers of rich earth, and securing the moisture in pits, for the purpose of irrigating meadows and hay-fields*.

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* The best mode is, to cover the bottom of straw-yards with layers of peat, to absorb the fluid parts of the manure.

Peat

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It is to be observed, that Scotch kail, and carrots, thrive surprizingly on all descriptions of dry, deep, and light lands.

On a farm of light sandy ground, belonging to the Author of this Address, the tenant for twenty years, has seldom had less than an acre of Scotch kail drilled and planted in summer. During the whole period, the crop has never failed, while grain and turnips have frequently been injured by drought, and other causes. The kail is of excellent service, in feeding cattle through the winter, and in preparing the land for a succeeding crop of spring corn.

As for carrots, when successful, they are more beneficial than any other crop, potatoes hardly excepted. Not only cattle, but horses and swine, which dislike turnips, prefer carrots to any other food. In-somuch, that horses frequently eat them, rather than oats, put in the same manger. The land requires to be well pulverized and

Peat and alkaline salts form a soluble compound, equal in quality, to its own weight, of the best manure from stable-yards or cow-houses. On the other hand, the best stable manure, when too long kept, loses its fertilizing power, and in time, may be reduced to the state of a perfect peat.

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manured; the carrot-seed to be sowed in drills in April, kept clear from weeds by the hoe, or by the plough, and the carrots to be lifted in the end of autumn, stowed in a dry place, and washed in a trough, without farther trouble, than throwing them before the stock who are to feed upon them. Like turnips, however, they are more precarious, and liable to a greater variety of accidents, than potatoes or kail.

The Writer of this Address, seldom sows fewer of them than three or four acres, which give great richness, and a fine colour, to milk during winter, and keep the cows, horses, pigs, and young stock, in high condition. On the other hand, kail, and turnips, give a bad taste to milk, and cannot be applied to the feeding of horses at all.

CHALK-LAND, and DOWNS.—The next distribution of soil, includes chalk-lands, and downs. It is proved by Dr. BLACK, and other philosophical experimenters, that chalk, and lime, are only different modifications of the same calcareous earth,

earth, receding, in different degrees, from the caustic state of quick-lime. According to Dr. BLACK, the caustic quality of lime is occasioned by the expulsion, of what he calls fixed air. Limestone, in its mild or natural state, and still more, in the state of chalk, as found in the earth, has ceased to be caustic, and has been rendered mild by oxygenation, or the absorption of vital air.

Considering chalk in this view, downs, or other lands in which chalk predominates, will be strong, or light, according to the proportions of clay or sand, inherent in their composition. If moss, loam, or animal and vegetable substances, are mingled with them, they will be proportionally fertile, on the principles already explained. Without any of these, however, the admixture of the chalk, or mild calcareous matter alone, affords, in such soils, the means of fertility. In many parts of Ireland, whole tracts of country are mingled in their soil, with what is called limestone gravel; and other tracts of dry and fertile earth, is placed by nature on strata of limestone. These, are usually of a superior fertility; they are not, however, considered as downs; yet, if chalk-land, and downs,

downs, are considered as connected, we must, of course, include calcareous matter in the description of their component parts.

Lime, in its mild, or uncaustic state, is not, in general, esteemed an active stimulus of vegetation; insomuch, that limestone, and chalk, are usually burned before they are spread upon the land, taking care not to apply them, when the ground is wet, or during a rainy season.

On the other hand, limestone gravel, which consists of earth, mixed by nature with calcareous matter in a mild state, is frequently used in Ireland, as a powerful fertilizer. Sea-shells, mixed with sand, and what is called shell-marl, are constantly used in Galloway, wherever they can be procured. In that county, and in other places, they are invariably preferred, both for effect and duration. These facts, corroborate the opinion of many respectable agriculturists, who recommend the application of pounded, and unburned lime, especially in countries where fuel is expensive.

Notwithstanding these observations, it is undoubtedly true, that chalk-lands and downs, as existing in many parts of England,

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land, are generally bare, and comparatively unproductive.

It is presumed that this arises, either from the slight operation of chalk, in its mild and uncaustic state, or from the small quantity of it contained in those soils, or else from the deficiency of mineral, and vegetable acids, necessary to call forth the fertility of the soil, by acting on the calcareous matter.

It is generally observed, that lime, laid on any dry spot, in the midst of bare downs, and barren heaths, invariably occasions shamrock, or white clover, to be produced, although never seen on the place before. Yet these chalk lands and downs are seldom covered with luxuriant pasture; they afford excellent sheep-walks, are less subject than other lands, to couch-grass, ronces, darnel, crowfoot, and various other weeds, which infest loams, and light, rich soils. Unless in very bleak and exposed situations, there seems to be nothing in their composition, to render them unfit for producing luxuriant crops.

It is presumed, that the defect of mould, or mixtures of manure, and vegetable earth, is a principal cause, of their ordinary sterility.

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The advantage of the Wiltshire method, of hurdling sheep on such lands, proves, that manure, when it can be obtained, and properly applied, ensures abundant produce.

On the coast of Galloway, there are large tracts of land of this description, by no means strong, nor yet extremely light, on a warm dry bottom.* Thirty years ago, such lands used to lett for a few shillings per acre: by the use of marl, sea-shells, and other manure, they are now, in many places, worth 30 or 40 shillings per acre: they yield early crops, and grain of good quality, although not so heavy, as those on stronger lands. One circumstance appears remarkable, when ploughed, and sowed the first time, from long rested ley, they bear excellent crops of clean barley; although in many other places, where weeds, and annuals prevail, such an attempt would only expose the farmer to ridicule.

It has often been remarked, that sainfoin thrives better on such lands, than on any other. In the same manner lucerne, even when sown broadcast, continues in force

* Not chalk-lands, but downs.

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many years, in such parts of the Netherlands, as are not subject to couch-grass, and other weeds; while in England, it is constantly destroyed by weeds, unless drilled and regularly cleaned.

If this deduction be well founded, the proper application of chalk-lands and downs, during the present emergency, will naturally occur. Although not of a sandy nature, yet being generally dry, however bleak, they are applicable to the purposes of raising green crops, with intermediate crops of grain.

PEAT, MOORS, and FENS.—The last kind of soil, specified by your Lordship and the Board, includes peat, moory, sedgy, rough bottoms, and fens.

Although the origin and formation of peat, in many places called moss, is one of the most curious investigations in natural history, yet any elaborate observations on it, would be inapplicable to the present purpose. At the same time, in order to prevent mistakes, respecting the subject under discussion, it is necessary to describe
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and ascertain its leading, or distinctive qualities.

It is admitted, on all hands, that peat is chiefly formed from vegetable substances, particularly from decayed wood, and the rank plants, produced in swamps and forests. Many facts concur, to prove that the stagnation of water, by the casual decay and fall of trees, and other circumstances, damming up water-courses, materially contribute to the formation of peat-moss, or bog. These, are not only found in bottoms, where the stagnation of water, and consequent reduction of decayed wood and vegetables, into the state of peat, appears more likely to occur; but they are very frequently situated, on the flat summits, and declivities of hills. They are of various qualities and colour, according to the original substances which constitute their component parts; including different kinds of decayed wood and vegetables, and the particular earth, with which they were blended. To all these are added, the various kinds of salts, and decomposed minerals, mixed with the earth, or held in solution by the water, which cooperated in the formation of the peat or moss.

Peat

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Peat is also found in numerous gradations, from the state of decayed wood, heath, and other vegetables, imperfectly reduced, and still retaining part of the original form, and character, to the most complete decomposition, exemplified in the black and red peat earth, usually cut and dried for fuel, in many parts of Ireland and Scotland.

It appears necessary, my Lord, to be minute in this description, in order to shew the great varieties likely to occur in the quality of peat, and other soils, of similar formation. These qualities, in a chymical sense, as applicable to promote the purposes of vegetation and improvement, by acting as a manure for other soils, depend entirely on the state and combination, of their component parts.

With a view, however, to the improvement of peat-bogs, mosses, moors, and fens, the mode of operation, and probability of success, depend on many other considerations.

A peat-bog, or moss, in a warm sheltered bottom, will be much more likely to repay the expences of improvement, than a peat exactly of the same quality, situated on a bleak mountain.

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In the same manner, a bog or fen, where main or leading drains can be conveniently constructed, with sufficient declivity to carry off superfluous moisture, may be advantageously improved, at least, so far as draining is concerned. If lime, sea-shells, or shell-marl, can be procured on reasonable terms, the success will hardly appear doubtful. But the case will be materially altered, if these desiderata are distant, and expensive, or if any obstacles impede the perfect command of the water, and manure.

It is taken for granted, that your Lordship does not include, under this distribution, all the fens of Ely, Lincoln, Cambridgeshire, and others of that nature, because, in many of these places, the soil is rich, deep earth, mould, or sand, dry in its own nature, without any peat in its composition, and only considered as fen, from the surface water with which it is overflowed.

Your Lordship and the Board will, it is presumed, direct the public attention to the important object of draining, and permanently securing, these large and valuable tracts of land for cultivation. But, accord-

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ing to the terms of your Advertisement, it would appear a deviation, to dilate on that subject in this Address; more especially, as it would resolve immediately into a question of draining, under the surveys, estimates, and direction, of civil engineers. For, if these fens were perfectly drained, their proper management in the way of cultivation, would depend on their belonging to one or other of the leading qualities of soil, stated in the Advertisement from your Lordship and the Board, and already discussed in this Paper.

Adhering, therefore, to the question of peat-bogs, or moors, the Writer of this Address can state, from personal knowledge, that there are many of them, in different parts of England, Scotland, and Ireland, capable of being rendered immediately productive, during the present emergency.

It is well known to your Lordship and the Board, that many bogs, though reduced to the perfect state of peat, are not covered with heath or moss plants, at all; but with rank grass, yielding large quantities of coarse hay.

In Berkshire, peat of this description is
burned,

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burned, and the ashes sold, as a very valuable manure. In the county of Armagh, almost every bottom has a bog of this description, the turf or peat is dug in one part of it, the remainder is covered with coarse grass, and worked for hay.

Such soils are very frequent, and very valuable, in many counties of the united kingdoms; when mixed with lime, they afford the means of improving all the poorer lands within their reach. In their own nature, whenever they can be drained and limed, and skilfully managed, they yield the largest crops of any soils. In support of this assertion, the Writer begs leave to detail the following fact.

Many years ago, he drained and improved a peat-bog, containing near 50 acres: the peat was of a rich, black nature, about six feet deep, resting on an understratum of sand; the sward was coarse grass, intermingled with rushes, usually cut for hay, of a very inferior quality. In many parts, the bog was so soft, that it could not have been ploughed, in that state, without great danger of straining the horses. It was flat, and in a sheltered situation. A large
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drain, nine feet wide, and six feet deep, was cleared out, running through the centre of the bog, and extending near a mile in length, to ensure a sufficient current for the water. At the distance of 200 or 300 yards from each other, open cross drains, five or six feet wide, and three or four feet deep, were cut, in directions across the bog, and communicated with the main drains; the intermediate space was intersected by many small drains, very close to each other, in the wet places. These small drains, terminated either in the main drain, or in the large open, cross drains. They were formed about six inches wide at top, and eighteen inches deep, very narrow at the bottom; they were filled with brush-wood, and the stiff top sward, or turf, inverted over the brush-wood, at a depth sufficient to let the plough pass over without injuring it; large pieces of wood were laid in their openings, into the main and cross drains. The whole operation cost, at that period, between 3l. and 4l. per acre, without including the value of the brush-wood.

Along the skirts of the bog, large drains or ditches were formed, to carry off the water from the adjoining sand, which was
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much impregnated with ochre, and other mineral solutions, extremely pernicious to vegetation.

By means of these operations, the water ran from the bog into the large open drains, in numberless streams; the soil soon subsided, and became sufficiently condensed, to admit of being ploughed.

The first year, it was sown with oats, and yielded a crop so luxuriant, that if the season had been wet, it would have lodged, and spoiled. It produced nine or ten quarters of oats per acre, with superabundance of straw. Next year, part of it was continued in oats: the sward being broken, the ploughing was severe upon the horses. The oats yielded as largely as the preceding year; another part of it was drilled for potatoes, and yielded an abundant crop of good quality; the third year, part of it was cropped with oats and potatoes, one part sown with barley and grass-seeds, and the remainder sown the succeeding year.

During these four years, the produce was greater than from the best land in the neighbourhood.

The chief defect in the management, ap-
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pears to have arisen, from the difficulty, at that time, of procuring lime, in sufficient quantity to form a mould upon the surface of the peat. This would have ensured the destruction of the coarse aquatic grasses, which over-ran the bog before it was drained, and would have occasioned the production of sweet and valuable grasses, along with the sown grass-seeds. Owing to this deficiency, however, the hay was coarse, and the pasture afterwards was full of rushes. In this state it remained for many years, yielding coarse hay, and profitable summer feeding for cattle. Wishing, however, to bring it into perfect verdure, with good pasture grasses, it has been again broken up, cropped with oats, potatoes, and barley, as before. The part of it which has been manured with lime, as long as it is kept thoroughly dry, yields clover, and other grasses, of superior quality. Another portion of it was manured with sea-weed, which answered well, but in no respect equal to the lime.

The remainder of it, after having been four years cropped, and sown down with barley and grass-seeds, had about 100 cart-loads per acre, of sharp sand, mixed with sea-shells,

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shells, spread on it. This very materially improved the verdure, and sweetness of the pasture.

The object of this detail is, to shew that the various bogs, and meadows of this description, throughout Great Britain and Ireland, may be brought into immediate cultivation for corn and potatoes, with much advantage to the proprietors, and to the public.

The same assertion may, with confidence, be applied to all moory, sedgy, rough bottoms, and fens. In these soils, as well as in peat-bog, in different degrees and modifications, a rich earth, formed from the decomposition of decayed wood and vegetables, is predominant.

Notwithstanding that peat owes its origin to decomposition and decay, yet, when formed, its most distinctive quality is antiseptic, insomuch that peat, or moss water, is capable of preserving wood, and animal, or human bodies, from putrefaction, for ages. This has been attributed by many, to the acid of galls, or the tanic principle. On the other hand, the sorrelline acid is stated, by others, as the cause of these qualities. At all events,

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it is obvious, that these and other acids, of the vegetable, or mineral kingdom, predominate in peat, from their powerful action on lime, sea-shells, and other calcareous matter.

It is proved, that the admixture of lime with peat, occasions an immediate fermentation, and terminates in the formation of mould, or rich earth, favourable, in the highest degree, to the growth of corn and grass, when preserved in a state, neither too wet, nor too dry.

On the same principle, depends the value of the substance formed by the fermentation of peat and lime together, producing a compost hardly inferior in quality to the best manure, and far superior, from the quantities in which it can be obtained.

These views are applicable, on a much more extended scale, to the general improvement of the wild moors, heaths, and fens, in every quarter of these kingdoms.

The facts, ascertaining the mode in which such operations have hitherto been most successfully conducted, have been fully verified, by the recent experiments and practice of Mr. SMITH, of Swineridge-Muir, in
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the county of Ayr; Mr. WAKEFIELD, of Lancaster, in the improvement of Troffor moss, near Manchester. Similar operations have confirmed the benefit of that system, under the direction of Sir JOHN MAXWELL, Mr. BOYD ALEXANDER, and Mr. FULTON, in Renfrewshire. In particular, Mr. GOW, employed by Mr. WAKEFIELD, on the part of Mr. NIEL MALCOLM, since the year 1796, has reclaimed many hundred acres of wild peat-bog, or moss, near Crinan, or Druntroon, in Argyleshire. Sir JOHN MACARTNEY, and Mr. ANDERSON, in Ireland, are engaged in extensive operations, all tending to confirm the benefits resulting from such improvements.

The modes in which these, and similar works, have been conducted, are so fully detailed in different communications to your Lordship and the Board, that nothing remains at present, except to recapitulate the results, so far as they are applicable to the object of this Address.

The chief point is, by proper surveys, to ascertain the falls, and levels, so as to conduct the main, and leading drains, through the centre, and round the skirts of the moss,

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to be improved. In the next place, to make those main drains sufficient in width, depth, number, and declivity, to carry off all the superfluous water, and to receive all the intersecting smaller drains, in every direction.

Few peat-bogs, are sufficiently condensed to admit of being ploughed, till after they have been drained, and worked for several years. Mr. SMITH, therefore, commenced all his moss improvements with the spade, forming the ridges 18 or 20 feet wide, trenching 10 or 12 inches deep, and separating each ridge, by a division furrow, about two feet wide, and deep enough, according to the declivity, to carry the water to the main drain.

The ridges should be flat, otherwise the ground will become too dry, like turf for fuel.

As soon as the moss is spaded, top-dress it with 200 or 300 bushels of quick-lime, to be spread during the dry, and early parts of spring, or summer. Sow oats in spring, and cover them, by means of a small bush-harrow, drawn by two men. The crops of oats, frequently exceed 10 and 12 quarters per acre. When the bog is so wet, that men cannot

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cannot stand to dig it, they work on planks, or boards, till the drains operate, and the moisture subsides.

As oats, or other grain, are too luxuriant for the first crop, it is better to plant potatoes. The lazy-bed way is applicable here, as the division furrows carry off the water, and the stuff thrown out from them, covers the potatoes, with mould thrown on them, at three different times, amounting altogether to four or five inches. The potatoes to be planted, in rows, about one foot asunder. In this manner 5 or 600 bushels of potatoes, weighing 54lb. per bushel, is no unusual crop. After this preparation, if the main drains, and division furrows, be preserved in good order, six or eight successive, and luxuriant crops of oats, potatoes, rye, rape-seed, and barley, may be raised, without any additional manure. After this, the surface of the peat is changed into a deep, brown mould, and, by continued crops of grain, unless cleaned by intermediate drilled green crops, the land becomes foul with weeds, and natural grasses, so as to impede the growth of corn.

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After such a course, it should be sown down with barley, and grass-seeds, mowed one, or two years, then pastured, occasionally top-dressed, if necessary, with lime, or sea-shells.

If the sown grass should be destroyed by the natural crop of coarse grass, rushes, and aquatic weeds, the drains must be cleared, and the former course, of potatoes and corn crops, renewed.

Previously to the introduction of this satisfactory system, the immemorial practice was, to burn the peat, and spread the ashes on the surface.

A complete system of improvement, however, could not be effectual, without draining, aided by the operation of lime.

The Writer of this Paper has inspected an expensive undertaking, on a great moss, near Stirling: it was commenced above thirty years ago, and continued by the celebrated Lord KAIMS.

The moss was in many places very deep, and rested on a stratum, of what is called carse-clay, or alluvious earth, of the richest quality.

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This moss, or rather, one in its vicinity, is said to have been originally formed by the stagnation of water, and consequent decay of a great forest, part of which was cut down, and part of it burned, in the time of the Romans; many of the trees, half felled, have been discovered, and some of the hatchets, sticking in the wood.

His Lordship induced many small cottagers, and labourers, to build houses adjoining to the moss; to cut and float off large portions of the peat, and then to cultivate the rich soil beneath.

The process was extremely tedious and expensive, and the produce, even from the rich under stratum, by no means greater, than what the Writer has seen, and has himself obtained, by the draining and management of peat with lime, in the manner already stated.

On this part of the subject, there only remains one observation more, respecting the important and extensive purposes to which peat, combined with lime, may be applied, in the improvement of all the bare and unproductive soils, in the vicinity of peat-mosses, throughout these kingdoms.

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The Earl of DUNDONALD, in his ingenious and valuable Treatise, on the Principles of Chymistry applied to Agriculture, states, that in the county of Lanark alone, there are 40,000 acres of peat-bog, or moss, scattered and interspersed with still larger tracts, of bare clay soil. These tracts are as yet unconscious of improvement, and nearly destitute of animal or vegetable substance, or calcareous matter, to call forth their powers of re-production.

His Lordship suggests, that peat and lime formed into compost, would supply the principle, deficient in these soils.

The proportions recommended, are eight tons of burned and slacked lime, mixed with forty-eight tons of peat.

If lime new burned, and not slacked, were applied to wet peat, so great a heat would be produced, as to reduce the peat to charcoal ; thus dissipating in a state of vapour, all its component parts, except the ashes.

He very justly observes, however, that one or two dressings, with such compost, to the amount of one or two hundred cart loads per acre, or even thrice that quantity, could

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could not be expected to render these barren clays, at once so productive, as old crofts and infield lands, which have been receiving amelioration, by manure and cultivation during centuries. But that a course of such compost, with proper draining of the land, skilful ploughing, and judicious succession of crops, together with shelter by hedges and plantations, would materially improve the soil. At the same time, it would ameliorate the climate, rendered cold and bleak, by the great evaporation from mosses, and undrained land.

On this principle, it is presumed that many hundred thousand acres might be brought into a productive state of cultivation. Thus adding to the national stock, not only many hundred useless wastes and moors, in Ireland and Scotland, but those extensive tracts which separate Yorkshire from Lancashire ; those moors which extend from Whitby towards Scarborough ; great part of the Yorkshire Wolds, and many other parts of England.

It will afford me peculiar satisfaction, if the modes of management specified in this
Address,

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Address, with relation to the leading qualities of land, shall prove useful, by shewing the safe and beneficial practice of breaking up pasture ground, and, after a course of corn, and green crops, returning it to grass, in an improved state.

Every part of the plan recommended, is the result, not only of long and accurate observation, in many parts of the three kingdoms, but of actual operations, with which the Writer is immediately connected, as a proprietor, as a farmer, and as trustee on large estates.

To what amount, these suggestions may be practicably extended, in the immediate breaking up of pasture land, to increase the quantity of corn, is fit matter for the determination of your Lordship and the Board. Any calculation of mine, might prove either imperfect or superfluous; especially, as such ample means of information are in your possession.

Taking, however, the measure of different counties, as lately published by your able and enlightened Secretary, Mr. YOUNG, the two grazing counties of Cheshire and
Leicester,

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Leicester, alone, contain near 1,300,000 acres*.

Supposing one-third, or one-fourth, of those rich, and long-rested pastures, were ploughed this season, it is obvious that the average produce would be more than double, in many cases triple, the produce of ordinary cultivated lands in England.

By introducing, and continuing, such a system of convertible husbandry, much greater quantity of corn, and herbage, may be produced, than by constant tillage or invariable pasturage.

If one million of such acres were ploughed in different parts of these kingdoms, it is hardly fanciful to suppose, that an additional produce, from seven to ten millions of quarters of grain, exclusive of potatoes, would be added to the national supply, in one year.

How many such acres there are in the different counties, and how many tenants and proprietors, willing to call forth those advantages, for their own benefit, and the

* Many old farmers in Leicestershire, recollect when the greatest part of the county, was under regular course of tillage.

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public relief, are questions of primary importance.

Another question, not less material, is, to what extent bounties on produce, would encourage this desirable effect?

Your Lordship knows, that this species of bounty, including that on fish, for home-consumption, is almost the only one, ever recommended by Dr. ADAM SMITH.*

Thus far, these observations have been directed to your Lordship's intimations, respecting grass-lands, of different soil, confining myself to such, as are in good condition for immediate ploughing, and production of grain. Besides these, even bare and ill cultivated lands, if situated in the neighbourhood of peat, and lime, have been considered, in a great measure, as applicable to the same object.

In obedience, however, to the terms of your Advertisement, there is still a harder task imposed—involving the discussion of

* Under the present circumstances of the country, it appears incumbent on the Legislature, to adopt these, and other efficient means, of increasing the quantity, and of decreasing the price, of articles necessary for subsistence and defence. Of course, including bounties on the produce of hemp, and other naval stores.

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means, best adapted, for converting all descriptions of pasture-lands into tillage; and, after a certain period, for returning them to grass, in an improved state. In other words, your Lordship, and the Board, have directly enjoined, an investigation of the measures, by which all the commons, wastes, and uncultivated pasture-lands of Great Britain, and Ireland, may be rendered productive.

There is another great distribution of land, including many hundred thousand acres, of common-field, or mingled property, uninclosed, unimproved, and constantly in tillage, under an unproductive, and barbarous system of mismanagement; but this does not come under the purview of the present inquiry.

The cultivation of the numerous wastes, and commons, is more personally interesting to the great body of the people, than any question which has been agitated since the days of Magna Charta.

If it rested merely on the proper plan for inclosing, draining, ploughing, manuring, and cropping them, little would be wanting, but for your Lordship and the Board, to

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establish, and publicly recommend, an approved system of management, considered as an affair of husbandry, adapted to the different soils and situations. Unfortunately, a multitude of other considerations are involved in this discussion ; in particular, the jumbled and contending interests of many co-proprietors, whose tenures are founded on rights, always counteracting, and frequently contradictory ; the usages of common law, and enactments of statutory regulation, the habits, prejudices, and passions, of many thousand individuals, all having property, and many of them having subsistence at stake.

It would be a deviation, at present, from the purpose of this Essay, to hazard any opinions on the legislative, and extensive arrangements, necessary to remove the obstacles which impede the improvement of undivided wastes and commons.

The immediate object is, to specify a practical and less abusive management, of so much unproductive, and improvable landed property, in these kingdoms. At the same time, to offer any views for the improvement of the lands in question, without allusion to
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the tenures and distributions, under which they are held, and agreeably to which, the divisions of them, when effected, must take place, would be no less nugatory than improper.

Supposing, therefore, my Lord, that every thing were done, that can be accomplished by the wisdom of the Legislature, the question would still recur, in what manner are these millions of waste acres to be reclaimed, for the subsistence of the people ?

In ancient times, this country was overspread with marshes, fens, and forests, insomuch, that one of our Kings, on a forced march, fed his army with venison. This was hardly more barbarous, than the actual state of landed property, with eight or ten millions of waste and uncultivated acres in England alone, and great part of the remainder, very imperfectly improved. Probably, means of subsistence, were not more difficult to be procured in those periods than at present : for it is supposed, in former days, there were not above four millions of people, on the surface, of England and Wales. Now, we learn from Mr. YOUNG, that there are 10 or 12 millions of people to be subsisted.

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It has always been considered as arising from the bad state of ancient agriculture, that famine very frequently recurred. It ought, however, to be recollected, that there were no potatoes, and few garden vegetables, of any kind, to correct or alleviate the want of meat, or grain, in consequence of disease among the cattle, or deficiency of crop.

We are told, that there are now, three millions of people in England, who subsist by labour, connected with husbandry. Of these, some are hired servants, in farm-houses, others are cottagers, having houses, gardens, cows, grass, and potatoe ground; but in general, they receive a specified allowance, out of which they must feed, and clothe themselves. We may farther suppose, that there are probably three millions of poor people in England, for Mr. YOUNG asserts, on the authority of Mr. HOWLETT, that the number of parish-poor relieved, amounts, in many places, to near one-third of the total population, and the poor-rates last year exceed ———*

In London alone, there are 300,000 manufacturers, and several millions more, in

* The amount is left blank.

different

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different quarters of the kingdom, who have no surplus, and who, if they do not work to-day, will have no means of subsistence, without parochial aid, to-morrow.

All these, as well as husbandry-labourers, must purchase their bread and meat, and other necessaries, at the current market rates: they are all at the mercy of fluctuating prices.

In their situation, the rise of meat from 4d. to 8d. per lb. and of bread from 6d. to 1s. per quartern loaf, exactly puts them upon half allowance.

These observations are premised, in order to urge the necessity of some arrangement, such as that proposed by Mr. YOUNG, for applying part of the commons, and waste lands, to the relief of those classes of the people.

Any large fields, or portions of wastes, and commons, when divided, and appropriated to one person, ought to come under a course of management, suited to their leading qualities, whether clay, loam, sand, chalk, or peat.

The chief difference, between those portions of new divided commons, and similar

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similar soils, already considered, arises from their barren state, and the greater expence, and length of time, required to inclose, drain, cultivate, and manure them. But the most important of all objects, connected with the subsistence and prosperity of the people, depends on the mode in which the smaller lots, and appropriations of those numberless wastes, and commons, are to be applied.

It is well known to your Lordship and the Board, and to every Member of the Legislature, that the people throughout England, are generally adverse to the division and inclosure of commons. They conceive, that there is some attractive influence, by which the rich man, too frequently, absorbs the possession of the poor. They declare all those plans of Divisions, and Inclosures, to be no other than contrivances for the benefit of the rich, at the expence of the small proprietors.

The Writer of this Essay has heard it maintained, in many cottages, that, by dividing a common, every poor man, having a share of it, is injured.

Strange

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Strange as it may appear, there are few instances in England, of any cottagers, or others, possessing petty rights on commons, having been enabled to repair their houses, to improve their land, or to increase their stock, by such appropriations. The reason is obvious—they seldom possess either skill, capital, or convenience, for such undertakings.—In order to improve the smallest piece of waste land, the expence and loss of time, are certain, and immediate; the profit is precarious, and remote.

Men, in the higher walks of life, do not usually possess the opportunities or habits qualifying them to appropriate the opinions and conditions of the poor. Many practices which seem rude and barbarous, in the present stage of society, were founded on principles of sound sense and safety in the feudal times—such as the establishing of villages adjoining to the Baron's castles; the farmers of a district, all living in one hamlet; the custom of runridge and common-field, or intermingled property.

Instead of treating with insult and contempt, the prejudices of the people, in favour of those ancient rights and customs, it becomes

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comes Statesmen and Philosophers to afford the means of correcting the abuses, and of improving the advantages derivable from such institutions. How is this to be effected? and how are ten millions of wastes and commons in England, to be brought under tillage, in an improved state?

Those who expect, that in order to accomplish this greatest of all national undertakings, nothing more is requisite, than to pass a general Division, and Inclosure Bill, would find that measure insufficient, unless connected with other serious and important regulations. It would only increase the dissatisfaction of many poor and unoffending individuals; and would leave the millions of waste acres, nearly as unproductive as before.

The proprietors entitled to large divisions, unless they were also monied men, would find the improvement of them, on any plan of rapid and extensive operations, far beyond their powers. The small proprietors and petty holders, instead of having liberty for their calves and pigs to range over several hundred acres, would be forced to tether them to a post, or confine them to a
hovel

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hovel and a hog-stye. Unable to purchase horses, implements, manure, and seed-corn, to hire labourers, to drain and cultivate their slender portions, their stock would be starved, and sold for half value, and their holdings would soon be deserted, or disposed of, to their wealthier neighbours. It would be an abuse of terms, to call measures producing such effects, an improvement.

In addition to the variety of soils in different wastes and commons, the size of the proportional allotments, materially affects their management and cultivation. The smallest holder, who has right to pasture a few sheep, a horse, and cow, upon a common, must be a sufferer by any separate appropriation, which gives him no more than three, four, or five acres of uncultivated land. Yet, if means were furnished for enabling families to be well lodged, and completely subsisted, by the aid of such small allotments, the increase of them would afford the greatest benefit that can be conferred on the community. Any quantity of land, less than three, four or five acres, is only applicable to the condition of a cottager.

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This, in its waste, or common state, will hardly keep alive a few sheep, a pig, and a cow. In its improved state, it will comfortably support a large and thriving family.

To prove this assertion, the Writer begs leave to select one example, out of many, within his own knowledge, and on his own property.

Having occasion for a drainer, he established an industrious man, of that profession, in a cottage, having a garden, and near four acres of sandy ground, adjoining to a rabbit warren. The ground not worth more than 10s. per acre; the house and garden worth 40s. more; altogether 4l. per annum. The man was bound, by contract, to clear a main drain through a peat-bog, annually, at the rate of 7l.; the remainder of the year, when not employed on his own four acres, he had work, at the rate of 1s. per day. He cropped above half an acre of sandy garden ground, with pease, beans, carrots, turnips, kail, cabbage, and potatoes; the last, in larger quantities than all the rest. He ploughed, manured, and sowed, near two acres, with oats, barley, and wheat, for his own consumption. On the remainder, being sown
grass,

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grass, with the aid of fodder from his crop, he fed a cow, which yielded milk for the family. He brought up a calf, kept some pigs, and a stock of poultry. He raised always a portion of flax, which was steeped, and dressed at a flax mill, worked, and spun into yarn, by his wife and daughters. They afterwards bleached the yarn, and sent it to the weaver, by whom it was wove into linen for the family use. In addition, they procured, every year, a few fleeces of fine wool, which were manufactured into woollen-drapery, and clothed the family. Part of the worsted was knitted, into stockings. Of course, he was little at the mercy of high prices, or of fluctuating markets.

In this manner, and on these means, without any other assistance, he brought up a family, of four sons, and three daughters, gave them all complete education, fitted to their station, such as reading, writing, arithmetic, and book-keeping. Every one of the sons has gone into respectable employments. Each of them, could purchase the fee-simple of the property on which he was bred,

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This appears the model of that condition, in which small holders of common-rights, ought to be enabled to place themselves, on receiving such a division as shall not exceed five acres.

When the ground allotted to any individual, extends from five, to 20, or 30 acres, in the actual state of cultivation, he is withdrawn from the condition of a cottager, and yet can hardly be considered as a farmer, in the ordinary acceptation of that word. If the holder of the land, is not enabled to cultivate and improve it, he and his family, and his stock, must starve.

Excepting, perhaps, in the case of some great nursery man, in the neighbourhood of a metropolis, there is hardly an instance, of so much as 20 or 30 acres, cultivated by the spade.

It is certain, however, that any land, excepting sand, being trenched, with two spadeings, and a shoveling, will yield such amount of green crops, garden stuff, and grain, as cannot be produced, from any ordinary culture, with the plough.

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To plough an acre five times, and harrow it, will not cost less at present than 3l. To trench an acre, two spadeings deep, or 18 inches, and to throw up a shoveling of earth from the bottom, which constitutes what is called double trenching, will not cost a great deal more. The produce will probably be double, and the land will be permanently improved.

It is a common observation, that the grass-walks in a garden, however bad the soil, being trenched, and raked, and sown, never fail to produce fine verdure. The same effect might be obtained by similar operations, on any other piece of land. Among the Chinese, it is reckoned extreme extravagance, to keep any ground in fallow, or in pasture. In that country, therefore, a horse, or a cow, are articles of luxury.—“How would a Chinese be confounded,” says LE POIVRE, “if he beheld “our wastes, and downs, and commons, “our ill-dressed ridges, useless fallows, and “bare fields.”

If the state of cultivation in this country, resembled that of China, the difference between

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tween a holder of five acres, and of 20 or 30 acres, would only consist in the number and quality of the acres.

But there is another, and specific difference. The cottager worth four or five acres, is not enabled to keep a horse. The possessor of ten, twenty, or thirty acres, never undertakes the management, without one horse, and sometimes two.

If he has not sufficient stock, for the improvement of his allotment, it remains unproductive—he has difficulty to maintain himself, his family, and cattle, and frequently must find extra work, for himself and horses.—Small holdings of this size, therefore, are usually in a wretched state, even when not newly separated from a common.

When the allotment extends from 30 to 50, or 100 acres, then it comes under the ordinary course of improvement, in the hands of a large proprietor, or farmer. In all, or any of these instances, to reclaim land from wastes, or commons, will require an expenditure, somewhat in the following proportions.

A cot-

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A cottage 32 feet long within walls, and 16 feet wide, the wall 7 feet high, of bricks, or stone and mortar, thatched or tiled, with standing for two cows, and place for pigs and poultry, - - - - - £.30 0 0

In many places, 40l.*

Trenching and draining five acres of ground, in ordinary cases, 4l. per acre, - - - 20 0

Manure, at the rate of forty single-horse cart-loads per acre, worth 1s. per cart-load, - 10 0 0

Total for the house, 30l.

For improving the land, 30l.

The increase of annual value, or rent, upon the five acres, even including the large expence upon the house, will very generally exceed 10 per cent. for it must be bad soil, indeed, so treated, which will pay less than 40s. per acre; supposing it in the rude state, to have been valued from 14s. to 16s. per acre.

These calculations, are by no means offered in any respect as accurate, but only as a conjectural statement of expence.

Without attempting any thing like correctness, therefore, it will suffice to shew, that in the present state of agriculture, 10l. or 12l. per acre, laid out in the cultivation

* Note, a complete cottage, with an upper story, will cost more than double that sum, at the present prices of labour and materials?

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of a newly divided common, will usually yield, additional value of 20s. or 24s. per acre yearly, equal to 10 per cent. on the capital employed. In many cases, much more.

The object is to establish, that when a cottager, or other person, receives five acres of common, or unimproved land, he ought to be enabled to employ 30l. at least, on building a house, and as much more for the improvement of the land. As a security for re-payment, he is enabled to offer a house and garden, and four or five acres of cultivated ground.

With variations in the calculation and proportion of expence, for Houses and Inclosures, the same principle applies to the possessor of 20 or 30 acres of unreclaimed, and newly divided common.—It farther extends to the possessor of 100, or 1000 acres, of the same description.

Here, it is humbly conceived, the mere agricultural question terminates. What remains, is rather a consideration of the resources requisite, and of the funds from whence they can be supplied; together with a view of the distributions, and arrangements, tending to effect, a change so important,
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and extensive, in the condition of the country.

In addition to the passing of an Act, to facilitate the division of commons, an arrangement is not less requisite, to ascertain, by statistical tables, and practical surveys, the contents, and valuation of the different counties, and parishes, of which these kingdoms are composed. These tables should contain columns, shewing the actual rent, the number of souls, proprietors, farmers, husbandry-labourers, manufacturers, paupers; horses, cows, sheep; amount of tythes, poor-rates, and collections for the poor; length in miles, breadth in miles, extent of acres, number of acres possessed by proprietors, number of acres let to tenants, number of acres in tillage, number of acres in sown-grass, and pasture, number of acres of planting, number of acres waste, or uncultivated, number of acres in common, common-field, or mingled property; quality of the soils, on the different farms; number of carts and ploughs; average amount of grain produced, average of hay, on each farm, number of collieries, and lime-works, in the parish.

To detail the advantages derivable from
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such information, would be idle waste of words. It is enough to observe, that until such knowledge be obtained, Statesmen must remain as ignorant of the internal circumstances of the kingdom, as a land-owner, or steward, would be, who neither knew the extent, soil, produce, rent, nor tenantry of the estate under his direction.

But we are told, that such a measure would be impracticable, or extremely expensive: the answer is, it will be neither. A few additional pounds per annum, to that deserving, and ill-rewarded class of men, the school-masters, in the different parishes, would officially ensure the operation. To prove that the measure is neither impracticable nor expensive, the Writer of this Address, if so directed, will undertake, in two months, to lay before your Lordship and the Board, without any expence at all, a detailed table, for a large county, specifying all the particulars already enumerated, and most of them, with sufficient accuracy for any general public purpose.

If such knowledge were obtained, of all the counties in Great Britain and Ireland, the application of it to the object of your
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Advertisement, would be apparent. You would then be enabled to ascertain, in every parish, throughout these kingdoms, the extent, rent, and produce of land under tillage, of land in grass, of waste land, common or undivided land, and of land, which, though divided and appropriated, is barren and uncultivated. You would know the number of persons in each parish, as husbandry-labourers, cottagers, manufacturers, tradesmen, or paupers, whose condition required to be improved.

Thus, in your report to the House of Lords, you would be enabled to suggest the adaptation of means to ends, by which many millions of acres, at present lost to cultivation, could be reclaimed. At the same time, shewing how the lower classes, struggling with want and indigence, might be relieved.

The next object is, the fund from whence should be advanced, the money necessary to cultivate these extensive tracts of land.

Your Lordship, and the Board, will hardly think it unreasonable to estimate the building of a cottage, such as has been described in the preceding pages, at 30l. ; or the first cul-

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cultivation of unreclaimed land at 6l. per acre. In many instances, the levelling inequalities, clearing baulks, stubbing furze, and broom, and removing stones, will require an additional expence.

Considering money, or credit, as the instruments of cultivation, as much as the plough, or the spade, put in motion by them, it will hardly appear a deviation, from the immediate question, to suggest the fund or means, as inherent in the land.

It was a favourite endeavour of the celebrated Mr. LAW, with the Scotch Parliament, before he went to France, to establish what he called a Land Bank. The object was, to enable every land-holder, by registered mortgages, or what, in Mr. LAW's native country, was termed heritable security, to raise as much money as would enable him to improve the ground. It is obvious, that the principal would always be secure, as long as the land would sell for the amount. This, at present, is seldom less than 30 years purchase.

But to secure principal and interest, and to avoid, both hazard and trouble to the lender,

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lender, or borrower, it only requires to lend no more than at the rate of 20 years purchase, which secures 5l. per cent.

In point of security, notes issued, on such a fund, and to such an amount, are on a footing of stability, which cannot attach to any other kind of property. With respect to the facility of transaction, difficulties occur, requiring arrangements not immediately connected with the subject of this Essay. The Writer, however, would be happy to detail a specified proposal on the subject, if it should appear at all conducive to the great purposes under consideration. At present, he will only observe, that the floating property of Great Britain, employed in manufactures and commerce, has enabled banking companies, and others, to put in circulation, paper-currency, or credit, including notes, bills, and acceptances, to an amount, which, in the year 1793, at the commencement of the war, was estimated at 200,000,000l. sterling. In the present year, it is probably more than double that sum. All that mass of paper-credit and circulation, is supported, without the intervention of any mortgages, or landed security at all.

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At the time when banks, and paper-credit, were first established in Europe, confidence was weak, and rested on the actual deposit.

It would, in those days, have been thought impossible to erect a fabric of commercial credit, so stupendous as that which exalts, and invigorates, the British Empire. But, it would have appeared a feasible transaction, under such a Government as this, to have established a credit, or to have issued paper-currency, for the improvement of the soil, to an amount not exceeding 20 years purchase, on the security of 30,000,000l. sterling, which is not more than the annual rent of Great Britain.

All men know that money, coin, or paper-currency, are vague, and fluctuating representatives of wealth, or value; but houses, stock, cattle, corn, and produce, constitute real, and substantial wealth. In this view, it is not chimerical to assert, that the 40,000,000 of acres in England, which barely, and at present, scantily support, 10,000,000 of people, would amply have maintained twice that number. In other words, would have more than doubled, or
tripled

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tripled their annual produce, if a sum had been raised, on the credit of the land, equal to that which at present is circulated on manufacturing and commercial security.

If we were to consider this point, merely in an agricultural view, it would be impossible to improve, and cultivate lands, without keeping the horses, stock, and implements, in good condition; without employing skilful managers, and industrious, practised labourers, and ploughmen.

On this principle alone, if there were no higher motives of political, and still more, of religious obligation, it becomes the bounden duty of Government, along with protection, to afford subsistence. By these words are signified, the means of comfortable lodging, of sufficient maintenance, and clothing, of education for the young, attendance on the sick, and provision for the disabled, and infirm. The means of procuring these, for His Majesty's Subjects, of ensuring to the lowest of them, lodging, food, and clothing, and a surplus, and permanent provision, forming what may be called, a stake in the country, suited to their respective conditions, without imposing additional
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incumbrances on the public revenue, is a question nearly connected with the present discussion.

It shall form the basis of an additional, and supplementary detail, whenever your Lordship, and the Board, desire communications respecting it.

The Writer of this Address, farther begs leave to submit another observation.

After two succeeding years of deficient crops, the poorer orders, feel additional pressure from increasing price; among other reasons, because their small stock, or surplus, the produce of industry, and care, is exhausted. They cease, therefore, to belong, even in a small degree, to that class, who, besides their skill, and labour, have somewhat to assist their maintenance, or to employ, in bettering their condition. Of course, in this situation, they are less than ever, in a capacity to apply a capital of their own, or any thing whatever, but mere skill, and labour, to the improvement of the smallest piece of barren land.

On the other hand, the rich, or those who possess unengaged money, and credit, can hardly

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hardly be expected to undertake, at present, the cultivation of any great extent of wastes or commons;—because, great as the ultimate advantages may be, there are much greater, and far more immediate profits, derivable from other operations, in times of ready sale, and rising markets, affecting all the articles of commerce, at home and abroad.

These circumstances afford ground for apprehension, that the progress of improvement may be less rapid and extensive, than the urgency of the case demands. Even the increased quantity of tillage, during the present year, requiring an addition of seed-corn, must augment the scarcity, by withdrawing a part of that grain which would serve for food. Thus, of course, diminishing the ability of the lower classes, to aid in the culture of waste lands, except by personal labour.

At the same time, the necessity of maintaining a formidable force of cavalry, essential to the safety of the country, and to the respectability of the military establishment, cannot fail to occasion a considerable consumption of grass and hay, which would
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otherwise fatten cattle for the market, and of oats, which would feed the northern inhabitants of this island, and those of Ireland.

Under these impressions, it is assuredly a material object, to enable cavalry to furnish their own subsistence, by cultivating lands, hitherto unproductive; thus relieving the country, and increasing, instead of diminishing, the national produce. Notwithstanding the reluctance of officers, to employ the soldiers under them on any duty, but parade, or actual service, it is humbly presumed, that discipline and efficiency are less likely to be impaired by well-regulated and well-rewarded employment, than by the opposite extreme.

In order to obtain this important benefit, it is presumed, there are two practicable modes.—In the first place, if it should be His Majesty's pleasure to ensure the improvement of his Waste Crown Lands, and Forests, by directing specified portions of them to be cultivated by bodies of his cavalry. This would materially increase the value of the Crown Estates, and render them productive, without alienating them

them from the Crown. Or, if this measure should not meet His Majesty's approbation, by renting and appropriating a portion of waste, or unimproved arable land, worth eight or ten shillings per acre, for the support of certain bodies of cavalry. The mode of combining the labour of a part of cavalry corps, with the perfect discipline of the whole, is specified in a separate paper; it cannot, with propriety, be inserted here, as it involves military discussions.

By a calculation, of which the detail will be produced, if desired, it appears, that the maintenance of cavalry, including men, and horses, requires very large supplies of meat, barley, wheat, potatoes, oats, and hay.

If it be admitted, that existing circumstances require, at least, an efficient force of cavalry, amounting to 30,000 men, and horses, it would cost Government near 3,000,000l. sterling annually, to maintain that force, at the rates, or tariff, of 1798, and, of course, much more at present, exclusive of horse artillery. It would also require the produce of about 365,000

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arable acres, in a high state of cultivation.

It is farther stated, that there are near two millions of horses, mares, colts, and fillies, in England. On an arable farm, four horses are sufficient to work 100 acres; allow two more, for breed, and extra purposes, and two young ones. Suppose eight horses for every arable farm, of 100 acres, this amounts to 80,000 horses for 1,000,000 of acres, under arable management; 800,000 horses for 10,000,000 of such acres; 1,200,000 horses for 15,000,000 of acres. If there be any justness in the data, or rather, vague suppositions, on which these calculations are founded, it would appear, there are many hundred thousand horses, in England alone, not employed in cultivation, and consuming the produce which would support several millions of people.

Under these circumstances, might not the purposes of cultivation, and diminution of consumption, both be promoted, by obliging every person, to expose in the nearest public market, under regulations to be specified by the Legislature, certain quantities of

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of grain, proportioned to the number of horses kept, and not employed in agriculture, and other useful operations?

It may also be remarked, that notwithstanding the superior skill, capital, credit, and machinery of British manufacturers, indefinite increase in prices of provisions, and consequent rise in the rates of labour, may ultimately diminish the benefits resulting from that superiority. Should events throw any considerable number of the manufacturing classes out of employment, it is presumed they need neither be indigent nor idle, if the gracious intentions of His Majesty, and the wisdom of the Legislature, direct the credit of the public, and the exertions of individuals, to be employed in relieving the distresses of the people, by improvement of the soil.

It would be difficult, however, to give full effect to any arrangements of such magnitude, without affording permanent encouragement to all employed in labours of such national utility.

In this Essay, the discussion of these points might appear digressive, but a detailed statement is prepared, and ready to be

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be produced, if your Lordship, and the Board, conceive it applicable to the object, on which you have intimated an intention, of reporting to the House of Lords.

With great respect, &c.

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POSTSCRIPT.

THE great body of the people, neither possess property in land, in cash, nor in moveables. They exist by the daily exertions of their industry and skill. In these northern climates, and on soils only rendered productive by constant culture, and attention, the labouring part of the community can hardly subsist, without nine or ten hours of bodily fatigue per day. When rendered incapable of labour, by age, sickness, and infirmity, they, and their families, must either starve, or go upon the parish. Even in prosperous seasons, the comforts of life are possessed by them, in very moderate proportions. Times of scarcity, high prices, and fluctuating markets, disturb the just relation, between the rates of labour and subsistence.

At first, they are obliged to part with any surplus, or articles of use and value, they may possess. At last, they are reduced to extreme distress. They resemble persons
who

who have lost their whole property by fire, or shipwreck—their lives are saved, but they have to begin the world anew, and in a state of nakedness.

Under these circumstances, too many of them are apt to fancy, that the produce of their labour could hardly yield less, under any form of Government. This renders them prone to schemes of innovators, and perturbators, fatally exemplified by the late rebellion in Ireland, and certainly diminishes their due attachment to the happy Constitution under which they live. At the same time, the mode of providing for them, by poor-rates, and work-houses, when sick or indigent, only adds reproach to misery. It costs more than five millions sterling, annually, without including the numerous asylums, and charitable institutions, for which this Nation is celebrated, above all other States.

These circumstances, cannot fail to render many thousands of the poorer classes, no less useless than improvident.

It is a fact, well established in Birmingham, and other great manufacturing towns, that the fiftieth penny, or a week's pay, per

per annum, for every individual, in the different associated classes of labourers, and manufacturers, is usually sufficient to afford every person in the society, when sick, hurt, or superannuated, the full amount he was in the habit of receiving, when in health.

It is farther known, that by another calculation of a similar nature, but somewhat different in its object, a fund was provided, on the plan of Dr. WEBSTER, for securing annuities to the widows and children, of deceased Scottish clergy.

This was effected by means of annual contributions, at certain established rates, from each clergyman during his life.

It would not be difficult to prove in detail, that this system might be extended with great public benefit, to every trade and vocation, in all the districts throughout the realm.

The result would be, that every individual who subsists by labour, would have an adequate provision, for himself and family in all contingencies. Taxes for the maintenance of the poor would also be diminished, by this appropriation of a small portion

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portion of wages, for the benefit of the labouring part of the community.

The same mode of provision might easily be applied to seamen, soldiers, and every description of persons who subsist by pay, salary, or the produce of skill and labour.

If such an arrangement, at large, were formed and executed under sanction of the Legislature, it would give every individual a stake and interest in the country, and would attach him to that Government, under which he enjoyed these permanent advantages. The converse of these propositions, is hardly less apparent.

Several hundred thousand labourers, in these kingdoms exist in mud-hovels, without a vent for the smoke, but at the door, with their families in rags and wretchedness. Their sufferings wound the feelings of every beholder, and they are extremely dangerous to the State. Under proper regulations, however, they might be rendered powerful instruments of national improvement.

At a period of scarcity, when the supplies of the Roman Empire, were inadequate to the consumption, the Emperor THEODO-
SIUS

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SIUS enacted, that it should not be lawful to confine for debt, any husbandman, nor to sell any articles, without which he could not be lodged, and fed; or any implements, without which, such persons, living by the produce of their industry, could not perform their labour.

The same principle, which in hard times dictated this law, and which frequently has induced the Judicial Courts of England to prevent the foreclosure of a mortgage, operates powerfully, at this moment, in favour of labourers in husbandry, and manufacturers. From the nature of their situation, when in debt, it is almost impossible they should have any other fund for payment, than their power of labour; excepting such articles, as are necessary to bare existence. To allow a creditor to sell the bed on which such persons stretch themselves, and the implements with which they work, and the clothes that cover them, is surely not less objectionable than the sale, or purchase, of a soldier's regimentals, which, by Act of Parliament, is forbidden.

To confine a person of this description in a gaol, who, without possessing any surplus,

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plus, can hardly subsist, by the utmost exertions of his labour; and who, in ordinary cases, never can pay his debt, but by the labour of his hands, is an act, irreconcilable to any principle of policy or justice.

It does seem necessary for the public safety, and for the national subsistence, that land-owners, and others, should be encouraged, and enjoined, to promote the duties of cultivation; that men, in the labouring classes, should be protected against such wretchedness, as prevails in many parts, of Great Britain and Ireland. In short, that men should, in a manner, be forced to obtain a surplus, and to preserve it. When once relieved from that unhappy state, in which they have nothing, by the acquisition of some property, or a provision for life, they should be prevented from reverting to beggary and nakedness: for, in that condition, they, and their families, must suffer misery. They must prove always burthensome, and frequently dangerous, to the State.

THE END.