



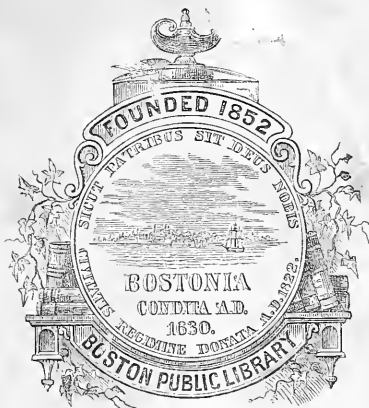
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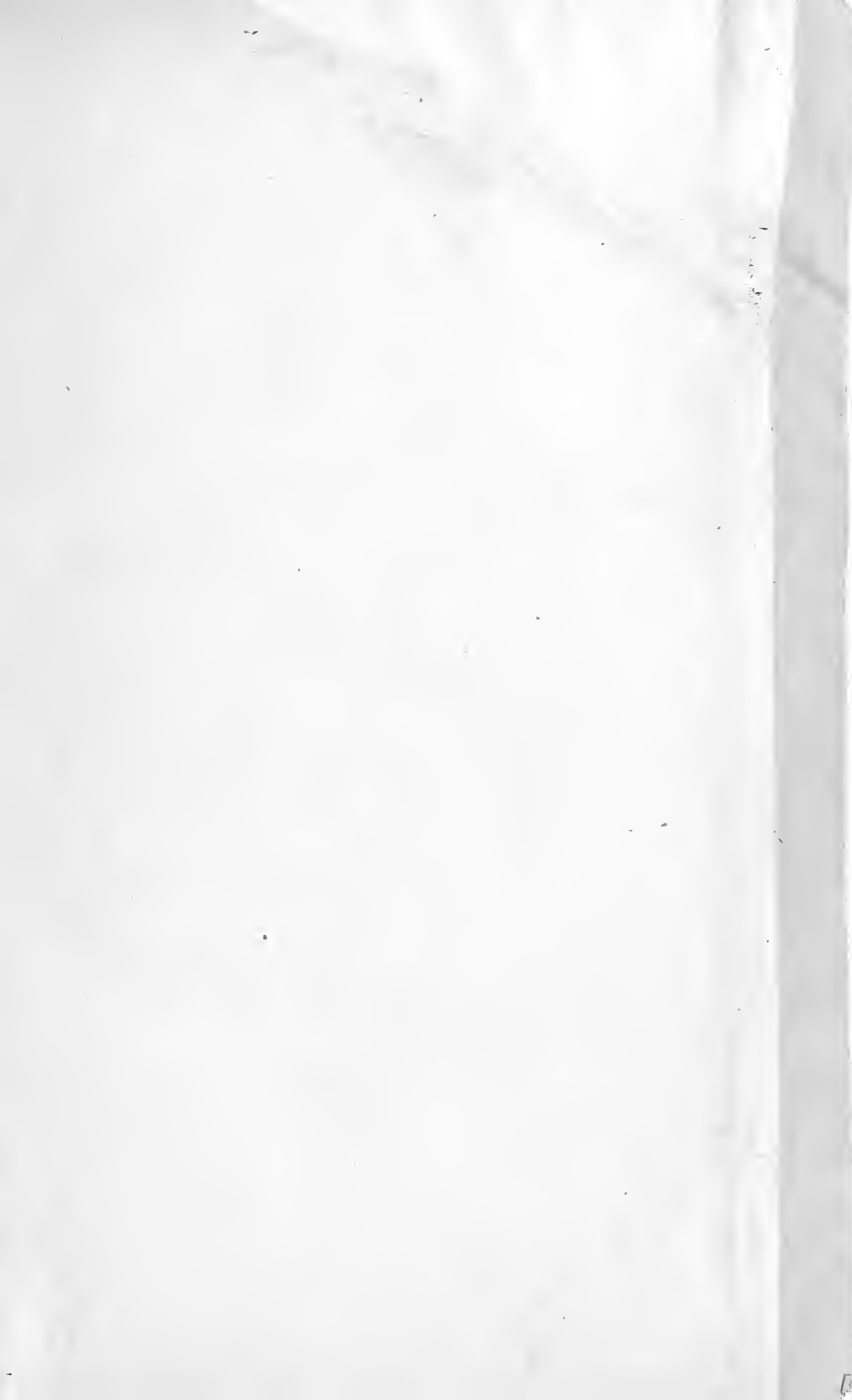
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PAMPHLETS.

(Agriculture,
Essays.)

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LAYING DOWN LAND

TO

PERMANENT PASTURE,

AND THE IMPROVEMENT OF OLD GRASS LANDS.

BY

MARTIN H. SUTTON, F.R.H.S., &c., &c.,

(OF READING.)

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JOURNAL OF THE ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

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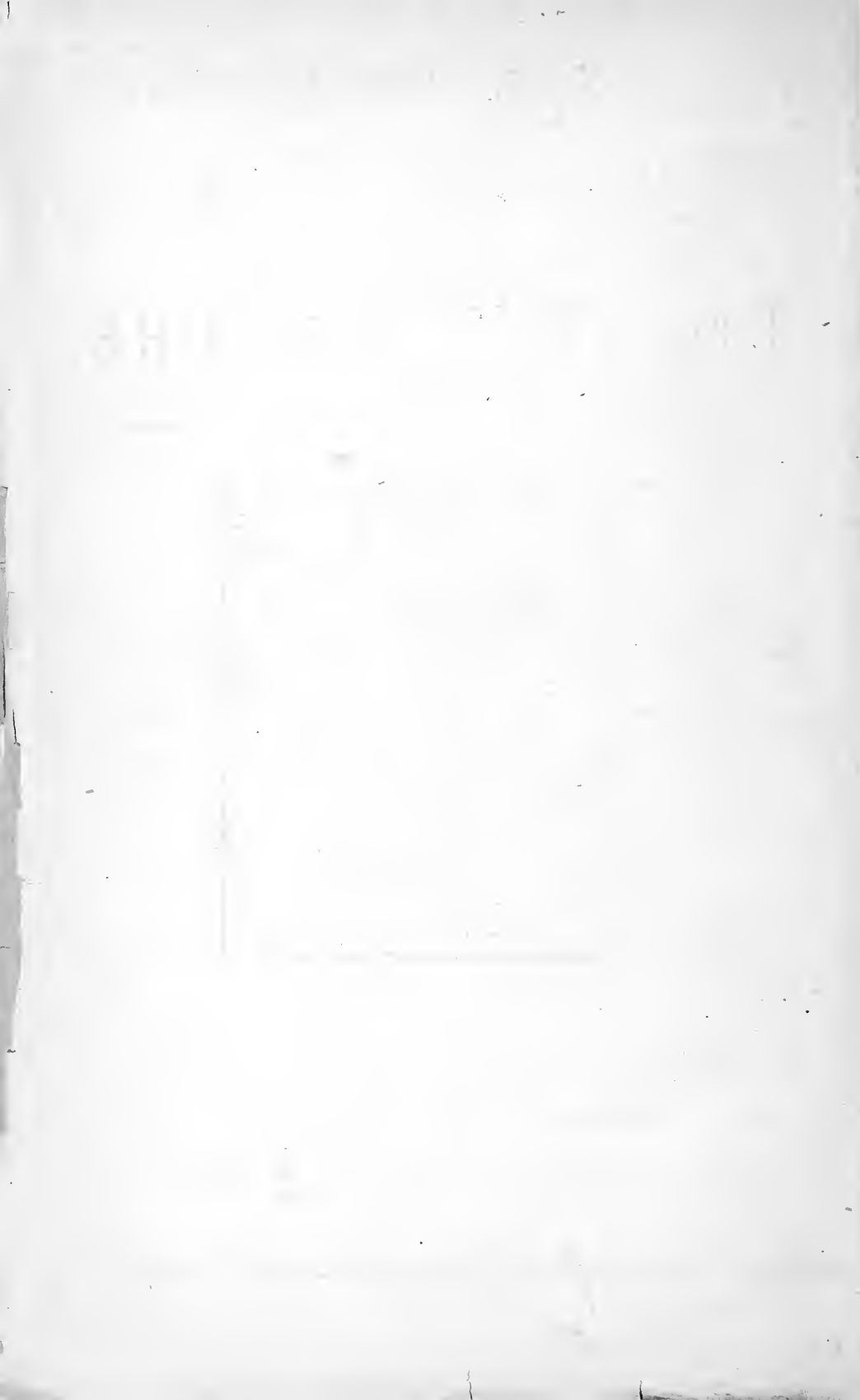
AN ORIGINAL TREATISE ON CULTIVATED GRASSES & CLOVERS,

BY SUTTON AND SONS.

ELEVENTH EDITION—ILLUSTRATED.

LONDON:

LONGMANS, GREEN AND Co., PATERNOSTER ROW.



PERMANENT



PASTURES

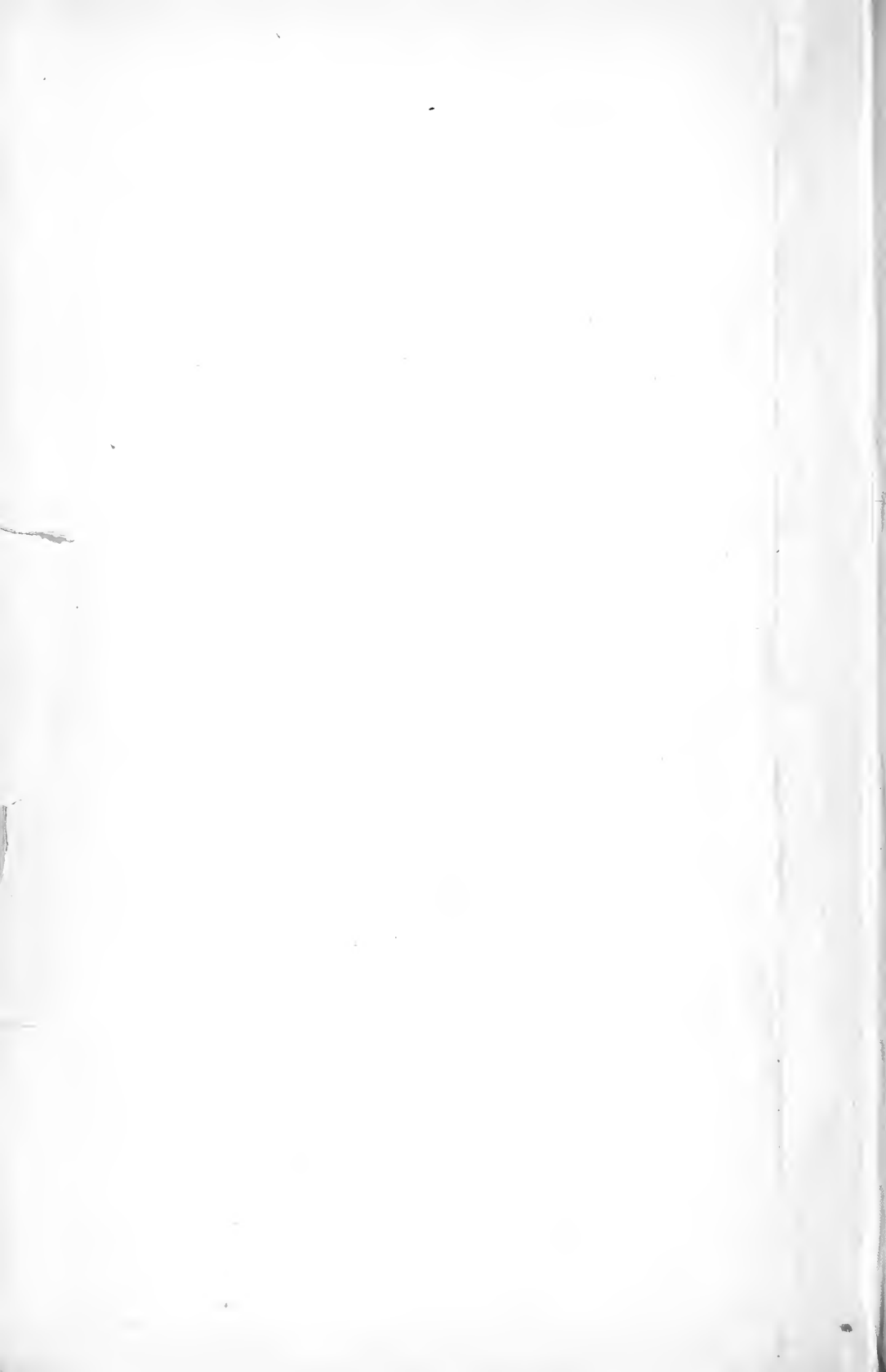


BY MARTIN H.
SUTTON,
F.R.H.S., &c. &c.

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OF



SUTTON & SONS, READING.



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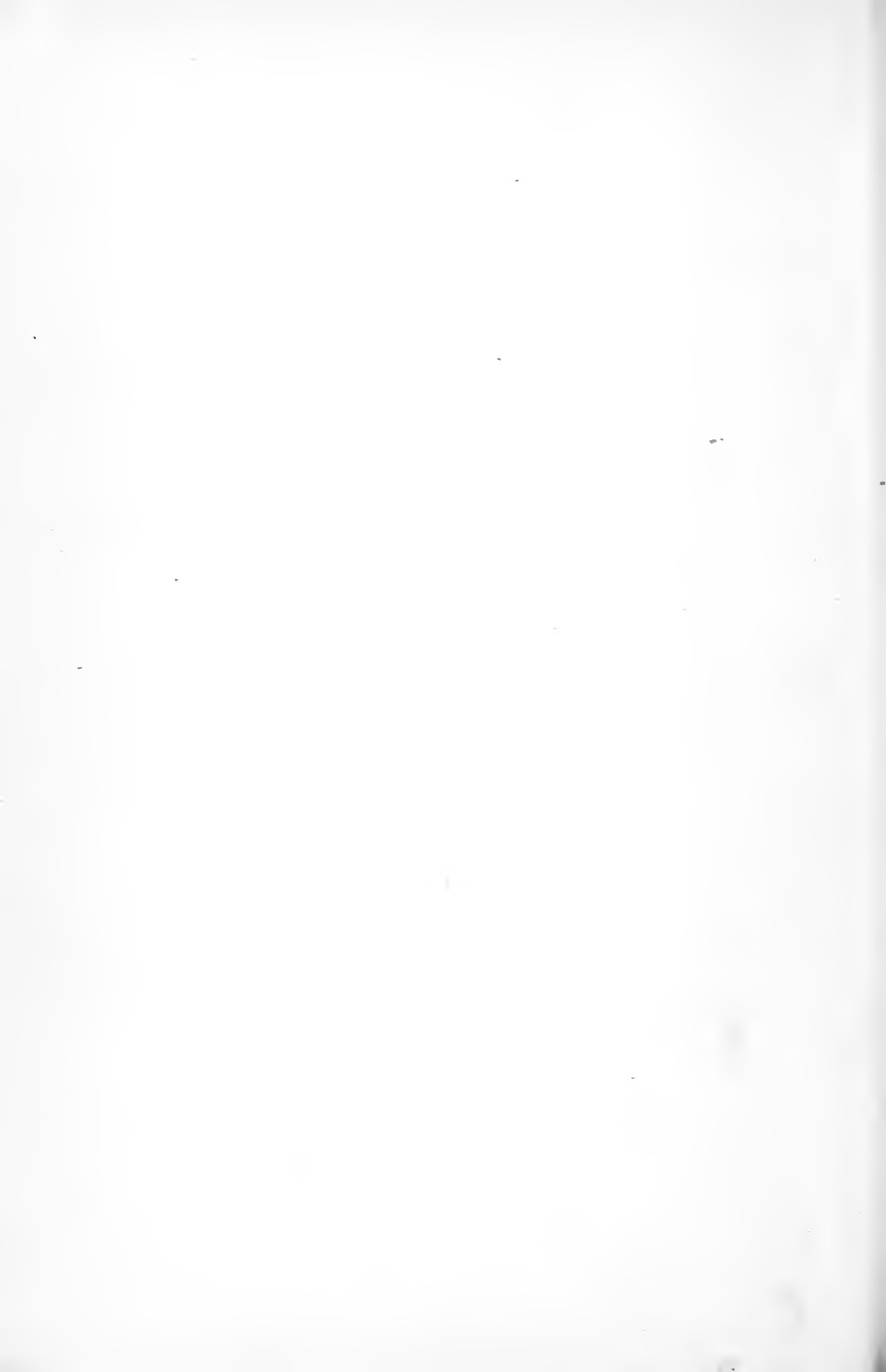
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LAYING DOWN LAND
TO
PERMANENT PASTURE.

By MARTIN H. SUTTON, F.R.H.S., &c., &c.

PREPARATION OF THE LAND.

If the land is not clean, it is well to take a crop of turnips or other roots previous to laying down grass, which will afford opportunity for more effectual cleaning than can be done in the winter months preceding the seed-sowing.

The importance of getting the land into a good tilth, fine, firm, and level, cannot be overstated, for if it is rough or hollow, some seeds will be too deeply buried, and others not covered at all. Should the field be full of weed seeds, they will germinate more quickly than the grasses, and take possession of the soil. Useless grasses are, however, the most serious weeds, and hence pure seed is all-important.

MANURE.

When a root-crop has been *fed off* in the previous autumn, it will generally be unnecessary to apply other manure; but where the land requires assistance, a top-dressing of 2 cwt. per acre of Peruvian guano, or the same quantity of nitrate of soda, or perhaps better a mixture of both, 2 cwt. to the acre, should be applied when the grass is well established, say 2 inches high.

SOWING.

Choose a still day, as a rough wind would prevent the regular spreading of the seeds. Some men who are used to it will sow grass-seeds well by the hand; but it will generally be done better with the common seed-barrow. This will distribute the seeds very evenly, either in one mixture of clovers and grass-seeds together, or (which is most usual) by going twice over the land, sowing the light grass-seeds first, passing

up or down the furrows, and subsequently crossing the lands with the mixture of clovers and other heavy seeds.

A bush-harrow, or the lightest iron harrow, should be applied immediately before and after sowing, thereby covering the seeds before birds or a change of weather can interfere with them, care being taken that as few seeds as possible are buried too deeply, or remain uncovered. After harrowing, the whole should be carefully rolled. As to the best *season* for sowing, though much has been written in favour of autumn-sowing, I have no hesitation in saying that the spring is preferable, when the land can be made ready. With very heavy land, however, in a wet spring, it is often late in the summer before it is sufficiently pulverized, and if later than the middle of June, it is well to defer the sowing until August or September; but in autumn-sowing there is a danger of losing the clovers, for, while in a young state, they are liable to be carried off by slug or frost. Therefore, should autumn-sowing be adopted, it is well to examine the young pasture early in the spring, and, if the clovers are found to be deficient, to sow more of the same kinds immediately, which will take very well if the grasses are not too strong.

By spring-sowing I mean sowing during the months of March, April, and May; and, generally, April will be the safest and most favourable month of the three. If, however, the land is quite ready by the middle of March, and the weather favourable, it would be good policy to sow without delay, rather than incur the risk of the seed-bed being spoiled by a change of weather. When it is desired to grow a crop of corn, the time for sowing the grass-seeds will be either immediately after the corn is sown, or else when it is two inches high—the former being most favourable for the grass. As to the question whether it is best to sow with or without a crop of spring corn, it is no doubt safest and best to sow the grass-seeds alone, especially where the object is to obtain a fine park-like sward as soon as possible. One great advantage of this practice is, that where the land has not been thoroughly cleaned, and the annual weeds get ahead of the young grass, they may be destroyed by mowing as soon as the grass is six inches high; and another advantage is, that if, from irregular sowing, or from the roller not having passed over every part of the field, some bare spots occur, they may be discovered and re-sown in good time.

When corn is sown with the grass-seeds, some of the finer kinds of grasses are almost sure to fail, especially if the corn crop is heavy and becomes lodged. Still much may be, and is said, in favour of this practice; and seeing that a crop of oats or barley is an important matter with most farmers, I would not altogether condemn the practice, especially as the seedsman can, if duly informed of the intention of his customer, provide such sorts and proportions of grass and clover seeds as will, under ordinary circumstances, insure a full plant. The quantity of corn sown should not be more than 2 bushels per acre, and oats are generally less injurious to young grass than barley.

SOWING GRASS-SEEDS UPON WHEAT.

It not unfrequently happens that a field already sown with wheat is desired for adding to the grass-lands; and if it is pretty clean, there is no difficulty in effecting this, provided the seeds are sown sufficiently early, before the wheat is too high. Upon autumn-sown wheat the grass-seeds may be sown as early as the middle of February, if the weather be open, as the wheat will defend the young grass from any injury by frost; but if the wheat is very backward, or stands thin on the ground, the sowing may with advantage be deferred.

On spring-sown wheats the grass-seeds should be sown as soon as the corn is 2 or 3 inches high; and as all the tillage required will be bush-harrowing before sowing, and rolling afterwards, no injury to the wheat-plant need be apprehended.

THE MOST SUITABLE WEATHER FOR SOWING GRASS-SEEDS.

Choose a fine day, when the land is tolerably dry, but when there are indications of approaching rain. These are much more favourable conditions for the seeds to fall on the land than during rainy or showery weather, as they are more likely to be evenly covered, and will be very gradually absorbing moisture from the soil previous to the next fall of rain, which they will be in a condition to receive with benefit; whereas, if sown *after* a shower, as is too frequently done, these advantages are not obtained, but after the seeds have become saturated with moisture, the dry weather returns, and they become "malted."

THE SORTS OF GRASSES AND CLOVERS MOST SUITABLE FOR PERMANENT PASTURE.

This is perhaps the most important point of all in laying down land. The natural grasses vary exceedingly as to their suitability for the many soils and situations for which they may be required; and when the seedsman is informed of these particulars concerning the land, and the number of acres to be laid down, he can apportion the sorts accordingly. I am often applied to for advice as to what kinds are most suitable to form a thoroughly good permanent pasture, and I take the present opportunity of stating the sorts which I consider the best for a good medium soil, neither too heavy nor too light, *i.e.*, good turnip and barley land. These are all of excellent properties; and

coming to maturity at different seasons of the year, are found to produce a permanent and evergreen sward :

Alopecurus pratensis—*Meadow Foxtail.*

Anthoxanthum odoratum—*Sweet Vernal.*

Cynosurus cristatus—*Crested Dogstail.*

Dactylis glomerata—*Rough Cocksfoot.*

Festuca duriuscula—*Hard Fescue.*

Festuca pratensis—*Meadow Fescue.*

Festuca heterophylla—*Various-leaved Fescue.*

Festuca ovina—*Sheep's Fescue.*

Festuca rubra—*Red Fescue.*

Lolium perenne sempervirens—*Evergreen Rye Grass.*

Lolium perenne Suttoni—*Sutton's Perennial Rye Grass.*

Lolium perenne Paceyana—*Pacey's Perennial Rye Grass.*

Phleum pratense—*Timothy.*

Poa pratensis—*Smooth-stalked Meadow Grass.*

Poa trivialis—*Rough-stalked Meadow Grass.*

Medicago lupulina—*Yellow Trefoil.*

Trifolium repens perenne—*Perennial White Clover.*

Trifolium pratense perenne—*Perennial Red Clover.*

Trifolium hybridum—*Alsike Clover.*

The sorts and proportions of the seeds used should be varied on particular soils, and also on those pastures which are devoted to special purposes.*

Nothing can be more injudicious than sowing "hay-seeds," as they are called, which are collected in the hay-loft. They consist principally of *Holcus* and *Bromus*, which are almost the only grasses ripe at the time grass is cut for hay, and some other weeds which are very detrimental to a pasture.

AFTER-MANAGEMENT.

Soon after the young plants are established—say 3 to 4 inches high—a roller should be drawn over the field, and if any spots are found in which the seeds have missed, more should be sown. As weeds indigenous to the soil are almost sure to come up in land newly laid down to grass, care should be taken to remove them by the hand, or, should that be inconvenient, check them by *early* mowing.

These operations, of course, cannot well be performed where a crop of corn has been sown with the grasses; but in such case the grasses and clovers should be looked to immediately after the corn is carried, some additional seed sown in any parts where the grasses have suffered from the corn crop, and a top-dressing of well-rotted farm-yard manure may also with advantage be applied. Rolling once or twice before Christmas will be beneficial; and should the grass become very strong before winter, cattle may be turned in during fine weather; but on no account sheep, as they are apt to pull up the young plants of grass.

It will, however, generally be better to leave the pasture till spring, giving it an additional rolling or bush-harrowing in the month of March, with a top-dressing of manure, if considered necessary. The young grass should not be *grazed* till the following autumn; but two crops of hay may be taken in the first season where the growth is very

* The Tables of grasses commencing at page 10, show the varieties which are suitable for the surface soils which cover each geological formation.

luxuriant—the first as early as possible. This frequent cutting checks the stronger grasses, and affords the more slender-growing kinds a better chance, and all are encouraged to tiller out and form a good close sward; whereas, if allowed to stand too long before mowing, the early kinds become strong and ripe, to the injury of others.

Again, if cattle are allowed to graze after the first mowing, (or instead of mowing,) they will pick out certain grasses and clovers, leaving others, which in time become more coarse than is desirable, and have a very unsightly, patchy appearance.

Where grazing is practised, as being more in accordance with the requirements of the owner, then a scythe should be applied once or twice during the first summer to those plots of grass which the cattle leave.

BREAKING UP OF GRASS-LANDS.

Some old pastures are so unproductive, and foul with weeds, that it may be desirable to break them up, grow a crop of turnips, or other roots, and then sow seeds for permanent pasture. The subsequent crops of grass will be incomparably better than were obtained previous to breaking up. Paring, burning, and spreading the ashes for manure, is an excellent plan, and very superior to ploughing the turf in. The expense of this operation will soon be repaid tenfold by the increased crops of hay and pasturage. About the beginning of March is the best time to begin the paring; and as to the burning, no time should be lost when dry, so as to get the land ready for turnip-sowing.

IMPROVEMENT OF GRASS-LANDS.

Thousands of meadows and upland pastures are producing less than half the quantity of hay and feed which the land is capable of, from a deficiency of plants of those kinds which are most productive and suitable for the soil. In some cases, where the pasture is very foul with weeds and moss, it is advisable to pare and burn the old sward, and resow the land entirely, as above directed. In some other instances it may be desirable to drain and manure the land: but in most cases great improvement can be effected by merely sowing renovating seeds (which should consist of the finest and most nutritive kinds of perennial grasses and clovers) in the following manner. Heavy harrows should be drawn over the old turf early in the spring, to loosen the soil for the admission of seeds, which, if sown freely, will occupy the numerous small spaces between the grasses already growing, and supersede the coarse grasses and noxious weeds. After the seeds are sown the land should be carefully rolled.

It is a good practice to sow these seeds upon a thick top-dressing, for which a mixture of any decayed material with good soil is preferable. The months of February, March, and April, are proper for sowing the seeds; the earlier the better, as the old grass will protect the young from frost. It is also useful to sow in July and August, immediately after carrying

the hay. Should the old turf be very full of moss, this is generally an indication that draining would be beneficial. The following is, however, an almost infallible remedy for the moss, not only destroying it, but preventing the growth in future. Mix two cartloads of quicklime with eight cartloads of good light loam, turning the compost several times, that it may be thoroughly mixed and the lime slaked, and spread *this quantity per acre* over the pasture, dragging the turf well with iron harrows.

MANURES MOST SUITABLE FOR OLD PASTURES.

Farmyard manure well decomposed is the most suitable for grass lands, and is invariably found to maintain or restore a good variety of grasses, clovers, and other bottom herbage. When, however, this is not possessed in sufficient quantity, Peruvian guano, superphosphate, or partially dissolved bones, are the most desirable, with a small addition of salt or nitrate of soda; but the last-named substances, if used alone, have a natural tendency to encourage the growth of Cocksfoot and other luxuriant grasses, to the destruction of clovers and the finer kinds of grasses. This is the general tendency of ammoniacal salt; while superphosphate of lime, on the contrary, encourages the growth of clovers and leguminous plants generally. Upon the whole, therefore, I should recommend as the best dressing of artificial manure for grass land which is much deteriorated, and destitute of bottom herbage, 2 cwt. superphosphate of lime, 1 cwt. Peruvian guano, and 1 cwt. common salt, per acre. The months of March and April are generally most suitable for the application of artificial manures.

These hints on laying down permanent pastures, etc., are founded on my own personal experience during the past forty years, under the various circumstances and upon the different soils which prevail in this country; and if acted upon pretty generally, considerable improvement will be observed in this important department of agriculture.



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NOTES ON THE USE OF
SUTTON'S GEOLOGICAL MAP,*

And the importance of Laying down Land to Permanent Pasture.

We believe that this Map will supply a want which has long been felt by intelligent agriculturists. Such various and contradictory opinions are often held as to the geological strata on which a particular farm or district lies, and a true knowledge of the facts is becoming so increasingly important to the Farmer and Landowner, that a Map which will give this information in a clear and intelligible manner appears to be a necessity.

While the culture of grain crops remained the principal part of the Farmer's business, it was of comparatively little consequence to him whether his farm lay over the Wealden or the New Red Sandstone, over the Norfolk Crag or the London Clay; for by using the sort of corn suitable to the district, and by putting on a dressing of manure, he could pretty generally reckon on a fair crop of wheat.

Now, however, wheat growing should, to a large extent, give place to meat growing. The transit of grain is becoming easier every day, and countries which a short time since could only be reached in three months, are now sending us their surplus corn in little more than three weeks. But the supply of meat is still almost entirely the English Farmers' monopoly, and is likely to remain so for many years to come, unless some unheard of plan be devised for conveying cattle to our shores. Meat would probably be used by a much larger number of the people, and be consumed to a greater extent than at present, were the price somewhat reduced. To secure this result less attention must be paid to the cultivation of cereals, and more care be devoted to the production of food for cattle. The raising of stock would then take its proper place, and become the *principal* part of the ordinary Farmer's business, instead of being looked upon as only the disagreeable and troublesome adjunct. The Farmer ought to recognise the altered state of things, lay down a large portion of his arable land to grass, and thus curtail his expenses by keeping fewer hands and horses.

To the corn producer a Geological Map has hitherto been of very little use, but immediately he determines to alter his policy and grow meat it becomes valuable, for it gives information which could not well be acquired in any other way, unless by the costly and uncertain experiment of boring.

A field or district may be shown on the Geological Map as situated on the Clay, and yet there is, perhaps, nothing like clay to be found for some distance below the surface. Thus the idea has arisen that it is unnecessary to pay any regard to what strata the land is on, so long as the nature of the surface soil is taken into consideration.

But the fact is, that although often covered by a bed of gravel, or some other extraneous soil which has been placed upon the geological strata, either by the action of water or by some other motive power, yet that underlying strata exercises a very considerable influence upon the surface soil, whether sand, gravel, or clay. And although many of the grasses will grow on well nigh every strata, yet some few of the varieties are not only *indigenous* to one formation alone, but will thrive nowhere else.

By referring to our Map each one may see for himself on what particular formation his land is situated, and the tables of grasses on the following pages show the various grasses and clovers which are suitable for each kind of soil, and which will become permanent there.

The difference in the *sorts included* in the mixtures may not at first sight appear very great, for, as we have already remarked, there are many varieties of grasses which thrive on all formations. But the omission or addition of one sort may be a most important matter, by which a perfectly distinct result may be produced.

Besides the changes which are indicated in the following tables, the *quantity* of each sort of grass is increased or diminished in each of our mixtures according to the requirements of the land; for the right *proportion* in which the various grasses should be sown is quite as important a condition of success as the choice of varieties.

* Sutton's Geological Map (Copyright, entered at Stationers' Hall) will be supplied, mounted on rollers, price 2s. 6d.

TABLE OF GRASSES AND CLOVERS

Included in Messrs. SUTTON'S Permanent Pasture Mixtures specially prepared for the Formations and Surface Soils named.

BOTANICAL NAMES	ENGLISH NAMES	SYSTEM—'POST TERTIARY'										SYSTEM—'TERTIARY' OR 'CAINOZOIC'			
		Series—'RECENT' AND 'PLEISTOCENE'					Series—'PLOCENE'					Medium Loams	Clay Loams	Light Loams	Gravel, Sand, and Shell
		1.	2.	3.	4.	5.	6.	7.	8.	9.	10.					11.	12.
		Subject to Floods	Not subject to Floods	Petty Soils	Heavy Loams & Marls	Good Medium Loams	Gravel and Light Loams	Sand Drifts and Shingle	Formation 'Marsh Lands,' 'Drifts,' &c., &c.	Formation 'Crag,'	Surface Soils	Surface Soils	Surface Soils		
		.. S	.. M	.. M	.. L	.. M	.. S	.. S	.. S	.. M	.. L	.. L	.. M		
<i>Achillea Millefolium</i>	<i>Yarrow</i>	..	..	..	..	..	..	..	..	..	..	..	..
<i>Alopecurus pratensis</i>	<i>Meadow Foxtail</i>	..	..	..	..	..	..	..	..	..	..	..	..
<i>Anthoxanthum odoratum</i>	<i>Sweet Vernal</i>	..	..	..	..	..	..	..	..	..	..	..	..
<i>Agrostis stolonifera</i>	<i>Creeching Bent Grass</i>	..	..	..	..	..	..	..	..	..	..	..	..
<i>Avena flavescens</i>	<i>Yellow Oat Grass</i>	..	..	..	..	..	..	..	..	..	..	..	..
<i>Cynosurus cristatus</i>	<i>Crested Dogstail</i>	..	..	..	..	..	..	..	..	..	..	..	..
<i>Dactylis glomerata</i>	<i>Rough Cockfoot</i>	..	..	..	..	..	..	..	..	..	..	..	..
<i>Festuca duriuscula</i>	<i>Hard Fescue</i>	..	..	..	..	..	..	..	..	..	..	..	..
<i>Festuca elatior</i>	<i>Tall Fescue</i>	..	..	..	..	..	..	..	..	..	..	..	..
<i>Festuca heterophylla</i>	<i>Various-leaved Fescue</i>	..	..	..	..	..	..	..	..	..	..	..	..
<i>Festuca pratensis</i>	<i>Meadow Fescue</i>	..	..	..	..	..	..	..	..	..	..	..	..
<i>Festuca ovina</i>	<i>Sheep's Fescue</i>	..	..	..	..	..	..	..	..	..	..	..	..
<i>Festuca rubra</i>	<i>Red Fescue</i>	..	..	..	..	..	..	..	..	..	..	..	..
<i>Festuca tenuifolia</i>	<i>Fine-leaved Fescue</i>	..	..	..	..	..	..	..	..	..	..	..	..
<i>Festuca loliacea</i>	<i>Dark-leaved Fescue</i>	..	..	..	..	..	..	..	..	..	..	..	..
<i>Glyceria fluitans</i>	<i>Floating Sweet Grass</i>	..	..	..	..	..	..	..	..	..	..	..	..
<i>Lolium perenne Suttoni</i>	<i>Sutton's Perennial Rye Grass</i>	..	..	..	..	..	..	..	..	..	..	..	..
<i>Lolium perenne Paceyannum</i>	<i>Pacey's Perennial Rye Grass</i>	..	..	..	..	..	..	..	..	..	..	..	..
<i>Lolium perenne sempervirens</i>	<i>Evergreen Rye Grass</i>	..	..	..	..	..	..	..	..	..	..	..	..
<i>Phleum pratense</i>	<i>Timothy</i>	..	..	..	..	..	..	..	..	..	..	..	..
<i>Poa pratensis</i>	<i>Smooth-stalked Meadow Grass</i>	..	..	..	..	..	..	..	..	..	..	..	..
<i>Poa trivialis</i>	<i>Rough-stalked Meadow Grass</i>	..	..	..	..	..	..	..	..	..	..	..	..
<i>Poa nemoralis</i>	<i>Wood Meadow Grass</i>	..	..	..	..	..	..	..	..	..	..	..	..
<i>Poa aquatica</i>	<i>Water Meadow Grass</i>	..	..	..	..	..	..	..	..	..	..	..	..
<i>Poa nemoralis sempervirens</i>	<i>Evergreen Meadow Grass</i>	..	..	..	..	..	..	..	..	..	..	..	..
<i>Lolcus corniculatus</i>	<i>Birdsfoot Trefoil</i>	..	..	..	..	..	..	..	..	..	..	..	..
<i>Medicago lupulina</i>	<i>Yellow Trefoil</i>	..	..	..	..	..	..	..	..	..	..	..	..
<i>Pterisilium sativum</i>	<i>Sheep's Parsley</i>	..	..	..	..	..	..	..	..	..	..	..	..
<i>Trifolium repens perenne</i>	<i>Perennial White Clover</i>	..	..	..	..	..	..	..	..	..	..	..	..
<i>Trifolium pratense perenne</i>	<i>Creo Grass</i>	..	..	..	..	..	..	..	..	..	..	..	..
<i>Trifolium hybridum</i>	<i>Alsike Clover</i>	..	..	..	..	..	..	..	..	..	..	..	..
<i>Trifolium minus</i>	<i>Yellow Suckling Clover</i>	..	..	..	..	..	..	..	..	..	..	..	..

2 bushels Grass Seeds and 12 lbs. Clover Seeds supplied per acre.

2 bushels Grass Seeds and 12 lbs. Clover Seeds supplied per acre.

TABLE OF GRASSES AND CLOVERS

Included in Messrs. SUTTON'S Permanent Pasture Mixtures specially prepared for the Formations and Surface Soils named.

EXPLANATION.	SYSTEM—'SECONDARY' OR 'MESOZOIC'— <i>continued</i>				SYSTEM—'PRIMARY' OR 'PALÆOZOIC'								
	Series—'OOLITIC' OR 'JURASSIC'— <i>continued</i>				Series—'TRIASSIC'								
	Formation 'The Lias' and 'Salt Mar'				Formation 'Magnesian Limestone'								
	Surface Soils				Surface Soils								
BOTANICAL NAMES	Stiff Clays	Heavy Loams	Medium Loams	Light Sands	Clays	Heavy Loams	Marls	Medium Loams	Light Sands & Calcareous Soils	Clays	Heavy Loams	Medium Loams	Light Red Sands
					13. 'Lower Red Sandstone'				Formation				
Achillea Millefolium
Alonecanus pratensis
Anthoxanthum odoratum
Agrostis stolonifera
Avena flavescens
Cynosurus cristatus
Dactylis glomerata
Festuca durnuscula
Festuca elatior
Festuca heterophylla
Festuca pratensis
Festuca ovina
Festuca rubra
Festuca tenuifolia
Festuca lolifera
Glyceria fluitans
Lolium perenne Suttoni
Lolium perenne Faceyanum
Lolium perenne sempervirens
Phleum pratense
Poa pratensis
Poa trivialis
Poa nemoralis
Poa aquatica
Poa nemoralis sempervirens
Lotus corniculatus
Medicago lupulina
Petroselinum sativum
Trifolium repens perenne
Trifolium pratense perenne
Trifolium hybridum
Trifolium minus
	2 bushels Grass Seeds and 12 lbs. Clover Seeds supplied per acre.				2 bushels Grass Seeds and 12 lbs. Clover Seeds supplied per acre.				2 bushels Grass Seeds and 12 lbs. Clover Seeds supplied per acre.				

TABLE OF GRASSES AND CLOVERS

Included in Messrs. SUTTON'S Permanent Pasture Mixtures specially prepared for the Formations and Surface Soils named.

EXPLANATION.	SYSTEM—'PRIMARY' OR 'PALÆOZOIC'—continued															
	Series—'CARBONIFEROUS'				Series—'DEVONIAN'				Series—'SILURIAN'				Series—'CAMBRIAN'			
	Formation 15. 'Coal,' 'Millstone Grit,' and 'Carboniferous Limestone,' &c.				Formation 16. 'Red Conglomerate,' 'Cornstone,' 'Silty Limestone,' & 'Sandstone.'				Formation 17. 'Upper' and 'Lower Silurian'				Formation 18. 'Longmynd,' 'Harlech,' &c.			
	Surface Soils				Surface Soils				Surface Soils				Surface Soils			
BOTANICAL NAMES	Stiff Clays	Heavy Loams	Medium Loams	Light Loams	Clay Marls	Heavy Loams	Medium Loams	Light Sands	Clay Soils	Heavy Loams	Medium Loams	Sandy Soils	Stiff Clays	Heavy Loams	Medium Loams	Sandy Soils
	Achillea Millefolium..	..	L	L	V S	M	M
Alopecurus pratensis	..	L	L	..	..	..	..	..	..	..	..	..	..	M	M	..
Anthoxanthum odoratum	..	S	S	S	..	V S	..	M	..	..	..	S	..	..	..	S
Agrostis stolonifera	M	..	..	..	V S	..	..	M	L	..	..	..	..	..	..
Avena flavescens	V S	..	..	..	V S	..	M	V S	V S	..	..	V S	..	..	..
Cynosurus cristatus	L	L	M	L	L	L	M	L	L	M	M	L	L	L	M
Dactylis glomerata	L	L	M	M	L	L	M	M	M	L	M	L	L	M	L
Festuca duriuscula	V S	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Festuca elatior	V S	..	..	..	V S	..	..	..	S
Festuca heterophylla	..	V S	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Festuca pratensis	V S	S	M	..	..	..	..	..	..	..	..	..	..	..	..
Festuca ovina	V S	S	S	V S	..	..	..	..	..	..	..	..	..	..	..
Festuca rubra	S	M	L	..	..	..	..	..	..	..	..	..	..	..	..
Festuca tenuifolia	M	S	M	..	..	..	..	..	..	..	..	..	..	..	..
Festuca lolacea	S	..	..	..	V S	..	..	..	..	..	..	..
Glyceria fluitans
Lolium perenne Suttoni	..	M	L	L	L	L	L	M	..	..	..	..	..	..	..	..
Lolium perenne Paceyianum	..	L	L	M	S	L	L	L	..	..	..	..	..	..	..	..
Lolium perenne sempervirens	..	L	S	..	..	V S	..	..	..	..	..	V S	..	..	..	..
Pheleum pratense	M	S	S	L	L	M	V S	M	M	M	..	..	..	..	..
Poa pratensis	V S	M	L	L	L	M	..	L	L	L	..	V S	V S	L	M
Poa trivialis	L	M	S	V S	..	..	..	..	..	..	..	..	..	..	..
Poa nemoralis
Poa aquatica
Poa nemoralis sempervirens
Lotus corniculatus
Medicago lupulina	M	M	..	..	M	..	..	M	M	..	..	M	M	..	V S
Pterosemium sativum
Trifolium repens perenne	..	L	L	L	L	L	L	L	L	L	L	..	L	L	L	L
Trifolium pratense perenne	..	V S	V S	M	S	V S	M	S	V S	V S	M	..	L	M	M	S
Trifolium hybridum	S	M	M	..	..	..	..	S	V S	M	..	V S	M	M	..
Trifolium minus	S	..	..	..	..	..	..	..	..

2 bushels Grass Seeds and 12 lbs. Clover Seeds supplied per acre.

2 bushels Grass Seeds and 12 lbs. Clover Seeds supplied per acre.

2 bushels Grass Seeds and 12 lbs. Clover Seeds supplied per acre.

2 bushels Grass Seeds and 12 lbs. Clover Seeds supplied per acre.

TABLE OF GRASSES AND CLOVERS

Included in Messrs. SUTTON'S Permanent Pasture Mixtures specially prepared for the Formations and purposes named.

EXPLANATION.	SYSTEM—'PRIMARY' OR 'PALÆOZOIC'—continued		MIXTURES FOR SPECIAL PURPOSES					
	Series—'LAURENTIAN' AND 'IGNEOUS'		Sutton's Mixture for Cultivation with Sewage	Sutton's Mixture for Orchards, and Pastures under Trees	Sutton's 'Crystal Palace' Mixture, for Park Grounds	Sutton's Mixture for Cricket Grounds and Bowling Greens	Sutton's Mixture for Garden Lawns and Croquet Grounds	
	19. 'Serpentine Granites,' and 'Trappean Rock,' Surface Soils							
BOTANICAL NAMES	Clay Loams	Light Loams	Medium Loams	Sutton's Mixture for Cultivation with Sewage	Sutton's Mixture for Orchards, and Pastures under Trees	Sutton's 'Crystal Palace' Mixture, for Park Grounds	Sutton's Mixture for Cricket Grounds and Bowling Greens	Sutton's Mixture for Garden Lawns and Croquet Grounds
Achillea Millefolium..	..	..	..	..	..	M	..	..
Alopecurus pratensis	M	S	M	M	..	M	..	..
Anthoxanthum odoratum	..	M	S	..	..	M	..	..
Brachypodium sylvaticum..	..	..	..	..	..	..	..	..
Cynosurus cristatus..	V S	M	S	..	..	M	..	L
Dactylis glomerata..	L	S	V S	M	..	M	..	..
Festuca duriuscula..	..	..	L	S	..	L	V S	..
Festuca elatior..	..	..	..	S	..	..	..	..
Festuca pratensis..	..	..	..	..	..	..	..	..
Festuca ovina..	M	..	..	..	..	..	..	..
Festuca rubra..	V S	M	M	M	..	L	L	L
Festuca rubra..	V S	L	M	M	..	V S	L	L
Festuca tenuifolia..	S	M	M	..	..	..	..	V S
Festuca lolifera..	..	..	M	..	..	M	..	..
Glyceria fluitans..	..	..	..	S	..	..	..	..
Lolium italicum Suttoni..	..	..	..	..	..	..	..	..
Lolium perenne Suttoni..	..	..	M	L	..	..	..	..
Lolium perenne..	S	L	L	L	..	L	L	M
Lolium perenne Paceyannum	L	S	M	M	..	V S	..	..
Lolium perenne sempervirens	V S	..	..	..	..	M	M	V S
Onobrychis sativa..	..	..	..	..	..	..	..	..
Phleum pratense..	..	V S	..	..	..	..	..	..
Poa pratensis..	L	M	..	S	..	M	M	L
Poa trivialis..	..	V S	..	..	..	..	..	..
Poa nemoralis..	..	..	..	..	..	..	..	..
Poa aquatica..	..	..	..	S	..	..	..	..
Poa nemoralis sempervirens	..	V S	..	..	..	M	M	M
Medicago lupulina..	M	M	V S	M	..	V S	V S	..
Medicago sativa..	..	..	..	..	..	..	..	..
Ferroseium sativum..	..	..	..	..	..	..	..	..
Trifolium repens perenne..	L	L	L	M	..	L	L	L
Trifolium pratense perenne..	M	M	M	M	..	V S	V S	..
Trifolium hybridum..	M	M	M	..	..	V S	V S	..
Trifolium minus..	..	..	..	..	..	V S	S	S
2 bushels Grass Seeds and 12 lbs. Clover Seeds supplied per acre.	..	..	..	3 bushels Mixed Grasses and Clovers supplied per acre.	2 bushels Mixed Grasses and Clovers supplied per acre.	2 1/2 bushels Mixed Grasses and Clovers supplied per acre.	3 bushels Mixed Grasses and Clovers supplied per acre.	3 bushels Mixed Grasses and Clovers supplied per acre.
1 bushel Grass Seeds and 24 lbs. of Sainfoin and other small Seeds supplied per acre.	..	..	..	..	..	..	..	15



AGROSTIS STOLONIFERA.
(Creeping Fiorin, or Marsh Bent Grass.)



AVENA FLAVESCENS.
(Yellow Oat Grass.)

DESCRIPTIONS OF
AGRICULTURAL GRASSES.

FROM FORTY YEARS' ACTUAL OBSERVATION AND EXPERIMENT.

BY SUTTON AND SONS,
THE QUEEN'S SEEDSMEN.

AGROSTIS ALBA,—VAR. STOLONIFERA.

(*Creeping Fiorin, or Marsh Bent Grass.*)

FRENCH—Agrostide blanche stolonifere.

GERMAN—Fioringras.

Perennial. Time of flowering, July. Height, 24 inches. Panicle spreading when in flower, afterwards compact. Stem rooting, and with many joints. Spikelets awnless. Leaves rough both on surface and edge. Root fibrous and creeping.

Although none of the Creeping Bent Grasses are considered particularly nutritious for cattle, yet this variety is with advantage included in Permanent Mixtures, in consequence of its value in affording herbage early in Spring and late in Autumn, before and after other grasses have commenced or left off growing. Its long fibrous roots and creeping habit render it valuable in damp and moist situations. It is best adapted for irrigated meadows: on dry sands it turns to a form of couch called Squitch by the farmer. (*See Illustration, page 16.*)

AVENA FLAVESCENS.

(*Yellow Oat Grass.*)

FRENCH—Avoine jaune.

GERMAN—Goldhafer.

Perennial. Time of flowering, July. Height, 15 inches. Panicle branched. Spikelets generally 2 or 3 flowered. Stem round, slightly haired. Leaves hairy. Root slightly creeping.

This grass should form a portion of all Permanent Pasture Mixtures on light and calcareous soils, on which it especially thrives. It may easily be discerned in July by its bright golden cluster of flowers, and is among the latest varieties in coming to maturity.



1. PHELIUM PRATENSE.
 (Meadow Catstail, or Timothy Grass.)
 a An enlarged Floret.

3. DACTYLIS GLOMERATA.
 (Rough Cocksfoot.)

2. ALOPECURUS PRATENSIS.
 (Meadow Foxtail.)
 a An enlarged Floret.

The leaves are of a pale green colour, hairy, and although they are not produced in great abundance, are much relished by cattle. It affords very sweet hay. There is a spurious variety sometimes sold as *Avena flavescens*, but this is a very obnoxious weed, and should be carefully guarded against. (*See Illustration, page 16.*)

ALOPECURUS PRATENSIS.

(*Meadow Foxtail Grass.*)

FRENCH—Vulpin de Prés.

GERMAN—Wiesen Fuchsschwanz.

Perennial. Time of flowering, April, May, and June. Height, 2 feet. Panicle closely set, spiked, and upright. Spikelets ovate, with hairy calyx. Stems erect, smooth, thinly produced and containing 4 or 5 leaves, which are of a bright green colour early in the season. Root fibrous.

This variety is a spreading perennial, and is found in all the best natural pastures of Europe. It is one of the earliest and best grasses for Permanent Meadow or Pasture, remarkably quick in growth, and comes early to maturity. It may with advantage be included in Mixtures for 3 or 4 years' lay, as it furnishes a very large quantity of nutritive herbage, produces excellent aftermath, and is eagerly eaten by all kinds of stock. The leaves are broad and of dark green colour. The habit is somewhat coarse, hence it is unfit for Lawns or Bowling Greens, but its very early growth recommends it as eminently suitable for Ornamental Park purposes. It succeeds best on well-drained rich loamy and clay soils, makes excellent hay, and should be included in a larger or smaller proportion in most Mixtures for Permanent Pasture purposes. It is admirably adapted for irrigation, as it grows very early pasturage, and soon revives again with fresh water. (*See Illustration, page 18.*)

ANTHOXANTHUM ODORATUM.

(*Sweet Scented Vernal Grass.*)

FRENCH—Flouve odorante.

GERMAN—Gemeines Ruchgras.

Perennial. Time of flowering, April and May. Height, 12 to 15 inches. Panicle oblong, and of dark green colour in its early stage of growth. Spikelets ovate-lanceolate, 4 or 5 together. Leaves pale green, and slightly hairy. Stem circular and smooth, with joints far apart. Root fibrous.

To the presence of this grass, our summer hay-fields owe so much of their fragrance, that it should be included in all Mixtures for Permanent Meadow or Hay. The scent is less distinguishable in a fresh than in a dried state, but its very pleasant taste, somewhat resembling highly flavoured tea, is discernible at all stages of its growth. In point of productiveness, this grass is inferior to Foxtail, Cocksfoot and other strong growing varieties, but it is of excellent quality, and comes very early. On account of its broad foliage, it is ill adapted for grounds where short grass is indispensable, but for Parks and Pleasure Grounds it is



1. ANTHOXANTHUM ODORATUM.
(Sweet Vernal Grass.)



a a Enlarged Florets.

2. CYNOSURUS CRISTATUS.
(Crested Dogtail.)

valuable and especially suitable. It is a well-known fact that pastures in which this grass abounds naturally, (such, for instance, as the extensive sheep grazing districts in Kent,) produce the finest mutton, and both in its young state, and when mixed with other varieties, it is much relished by cattle and horses. It is valuable in hay, as its flavour enhances the price greatly. (*See Illustration, page 20.*)

CYNOSURUS CRISTATUS.

(*Crested Dogstail.*)

FRENCH—Cynosure cretelle.

GERMAN—Kammgras.

Perennial. Time of flowering, June and July. Height, 1 to 2 feet. Panicle upright. Spikelets alternate, containing several florets without awns. Leaves thin and narrow. Stem and joints smooth, sheath also smooth. Root tufted and fibrous.

This is a valuable fine short grass, and constitutes a considerable portion of the herbage of Sheep Walks and Deer Parks. It is found in most descriptions of Meadows, whether used for Hay or Pasture. Sinclair describes it as forming "a close dense turf of grateful nutritive herbage, and is little affected by extremes of weather." From our own experience and observation, we can fully endorse the opinion of this eminent authority, and recommend its being included in all Permanent Pasture Mixtures. We have especially noticed the beneficial results obtained by its use with other grasses in Sheep Pastures; and its value is considerably enhanced by the fact that sheep fed on Pastures containing it are less liable to foot rot than when fed on Pastures composed of the more soft-leaved varieties. On account of its close-growing habit and evergreen foliage, it is particularly valuable for Lawns, Pleasure Grounds, and other places kept under by the scythe. (*See Illustration, page 20.*)

DACTYLIS GLOMERATA.

(*Rough Cocksfoot.*)

FRENCH—Dactyle gloméré.

GERMAN—Gemeines Knaulgras.

Perennial. Time of flowering, June till August. Height, 2 to 3 feet. Panicles tufted or crowded and pointing one way. Stem upright and rough. Spikelets small, much crowded. Leaves upright in their early stage of growth, then flat, and rough on upper and lower surface. Root fibrous and slightly spreading.

This well-known grass is to be found everywhere, on all varieties of soil, and in all situations. Its great recommendation is the enormous quantity of produce it yields, and the rapidity with which it shoots forth again after having been eaten or cut. For these reasons, and also for the important fact of its being so much relished by Horses and Cattle, it is eminently suitable for sowing with other quick growing grasses for alternate husbandry. It should be included in all Permanent Pasture Mixtures, except in parks and ornamental grounds, where its tufty habit of growth renders it inadmissible. It withstands drought well. (*See Illustration, page 18.*)



FESTUCA DURIUSCULA.
(Hard Fescue.)



FESTUCA ELATIOR.
(Tall Fescue.)

FESTUCA DURIOUSCULA.

(*Hard Fescue.*)

FRENCH—Fétuque durette.

GERMAN—Harter Schwingel.

Perennial. Time of flowering, June. Height, 18 to 24 inches. Panicle unilateral and spreading. Spikelets equal, and generally 6-seeded. Leaves narrow and upright. Stem 4 or 5 leaved, upright and smooth. Root fibrous.

This is one of the most valuable and important of the Fescue tribe of Pasture grasses, and its presence in hay is generally indicative of superior quality. It retains its verdure during long-continued drought in a very remarkable manner, and is one of the best of pasture grasses. All kinds of stock eat it with avidity, but especially sheep, which always thrive well on the succulent herbage it produces. From the fineness of its foliage and evergreen appearance during winter, it is eminently adapted for sowing in parks and ornamental grounds. (*See Illustration, page 22.*)

FESTUCA ELATIOR.

(*Tall Fescue.*)

FRENCH—Fétuque élevée.

GERMAN—Langes Hafergras.

Perennial. Time of flowering, June and July. Height, 3 to 5 feet. Panicle loose and branching. Spikelets numerous and slightly awned. Leaves flat and tapering, smooth within and rough without. Stems generally 5-jointed. Growth very erect. Root fibrous.

Some botanists consider the *F. elatior* and the *F. pratensis* to be identical, and these grasses are consequently to be found in many botanical works bracketed together as synonymous. There is, however, a very decided difference, which is clearly manifest not only in the seed, but in the various stages of growth of the two varieties. The seed of the true *F. elatior* is broader and longer than that of the *F. pratensis*. The growth, too, is more robust, of much greater size in every respect, and it will consequently produce a larger bulk of hay or feed. The panicles also of the *F. elatior* are very distinct from those of the *F. pratensis*, being much branched, bent, and drooping, and composed of large clusters. Those of the *F. pratensis*, on the contrary, are decidedly upright in their early stages of growth, becoming slightly bent as the flower approaches maturity. On account of its strong growth, we do not recommend the use of this grass where a fine turf is required, yet as a very productive variety, and one which is greedily eaten by stock, both as hay and green food, it should form a part of all Permanent Pasture Mixtures for moist and strong soils, and also for irrigation purposes. It is also admirably adapted for cover, in which its large seeds are useful as food. (*See Illustration, page 22.*)



1. FESTUCA OVINA.
(Sheep's Fescue.)

3. FESTUCA LOLIACEA.
(Darnel-leaved Fescue.)

2. FESTUCA PRATENSIS.
(Meadow Fescue.)

FESTUCA OVINA.

(*Sheep's Fescue.*)

FRENCH—Fétuque des brebis.

GERMAN—Schaf Schwingel.

Perennial. Time of flowering, June and July. Height, 12 to 18 inches. Panicle upright, compact, and short. Spikelets alternate, generally containing 4 or 6 florets, which are usually awned. Leaves remarkably narrow. Stem very erect, jointed, and angular. Root fibrous and tufted.

This grass is supposed to have received its specific name from Linnæus, on account of its being so much relished by sheep; and Gmelin, the eminent Russian botanist, says that the Tartars generally pitched their tents during the summer months in the closest proximity to it, on account of its value to their herds. There is no question but that on good Upland Pastures, used especially for sheep grazing, this grass should form a large proportion. In produce it is inferior to some others, but deficiency in quantity is more than counterbalanced by its excellent nutritive qualities. (*See Illustration, page 24.*)

FESTUCA LOLIACEA.

(*Rye, or Darnel-leaved Fescue.*)

FRENCH—Fétuque fausse ivraie.

GERMAN—Lolchschwingel.

Perennial. Time of flowering, July. Height, 2 to 2½ feet. Panicle spiked in double rows, like Perennial Rye Grass. Spikelets shortly stalked with two glumes. Stem 3 or 4 jointed, and quite smooth. Root fibrous and perennial. Leaves, long, broad, and drooping.

This very valuable variety is most closely allied to, and is sometimes mistaken for Rye Grass (as its name implies). It is however easily distinguished from Rye Grass, being short-stalked and having always two outer glumes or pales. It also differs essentially from Rye Grass from the fact that it *improves* as it gets fully developed. It is especially adapted to marshy soils, irrigated meadows, and rich river flats which are occasionally overflowed; and being of very early growth, and producing a very tender root foliage, it should be included in all mixtures for the above-named purposes. (*See Illustration, page 24.*)

FESTUCA PRATENSIS.

(*Meadow Fescue.*)

FRENCH—Fétuque des prés.

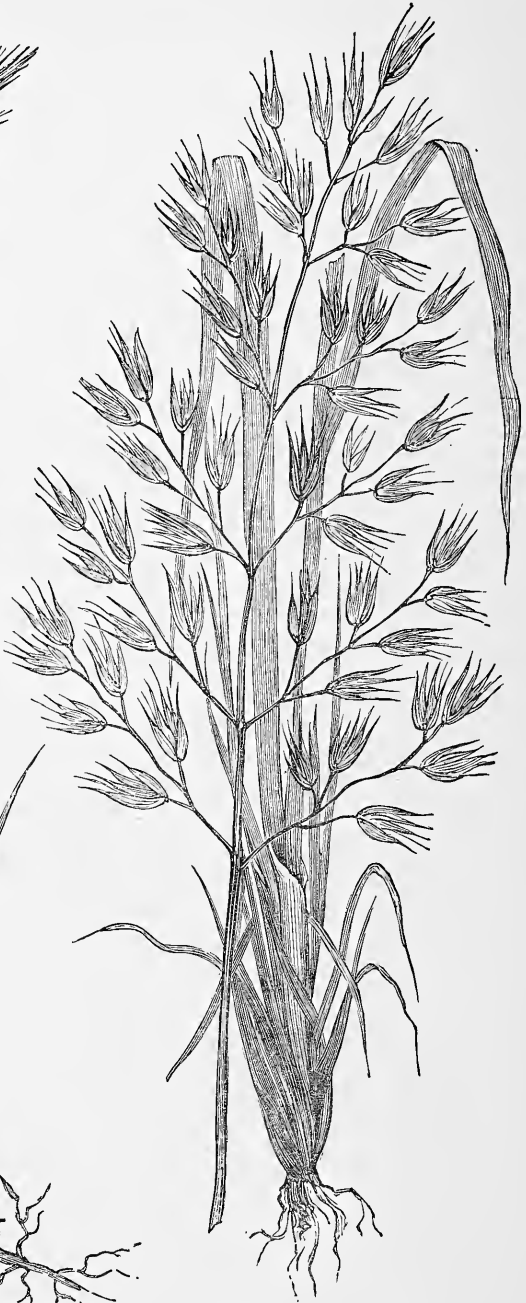
GERMAN—Wiesen Schwingel.

Perennial. Time of flowering, June. Height, 12 to 18 inches. Panicle compact, nearly upright. Spikelets approaching ovate, and containing 5 or 6 florets. Leaves flat and rough. Stem smooth, hollow, and round. Root fibrous.

One of the earliest, most nutritious, and productive of our natural grasses. Both in its green and dried state it is eagerly eaten by all kinds of stock. It is excellent for alternate



FESTUCA RUBRA.
(Red Fescue.)



FESTUCA HETEROPHYLLA.
(Various-leaved Fescue.)

husbandry, but is especially suitable for Permanent Pasture purposes. It is more adapted for moist than dry soils, but it constitutes a very considerable portion of the herbage of all high-class Pastures. It is thus referred to by Commander Mayne, in his "Four Years in British Columbia and Vancouver's Island:"—"Cattle and horses are very fond of *F. pratensis*, or Sweet Grass, and it has a wonderful effect in fattening them. I have seen horses on Vancouver's Island, where the same grass grows, which had been turned out in the autumn, brought in in April in splendid condition, and as fresh as if they had been most carefully treated all the time." (*See Illustration, page 24.*)

FESTUCA RUBRA.

(*Red Fescue.*)

FRENCH—Féтуque rouge.

GERMAN—Rother Schwingel.

Perennial. Time of flowering, June. Height, 2 to 2½ feet. Panicle drooping. Spikelets unequal, and generally 5 or 6-seeded. Slightly awned. Leaves rather narrow. Stems 4 or 5-jointed, quite smooth, and bending. Root fibrous, and very creeping.

Although this grass is considered by some to be merely a variety of *F. duriuscula*, altered in habit by frequent cultivation on dry soil, yet to the careful observer there will appear an appreciable difference between the two varieties. The leaves are broader, of darker colour than the *F. duriuscula*, while the growth is not so strong. The principal difference, however, is in the remarkable creeping habit of the *F. rubra*, which causes it to thrive well, where the *F. duriuscula* would fail. The *F. rubra* yields quite an average bulk of herbage, but it is especially valuable on account of its suitability for loose, light, dry soils, and for its endurance throughout severe droughts. Its creeping roots penetrate so deeply into the soil, as to enable the plant to give a fresh and green appearance when other varieties have apparently perished. It is particularly adapted for the best pastures by the sea-side. (*See Illustration, page 26.*)

FESTUCA HETEROPHYLLA.

(*Various-leaved Fescue.*)

FRENCH—Féтуque feuilles variées.

GERMAN—Wechselblättriger Schwingel.

Perennial. Time of flowering, June and July. Height, 2½ to 3 feet. Panicle long, loose, slightly spreading. Stems smooth, numerous, and very upright. Spikelets spreading and open. Root strictly fibrous. Leaves broad, very dark green colour.

This species is a native of France, where it is extensively grown. It was introduced to England in 1814, and is well adapted to our climate, both for Ornamental and Pasture purposes. Where heavy first crops of hay are required, it is particularly suitable, but it produces little but root leaves after mowing. (*See Illustration, page 26.*)



GLYCERIA FLUITANS.
(*Floating Sweet Grass.*)



FESTUCA TENUIFOLIA.
(*Fine-leaved Fescue.*)

FESTUCA TENUIFOLIA.

(Fine-leaved Fescue.)

FRENCH—Fétuque à feuilles menues. GERMAN—Schmalblättriger Schwingel.

Perennial. Time of flowering, June. Height, 18 to 24 inches. Panicles rather drooping, inclined to be loose. Spikelets awned. Stem erect and pointed. Leaves narrow. Root fibrous.

This is sometimes called Sheep's Fescue, but erroneously so: as the true Sheep's Fescue is smaller in seed, finer in growth, and of dwarfer habit. It is a valuable variety of *F. ovina*. *F. tenuifolia* produces a beautiful evergreen appearance. Hence it is valuable for Ornamental and Pleasure Grounds. It is also exceedingly useful in Pastures, as it improves the quality of the herbage, and gives a fine appearance to the hay. (*See Illustration, page 28.*)

GLYCERIA FLUITANS.

(Floating Sweet Grass.)

FRENCH—Glycérie flottante.

GERMAN—Schwimmgras.

Perennial. Time of flowering, May to August. Height, 3 feet. Panicle nearly erect, long, slightly branched. Spikelets long, slender, and slightly round. Leaves narrow. Stem smooth and thin. Root creeping.

This grass is found growing naturally by the sides of ditches, pools, lakes, and rivers, and is perhaps the only water grass which is eaten with avidity by both sheep and cattle. The leaves are narrow, of a pale green colour, very succulent, and exceedingly productive. It is invaluable for moist situations, and thrives especially in the fens of Lincolnshire. (*See Illustration, page 28.*)

LOLIUM ITALICUM SUTTONI.

(Sutton's Improved Italian Rye Grass.)

FRENCH—Ivraie d'Italie Sutton.

GERMAN—Italienisches Raygras Sutton.

Biennial. Time of flowering, June and July. Height, 4 to 6 feet. Panicle erect. Spikelets many flowered. Leaves broad and very succulent. Stem somewhat rough. Roots fibrous.

The Italian Rye Grass was introduced into this country in 1833. It is very distinct in its character and seed from any other Rye Grass, and as it is not strictly perennial in habit, it is more suitable for alternate husbandry, and producing early feed in the spring for sheep and cattle, than for use in Permanent Pastures. For Sewage Cultivation it stands in the first rank of all forage plants. We consider our *Improved Italian* to be by far the best type of Italian Rye Grass in cultivation. We have taken great trouble to improve it by yearly selection, and have succeeded in raising a variety unequalled for productiveness and earliness of growth. For further particulars of this variety, we refer the reader to "Sutton's Farmer's Year Book and Grazier's Manual." (*See Illustration, page 30.*)



LOLIUM PERENNE SEMPERVIRENS.
(*Evergreen Rye Grass.*)

LOLIUM ITALICUM SUTTONI.
(*Sutton's Italian Rye Grass.*)

LOLIUM PERENNE SUTTONI.
(*Sutton's variety, with its finer leaflets.*)

LOLIUM PERENNE SUTTONI.

(Sutton's Perennial Rye Grass.)

FRENCH—*Ivraie vivace Sutton.*

GERMAN—*Englisches Raygras Sutton.*

Perennial. Time of flowering, June. Height, 20 inches. Panicle flattened or compressed. Spikelets erect and compound. Leaves long and narrow. Stem upright, smooth, 4 or 5-jointed, slightly coloured red or purple. Root fibrous.

This variety is distinguished by the remarkable fineness of its foliage. The leaves are long and narrow, very abundant, and are reproduced in a remarkably short space of time after cutting. It is invaluable for Permanent Pastures, as it produces a bulky crop. It tillers out close to the ground, and soon forms a very compact sward. It retains its verdure throughout the year, and at all times produces a bright green effect. Hence it is eminently suited for sowing in Ornamental Grounds. (*See Illustration, page 30.*)

The other varieties of Rye Grass are :—

LOLIUM PERENNE PACEYANUM.

(Pacey's Perennial Rye Grass.)

FRENCH—*Ivraie vivace Pacey.*

GERMAN—*Englisches Raygras Pacey.*

LOLIUM PERENNE SEMPERVIRENS.

(Evergreen Rye Grass.)

FRENCH—*Ivraie vivace à feuilles persistantes.* GERMAN—*Wintergrünes Raygras.*

Both of which may be used in conjunction with *L. perenne Suttoni*, for Permanent Pasture purposes. (*See Illustration, page 30.*)

PHLEUM PRATENSE.

(Meadow Catstail, or Timothy Grass.)

FRENCH—*Fléole des prés.*

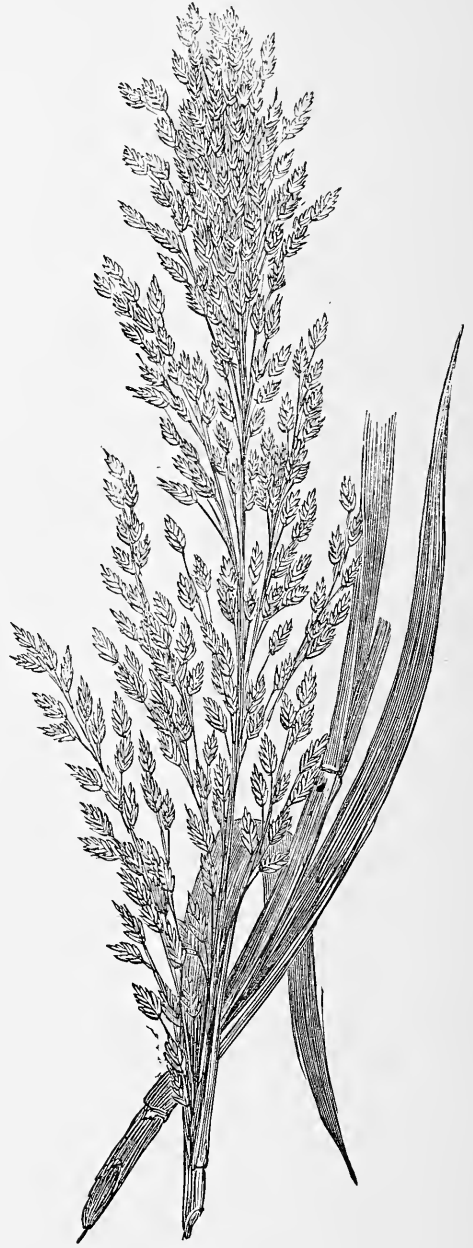
GERMAN—*Timothygras.*

Perennial. Time of flowering, June and July. Height, 18 inches to 2 feet. Panicle cylindrical, compact, and upright. Leaves flat, inclined to roughness. Spikelets long and ovate. Stems much jointed, smooth, strong, and upright. Root fibrous and slightly creeping.

This grass is one of the most common of Meadow Plants. It grows very luxuriantly in some parts of America, often attaining the height of 4 feet. It forms the great bulk of the grass hay of that country. In England it is also very largely cultivated in conjunction with other varieties. For very early feeding it is superior to Cocksfoot and some varieties of the Common Rye Grass; is equally productive, and may be pastured a long time through the spring without damage to the hay crop. It succeeds well on almost any description of soil, especially that of a moist and retentive nature, and is keenly relished by all kinds of stock, whether in its green state or made into hay. (*See Illustration, page 18.*)



POA NEMORALIS.
(Wood Meadow Grass.)



POA AQUATICA.
(Water Meadow Grass.)

POA AQUATICA.

(Water Meadow Grass.)

FRENCH—Paturin aquatique.

GERMAN—Wasser Rispengras.

Perennial. Time of flowering, July and August. Height, 4 to 6 feet. Panicle erect and branched. Spikelets many flowered and generally awnless. Leaves long and broad. Stems erect, smooth, and jointed. Root very creeping.

The *P. aquatica* grows most luxuriantly in the Fen counties, where it forms not only a very rich pasturage in the summer, but the chief winter fodder. There is no doubt but that it is entitled to receive an increased amount of attention, especially in districts wholly or partially flooded. It may be cut three or four times a year, and produces an immense quantity of herbage on soils which will not grow other varieties of grass. The seed is generally scarce. (*See Illustration, page 32.*)

POA NEMORALIS.

(Wood Meadow Grass.)

FRENCH—Paturin des Bois.

GERMAN—Hain Rispengras.

Perennial. Time of flowering, July and August. Height, 18 inches to 2 feet. Panicle loose, slender, inclined on one side. Spikelets ovate, and with generally 4 florets. Leaves long and narrow. Stem slender, erect, almost smooth, 5 or 6 jointed. Root fibrous and slightly creeping.

This grass is very common in our woods and thickets, but has not hitherto been used to any great extent for Pasture purposes. It is a valuable variety, and should be included in most Permanent Pasture Mixtures, as it produces a thicker growth of both culms and stalks than either *P. pratensis* or *P. trivialis*. It is, however, especially valuable for Lawns and Ornamental Grounds, overshadowed by trees. (*See Illustration, page 32.*)

POA NEMORALIS SEMPERVIRENS.

(Hudson's Bay or Evergreen Meadow Grass.)

FRENCH— { Paturin des Bois à
feuilles persistantes.

GERMAN—Wintergrünes Hain Rispengras.

Perennial. Time of flowering, July. Height, 18 inches to 2 feet. Panicle loose and slender. Spikelets oval-shaped, with 4 florets. Leaves very narrow. Stem slender and erect. Root fibrous.

This is one of the numerous varieties of *P. nemoralis*, and is the most important of them all. Its great recommendation is its perpetual greenness and its remarkably dwarf, close growing habit. These qualities, as well as its reproductiveness, render it one of the very best varieties for Lawns or Pleasure Grounds, and the fact of its succeeding well under the shade of trees considerably enhances its value.



a Leaf with pointed Ligule.

1. POA TRIVIALIS.
(Rough-stalked Meadow Grass.)

2. POA PRATENSIS.
(Smooth-stalked Meadow Grass.)

a. Leaf with short obtuse Ligule.

POA PRATENSIS.

(Smooth-stalked Meadow Grass.)

FRENCH—Paturin des prés.

GERMAN—Wiesen Rispengras.

Perennial. Time of flowering, May and June. Height, 2 feet. Panicle loose. Spikelets oblong, generally containing 4 or 5 florets. Leaves generally broad. Stem quite smooth and round, the upper sheath longer than its leaf. Root creeping.

This variety in early spring presents a very beautiful green appearance, and is easily distinguished from the *P. trivialis* by its smooth culms and leaves. Being of a more creeping habit than other Poas, it is sometimes condemned as exhausting the soil. Our own experience, however, is, that although not so valuable as the *P. trivialis*, yet on account of its unusual earliness and great productiveness at a period of the season when other grasses are comparatively dormant, it should be included in most Permanent Pasture Mixtures. The *P. pratensis* delights in a good average dry soil, makes excellent hay and aftermath, and is valuable for sowing with other grasses for Garden Lawns and Ornamental Grounds. (*See Illustration, page 34.*)

POA TRIVIALIS.

(Rough-stalked Meadow Grass.)

FRENCH—Paturin commun.

GERMAN—Gemeines Rispengras.

Perennial. Time of flowering, middle of June. Height, 18 inches to 2 feet. Panicle loose. Spikelets oval, somewhat compressed, and connected by a web. Leaves tapering. Stem rather rough, round, 5 or 6-jointed. Root fibrous, but not spreading.

This grass is somewhat similar in appearance to *P. pratensis*, but the two varieties differ very much in habit and general properties. *P. trivialis* is only suitable for good deep rich moist loams, stiff heavy clays, and irrigated meadows. It is seldom or never met with in Upland Pastures, and if sown in such positions will soon disappear. Opinions differ as to the merits of this grass, some botanists declaring it to be only a second-rate variety. Our own experiments quite confirm both Sinclair and Parnell, who thus refer to it:—"The superior produce of this Poa over many other species of grass, its highly nutritive properties, the season at which it arrives at perfection, and the marked partiality which horses, oxen, and sheep have for it, are merits which distinguish it as one of the most valuable of those grasses which affect rich soil and sheltered situations." (*See Illustration, page 34.*)





1. TRIFOLIUM PRATENSE.
(Red or Broad Clover.)

a Leaf of ditto.

2. TRIFOLIUM INCARNATUM.
(Italian Crimson Clover.)

NOTES ON SOME OF THE PRINCIPAL
CLOVERS USED IN AGRICULTURE.

TRIFOLIUM PRATENSE.

(Red or Broad Clover.)

This variety is used for alternate husbandry, and other purposes where a permanent pasture is not required. It is unquestionably a valuable fodder plant, and yields an abundance of excellent feed or hay. Sheep and cattle are always fond of depasturing it. There are several varieties of Red Clover besides the English, the principal of which are French, German, and American. The English is of stronger growth and more robust habit than the others, and we consider it to be the best of all. But little inferior in value to the English is the North German, which, coming from a colder climate than our own, answers well in this country, and appears even hardier than English seed. We have sometimes seen crops produced from this variety fully equal to the best English. The French is easily distinguished from the preceding by the leaves and stems being of darker colour, smoother, and the leaves are generally rounder. The crop, however, is not nearly so heavy, and the plant not so robust as the varieties previously alluded to. The American is not so luxuriant in growth as either, and should be carefully avoided, especially as it generally contains very obnoxious weeds. *(See Illustration, page 36.)*

TRIFOLIUM HYBRIDUM.

(Alsike or Hybrid Clover.)

This variety was originally introduced from Sweden, and is named "Hybrid Clover," on account of its possessing qualities and appearances between the Broad Red and White Dutch varieties. In fact, it possesses all the productive properties of the former with the permanent nature of the latter, and is in consequence extremely valuable for pasture or soiling. Some lands, from the too frequent sowing of Clover, fail to produce a crop, and are termed "Clover sick." On such soils the Alsike will often answer admirably, and produce very heavy crops where no other Clover will succeed. After cutting or feeding off, and taking a cereal crop, the same land may again grow Red Clover as well as ever. The flowers of Alsike Clover are of a distinct light pink colour. *(See Illustration, page 38.)*

TRIFOLIUM MINUS.

(Yellow or Red Suckling Clover.)

This has been recommended for dry rocky places, but its very small growth and scanty produce render it of little value, except for Lawns and Pleasure Grounds, for both of which purposes it may be sown with advantage.



TRIFOLIUM REPENS PERENNE.
(Perennial White Clover.)

a Separate leaf of Alsike.

TRIFOLIUM HYBRIDUM.
(Alsike Clover.)

TRIFOLIUM INCARNATUM.

(Carnation or Crimson Clover.)

This is said to have been introduced from Italy, hence it is often called "Italian Crimson Clover." Where a single crop is required, either alone or with Italian Rye Grass, this is undoubtedly the very best Clover that can be grown. It is generally sown in the autumn on the stubble, and comes in for cutting during the May following, at which time it may be readily distinguished by the bright crimson colour of its flowers. It is exceedingly productive, and cattle are very fond of it when young and green. The growth is very rapid, and on this account it is valuable for sowing on clover lays, which, after the corn is cut, are found to be deficient. It then comes in for cutting at the same time as the clovers sown in the spring. It may also be sown in March for cutting in July. (*See Illustration, page 36.*)

TRIFOLIUM INCARNATUM TARDIF.

(Late Red Trifolium.)

This possesses all the quick growing and productive properties of the *Trifolium incarnatum*, but comes in a fortnight later. A valuable succession is thus obtained.

MEDICAGO LUPULINA.

(Common Yellow Clover, Trefoil, Nonsuch, or Black Medick.)

This is a biennial plant, and consequently only valuable for sowing on land required to lay down 1, 2, or 3 years. It is very productive and grows with great rapidity, especially when indigenous to the soil, as it often is. If too large a proportion be sown, it is apt to smother other clovers. It is an excellent fodder plant with other grasses and clovers, but should not be used alone. As it produces early feed, it is also useful for sowing at the rate of 2 or 3 pounds per acre with Saintfoin.

LOTUS CORNICULATUS.

(Birdsfoot Trefoil.)

A very productive perennial plant, particularly suitable for dry, heathy, and sandy soils. It is eaten with avidity by cattle, and also by sheep. It has much narrower leaves than *L. major*, with a smooth stem, bright yellow flower, occasionally tinged with orange. The seed is larger than *L. major*, and almost black.

LOTUS MAJOR.

(Greater Birdsfoot Trefoil.)

This is scarcely so productive as the former, but has larger and more oval-shaped leaves, which are very hairy. The colour of the leaf is darker, and the flowers, though yellow, have a decided tinge of red. The seed is smaller than *L. corniculatus*, and of a deep green colour.



1. TRIFOLIUM PRATENSE PERENNE. (*Perennial Red Clover, or Cow Grass.*)
a Leaf of common Red Clover.

TRIFOLIUM REPENS—VAR. PERENNE.

(Perennial White Clover, sometimes called White Suckling.)

If there is one Clover more valuable than another for Permanent Pasture purposes, it is the Wild White or Perennial stock of the White Dutch Clover. It is almost exclusively used in some of the best sheep-grazing districts of the South and South-Eastern part of England, and although the Common White Dutch Clover will come up spontaneously on most of our well cultivated lands, yet a sowing of this should always be made either for Permanent Pasture, or to remain down 2, 3, or 4 years. It produces a beautiful white flower, sometimes slightly tinged with red. The leaves are very dense, of oval shape, bright green colour, and distinctly blotched with white. (*See Illustration, page 38.*)

TRIFOLIUM PRATENSE HYBRIDUM GIGANTEUM SUTTONI.

(Sutton's Giant Hybrid Cow Clover.)

A valuable Clover recently introduced by us. It is a hybrid between the Common Red Clover and Cow Grass, partaking of the abundant cropping properties of the former, and the succulent nature of the latter. It is exceedingly productive, and under favourable circumstances, will produce three heavy crops for mowing or grazing in one year. It has also the merit of succeeding on soils that will not grow the Common Red Clover.

TRIFOLIUM PRATENSE PERENNE.

(Perennial Red Clover, Cow Grass.)

This is quite distinct from the Common Red Clover, (*Trifolium pratense*), and is most valuable for purposes for which the Red Clover is wholly unsuited. It produces only one crop in the year, and comes into cutting fully a fortnight or three weeks *after* the first cutting of Red Clover, at a time when green food is generally very scarce. A further important use for the Cow Grass is its suitability for Permanent Pastures; indeed, it is almost the only Clover that can be depended on to stand for any length of time on alluvial and clay soils. It differs very much in appearance from the Common Red Clover, as will be seen from the following notes made from specimens of each, grown at our Experimental Farm:—

BROAD CLOVER.

LEAF—Broad, the white spot clearly defined, decidedly oval shape, slightly woolly at the edges and back of leaf.

STEM—Succulent, hollow, and inclined to be pithy, rather hairy, and the same colour from base to extreme point.

FLOWER—Light pink, round in form, large size.

COW GRASS.

LEAF—Rather narrow, the white spot occasionally very obscure, elongated, very woolly at edges and the back of leaf, which has quite a velvety appearance.

STEM—Solid, and very succulent, with a light vein of red running up towards the leaf.

FLOWER—Dark pink, slightly oval form, medium size.

(See Illustration, page 40.)

Grasses not recommended for Permanent Pasture, *Or any other than exceptional Cultivation.*

AIRA CÆSPITOSA.

(Tufted Hair Grass.)

This grass has large and flat wiry leaves, and is sometimes found growing naturally on damp marshy soils. It is only suitable for sowing for game covers, and is seldom eaten by domestic animals.

AMMOPHILA ARUNDINACEA.

(Sea Reed or Mat Grass.)

From the long creeping roots peculiar to this grass, and the fact of its succeeding on light drifting sands, where no other grass will thrive, this variety is specially suited for fixing sandbanks. We recently saw it growing most luxuriantly on the shore at Schevengen, in Holland, where it was the only green plant to be seen for miles.

ARRHENATHERUM AVENACEUM.

(Fibrous-rooted or Common Tall Oat-like Grass.)

A fibrous rooted perennial, not relished by cattle on account of its bitter taste, but very productive and of luxuriant growth. Excellent for plantations and for forming covers.

BRACHYPODIUM SYLVATICUM.

(Wood Brachypodium or Wood Fescue Grass.)

This is one of the very few grasses that thrive well under trees. Its dark green foliage, at all times of the year, renders it exceedingly useful for sowing in shady woods and plantations, or in places on the lawn where other grasses fail.

ELYMUS ARENARIUS.

(Sand Sea Lyme Grass.)

Sometimes called the Sugar Cane of Great Britain, as its hay is said to contain a certain quantity of nutritious matter. It is, however, of too coarse a habit, and is not sufficiently valuable to become cultivated for any other use than binding loose sands, for which purpose, on account of its long and powerful creeping roots, it is eminently adapted.

ELYMUS GENICULATUS.

(Knee-Jointed Lyme Grass.)

This plant is somewhat similar to the *E. arenarius*, but differs in its foliage. The leaves are narrower, and the spikes more loose. It produces large Oat-like seeds, which are said to afford good food for wild fowl, and it forms excellent cover for game.

FESTUCA GIGANTEA, (or Bromus Giganteus.)

(Tall-bearded Fescue or Brome Grass.)

This grass is useful for sowing in game covers, and in other places where coarse and luxuriant herbage is required.

PHALARIS ARUNDINACEA.

(Reed-like Canary Grass.)

A very tall and conspicuous grass, often attaining the height of 6 feet. It grows naturally on wet heavy clay soils, and is useful for sowing to produce a green appearance on the margins of lakes and pools.

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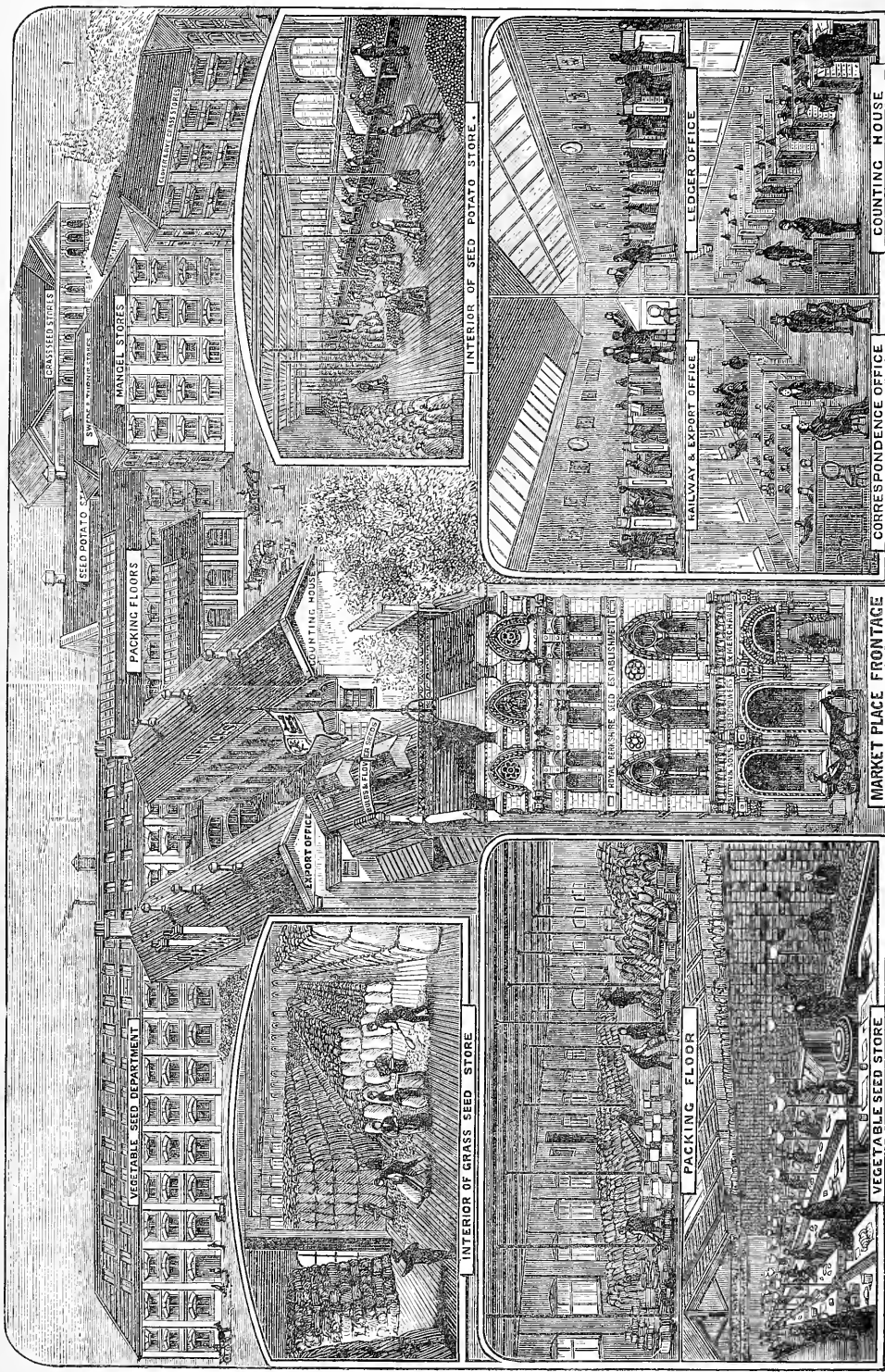
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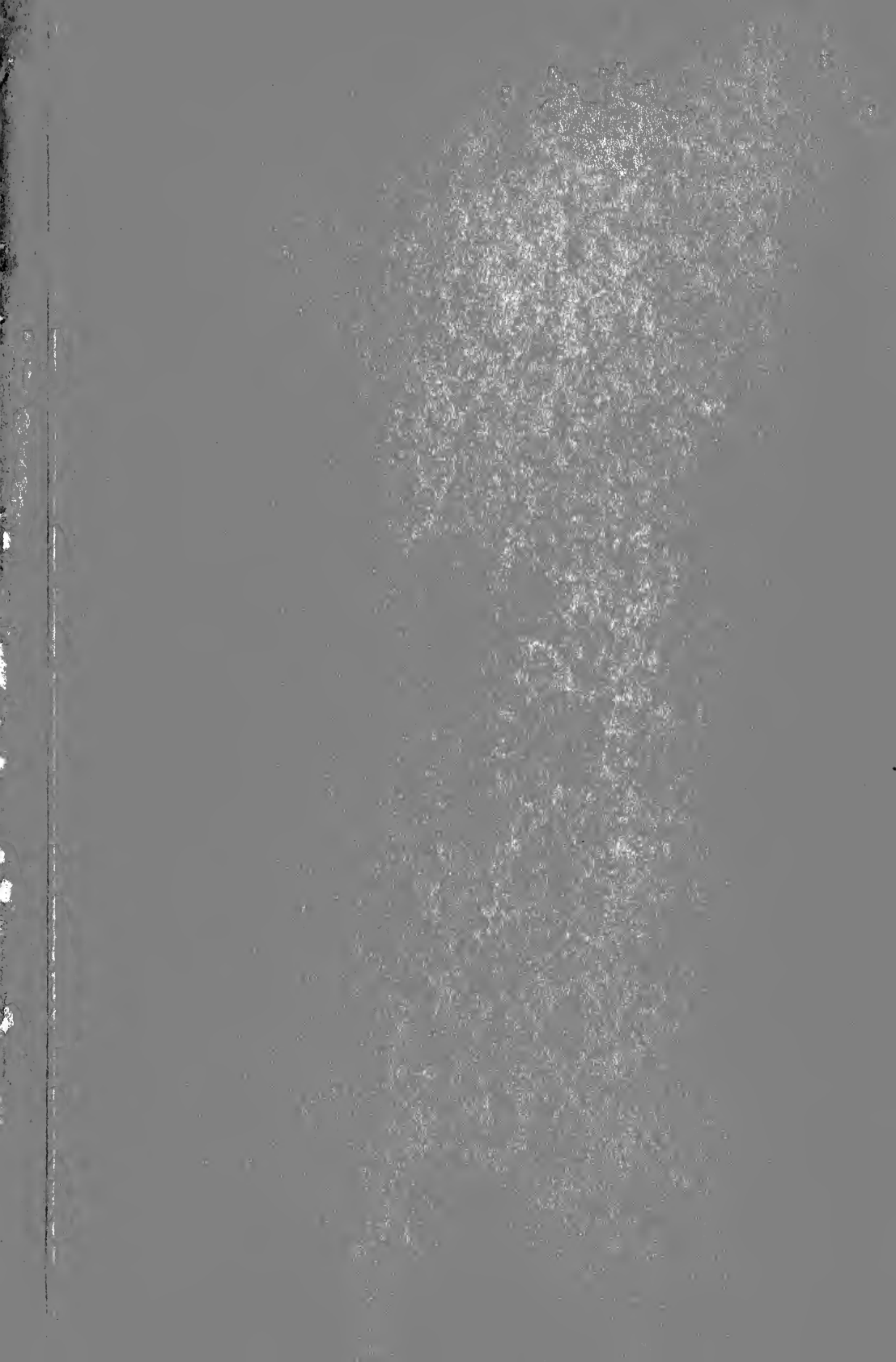
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